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July -September 2007
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Dear Fellows and Members,

In this special issue, the entire subject is of laparoscopic surgery and is dealt in depth.

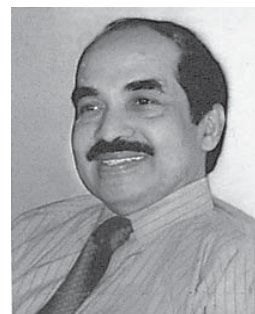
Minimally invasive surgery was in practice with the gynecological surgeons. The first general surgical procedure, laparoscopic cholecystectomy was performed by Dr.E.Muhe of Bolingen, Germany in 1985 and Philippe Mouret of Lyon, France in 1987, subsequently several modifications and improvements in technique were incorporated. Now the time has come that it is being widely used in the practice of General surgery, Endocrinology, Neurology, Cardiothoracic Surgery, Urology, ENT, Orthopedics etc.

The new development is 'robotic' in minimally invasive surgical procedures. This has really revolutionized the entire surgical scenario which is well received by the medical and the patient population. The advantage to the patients is minimal scar, fast recovery and least hospital stay, the aspect of economics has to be improved to suit various categories of the patient population. There should be more training centers and it should form a part of the curriculum in medical teaching.

Preparation for our annual convention IMSACON 2007 is taking shape at Manipal. I am very positive that it is going to be one of the memorable meetings of our academy. Hope to meet you all at Manipal.

With best wishes

PRESIDENT WRITES



K. Jagadeesan

Dr. K. Jagadeesan,
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All fellows and members of IMSA can have access to the site and get information about its objectives, benefits to the fellows/members, chapters and their activities including seminars, refresher courses, rural CME;s etc. and also IMSACON - a regular annual event of international standard; application form for enrollment as fellow/member can also be downloaded. Fellows - members and even not fellows - members can have access to full text in the quarterly journal - jimsa from July - Sept. 2003 onwards by putting their E-mail address under 'user name' and using the password 'UserJimsa'.

IMSA Chapter Activities**CME Delhi Chapter**

- 21.07.2007 : Clinical Meeting of IMSA Delhi Chapter in collaboration with Moolchand Medcity Auditorium, Lajpat Nagar III, New Delhi on "Urology Update – New Frontiers"
Speakers : Dr. S.K.Pal, "Renal Stones – An Overview" Dr. S.V.Kotwal, "Gender Re – Assignment" Dr. K.Juneja, "Holmium Laser in Urology"
- 25.8.2007 : Clinical Meeting of IMSA Delhi Chapter in collaboration with Moolchand Medcity Auditorium, Lajpat Nagar III, New Delhi on "Psychiatry Update"
Speaker : Dr. J.Nagpal, Dr. Sharad Chandra, "Mental Illness, Mental Health and Well Being"
- 25.8.2007 : Clinical Meeting of IMSA Delhi Chapter in collaboration with DRA at Indian Spinal Injuries Centre, Vasant Kunj, New Delhi
- 08.09.2007 : Clinical Meeting of IMSA Delhi Chapter in collaboration with Rheumatology Association at AIIMS, New Delhi.
- 15-09-2007 : Clinical Meeting of IMSA Delhi Chapter in collaboration with Guru Harkishan Hospital, Bangal Sahi Gurudawara, New Delhi on "Common Skin Disease" **Speaker**
 : Dr. Mrs. Vibhu Mendiratta
- 22-09-2007 : Clinical Meeting of IMSA Delhi Chapter in collaboration with Moolchand Medcity at Moolchand Auditorium, Lajpat Nagar III, N.Delhi-24 on "CVD – Metabolic – Syndrome Update" **Speaker** : Dr. H.K.Chopra, "CVD & Metabolic Syndrome : A Double Jeopardy, Time to Fight is Now"

28-09-2007 : Dr. Geeta Shroff, "Stem Cells and its Modern Day Applications" at Lady Hardinge Medical College at Delhi

CME Tamil Nadu Chapter

- 8.7.2007 : Dr. Rajeshwari Ramachandran, "HIV-Tuberculosis Co-Infection-Double Trouble!"
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- 12.8.2007 : Dr. Joy Thomas, "Non Pharmacological Option in Heart Failure Management"
- 9.9.2007 : Dr. K.Janardhanan, "Perspectives of Physical Medicine & Rehabilitation"

RCME Tamil Nadu Chapter

- 29-06-2007 : Dr. H.K.Chopra, "Health Heat a matter of your own choice-life style"
- 19-08-2007 : Prof. M. Rajkumar, "Common Vascular Problem"
 Tindivanam in Villupuram District, Chennai
- : Prof. Namitha Bhuwaneshwari, "Ophthalmological Conditions in General Practice" at Tindivanam in Villupuram District, Chennai

Announcement**IMSACON 2007 Manipal, Karnataka, India**

Annual Conference of International Medical Sciences Academy **IMSACON 2007** will be held on November, 2nd – 4th 2007 at Manipal Karnataka India, **Dr. Padmaraj Hegde is the Organising Secretary. Theme : "Frontiers of Medicine – Medicine in the 21st Century"** **Venue** :Hotel Valley View International, Manipal, Karnatak India **Host** : Manipal University, **Visa**: Visa is required for India and must be obtained before Travel. Please allow at least 3 months before conference date for application to be processed. **First information brochure** can be seen on the IMSA website "www.imsaonline.com". The brochure contains all details about registration fee, registration form, details of Hotel stay etc. Non fellows accompanying the Fellows of IMSA are welcome to participate. You are requested to register yourself early and participate with your spouse and other accompanying person and enjoy hospitality of the hosts.

	Before 1 st Aug 07	1 st Aug 07 onwards		Before 1 st Aug 07	1 st Aug 07 onwards
Registration Fee			Registration Fee		
<i>Delegates (India, SARRC, S.E Asia)</i>	Rs. 3000	Rs. 4000	<i>Foreign Delegates</i>	USD 350	USD 350
<i>Accompanying Person</i>	Rs. 2500	Rs. 3000	<i>Accompanying Person</i>	USD 150	USD 200
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In case participants intend to present paper in the Scientific Programme of the conference, they should send "Abstract" of the paper to the Chairman Scientific Programme **Prof. Joseph Thomas, Head of the Dept. Urology, KMC Hospital, Manipal – 576104, drjosephthomas@yahoo.com, ph : 0911-820-292242**

For details contact : **Conference Secretariat : IMSACON 2007, Dr. Padmaraj Hegde, Organising Secretary IMSACON 2007, KMC Hospital, Manipal, - 576104, Karnataka, India, Ph : 091-820-292224 padmaraj.hegde@manipal.edu** under information to **World Headquarter (IMSA) : International Medical Sciences Academy, Dr. H.K. Chopra, Secretary General, IMSA WHQ , 2nd Floor, National Medical Library Building, Ring Road, Ansari Nagar, New Delhi Ph : 26589660, 26588226, Mobile : 9811090204 imsa@ndf.vsnl.net.in, imsa@imsaonline.com**

R.R.Thukral, Vice President, IMSA WHQ



Dr. P. Narasimha Rao
 Ex. President, IMSA World H.Q.

Appeal by Vice-President IMSA

Dr. R.R. Thukral
 Vice President IMSA World H.Q.

Dear Fellows and Members

You are aware late Dr. P. Narasimha Rao, an international figure both in the academic and teaching had been the President of this prestigious organization for more than a decade from 1990 to 2002. He was President of Medical Council of India and Vice Chancellor of various universities. He had at his credit the outstanding contributions to the medical fraternity till death. He had been in close association with IMSA since its very inception in 1981. The Academy has flourished tremendously during his tenure as President. Keeping in view of his status, services rendered to the mankind and on the insistence of senior Fellows the Academy has established as **International Award** in his honour named '**Dr. Pinnamaneni Narasimha Rao International Award**', on the lines of Dr. B.C. Roy National Award; substantial funds are needed for this prestigious award. Initially, the family of Dr. P. Narasimha Rao have contributed a fair amount of money and have assured to contribute further. I appeal to all our Fellows and Members to contribute generously for this noble cause in the memory of This dedicated acadamecian, Dr.P. Narasimha Rao. A separate open fund is open for this award.

Dr. R.R. Thukral
 Vice-President, IMSA World H.Q.



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FROM EDITOR'S DESK

With the scientific & technological advance taking place at an incredible pace, it has become necessary to periodically refresh and update the existing knowledge. The present issue of JIMSA is devoted to a highly academic and research - oriented subject – 'New Developments in Laparoscopic Surgery'. This procedure is now an established minimal excess surgical technique being popularly practised by the general surgeons, neurologists, obstetricians and gynecologists. Many abdominal surgical interventions which were earlier being performed through abdominal incisions are now being carried out under laparoscopic visualization; benefit to the patients being minimal hospitalization stay and minor morbidity. During the last two decades many surgeons have acquired training, skill and expertise in this technique which has now become a routine procedure for a large number of surgical conditions.

Friends, we are fortunate to have versatile and knowledgeable general surgeon – **Dr. Brij Bhushan Agarwal** as the **Guest Editor** of this special issue. I am extremely grateful to him for his personal interest and pains taking efforts in bringing out this excellent monogram. The topics have been appropriately selected covering major disciplines of medicine; various chapters have been contributed by experts in their respective fields from all over the country and abroad.

Dr. Agarwal's laparoscopic bloodless breast surgery without using potentially harmful 'energy source' leaving scar performed in over two dozen breast-lump cases, has been internationally recognized. Dr. Agarwal has very rightly emphasized that laparoscopic technique should be used judiciously and must be avoided in situations where the surgeon does not feel confident due to inadequate expertise. The write ups of various subjects provide useful and practical information; I am confident the issue will not only benefit the practising surgeons but will also enrich the knowledge of postgraduates, researchers in the field and teachers of various medical institutions. I really feel indebted to Dr. Brij Bhushan Agarwal and the team of experts who have contributed to this issue; no doubt, a commendable task has been achieved.

I take this opportunity to thank all the members of Editorial and Advisory Boards for their help and suggestions and also the various pharmaceutical firms without whose financial help this publication would not have been possible.

P. D. Gulati

JIMSA BEST PUBLISHED ARTICLE AWARDS

Journal of International Medical Sciences Academy has instituted award for **three (3)** best original articles published during the previous 3 years; **guidelines** are as below:

- (1) **Original articles** belonging to any discipline of medicine published in JIMSA during the previous three years.
- (2) Age Limit for the principal author/main researcher should be 45 years and below.
- (3) Number of awards: Three (3) annually, carrying a gold plated medal, citation and cash prize (1st Rs. 3000/-, 2nd Rs. 2000/-, 3rd Rs. 1000/-)
- (4) Awardee should preferably be a fellow/member of IMSA; non-fellows/ non members can also be considered for the award if the original work is outstanding; and if selected for the award will be required to apply for fellowship/membership of IMSA.
- (5) Awardees should preferably plan to receive the award at the annual IMSA conference - IMSACON.

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OUR GUEST EDITOR



Dr. Brij B Agarwal

Dr. Brij B Agarwal, a graduate of Maulana Azad Medical College has been trained at most prestigious institutions including AIIMS and at UK, is presently working as a Consultant and Laparoscopic Surgeon, Department of General Surgery, Sir Ganga Ram Hospital, New Delhi, India

He has been richly decorated with awards like best resident in surgery, gold medal in Yoga and social recognition such as Samaj Rattan, Agarwal Rattan and Rashtriya Rattan. He is an active academician, received an award for being exemplary teacher in a medical college and has published more than 25 international publications in last one year.

He is credited with many innovations in the field of laparoscopic surgery which have been recognized by international bodies. He was the only Indian to be given a podium presentation in both American and European Scientific body meetings. This year, he has been invited to be an organizing committee member and faculty for the Asia-American Summit of Laparoscopic Surgeons of USA. He is an active social worker and left for Gujarat earthquake on his own to work there for three weeks.

Apart from his scientific pursuits, he is a proponent of yoga, has been a national level table-tennis player and a keen lover of billiard and horseback riding.

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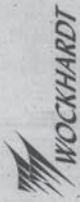
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Laparoscopic Surgeon and Basics of Technology- Is There a Need to Revisit the Classrooms?

Laparoscopic surgery has seduced the patients and surgical fraternity alike. The march of laparoscopic surgery has been attributed to its appeal on account of limited invasion, better cosmesis and minimum disturbance to the activities of the patients. Technology the ever young seductress has put additional responsibility on all of us. It had to be absorbed and assimilated in existing armamentarium of medical scientist but with utmost respect to ethics of surgical practice. It forced a process of unlearning - relearning and retraining amongst us. The hurry to catch up and stay abreast led to expertise built upon anecdotal experience. But the advances in laparoscopic surgery continued even in absence of scientific randomized control led trials. This is a testimony of not only the popularity but the efficacy of technology as well. The laparoscopic surgeon has to strive to reproduce the gold standards defined in the era of conventional surgery. Despite this endeavor laparoscopic surgeons have had to compromise on some basic tenets of surgery. The pressure of ever evolving technology is to partially blame for it. One such example is the propensity of the Laparoscopic Surgeon to use Energy Sources routinely. Despite knowing well the potentially fatal side effects of such use, no attempt has been made to explore the avascular plains in Surgery. Lack of adherence to some basic principles of science is due to their unawareness. Technology has preceded the advance of Laparoscopic Surgery but the basis of technology has not been incorporated in medical curriculum. In this era of bio-technological convergence it is imperative to understand the basis of technology i.e. Physics. Technology should be used judiciously. Its use should be avoided even if there is an iota of concern about safety especially in situations where its use seems to be driven by our lack of understanding and skills. Human body is sacred. Our endeavor should be guided by the oath 'Primum Non Nocere'. Absence of even a potential harm has to be the prerequisite to any surgical procedure. Technology cannot be an excuse for its blind application. It has to be applied only if needed and absolutely validated by basic scientific wisdom. The challenge of training the untrained / self professed experts, adherence to ethics in face of biotechnological convergence and replication of the gold standards of conventional surgery are daunting tasks. I am sure we all agree to face the challenges constructively. Whatever we intend to do is of no use unless we communicate it well. Rising awareness levels and access to information have led to a well-informed patient seeking quality medical care. This has made ethics and soft skills or people skills a mandatory requirement in medical practice. This issue is a step towards addressing some of these concerns. Many stalwarts and pioneers of laparoscopic surgery have contributed to this issue. I am grateful for the same. I will be failing in my duty if I do not acknowledge the support of my colleagues. This issue would not have been possible without the support from Ms. Pooja and two school children namely Krishna Adit Agarwal & Nayan Agarwal. I have been privileged being taught by greats like Prof. Dr. P.D.Gulati, Prof. Dr.K.C.Mahajan & Prof. Dr.(Late) N. Singh. Their continued blessings only have made this publication possible.

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ETHICS FOR SURGEONS: THE ROLE OF TRAINEES, SURGICAL INNOVATIONS AND THE INFORMED CONSENT

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Abstract: Nobility of medical profession is inherently linked to ethics in their absolute dimensions. Despite the tacit understanding, our profession has time and again been subjected to questioning by the society on account of our ethical standards. Surgical disciplines, a blend of science and human skills have been specially under scrutiny. You cannot learn to play piano by going to concerts. Society expects perfection. Perfection can only come from practice. Practice is linked to training and training involves acceptance of the possibility of an error. Magnitude of the error left aside, even its potentiality is unacceptable to any patient. Surgical disciplines have evolved in experiential manner. The circle of training, practice, perfection and innovation is mired in whirlpool of ethical dilemmas. Consensus continues to elude us. We examine some of these issues in brief with an insight from the literature.

INTRODUCTION

Training in our medical programs both at the medical school and higher levels lacks in appreciation for medical ethics. As a result most doctors in the country are ill-informed and only acquire information on a need-to-know basis. This article aims to address the issues regarding medical ethics in general and for surgeons in particular. Furthermore, it focuses on the process of a valid informed consent and its importance both ethically and medico-legally.

ETHICS IN GENERAL

Ethics codes date back to the origins of medicine in virtually all civilizations. Ethical codes bound new physicians to the profession through agreement with the principles of conduct toward patients, colleagues, and society. Although less famous than the Hippocratic oath, the medical fraternities of ancient India, seventh-century China, and early Hebrew society each had medical oaths or codes that physicians swore to. The ethical backbone from the Hippocratic oath—beneficence, nonmaleficence, confidentiality, and prohibition of abortion, euthanasia, and sexual relations with patients—remained essentially unchanged for Western medicine until the mid 20th century. The World Medical Association (WMA) has made an attempt since World War II to be a general regulatory body for physicians. However, lot countries do not accept the sanctity of this body and follow their own ethical codes. This makes a lot of sense as there are significant cultural, educational and economic differences between different countries. It is imperative for all countries, including India to lay down ethical norms in general than conform to current medical practice and are not carry-over from a defunct generation of medicine. The general guidelines laid down by the WMA are listed below (Table 1).

Ethics in medicine deal with wide ranging topics such as patient-doctor trust, patient confidentiality, role of informed consent, status of minors, reporting of patient abuse, reporting of misdemeanor by colleagues etc. Discussion of all these conditions is beyond the scope of one article. We will take a look at ethics as applicable to surgeons and the role of informed consent in today's world of

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medicine.

ETHICS FOR SURGEONS

The major ethical guidelines regarding medical ethics have not come from surgical organizations. The Hippocratic Oath apparently prohibited surgery. Whether this prohibition actually outlawed surgery or simply relegated the discipline to specialists is not clear. Surgeons were once again excluded from bodies such as the American Medical association (AMA) in 1847, which have shaped the formation of ethical codes in modern day medicine. The AMA Code of Medical Ethics criticized all physicians claiming special abilities (? Surgeons) and labeled them as quacks. The American College of Surgeons (ACS), Chicago, Ill, was formed in 1913, and the Fellowship Pledge of the ACS is one of the earliest surgical ethics guidelines¹.

Surgical organizations and surgeons have traditionally had less interest in ethics discussion than their medical colleagues. Most surgeons are viewed by colleagues and society as cavalier and “cowboy” like in attitude. A daring surgeon is rated better than one who shows ethical concerns about the treatment he is about to deliver. However, given a choice most patients would like to place themselves in the hands of the latter. Surgeons are increasingly encountering bioethical issues brought about by the changing landscape of surgical intervention and the development of newer and alternative forms of treatment.

Surgeons also share a unique relationship with their patient. The invasive and potentially life-threatening nature of surgically therapy demands a high level of faith from the patient. As compared to a medical patient who to some degree always has control over his treatment, a surgical patient places his life entirely in the hands of his surgeon.

Therefore, there exists an increased need to know more about ethics pertaining to surgeons in particular and this has led to renewed interest by them in the discussion of bioethics issues. In this article we will take a look at some of the issues that surgeons encounter in their day to day practice.

ROLE OF FIRST TIMERS AND TRAINEES

Surgical residents acquire the necessary skills needed for patient care by observing and subsequently performing operations

that are the mark of the expert. Only then can they progress to being independent care givers. There always must be a "first time". However, this can be made safe and without jeopardy to the patient if the supervising surgeon is present and available if needed.

What should the surgeon and the teacher say to the patient? What is the moral position of the primary surgeon?

Both surgeon and trainee should tell the patient that the operation is being done by them as a team. However, the primary surgeon in whose hands the patient has placed his care remains legally and ethically responsible for the patient's outcome. It is neither unethical nor illegal for a trainee to be performing a procedure under the close supervision and assistance of the expert. It is the responsibility of the senior to ensure that the quality of care delivered and procedure done is of a high standard.

An operation is an exercise in trust. The surgeon must assure himself that all members of the team are up to the demanding performance expected of them at that specific time and under those specific circumstances. This means that he is putting his trust in the hospital where he works and all the people bearing even peripheral responsibility for the success of the undertaking, whether or not they work under his direct supervision. These people include those who are not actually on the team, whose duties are performed far away from the operating room. Some of them he rarely or never meets — such as those who sterilize or maintain the equipment, prepare the instruments, or hire or assign some of his assistants. When patients put their trust into a surgeon, they are entrusting their health to a whole array of systems. Because of this complex nature of the relationship of a patient with his surgeon it is unlikely that concrete laws relating to the role of trainees will appear. However, if they do, then likely they will permit trainees to perform the surgery under the presence of the primary surgeon.

NEWER SURGICAL TECHNIQUES

The development of newer surgical techniques has traditionally not conformed to the rigid standards of other medical innovations. The distinction between clinical practice and surgical research may seem trivial, but this distinction can become a complex issue when innovative surgeries are substituted for standard care without patient knowledge. At present only 7% of surgical investigators use a randomized-study design of any type, according to a report in *The Lancet* (1999). Another study found that, during the previous four decades, only 10 to 20% of surgical techniques have undergone any clinical trials. Instead, surgeons prefer to rely on case series, a type of study that tracks individual patients and records their outcomes, but does not compare the procedure with an alternative. Since most case series tend to favor any given intervention, multiple similar reports reinforce a possibly mistaken view that the surgery provides benefits. Once such a view is established, conducting definitive trials becomes increasingly difficult. Pressure to use the new technique builds, as does the impression that withholding the surgery now amounts to 'unethical' treatment, despite the lack of clear evidence of a procedures benefit. A similar event occurred during the popularity of development of surgery for cystic fibrosis. Only after many years it was found that medicines offer a better outcome. It is probably true that most proposed surgical innovations would not pass the IRB (internal review board) of the

hospital and would be dropped at the drawing board stage. Currently, it seems, there is greater oversight protection in place for laboratory animals than there is for testing innovative surgeries in humans.

On the other hand, some great surgical procedures have evolved out of a similar exploratory mode. The development of Coronary Artery Bypass Graft (CABG) was problem driven, rather than developed from a rigid protocol. It developed from an understanding of the disease process and its mechanisms. Improvement came simultaneously from many areas, including anesthesia, heart-lung bypass machines and surgical techniques. It was developed in response to patients' needs and new surgical opportunities, which depended on a high level of skill and quality of judgment on the part of the whole medical team.

It is unlikely and probably unreasonable that surgery shall ever fit the traditional "regulatory ethics paradigm". Surgical innovation is acceptable because it focuses on patients and is clinically driven. For quality control and legal standing it is imperative that all surgeons appreciate the innovativeness and experimental nature of their procedure and apply regulatory mechanisms such as retrospective reviews to ensure their safety and efficacy. To continue to perform procedures different from the acceptable standard of care without such regulation is unacceptable in today's world — ethically and legally.

THE INFORMED CONSENT

Informed consent is more than a legal requirement. It is a standard of ethical surgical practice that enhances the surgeon/patient relationship and that may improve the patient's care and the treatment outcome. True surgical informed consent has the following components :

- (1.) The name of the procedure
- (2.) The explanation of the procedure in laymans terms and in a language that is easily understood by the patient. An informed consent in English for someone who understands only Hindi has no standing. It may be written in English but should be translated into Hindi. The name of the translator should be noted (it is permissible for the surgeon to do it himself/herself). The translation should be verified by the sign of a witness who will testify to its accuracy. This can be a patients relative or a nurse in the preoperative room.
- (3.) The risks of the procedure and their effects on lifestyle. It is not adequate to consent for "Cranial Nerve VII injury OR facial nerve injury" for a parotidectomy. The resultant "asymmetry and weakness of the face" should be the correct wording on the consent form.
- (4.) The reasonable alternatives available should have been discussed and documented.
- (5.) The patient should be "competent" at the time of signing the consent

We will now take a look at some of these aspects in more detail.

How much information to patient

How do you know when you have said enough about a certain decision? Most of the literature and law in this area suggest one of three approaches:

- **Reasonable physician standard: what would a typical physician say about this intervention?** This standard allows the physician to determine what information is appropriate to disclose. However, it is probably not enough, since most research in this area shows that the typical physician tells the patient very little. This standard is also generally considered inconsistent with the goals of informed consent as the focus is on the physician rather than on what the patient needs to know.
- **Reasonable patient standard: what would the average patient need to know in order to be an informed participant in the decision?** This standard focuses on considering what a patient would need to know in order to understand the decision at hand.
- **Subjective standard: what would this patient need to know and understand in order to make an informed decision?** This standard is the most challenging to incorporate into practice, since it requires tailoring information to each patient. It also expects the patient to have great powers of understanding and an excellent state of mind to decide correctly for himself. Research suggests that patient who is sick sometimes may not judge things accurately.

In India it would seem that most often the “reasonable physician standard” is applied. However, the “reasonable patient standard” should be the required standard. Given the educational level of most of our patients, their general lack of medical awareness and their faith in their physician it is probably unreasonable to apply the “subjective standard”. If a patient desires more information, then it should be provided. In the United States different states have their own legislation which demands which standard to apply. It is generally either the “reasonable patient standard” or the “subjective standard”.

Should the consent be written?

No. It is not necessary for the consent to be written. In a life threatening situation or a situation where written consent cannot be obtained a verbal consent is adequate. In the interests of the physician a written consent is preferable. Likewise, consent can be retracted verbally by the patient (for example, a change of mind while being wheeled into the operating room should be treated as a retraction and the procedure abandoned).

Which procedures require consent?

All invasive procedures and sometimes non-invasive procedures (like HIV testing) require consent. Blood sampling and Xrays etc are normally exempt and a presumed to have been consented for by all patients.

Who is a competent patient?

Competence of a patient is sometimes a critical factor in deciding their ability to make a decision. Minors by definition are incompetent and must be decided for by the parents / caregivers. A competent patient is one who (a) understands his or her situation; (b) understand the risks associated with the decision at hand; and (c) can communicate a decision based on that understanding.

To illustrate this better lets take the example of a mentally challenged patient. Simply being “mentally challenged” does not make the patient incompetent. If he or she is able to demonstrate enough understanding of the issue being discussed then he or she is deemed competent. Likewise, he or she may be considered competent for deciding one aspect of his/her care but not for

another.

Likewise a competent patient may become temporarily incompetent once premedicated preoperatively. Therefore, it is imperative that all strong premedication be withheld till the consent process is completed. It is not justifiable though to withhold pain relievers from a suffering patient under the pretext of obtaining consent, for that might amount to some form of coercion.

Another question is whether the preoperative room is the best place for consent taking. The argument against it being the patient there is under considerable stress and therefore not competent. However, numerous studies on this issue have demonstrated that these patients take the same decision in the preoperative room as otherwise. It therefore seems justified to continue taking consents in the preoperative room.

Can patients be influenced by the consent process?

Influence can be applied to the information given to patients, and generally falls into three categories: (a) coercion, (b) manipulation, (c) persuasion

Coercion is the application of a credible threat to the patient, and is always unethical. *Manipulation* involves incomplete or nontruthful presentation of information, such as lying, omitting vital information, or deliberately deceiving. Manipulation is always ethically suspect. *Persuasion* involves the presentation of a rational argument for a choice, and is permissible, even desirable at times during the consent process. Patients recognize that physicians have expertise and advice to offer about their care, and expect physicians to be forthright with recommendations. Once again, it seems in the Indian scenario that persuasion may be the best policy. Most of our patients as mentioned earlier lack the in depth understanding wherein they can be presented all the data and statistics and ask to make up their mind themselves as to how they wish to be treated.

What risks need to be explained?

General rules to follow in consent for surgery and anesthesia are to inform the patient of common risks even if they are not serious and very serious risks, such as death, even if they are not common. It is unreasonable to expect that a doctor would explain all the risks associated with a procedure, including anecdotal ones as the list may run into several pages.

Is anesthesia covered?

While the surgical consent form does contain a phrase regarding consent for anesthesia care, the informed consent process requires that a separate discussion of anesthesia risks be carried out by the anesthesia provider.

What to do for an incompetent patient?

If the patient is determined to be incapacitated / incompetent to make health care decisions, a “surrogate decision maker” must speak for him/her. If such a person is not available then the “best interest policy” should be adopted. Herein, the physician takes a decision that he/she believes an “average patient would have taken given all the available information”. Distinction has to be made between what the physician thinks is reasonable versus what the physician thinks an average patient would consider reasonable.

Is a properly taken informed consent a fool-proof guarantee against medico-legal liability?

No. There is no ‘legally foolproof’ consent form. A signed consent form of any nature neither guarantees a doctor protection against legal action nor ensures patient satisfaction. It merely demonstrates

that some process to exchange information was followed.

WORLD MEDICAL ASSOCIATION INTERNATIONAL CODE OF MEDICAL ETHICS

DUTIES OF PHYSICIANS IN GENERAL

A PHYSICIAN SHALL always exercise his/her independent professional judgment and maintain the highest standards of professional conduct.

A PHYSICIAN SHALL respect a competent patient's right to accept or refuse treatment.

A PHYSICIAN SHALL not allow his/her judgment to be influenced by personal profit or unfair discrimination.

A PHYSICIAN SHALL be dedicated to providing competent medical service in full professional and moral independence, with compassion and respect for human dignity.

A PHYSICIAN SHALL deal honestly with patients and colleagues, and report to the appropriate authorities those physicians who practice unethically or incompetently or who engage in fraud or deception.

A PHYSICIAN SHALL not receive any financial benefits or other incentives solely for referring patients or prescribing specific products.

A PHYSICIAN SHALL respect the rights and preferences of patients, colleagues, and other health professionals.

A PHYSICIAN SHALL recognize his/her important role in educating the public but should use due caution in divulging discoveries or new techniques or treatment through non-professional channels.

A PHYSICIAN SHALL certify only that which he/she has personally verified.

A PHYSICIAN SHALL strive to use health care resources in the best way to benefit patients and their community.

A PHYSICIAN SHALL seek appropriate care and attention if he/she suffers from mental or physical illness.

A PHYSICIAN SHALL respect the local and national codes of ethics.

DUTIES OF PHYSICIANS TO PATIENTS

A PHYSICIAN SHALL always bear in mind the obligation to respect human life.

A PHYSICIAN SHALL act in the patient's best interest when providing medical care.

A PHYSICIAN SHALL owe his/her patients complete

loyalty and all the scientific resources available to him/her. Whenever an examination or treatment is beyond the physician's capacity, he/she should consult with or refer to another physician who has the necessary ability.

A PHYSICIAN SHALL respect a patient's right to confidentiality. It is ethical to disclose confidential information when the patient consents to it or when there is a real and imminent threat of harm to the patient or to others and this threat can be only removed by a breach of confidentiality.

A PHYSICIAN SHALL give emergency care as a humanitarian duty unless he/she is assured that others are willing and able to give such care.

A PHYSICIAN SHALL in situations when he/she is acting for a third party, ensure that the patient has full knowledge of that situation.

A PHYSICIAN SHALL not enter into a sexual relationship with his/her current patient or into any other abusive or exploitative relationship.

DUTIES OF PHYSICIANS TO COLLEAGUES

A PHYSICIAN SHALL behave towards colleagues as he/she would have them behave towards him/her.

A PHYSICIAN SHALL NOT undermine the patient-physician relationship of colleagues in order to attract patients.

A PHYSICIAN SHALL When medically necessary, communicate with colleagues who are involved in the care of the same patient. This communication should respect patient confidentiality and be confined to necessary information.

Adopted by the 3rd General Assembly of the World Medical Association, London, England, October 1949 and amended by the 22nd World Medical Assembly Sydney, Australia, August 1968 and the 35th World Medical Assembly Venice, Italy, October 1983 and the WMA General Assembly, Pilanesberg, South Africa, October 2006

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MANUSCRIPT SUBMISSION : FOR JIMSA

Check-list

- (i) Copyright statement/declaration (not submitted or published elsewhere) signed by all the authors.
- (ii) Three hard copies of manuscript with illustrations attached to each; **must send an electronic copy of text with photographs loaded on CD.**
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- (iv) The text of the article should contain **Abstract** highlighting objectives, methods, results, conclusions.
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- (vi) Update/Review/ Therapy update should have appropriate headings. with reference numbers in the text; Indian Literature cited, wherever available.
- (vii) References: maximum number of references for update-30, original-20, Case reports-6:8.
- (viii) Each table on separate sheet; maximum number-4 in original article; 6 in update.
- (ix) Photographs/ figures in envelope, each marked figure number on reverse with legends on separate sheet, numbers not to exceed 4 in original, 2 in case report.
- (x) Statement signed by all authors regarding adherence to Standard ethical guidelines prescribed by ICMR 2000. (*see page 176*)

COMMUNICATION SKILLS – AN AREA OF CONCERN IN MEDICAL EDUCATION

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Abstract: A surgeon, usually a stranger to begin with, spends few outpatient sessions with her patient. During these sessions of about 15-45 minutes each, a bond of trust is formed between the patient and her surgeon. Based upon this trust, the patient allows the surgeon to physically enter and change her body and to alter the very mannerism in which the patient interacts with the environment and self. Through this trust, the patient risks potential long term harm, disability or even loss of life. It is the formation of this bond of trust and the implied duties that need to be addressed. Changing social structure, empowerment of patients and dwindling humanness has aroused the need for building blocks for the trust in question. A shift from being a stranger to being the keeper and sole guardian of body, soul and faith reposed is possible only with relationship building skills. Communication is the first brick to be laid. We intend to put across this aspect and its utility in surgical practice.

“You don’t need to have pain in your right iliac fossa to diagnose a patient’s appendicitis”

INTRODUCTION

To be regarded as good doctor effective communication with the patient is being recognized as an important trait. Communication is a major component of medical management and sometimes it is all that doctors have to offer. Poor communication skills have been shown to be an indicator of future litigation and burnout¹. In a career span of 40 years doctors conduct almost 200000 interviews with their clients. This is greater than number of any medical procedures performed, so it is better that doctors recognize that talking matters.

Doctor-patient relationship is the sacred foundation of a healthcare system. Communication is to relationship what breathing is to life. Hence, communication skills are necessary for medical students and have been made a core subject in many medical schools.

The word communication originated from Latin ‘Communicare’ which means “to share”. The word doctor similarly means “I care”. Isn’t it said “Half the sorrows are solved if you share them with somebody”

BENEFITS OF PROPER COMMUNICATION

- Patient’s problems are accurately identified
- Patients get a better understanding of their problem
- Their anxiety / distress level is minimized
- They become a partner in decision
- Doctors make less errors
- Doctors face less chance of litigation
- Doctor’s overall well being gets a boost

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Communication looks easy when done well. But doctors face difficult situations on daily basis. They need to comprehend and crystallize complex information and respond to diversity of social factors. Sometimes, they have to deliver the worst news. They have to do all this under pressures of time and schedule and under the hawk eye of society. So communication is not easy always and things do go wrong.

WHEN AND WHY THINGS GO WRONG ?

- Changes in health care delivery system and their continuous evolution put an additional burden on doctors
- Doctors are dealing with more complex diseases and newer diseases
- Doctors deal with variety of treatment options arising out of technoindustrial onslaught.
- Legislation keep on changing
- Doctors are bogged down by the need to generate revenue

Most of the doctors are aware to all these and adapt appropriately but at times their behavior is seen as unprofessional by the society.

WHAT IS PERCEIVED AS UNPROFESSIONAL BEHAVIOUR ?

- Arrogance / disrespectfulness
- Prejudices vis a vis gender, caste, race etc
- Abrasiveness or rudeness
- Abandonment / strategic absence in case of unexpected or unfavorable outcome.

But the good news is that patient’s still want to trust their doctor but the trust has to be earned by treating patients as grown ups, answering their question honestly, listening to their views and involving them in decisions². Various studies have identified ‘humanness’ as a factor in health care rated higher than competency / accuracy³. So there is a need of

marriage between the applied scientist and the medical humanist⁴. Improvement in soft skills goes a long way in achieving this.

Building The Doctor – Patient Communication

Establish the initial rapport

- Greet the patient (with name if known)
- Obtain patient's name
- Introduce yourself
- Clarify your role

Survey the reason for patient's visit

- Allow the patient to complete her opening statement
- Invite her to tell her stay chronologically
- Active listening
- Summarize and define her concerns

Medical History Taking

- Doctors are taught this in detail in their curriculum

Manage Flow

- Provide the structure to interview / history
- Summarize periodically

All this seems very easy. Surprising fact is that it takes only 18-23 seconds for a doctor to interrupt their patient once. She has started speaking, so listening becomes an important part in this relationship. Speaking is important but whenever in doubt it is better to listen.

FACTS ABOUT CONVERSATION⁵

- Our words account for only 7% of the impression we make in first 30 seconds of face-face interaction
- Our vocal quality accounts for 35%
- Body language 58%
- It is only after 30 seconds, that the content becomes important

How to Improve Conversation ?

- ***Volume adjustment*** – volume should be adjusted to match those you are speaking to. Also selectively raising and lowering the volume has a powerful and a dramatic impact.
- ***Body language*** – too many body movements distract your listener and take away their ability to concentrate on your words. So keep calm and still. Shuffling of papers, fidgeting with files / mobile phones / laptops or repetitive gestures take away your impact
- ***Gestures*** – Gestures used appropriately and in small doses enhance your ability to present information
- ***Demeanor*** – Your demeanor should be confident and display respect & humility. Your respect for the patient should be genuinely visible.

The empathic response is a technique consisting of 3 steps¹

1. Identifying the emotion
2. Identifying the source of emotion
3. Responding in a way that shows that you have made the connection between the first two steps

LISTENING

Listening is the most important and equally neglected art of

communication. God knew that listening was twice as hard as talking hence he gave us two ears but one mouth.

Doctors need to practice and acquire listening skills because the information cannot be thrown like a dart at a passive dashboard. Information is an intangible virtue that needs to be conveyed by speaker and received by an active listener⁶.

- ***Be a good listener*** - Doctors have to spend a lot of energy comprehending the information thrust upon them. So it is important that they develop a body language from that of a deflector to that of a receiver like a satellite dish. Our faces contain all the receptive equipments of our body so it is better that we tilt our faces towards our patient.
- ***Establish eye and face contact*** – Doctor should use their other bodily receptors besides the ears. They can be better listener while looking at the patient. Their eyes should be trained to pick up non-verbal clues being conveyed by the patient. It can be achieved by making a good eye contact. Your eyes help complete the communication circuit that must be established with your patient. Your gaze should be at a triangle the base of which is made by the eyebrows of the patient and the apex by the Cupid's bow of her philtrum
- ***React to the speaker*** – By sending out non verbal signals by way of facial gestures, nods or gentle body movements, you can make your patient more comfortable and easy to communicate.
- ***Stop talking*** – It is extremely difficult to receive information when your mouth is moving information out at the same time. Use the “I see..... un hunh....oh really” words and phrases that follow and encourage your patients train of thoughts. This forces you to react to the information presented rather than the person.
- ***Concentrate*** – Move your mind to concentrate on what the speaker is saying. You cannot fully hear their point of view or process information when you argue mentally or judge what they are saying before they have completed.

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The article by Hart MJ⁷ has been of immense help. Compilation of this article has been inspired by Dr. K. C. Mahajan's interaction with his patients and consultant students in surgery. This was made possible by meeting International stalwarts like Sir Alfred Cuschieri, Dr. G. Buess, Dr. D.H. Birkett & Dr. Steve Wexner. We feel grateful in being blessed by them.

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TRAINING IN LAPAROSCOPIC SURGERY

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Abstract: A structured training to teach and train laparoscopic skills lacks across continents. Halstead's approach "See one, do one, teach one" is not very effective for training laparoscopic surgery because a different set of skills are required. A preclinical teaching in the skills laboratory can help trainee to learn these basic skills. There are many methods of training available but the best method is not yet established. Training on animal organs integrated in to a special trainer provides a realistic view and the surgeon can practice repeatedly and obtain the training effect in a short time. All academic training institutes/hospitals should develop a surgical skills laboratory for training of residents in surgery.

Key words: Laparoscopic surgery, Residents training, Skills laboratory, Phantom trainer, Animal organs

INTRODUCTION

Although laparoscopic surgery is being practised worldwide for the last 17 years, yet the opportunities for a structured training to teach and train laparoscopic skills lack across continents. The available training opportunities are deficient in developing levels of skill for safe performance of laparoscopic surgery since the training modules do not match the operating room scenario. Training in laparoscopic skills needs focus¹.

Training surgeons is an arduous and difficult task. With the widespread use of minimally invasive surgery this aspect has become even more demanding. Tactile based maneuvers that were performed with fingers and hands in direct contact with tissues are now performed at a considerable distance from them. Generations of surgeons have been trained in conventional surgery according to Halstead's concept of, "See one, do one, teach one" approach. This approach is not very effective for training of the laparoscopic surgeon because the assistant cannot easily mimic the movements of the surgeon and a different set of skills are required for safe performance of laparoscopic surgery^{2,3,4}.

The specific skills required for performing minimally invasive surgery include depth perception, translation of three-dimensional image into a 2D environment, loss of tactile sensation, hand-eye coordination, limited degrees of freedom, working with long instruments and the fulcrum effect of the long instruments. Until and unless the trainee has learnt these basic skills, it is not safe for him to perform laparoscopic surgery^{5,6}.

ACQUISITION OF LAPAROSCOPIC SKILLS

Surgical competence has two major components. The first one is cognitive competence, which requires cognitions mainly based on surgical, anatomical, and medical knowledge. The second one is technical skill in surgery, which is the result of a person's ability to perform a specific surgical task. There are numerous theories that explain the

acquisition of technical skill. They emphasize the importance of modeling, repetitive practice, and formative feedback⁷.

Fitts and Posner's three-stage theory of motor skill acquisition is the most accepted⁸ (Table1). The three stages are cognitive stage, the integrative stage and the autonomous stage (Table2). In the cognitive stage, the learner intellectualizes the task; performance is erratic, and the procedure is carried out in distinct steps. For example, with a surgical skill such as tying a knot, in the cognitive stage the learner must understand the mechanics of the skill - how to hold the tie, how to place the throws, and how to move the hands. With practice, the learner reaches the integrative stage, in which knowledge is translated into appropriate motor behavior. The learner is still thinking about how to move the hands and hold the tie but is able to execute the task more fluidly, with fewer interruptions. In the autonomous stage, practice gradually results in smooth performance. The learner no longer needs to think about how to execute this particular task and can concentrate on other aspects of the procedure.

This model has obvious implications for surgical training. The earlier stages of teaching technical skills can take place outside the operating room; and with practice the skill can be mastered upto a point where the task is performed automatically. This allows the trainees to focus on more complex issues, both technical and nontechnical, in the operation theatre. To return to the example of knot tying, the learner who still new has to think about how to tie a square knot is much less likely to pick up on other teaching that occurs in the operating room than is the learner who has mastered this skill.

METHODS OF TRAINING FOR LAPAROSCOPIC SURGEY

Various methods of training for laparoscopic surgery which are available include; training on live animals, training on phantom models using animal organs, box trainers and computer simulation. The best method of training, however, has not yet been well established. Table 1 outlines the advantages and disadvantages of various training techniques.

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Table 1. Fitts–Posner Three-Stage Theory of Motor Skill Acquisition.*

Stage	Goal	Activity	Performance
Cognition	Understand the task	Explanation, demonstration	Erratic, distinct steps
Integration	Comprehend and perform mechanics	Deliberate practice, feedback	More fluid, fewer interruptions
Automation	Perform the task with speed, efficiency and precision	Continuous, fluid,adaptive	Automated performance requiring little cognitive input, focus on refining performance

*Adapted from Fitts and Posner ⁽⁹⁾

Table 2. Advantages and disadvantages of various training techniques ⁽⁸⁾

Simulation	Advantages	Disadvantages	Best Use
Bench models	Cheap, portable, reusable minimal risks	Acceptance by trainees; low fidelity basic tasks, not operations	Basic skills for novice learners, discrete skills
Live animals	High fidelity, availability, can practice hemostasis and, entire operations	Cost, special facilities and personnel required, ethical concerns, single use, anatomical differences	Advanced procedural knowledge, procedures in which blood flow is important, dissection skills
Cadavers	High fidelity, only “true” anatomy simulator currently, can practice entire operations	Cost, availability, single use, compliance of tissue, infection risk	Advanced procedural knowledge, dissection, continuing medical education Human performance
Simulators	Reusable, high fidelity, data capture, interactivity	Cost, maintenance, and downtime; limited “technical” applications	Team training, crisis management
Virtual reality surgical simulators	Reusable, data capture, minimal setup time	Cost, maintenance, and downtime; acceptance by trainees; three dimensions not well simulated	Basic laparoscopic skills, endoscopic and transcutaneous procedural skills

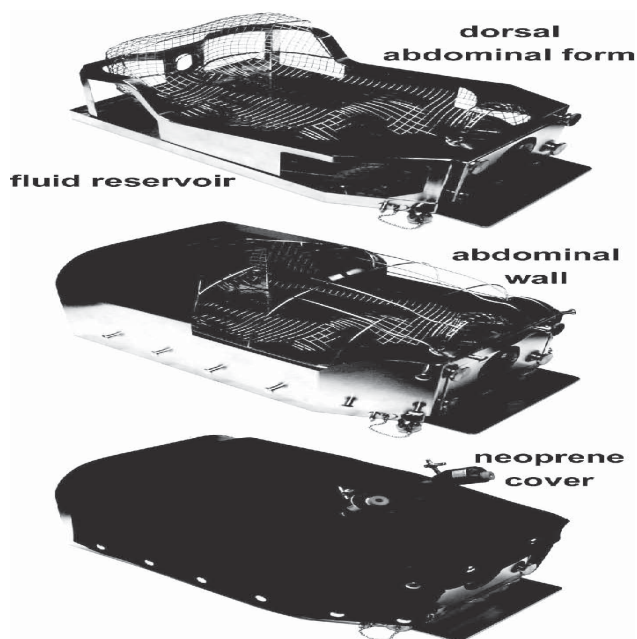


Figure 1. Tuebingen MIC Trainer

ANIMAL MODELS

Although training using live animals, such as pigs or dogs, has been performed for many years, it has become difficult in recent years due to restrictive legislation, public concern about the use of animals for training, and economic reasons^{10,11}. Professor Buess and his colleagues at the University of Tuebingen, Germany have developed a special trainer for providing training in both basic and advanced laparoscopic surgery. More than 3000 surgeons have been trained in this centre at Tuebingen and recently they have set up similar centers in Havana, Cuba and AIIMS, New Delhi, India¹². The Tuebingen MIC-Trainer was developed in cooperation with Richard Wolf GmbH (Knittlingen, Germany)¹³. This trainer consists of four parts: fluid reservoir, dorsal abdominal form, abdominal wall and neoprene cover (Figure 1). The form of this trainer was copied from a human body with gas insufflation; abdominal organs from the slaughterhouse can be integrated into this trainer (Figure 2). Surgeons can repeat operations such as laparoscopic cholecystectomy, appendectomy, fundoplication, colon resection and transanal endoscopic microsurgery (TEMS) in a realistic way and acquire a training effect in a short time¹⁴.

The phantom trainer using animal organs has the following advantages¹⁵:

1. The cost of the phantom is comparatively low
2. Tissues from the slaughterhouse are inexpensive
3. No anesthesia is necessary
4. Normal laparoscopic instruments are used
5. Quick preparation of the training model
6. More realistic anatomy

Since a training center using phantoms does not need to be an operating room, the cost of establishing a training center is relatively low compared to a training system using live animals. Actually, the training center in Tuebingen and the training

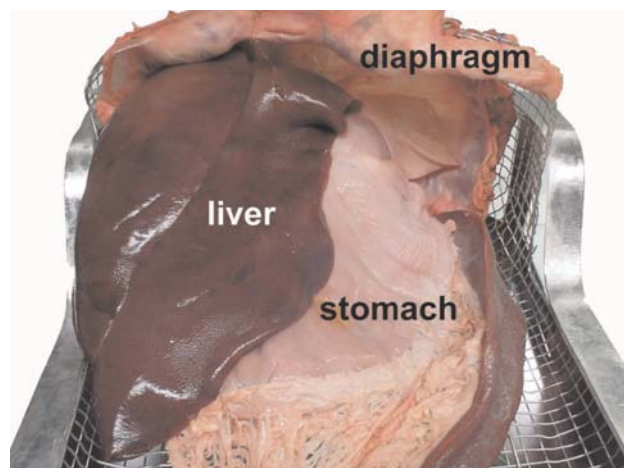


Figure 2. Animal organs integrated in the Tuebingen MIC Trainer

center in Havana, Cuba, and New Delhi, India are normal rooms. Since real internal organs are used, a participant can feel force feedback and dissection planes similar to those in human laparoscopic procedures. The most important advantage is that surgeons can practice repeatedly since it is possible to exchange the organs in the phantom¹⁵. They can obtain the training effect of surgical procedures in a short time.

The differences between this trainer and a real patient are as follows. There is no blood loss in this trainer. Although the perfusion system can be used for training for Trans anal endoscopic microsurgery (TEMS) and colorectal resection, the bleeding is not realistic. Using this system, large vessels show a quite natural bleeding situation, but there is no bleeding from the bowel wall or the mucosal layer itself. Pneumoperitoneum is not required. The form and the size of organs differ from that of patient. Although the anatomical position of organs can be adjusted, it is not completely equivalent to human anatomy. Since organs are not connected with other structures, the circumference organs next to an object do not exist¹⁶.

Cadavers

The advantages of a cadaveric model include, easy availability and less cost of establishing such training centre. Unembalmed cadavers give a real feel of the anatomy. Moreover the same body can be used for other field of surgical training such as sinus endoscopy, temporal bone surgery, micro neurosurgery and arthroscopy¹⁷. The disadvantage of this training module is less availability of cadavers, no bleeding. This model teaches residents specific training in the handling and manipulation of tissue as well as practice in surgical techniques for adnexal surgery, pelvic dissection, laparoscopic hysterectomy, and dissection within the space of Retzius that is not possible with mechanical trainers. In a study carried out at one centre, to estimate if cadaver training program significantly and relatively rapidly taught residents laparoscopic surgical skills. 96.9% of the enrolled students expressed a general satisfaction. The cadaver surgical training program appeared to significantly improve laparoscopic surgical techniques in PGY 2 and PGY 3 obstetric/gynecology residents in a relatively short time¹⁸.

BOX TRAINERS

The box trainers are simple inexpensive and easy method of

learning laparoscopic surgery. There are various types of box trainers available.

The Mirror trainer consists of a flat working field with two upright plastic fields. Two angled mirrors facing each other on the inside of the box create an indirect vision. The inside front mirror reflects the image of the operating field onto the inside back wall mirror, which is viewed by the trainee. The front side prevents the trainee from viewing the working field directly. Laparoscopic instruments are introduced into the box through two 10mm ports in the front upright side. The mirror trainer is inexpensive and can be used anywhere; not only in the environment of a "high tech" skills laboratory but also in an office or even at home¹⁹. Keyser et al.²⁰ validated the capacity of the Mirror Trainer to discriminate between surgeons with different expertise in laparoscopy.

Pelvic trainer consists of a black box covered by an opaque rubber mat enabling introduction of trocars, instruments and a scope. The scope is connected to the camera and a light source. The image is visualized on monitor. Scope is fixed with a custom made fixator to work independently.

VIRTUAL REALITY SIMULATORS

There are two categories of simulators: physical simulators (video trainers) and computer-based simulators ('virtual reality'). Video trainers consist of a trainer box and a videoscopic imaging system. Tasks are performed within the confines of the box using actual laparoscopic surgical instruments. The metrics used to assess performance in a video trainer are relatively simple (time to complete a task, predefined errors). Computer-based simulators vary in their sophistication but generally involve the performance of a task in a 'virtual' environment. The metrics in a computer-based simulator are typically more complex (motion analysis). Computer-based simulators are significantly more expensive than video trainers. Virtual reality simulation plays a key role in training of the personnel for high-risk industries such as the military and pilots for aircraft²¹. There is a growing awareness of the potential applications of such technology to training in laparoscopic surgery²². In 1989, Joseph Rosen MD and Scott Delp PhD²³ from NASA built the first surgical simulator which was followed up by Dr Richard Stava and Jaron Lanier (who coined the term virtual reality)²⁴. Dr. Christof Kaufmann has introduced simulators in anesthesia for training in ATLS for carrying out task such as endotracheal intubations, intravenous line access, cardiac massage, chest tube placement²⁵. Simulators for laparoscopic surgery training are available from the following companies; *Immersion, Mentice, Surgical Science AB, Symbionix Ltd, Reachin Technologies AB, SeSurgical Science AB, and Lect IT VEST Systems AG*.

An effective simulator must have

1. A user friendly interface
2. Measure multiple parameters of performance and error
3. Accurately reproduce the key aspects of laparoscopic skills
4. Have added force feedback mechanisms to provide tactile sense

Simulators can provide basic skills training without supervision in a controlled environment and free of pressure of operating on real patients. This training can consist of tasks that directly relate to the operative task or that are sufficiently related to improve performance in the operation theatre (Table 3). The

use of simulators also provides an objective certification/recertification to determine the surgical skills of surgeons in practice. Simulation labs provide an opportunity to assess technical skills of the residents. Scott has reported that laparoscopic suturing training results in improved suturing in a porcine model and, that laboratory training results in improved operative performance^{26,27}.

Table 3 Training task for virtual reality

- | |
|-----------------------------|
| 1. Acquire and place |
| 2. Transfer and place |
| 3. Transversal |
| 4. Withdraw and insert |
| 5. Diathermy |
| 6. Manipulate and diathermy |

There are various types of simulators which are available – low fidelity (realistic) to high-fidelity simulators, which vary in degree of similarity with actual clinical procedures²⁸. Technical skills can be taught in the practice of part tasks, for beginners to simplify a complex procedure, of whole tasks, for those who have mastered the component skill sets. Low-fidelity tasks and part tasks are better suited to beginners. This lesson has been borne out in aviation training. Beginning pilots are more likely to learn effectively within a simple simulation training environment than to be placed in an actual cockpit to fly, where the complexity of instrumentation and the pressure to perform perfectly can be overwhelming²¹. Examples of low-fidelity laparoscopic surgery simulation include the basic skills of transferring pegs to a pegboard or simple cutting exercises within a laparoscopic trainer. These fundamental tasks orient the learner to the perceptual adaptations that must be made in the course of performing laparoscopy. Mastery in the acquisition of these basic skills has been shown to correlate with learning more complex tasks, such as laparoscopic suturing²⁹.

MIST VR

Low-fidelity virtual reality simulators with combined metric systems, such as the early MIST VR, are used to provide feedback to trainees during practice^{30,31}. MIST-VR is a computer based virtual reality trainer designed to simulate basic laparoscopic tasks. It consists of a video monitor and a console that has instrument handles which the trainee uses to perform a virtual abstract task intended to simulate the skills needed to perform a laparoscopic surgery. This system demonstrates construct, predictive, and concurrent validity, and offers the additional advantage of providing immediate feedback of performance to the trainee subject^{32, 33,34}. Research done by Jordan et al.³⁵ has demonstrated that training on the MIST-VR simulator leads to faster adaptation of the psychomotor issues encountered in MIS. These findings suggest that acclimatizing subjects to the fulcrum effect on the simulator results in improved performance in the operation theatre.

The MISTVR simulator provides continuous, real-time feedback to the subject during training by the use of visual cues (i.e., the task target turns red to indicate an error). Van Sickle et al³¹ studied whether medical students who had received exclusively simulation-based training could perform laparoscopic suturing and knot-tying as well as senior surgery residents. Simulators were used to train 11 fourth-year medical students with no previous suturing experience to perform

intracorporeal suturing and to tie a free-hand intracorporeal knot. Students' skills were assessed by the performance of the fundal suturing portion of a Nissen fundoplication in a porcine model. Their operative performance was evaluated for time, needle manipulations, and total errors. Results were compared to those of 11 senior-level surgery residents performing the same task. The study concluded that trainees could learn advanced technical skills such as laparoscopic suturing and knot tying by using simulation exclusively. The trainees and senior level surgery residents had a similar number of needle manipulations.

McGill Inanimate System for Training and Evaluation of Laparoscopic Skills (MISTELS)

This system was developed to assess laparoscopic skills and to score them objectively and has been adapted into the SAGES Fundamentals of laparoscopic surgery (FLS) course. The simulator consists of a laparoscopic trainer box measuring 40x30x19.5cm³ covered by an opaque membrane (USSC Laptrainer; United States Surgical Corporation, Norwalk, CT, USA). Two 12-mm trocars are placed at convenient working angles on either side of the 10-mm 0 degree telescope. Alligator clips are used to suspend materials for the exercises. The laparoscope and camera are mounted on a stand at a fixed height, distance, and working angle relative to the position of the objects being manipulated. The video monitor is placed in line with the operator. Following tasks are required to be performed; Peg transfer, Pattern cutting, Endoloop, Extracorporeal knotting and intracorporeal knotting. Various tasks have predefined cut off time and scores are assigned on the basis of performance^{36,37}.

Fraser et al³⁸ conducted a study to see the effect of MISTELS on training in non competent medical students. The non competent group consisted of medical students and surgical residents in their first 2 years of training (n= 83). The competent group consisted of chief general surgical residents in their last year of training, laparoscopy fellows, and practicing laparoscopic surgeons (n=82). They concluded that there was a significant difference in total scores and individual MISTELS task scores between the non competent and competent laparoscopic surgeons (189 vs 372.5; p < 0.0001) and competent surgeons can be discriminated from non competent surgeons.

CONCLUSIONS

Laparoscopy is a difficult and often frustrating task to learn and teach. There is enough evidence in the literature to suggest that training improves performance in the operation theatre. Preclinical teaching in the skills laboratory can cover part of the learning curve for laparoscopic surgery. There are many methods of training available, but the best method is not yet established. All surgical residents must be given basic training in laparoscopic surgery in the skills laboratory. Training on phantom animal organs integrated into a special trainer provides a realistic view and the surgeon can practice repeatedly and obtain the training effect in a short time.

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NEW INVENTIONS & INNOVATIONS IN ENDOSCOPIC SURGERY

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Abstract : Laparoscopic surgery has seduced the surgeon and the society equally. In their zeal to do everything endoscopically, laparoscopic surgeons have compromised on the basic scientific principles enunciated by the accumulated evidence of open surgery era. Use of energy sources and its attendant morbidity and mortality is a concern. Similarly laparoscopic hernia surgery has failed to address the anatomical closure of defect. Laparoscopic surgeons have routinely violated the peritoneal cavity for extraperitoneal surgeries and have not explored the safer routes available to them such as axilla for breast surgery. We present our innovations addressing these shortcomings.

LAPAROSCOPIC CHOLECYSTECTOMY (LC) WITHOUT ENERGY SOURCES

Introduction

Outcome of LC can be improved by avoiding energy sources¹. Gall bladder has absolutely avascular planes which help in performance of a safe surgery². Use of energy sources to hide the surgical deviation, amounts to incompetence³. *Technique* (Watch the video at- <http://endosurgeon.googlepages.com>) LC was begun with capnoperitoneum and placement of ports. *The first step* was to establish surgical access to gallbladder (GB) and freeing it from any adhesions. Adhesions were of two types.

Type 1: Adhesion of viscera to other viscera or parietal peritoneum restricting clear view and access to GB

Type 2: Adhesions of GB to surrounding structures i.e.

omentum, duodenum, colon, intestinal loops or parietal peritoneum.

In both these types of adhesions, an avascular band of tissue could be identified between any two adherent structures (Fig 1). A nick was made in this avascular zone and the adherent structure was gently pushed away from the GB aided by sharp dissection.

The second step

Fundus of GB was grasped and retracted superolaterally. The Hartman pouch was then held away from midline by another grasper. The cholecystoduodenal peritoneal fold was identified and a window made close to GB at the point of maximum arch in this fold (Fig 2). Thus two leaves of peritoneum, the anterosuperior and posteroinferior, covering the Triangle of Calot (TOC) were defined. The posteroinferior leaf of peritoneum was then dissected towards the fundus of GB.



This dissection proceeded in the inferior cholecystohepatic peritoneal fold (Fig. 3). This peritoneum was divided with scissors close to surface of gall bladder. This dissection continued towards the GB fundus as far as possible.

The anterosuperior peritoneum of TOC was then pushed superiorly towards the liver. This displayed the anatomy of biliary pedicle in TOC (Fig. 4). The GB pedicle was then dealt with in standard manner. Then the loose areolar tissue attaching the neck of GB to undersurface of liver was cut close to GB (Fig. 5)

In the *third step* of LC, separation of GB from liver bed was begun. GB was gently pushed away from liver. This exposed a zone of loose areolar tissue between GB and liver (fig 6). Dissection was continued in this zone. The anterosuperior and posteroinferior peritoneal reflection from GB to liver were cut close to GB. The fibrous strands in the loose areolar tissue were cut close to surface of GB. Separation of GB was achieved by continuing this procedure towards the fundus of GB. After separation of GB, the liver bed was observed for any bleeding. Capnoperitoneum was abolished. The GB was then extracted in usual manner. Capnoperitoneum was created again. The liver bed was again inspected for any evidence of bleeding. After ensuring the absence of bleeding, the procedure was completed in usual manner.

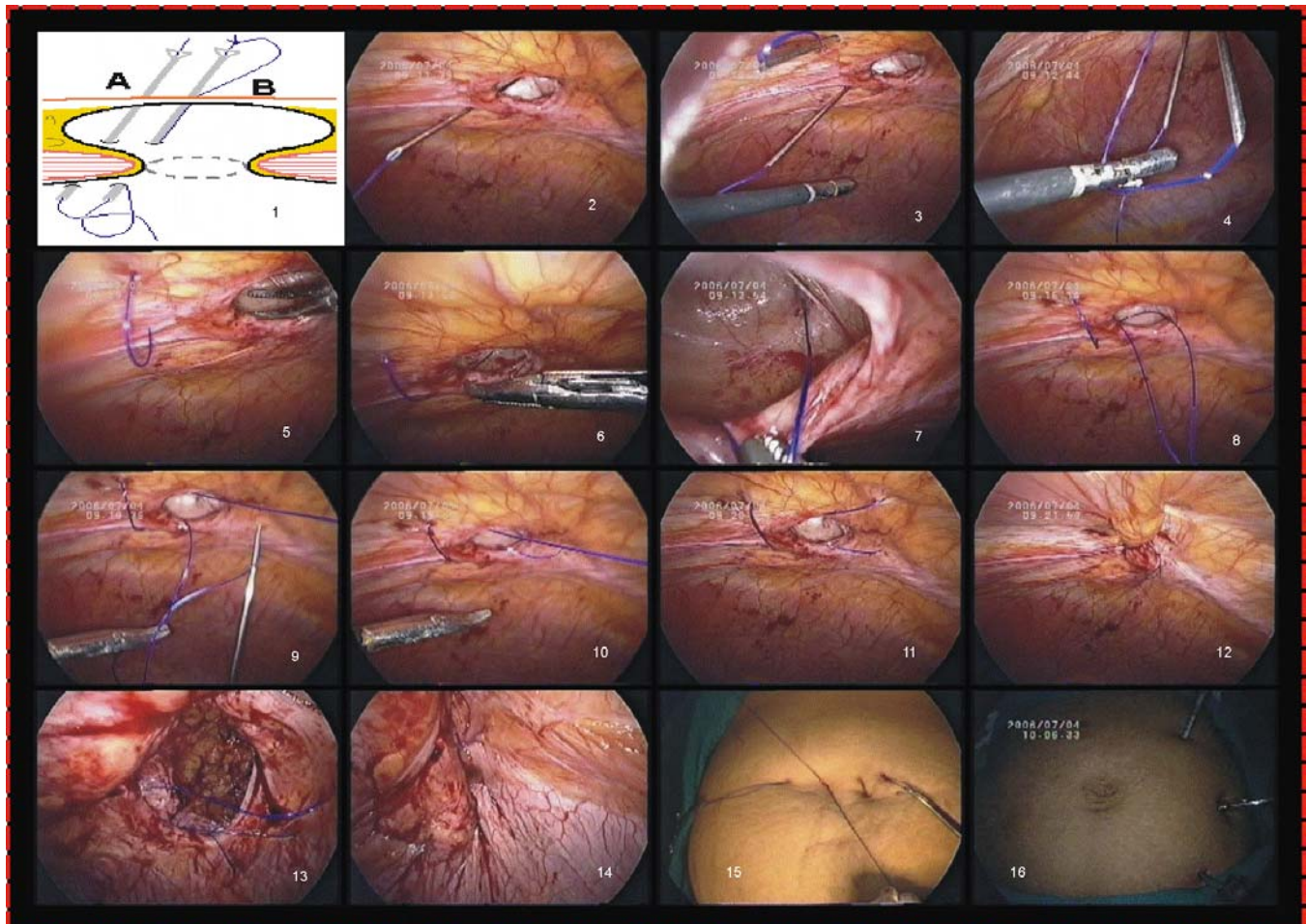
MAYO'S REPAIR AS A PREREQUISITE TO LAPAROSCOPIC VENTRAL HERNIA REPAIR (LVHR)

Introduction

Outcome of LVHR is based upon a generously overlapping mesh, stabilized and aided by Pascal's law⁴. For proper application of Pascal's law closure of defect is scientifically warranted. Principles for defect closure in ventral hernia have been established in era of open surgery. Mayo's technique is considered a gold standard for this. *Technique* (Watch the video at- <http://endosurgeon.googlepages.com>)

A no. 18 spinal needle was used to introduce a no. 1 prolene suture through its lumen into the abdominal cavity (Fig 1, A-the threader needle). Another spinal needle was used to snare intraabdominal suture out. This needle was threaded with no. 1 prolene suture, which was tied back on its own end to form a loop (Fig 1, B-the snare needle).

Tip of the threader needle was then introduced through a skin puncture overlying the centre of hernial defect (HD) till it was visible intraperitoneally. The tip was then guided towards the caudal lip of the HD to puncture the tissue 1 cm away from the edge of the HD. The suture was pushed further to hang freely



intraperitoneally (Fig. 2). The snare needle was then introduced in a similar manner to the caudal lip of HD. The tissue was similarly punctured 1 cm away from the previous puncture site (Fig 3). The suture from the threader needle was grasped loosely through the loop of snare needle (Fig 4). Both the needles were now pulled out from the skin. This led both the free ends of the suture to come out of skin (Fig 5). Under laparoscopic vision both (Fig 6) the free ends of suture were now (Fig 7) drawn back to the peritoneal cavity (Fig 8). The snare needle was then guided to the cephalic lip of HD through the same skin puncture in a manner similar to one used for the caudal lip (Fig 9). The free ends were then grasped and pulled through the tissue and skin, one at a time (Fig 10). This process was repeated to place these double breasting sutures at 1 cm interval from separate skin puncture wounds. Adequate number of these sutures was placed to ensure approximation of the caudal and cephalic lip of the HD. After placement of all sutures capnoperitoneum was deflated and sutures were tied. Tying of these sutures ensured sliding (Fig 11) of the cephalic lip of HD. (Vest) over the caudal lip of HD (pant). The capnoperitoneum was re-inflated and sutured HD observed for any evidence of bleeding or cutting through (Fig 12). The knot was buried in the subcutaneous space. The closed HD represented by the suture line was then buttressed with an intraperitoneal onlay mesh as in standard LVHR.

ENDOSCOPIC EXTRAPERITONEAL VARICOCELECTOMY

Introduction

Varicocelectomy is the most common surgery performed for male infertility. Laparoscopic varicocelectomy has been abandoned⁵ and considered unscientific⁶ because of failure of this approach to tackle inguinal / subinguinal collaterals. Laparoscopic approach was considered dangerous due to its peritoneal violation⁷ and use of energy sources. Our approach addresses these concerns and replicates the gold standard of open surgery principles as desired by scientific community⁸.

Technique (Watch the video at- <http://endosurgeon.googlepages.com>)

Standard laparoscopy instruments and capnosufflation were used as in TEP repair of inguinal hernias. Working space around both the deep inguinal rings was created as in TEP hernia repair.

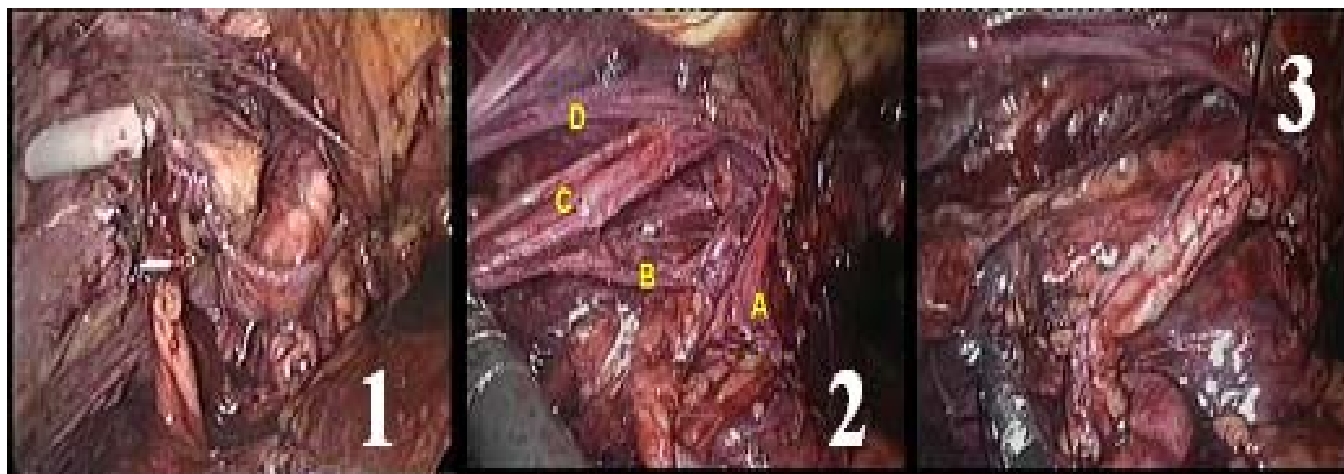
After identification of the peritoneal reflection, peritoneum was gently swept away from the spermatic pedicle. The spermatic pedicle was identified by a tug on ipsilateral testicle. The vas was visualized at the deep ring. Its deviation medially and away from the vasa spermatica interna (VSI) was confirmed. VSI was now lifted with a grasper close to deep ring and pulled out of inguinal canal (Fig. 1) aided by push to the testicle. Pulling the VSI out of inguinal canal exposed any parallel inguinal collaterals, external spermatic vein or vein from vein to vas and vein from inferior epigastric vein (Fig. 2). Veins seen entering VSI at this point were divided between clips. VSI was then released to slide back into scrotum. Venous tributaries of inferior epigastric vein seen entering from medial side of deep ring were similarly divided. The VSI proximal to the vas was then dissected for at least 2" by sweeping the posterior peritoneum away from it. Inclusion of all structures of VSI in the dissected part was confirmed by craniocaudal tug on the ipsilateral testicle. The dissected VSI was then divided between ligatures (Fig. 3). Hemostasis was ensured. No energy sources were used though they were available as standby. Same procedure was repeated on the other side to accomplish bilateral varicocelectomy. This can be refined with artery preserving principle. Now we are routinely dissecting and preserving the testicular artery. We have not faced any technical difficulty in this step.

ENDOSCOPIC EXCISION OF BENIGN BREAST LUMPS (BBL)

Introduction

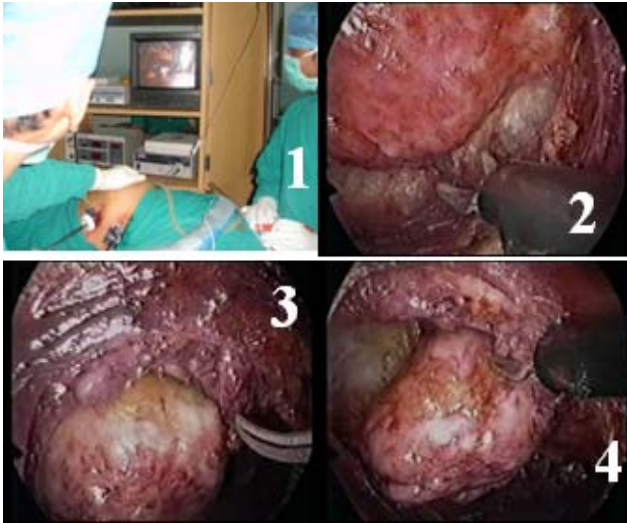
Breast is anatomically contiguous with axilla. Axilla has been used as an approach for mainly cosmetic breast surgeries.

However breast lumps continue to be excised by incisions placed on the breast. Axilla provides a window of opportunity to the



A- The Vas
C- Parallel collaterals pulled out of inguinal canal

B-Venous tributary from the vessels to Vas
D-Collaterals from inferior epigastric vessel/ Pelvic structures



endoscopic surgeon.

Technique (Watch the video at- <http://endosurgeon.googlepages.com>)

Standard laparoscopic equipment, 5 mm- 0 degree and 10 mm- 0 degree telescope, capnosufflation (10-12mmHg) and a standby energy source were used.

Position of patient

Supine with upper limb abducted and extended. The side to be operated was elevated with a sand bag under the scapula and operating table tilted up by 20-30 degrees. Port placement – 10 mm port in mid-axillary line. Two 5 mm ports along the anterior axillary fold, 2 fingers cranial and caudal to the 10 mm port (Fig. 1). The 10 mm port was introduced through the skin incision and advanced toward the breast staying superficial to the muscles of anterior

axillary fold. From the periphery of breast tissue the trocar was guided towards the area of BBL stabilized by the left hand of surgeon. Breast tissue was entered for about 2-3 cms. The trocar was now removed with the port in place. Gas for capnosufflation was connected. 10 mm -0 degree telescope was now introduced. Space for access to site and for working around the BBL was made by telescopic dissection in the loose areolar tissue. Once space was created, the working ports were placed. The BBL was dissected all around with the help of normal laparoscopic hand instruments (Fig.2,3 and 4).

The freed BBL was now guided towards the 10 mm port. Telescope was taken out and changed to a 5 mm -0 degree one. This was introduced through any 5 mm port. The BBL was grasped by the gall bladder extractor introduced in 10 mm port. The tip of extractor was brought upto skin incision. A small BBL could be squeezed out of skin incision. In case of large BBL, it was incised at the skin level and taken out in two parts. The operated space was examined for any bleeding. The axillary port sites were sutured in routine manner.

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SCARLESS NECK SURGERY FOR BENIGN THYROID & PARATHYROID PATHOLOGY

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Abstract: Endoscopic surgery in the neck was attempted in 1996 for performing parathyroidectomy. A similar surgical technique was used for performing thyroidectomy the following year.

Most commonly reported endoscopic neck surgery studies in literature have been on thyroid and parathyroid glands. The approaches are divided into two types i.e. the total endoscopic approach using CO₂ insufflation and the video assisted approach without CO₂ insufflation. The latter approach has been reported more often. The surgical access (port placements) may vary – the common sites are the neck, anterior chest wall, axilla and periareolar region. The limiting factors are the size of the gland and malignancy. Few reports are available on endoscopic resection for early thyroid malignancy and cervical lymph node dissection. Endoscopic neck surgery has primarily evolved due to its cosmetic benefits and it has proved to be safe and feasible in suitable patients with thyroid and parathyroid pathologies.

INTRODUCTION

The cervical region comprises a plethora of well-defined anatomical structures systematically arranged in layers with minimal or negligible vascular overlap. These well-defined layers form the vascular anatomical planes, which have been exploited by the endoscopic surgeon to create a working space for surgical manipulation. Reported initially in 1996¹, endoscopic neck surgery has evolved in its application especially due to cosmetic benefits. The other advantages include better tissue identification due to the magnified image thus decreasing the chances of injury to vital structures such as the recurrent laryngeal nerve.

The primary *target organs* have been the parathyroid and the thyroid glands^{2,3,4,5,7,8,9}, although few studies have reported on its application to other cervical structures, such as the submandibular gland and cervical spine^{9,10,11}. Furthermore the *approaches* may be classified into total (pure) endoscopic (CO₂ insufflation)^{3,4,5,6}, video assisted endoscopic^{12,13,14,15} and minimally invasive mini incision approaches^{16,17,18,19}. The total endoscopic approach has been further sub classified into a supraclavicular, anterior chest wall, axillary and periareolar breast approach. The latter three have also been attempted in the video assisted endoscopic approach.

Video-endoscopic neck surgery remains restricted to specialized centres of minimal access surgery.

Indications for a minimal access approach for thyroid or parathyroid pathology are essentially the same as for open surgery.

A thyroid swelling can present as a multinodular goitre, a solitary thyroid nodule (toxic / asymptomatic) or as Grave's disease, indication for removal include:

- Doubt of malignancy
- Toxic adenoma

- Pressure symptoms
- Cosmesis
- Grave's disease

Table 1 Exclusion criteria for Endothyroidectomy

- 1) Family history of Ca thyroid
- 2) History of neck irradiation
- 3) Significant thyroiditis
- 4) Multinodular Goitre (MNG)
- 5) Thyroid nodule > 35mm (Relative)^{20,21,22,23,24,25,26,27}

VIDEO ENDOSCOPY ASSISTED THYROID SURGERY

Endoscopic thyroidectomy has progressed towards more remote sites of access to improve cosmesis and provide patients with a scar less neck. This has been more on patient demand as thyroid disease predominantly affects women. The patient must be apprised of the difference in the technique and surgical approaches. Investigations are performed to assess the fitness of the patient for anesthesia and to evaluate the existing pathology. These specialized investigations help in defining the nature of the thyroid lesion and include:

- Thyroid function tests
- Ultrasonography
- Fine needle aspiration cytology (FNAC)
- Indirect laryngoscopy

Method

The procedure requires general anesthesia with endotracheal intubation.

Patient position and operation theatre layout

The patient lies supine with the neck in neutral position, a sandbag under the shoulders and head stabilized (extension should not be done as in open surgery because it stretches the neck muscles and hinders the development of the pretracheal space). The operating surgeon and the camera man stand on the side opposite to the pathology site, the

scrub nurse on the side opposite to the operating surgeon and the monitor is placed above and behind the patient's head.

Port Placement

- The primary access port is a 1.5cm long incision and made along the periareolar margin of the breast opposite to the site of pathology. The two working ports are 2mm / 3mm or 5mm in size. One is placed in the anterior axillary fold on the same side as the primary port and the second port is placed on the peri-areolar margin of the opposite breast.(Fig.1)
- The primary port is made under direct vision up to the

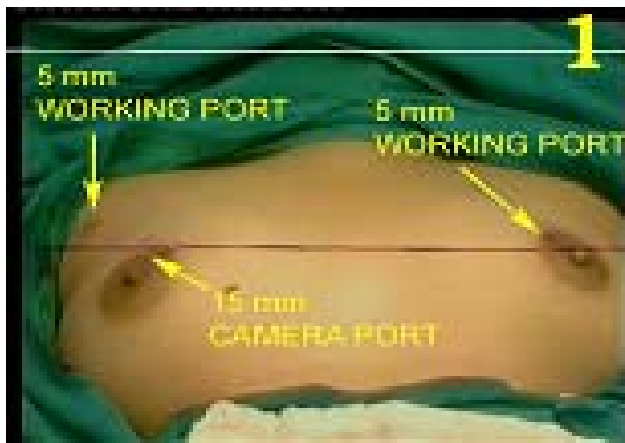


Fig. 1 Port placement : camera port 15mm rt. peri-areolar margin, 5 mm working port, anterior axillary fold same side, 5mm working port left peri-areolar margin.

pectoral fascia. Thereafter a glove finger balloon mounted on a suction cannula is introduced into this tunnel and the balloon inflated to create the working space.

- A 10mm Hassan's trocar is then placed in this region and a purse string suture is taken subcutaneously all around the trocar and tied for creating an air tight seal before beginning insufflation.
- A 10mm 30° telescope is then introduced into the trocar and the space inspected.
- The two lateral ports are now made under direct vision.
- It is preferable to use plastic ringed trocar cannulas for the two working ports. These trocars do not slip out of the port site during dissection in the limited space thus avoiding loss of CO2 and vision. Plastic cannulas have the added advantage of not interfering with cautery.
- The working space is expanded using ultrasonic shears (almost the entire surgery is performed using this energy source) into the area of the neck. Bilateral sternocleidomastoid muscles form the first anatomical landmark for spatial orientation. The space between these two is occupied by the strap muscles (Fig. 2).
- The strap muscles are split in the midline using ultrasonic

shears to expose the thyroid gland (Fig. 3).

Identification of the inferior thyroid pedicle

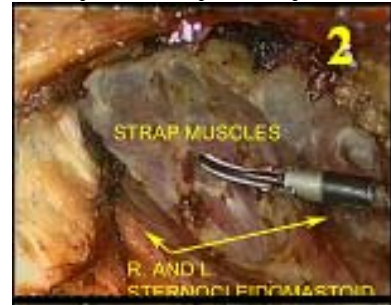


Fig. 2 Large working space with Left and Right sternocleidomastoid forming the anatomical landmark for orientation

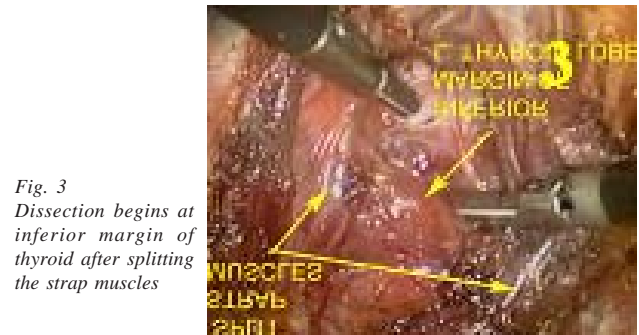


Fig. 3 Dissection begins at inferior margin of thyroid after splitting the strap muscles

- The important landmarks for identification and maintaining anatomical orientation include the tracheal rings in the midline and the carotid sheath laterally on either side.
- The isthmus overlies the second and third tracheal rings. It is traced laterally to the lateral thyroid lobe. The dissection begins along the lower thyroid margin, which is lifted up to expose the inferior thyroid pedicle
- The thyroid lobe is lifted at the infero lateral border to approach the tracheo thyroid groove. The inferior thyroid artery can be seen entering the glandular substance after emerging from below the carotid sheath (Fig. 4).

Position and identification of recurrent laryngeal



Fig. 4 Inferior thyroid pedicle divided with ultrasonic shears

nerve

- The recurrent laryngeal nerve is the next structure to be identified, traced and preserved before proceeding with the division of the inferior thyroid vessels. Being

embryologically related to the fourth aortic arch, the nerve descends down to hook around the subclavian artery on the right and the aortic arch on the left. It then moves along a variable course in the tracheo esophageal groove. The nerve may traverse through a vascular fork of the terminal arterial branches before entering the larynx. On endoscopy it is visualized as a glistening white cord like structure distinct from the inferior thyroid artery. The magnification makes identification and preservation of this structure easier. Once the nerve is clearly defined and traced, the inferior thyroid artery is divided (Fig. 5).

- The inferior parathyroid gland is encountered here lying caudal to the inferior thyroid artery and ventral to the recurrent laryngeal nerve.
- The superior parathyroid gland lies cephalad to the inferior thyroid artery and dorsal to the recurrent laryngeal nerve and should be identified and preserved.

Middle thyroid vein

- The lateral thyroid lobe is now lifted off the thyroid cartilage and the middle thyroid vein is encountered which is defined and divided (Fig. 6).

Superior thyroid artery



Fig. 5 The thyroid lobe lifted up to expose the recurrent laryngeal nerve



Fig. 6 The left middle thyroid vein defined

- The laterally mobilized thyroid lobe is lifted up to the trachea and the isthmus is dissected off the trachea. The isthmus is then divided using cautery or the harmonic scalpel (Fig 7).
- The mobilized thyroid lobe is retracted caudally and inferiorly to expose the superior thyroid pedicle. This vessel is divided close to the superior thyroid pole to avoid injury to the superior laryngeal nerve (Fig. 8 & 8.1).
- The specimen is retrieved through the periareolar

incision (Fig. 9).

- Having excised and removed the specimen the operated area is inspected for hemostasis (Fig. 10).
- Maintaining hemostasis is of paramount importance due to the limited operating space.
- A 12 Fr suction drain is placed in the area through the axillary port.
- The strap muscles are sutured in the midline with 2'0'



Fig. 7 Division of isthmus



Fig. 8 Division of superior thyroid pedicle while retracting the mobilized thyroid lobe inferiorly



Fig. 8.1 Completing division of superior thyroid pedicle posteriorly by lifting the mobilized thyroid lobe superiorly



Fig. 9 Complete hemostasis after left hemithyroidectomy



Fig. 10 Extracting the specimen from the 15mm peri-areolar incision

vicryl suture.

- CO₂ is desufflated and the incision is closed in layers for ensuring a good cosmetic scar. Skin is approximated using subcuticular sutures for both the periareolar and the remaining 5 mm port.
- The drain is removed after 24 hours and patient discharged.

The aim of most studies apart from being cosmetically superior has been to be minimally invasive offering all associated advantages such as minimal postoperative pain, rapid recovery and low analgesic requirement^{28,29,30}.

In terms of invasiveness none of the distant sites of access prove to be truly minimally invasive as extent of invasion is much more compared to a focused, direct approach. The popularity has however persisted and increased due to improvement in cosmesis.

The supraclavicular approach has certain advantages such as rapid access to thyroid (in the event of a vascular mishap), the advantage of applying external pressure for hemostasis³¹. The video assisted focused approach using conventional instruments has a shorter learning curve^{32,33,34,35}.

Table 2^{32,36,37} Post – Operative Complications with Endothyroidectomy

-
- 1) Rec. laryngeal n palsy
 - 2) Hypocalcemia
 - 3) Seroma
 - 4) Hematoma
 - 5) Wound infection
 - 6) Subcutaneous emphysema (with CO₂ insufflation)
-

Our experience comprises 25 patients operated since 1997. Twenty one patients had a solitary thyroid nodule and 4 patients had small multinodular goiter. In 3 patients a supraclavicular approach was adopted and 22 patients were operated by a peri-areolar approach. The surgery in one of the 3 patients of the supraclavicular approach was converted to a conventional exploration due to abnormally high vascularity of the gland, which turned out to be a multicentric papillary carcinoma on histopathology. The patient subsequently underwent a completion thyroidectomy. Three patients developed subcutaneous emphysema which resolved over 24 hours and 5 patients showed bruising in the presternal region which resolved in 2 weeks. There were no other complications. It was easier operating from the periareolar approach as a larger working space was available. In 21 patients of solitary thyroid nodule a hemi thyroidectomy was performed and in 3 patients of multinodular goiter the excision extended to a little more than half the opposite lobe. The size of the resected specimen varied from 2 x 2.4cm² to 5 x 4.1cm² (the specimen were not weighed).

ENDOSCOPIC PARATHYROIDECTOMY

Indications for parathyroidectomy are:

- Hyper-functioning parathyroid adenoma
- Parathyroid hyperplasia

The benign nature of the disease and small size of the specimen make it an ideal organ for access and dissection using the minimal access technique.

What follows is description of video-endoscopic thyroid surgery using the periareolar approach with CO₂ insufflation

Preoperative Evaluation

In case of hyperparathyroidism with hypercalcemia, the specialised investigations required are:

- USG/ CT Scan / MRI Scan of the neck.
- Technetium 99m Sestamibi scan / Thallium technetium subtraction scan depending on which is available for localisation. A combination of the sestamibi scan along with a radiological investigation has been described as equivalent to an open conventional bilateral exploration of the neck for localizing the parathyroid lesion. High-resolution cervical ultrasonography alone has reported a high success rate of 94% for preoperative specific side localization of the parathyroid lesion⁽³⁸⁾. The sensitivity was reported as 89% with a 98% positive predictive value.

Perioperative Evaluation

- Techniques to ensure complete removal of the hyper functioning parathyroid tissue in MIP reported are intra-operative rapid parathormone assays^(39,40,41,42,43), frozen section and good clinical judgment followed by postoperative S.Ca⁺⁺ and PTH level monitoring. Several studies have also reported day care minimally invasive parathyroidectomy (MIP) using local /regional anesthesia⁽⁴⁴⁾. Such centers apply techniques such as chemiluminescent assay for intact PTH level (quick PTH) giving a success rate of 95% to 98% to ensure a cure for the patient before discharge^(45,46,47). However these results are best observed in patients with uniglandular disease. Provided a careful preoperative patient selection is performed, an MIP will cure the patient whether or not an intra operative QPTH assay is done⁽⁴⁸⁾.

Method

The patient position and operation theatre layout remains the same as described for thyroidectomy.

Localization of the parathyroid gland

- Before embarking on the procedure of parathyroidectomy for parathyroid hyperplasia a thorough knowledge of the embryology and surgical anatomy of the parathyroid glands is a must.
- The approach is along the inferolateral margin of the thyroid lobe. On lifting the lobe the inferior thyroid artery and recurrent laryngeal nerve can be seen in the tracheo

thyroid groove.

- Majority of parathyroid glands are located within 1-2 cm of the intersection between the inferior thyroid artery and the recurrent laryngeal nerve.
- Remember the rule of symmetry i.e. glands situated on one side are placed similarly to the ones on the other side.
- A superior gland not in its usual position is likely to lie more posteriorly and caudally behind the esophagus and anterior to the vertebral column. The endoscopic advantage lies in being able to trace its blood supply arising from the inferior thyroid artery to site of the gland. The dissection may extend up to the anterior mediastinum. The lower parathyroid may be similarly traced as it may be displaced to lie in the thyro-thymic ligament or anterior mediastinum. The other sites which need to be explored include the upper thyroid pole, the retroesophageal or the retropharyngeal space¹⁸. A gland may be situated here in about 1% of cases.
- Lastly if the gland is still not found one may recall the embryological development of the superior and inferior thyroid gland which arise from the fourth and the third pharyngeal pouch respectively. Rarely the inferior thyroid gland may not descend to its normal position and may come to lie as high as the submandibular gland¹⁹. In such a situation conversion to a conventional approach may be required.
- In case of parathyroid adenoma pre-operative localizing studies such as CT Scan/ MRI Scan / 99 Technetium sestamibi scan facilitates a more direct approach with limited dissection of the concerned area.
- The dissection proceeds by isolating and cauterizing vessel supplying the gland.
- The gland is now excised and extracted through the primary port to prevent any trauma and spillage of cells.
- Hemostasis must be ensured and a suction drain placed through one of the 5mm ports for about 24 hrs.
- The facility of frozen section histopathology report is advisable especially in cases of parathyroid hyperplasia and where intra-operative rapid parathormone assays are not available.

Our own experience spans 8 years with 18 patients of primary hyperparathyroidism (PHPT) subjected to total endoscopic parathyroidectomy. Seventeen of these patients were diagnosed with a single parathyroid adenoma on 99^{TC} sestamibi scan corroborated by an USG neck or an MRI scan. One patient was diagnosed to have parathyroid hyperplasia. Ten procedures (7 procedures with CO₂ insufflation and 3 procedures video assisted) were performed by a supraclavicular approach, 4 by an anterior

chest wall approach and 4 by a periareolar breast approach. Carbon dioxide insufflation was maintained at 10mm of Hg. Post operative monitoring of S Ca⁺⁺ and S PTH levels were done to confirm complete removal of all hyper functioning parathyroid tissue. There was one conversion due to non-localization of the parathyroid adenoma. The tumor was identified in the tracheo-esophageal groove. Although the number of patients in our experience is small, the results conform to those reported in literature in terms of safety and feasibility.

Table 3⁴⁹ Complications reported in Endoparathyroidectomy are -

- 1) Recurrent laryngeal nerve palsy
- 2) Failed surgery (persistent – hyper calcemia / increase PTH)
- 3) Hemorrhage
- 4) Seroma
- 5) Hypocalcemia

Carbon dioxide embolization, a potential life threatening complication has so far not been reported.

Our progress from a supraclavicular approach to a periareolar approach is strongly driven by superior cosmetic results, as the dissection involved in this approach is much more than a focused mini-incision approach.

Gasless Endosurgery for thyroid & parathyroid Alternative approach

There is one line of thought which objects to the potential of intraoperative hyper carbia and subcutaneous emphysema while undergoing endoscopic neck dissection. As an alternative to avoid this problem innovators have come up with the gasless approach.

- The 2 cm primary port is made in the suprasternal notch under direct vision and extended up to the investing layer of the deep cervical fascia.
- This is followed by a short infusion of CO₂ for 3-4 minutes to facilitate creation of the pretracheal space under endo vision.
- The trocar is then removed and the insufflated CO₂ released.
- A 30° 5mm endoscope is inserted through the same incision. Two conventional skin retractors are inserted for retracting the thyroid lobe medially and the muscles laterally. All dissection takes place through this incision using special spatulated instruments.

Advantages

- The anatomy of the neck comprises delicate and important structures, the identification of which is tremendously enhanced by bright light and the magnification offered on endoscopy.
- Improved cosmesis is one of the major potential benefits of endoscopic neck exploration.
- The minimally invasive approach may lead to less post-operative pain and a faster functional recovery.

- Direct palpation of the structures can be done in neck surgery which is a great advantage. This can also be used to apply direct pressure on bleeding vessels.

Disadvantages

- Requires high degree of technical expertise of the surgical team and good quality equipment and instruments.
- Results in prolongation of operative time which may shorten as experience of dissecting in this area increases. However surgeons quickly adapt and the operative time reduces dramatically after a few cases only.
- The cost of the procedure may be slightly more due to disposable laparoscopic instruments and prolonged operating time.
- It is also important to bear in mind that since most thyroidectomies are performed for a potentially malignant nodule, it becomes imperative that the clinical outcome of the same being performed endoscopically be similar, if not better than its open counter part.

CONCLUSION

Endoscopic neck surgery offers a definite cosmetic advantage over its conventional counterpart. With increasing skill and patient demand, this surgery is going to be performed in more centers. However careful patient selection is advocated. Though few centers are reporting good results in thyroid malignancy, the role of endoscopic approach in thyroid malignancy is as yet controversial.

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ELECTROCAUTERY IN LAPAROSCOPIC CHOLECYSTECTOMY LEADS TO UNFAVORABLE OUTCOME. - RESULTS OF A COMPARATIVE STUDY.

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Abstract : The gold standard treatment of cholecystolithiasis, laparoscopic cholecystectomy (LC) remains a cause of concern due to attendant morbidity. Two decade of experience, better endo-optics and structured training have not alleviated the concern. Laparoscopic cholecystectomy can be done without using any energy sources. This study was undertaken to evaluate the outcomes in laparoscopic cholecystectomy done with or without using energy sources.

INTRODUCTION

Two decades of experience of laparoscopic cholecystectomy (LC) has not brought down the incidence of unfavorable outcomes¹. Proper skill evaluation prior to granting surgical privileges, anatomical orientation during surgery and use of technology have been cited as determinants of outcome in LC². Technology such as electrocautery (EC) is the most daunting challenge in LC³. We have earlier reported the technique of LC without using EC⁴. This study was undertaken to compare the outcomes in LC with or without using EC.

MATERIAL AND METHODS

Study design

Prospective study to evaluate outcome in respect of operative (hemodynamic stability, blood transfusion, hemostatic maneuvering, vascular/biliary/visceral injury), gall bladder perforation or conversion and postoperative (hemodynamic instability, peritonism, constipation, rehospitalization, biliary leak, re-exploration or mortality) features.

All patients were operated in a single surgical unit by experienced laparoscopic surgeons. All symptomatic cholecystolithiasis patients were included irrespective to their presenting symptomatology or co-morbidity. There were no exclusion criteria. Biliary colic and ultrasonographic demonstration of gallstones (GS) were the criteria for diagnosis. All the patients underwent perioperative evaluation for 'Fast tract surgery' module. An informed consent for the procedure was obtained after due explanation about the use or non-use of EC. LC was performed by using routine LC instruments. Hemostasis was ensured on the table.

End points

Operative

- Hemodynamic stability as assessed by anesthetist
- Need for blood transfusion
- Need for hemostatic maneuvering after separation of gall bladder (GB) from liver bed (LB)
- Identifiable vascular, biliary or visceral injury
- GB perforation by dissecting instrument
- Conversion

Postoperative

- Hemodynamic stability
- Postoperative peritonism beyond 24 hrs
- Constipation beyond 24 hrs
- Rehospitalization
- Re-exploration
- Biliary leak
- Mortality

RESULTS

A total of 135 consecutive patients of symptomatic cholelithiasis were divided into two groups.

The group with use of electrocautery had biliary injury (3), visceral injury (1), GB perforation (11), hemodynamic instability (2), peritonism (7), re-hospitalization (7), biliary leak (5), re-exploration (5) and deaths (2). The group without use of energy sources had biliary leak (1). There was a conversion common to both the groups.

	EC Group N=70	Non EC Group N=65
Comorbidity	35	32
Stones		
Single	23	21
Multiple	47	44
Grade of inflammation		
Acute cholecystitis	14	14
Chronic cholecystitis	28	21
Empyema GB	14	13
Mucocele GB	10	14
Perforated / Gangrenous	4	3
Adhesions present	41	42

OPERATIVE OUTCOME

None of the patient in either group had any hemodynamic instability or need for blood transfusion during surgery.

Rest of the end points were as below

	EC Group N=70	Non EC Group N=65
Per operative		
Vascular injury	0	0
Biliary injury	3	0
Visceral injury	1	0
GB Perforation	11	0
Conversion	1	1
Postoperative		
Hemodynamic instability	2	0
Peritonism	7	1
Rehospitalization	7	0
Re-exploration	5	0
Biliary leak	5	1
Mortality	2	0

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DISCUSSION

Electrocautery is used by more than 85% of surgeons in LC⁵. Use of energy sources in LC is universal. Electrocautery used as an aid in safe performance of LC has been implicated in many injuries especially hollow viscous injuries⁴. Gall bladder has surgical safe avascular planes to enable dissection without any electrocautery⁶. Yet energy sources are used & considered a necessary evil⁷. Chances of error are further increased by mechanical interface⁸. Injuries caused by EC are not only unique to LC era but more dangerous and potentially fatal⁹. Such injuries have been often hidden by the surgeon and not accepted¹ because they are the most common cause of litigation following LC¹⁰. It has been known¹¹ that EC can damage the hepatic veins and cause bleeding. Rise in temperature by EC¹² is known to damage the integrity of viscera. EC injuries not only create biliary cripples¹³ but can be fatal¹⁴. Our study has shown absence of any such complications in the study group (non EC). Also the only conversion in this study got included in both groups as she was initially in non-EC group but the surgeons could not proceed with dissection and felt the need to convert. EC was used to see if it could facilitate dissection and avoid conversion. But surgeons even with EC decided to convert. This showed that EC didn't offer additional advantage in dissection. This corroborates the evidence from literature¹⁵ which clearly favors sharp dissection and not the dissection using EC. EC in this study was associated with not only significant morbidity but mortality as well. LC has become a gold standard and day care procedure. This study showed that EC is not an aid in this direction but an impediment.

CONCLUSION

Energy sources are a source of avoidable complications in LC hence need to be done away with in a routine cholecystectomy.

ACKNOWLEDGEMENT

I am grateful to Miss Pooja Pant for preparation of this manuscript.

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Literature Review

Effect of aggressive risk factor modification on cardiac events and myocardial ischaemia in patients with chronic kidney disease

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Heart 2006,92: 1402-1408

Patients with CKD were randomly assigned to either an aggressive risk factor modification strategy (targeted treatment of hypertension, dyslipidaemia, homocysteine, haemoglobin and phosphate) or standard care. An intention to treat analysis was performed on 152 patients who had baseline dobutamine stress echocardiography (DSE), including 107 who had follow-up DSE. Biochemical parameters, cardiac risk factors and investigations (ECG, two-dimensional echocardiography) were recorded at baseline. New ischaemia was classed as new or worsening stress wall motion abnormality between follow-up and baseline DSE. Patients were followed up for the development of new ischaemia or cardiac death, acute coronary syndrome and non-fatal myocardial infarction over 1.8 years. The development of new ischaemia was common but not different between the standard and aggressively treated groups (15 (21%) v 18 (23%), $p = 0.8$). Independent predictors of new ischaemia were older age, abnormal ECG, higher systolic blood pressure and lower serum high density lipoprotein cholesterol, but not treatment arm. The standard and aggressively treated groups did not differ in cardiac event rate (10% v 13%, $p = 0.6$ or all cause mortality (10% v 19% $p = 0.2$). In patients with an abnormal baseline DSE (non-diagnostic, scar or ischaemia), the event rate was similar (22% v 20%, $p = 0.9$) Aggressive risk factor modification in CKD does not limit the development of new ischaemia or reduce cardiac events in patients with an abnormal DSE.

BARIATRIC (OBESITY) SURGERY - MINIMAL ACCESS APPROACH

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Abstract: The developing countries are no longer immune to the growing epidemic of obesity. The problem affects males, females and is also on the increase in the pediatric age group. Obesity is associated with several co morbidities requiring frequent and expensive medical treatment like cardiovascular diseases and Type2DM. In addition it is well documented that the Indo-Asians as compared to the world population are more prone to Type2DM and cardiovascular diseases which occur at much lower BMI's. Bariatric surgery has been well documented to be the best treatment option available for inducing and maintaining long term weight loss. Bariatric or obesity surgery performed by the minimal access approach is rapidly gaining popularity worldwide as it results in faster recovery with no added complications. The specialty is gradually gaining acceptance in developing countries like India as awareness of obesity as a treatable disease grows.

INTRODUCTION

Bariatric surgery comprises surgical management of patients suffering from an extreme degree of obesity. Obesity, which is no longer a mere cosmetic problem, instead has become a life threatening disease. This disease is termed as morbid obesity and is defined as a patient with a BMI (body mass index) of >37.5 Kg/m² (Western > 40 Kg/m²) or 32.5 Kg/ m² (Western 35 Kg/m²) with significant associated obesity related comorbidities. The disease has developed stealthily and has been declared the worst pandemic of the 21st century.

The world health organization in conjunction with the western pacific (WPRO), the International Association for the study of obesity and the International Obesity task force have formulated an extremely well researched and crisp perspective of obesity in the Asia Pacific region. Extensive recommendations are detailed on medical management of obesity. The perspective documented in February 2000 makes a reference to the role of bariatric surgery in the management of obesity in the Asia Pacific region. Bariatric surgery in fact is the only treatment option that has reported effective, consistent and sustained prophylaxis and improvement of obesity related complications. In an observational study published by Christou et al comparing bariatric surgery to conservative management for obese patients showed a mortality rate of 0.68% in the surgery cohort as against 6.17% in the control. This shows a significant advantage of surgery vis a vis conservative management in reducing the relative risk of death¹.

The two basic principles underlying bariatric surgery are restriction and malabsorption. These are at two extremes of a spectrum with a combination principle lying in between. Classification of bariatric procedures based on restriction and malabsorption is as shown in figure 1.

The data on obesity from the Asia pacific region brings to light certain *differences* in behavior patterns of obese individuals here as compared to that observed in the west.

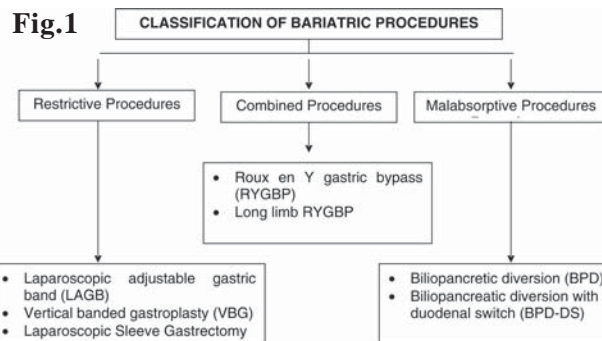


Table: Difference in the behaviour pattern of obese individuals between Asia-Pacific and Western Region

1. The most glaring difference is the onset of obesity related complications occurring in this population at much lower BMIs.
2. A higher percentage of body fat for a given weight.
3. Predisposition to abdominal adiposity. Accumulation of visceral fat occurs at lower BMIs increasing risk of hypertension dyslipidemia, diabetes and metabolic syndrome.
4. Predominantly large vegetarian population e.g. India.
5. Lack of adequate data on childhood obesity.

This makes extreme malabsorptive procedures like Biliopancreatic Diversion (BPD) unsuitable for this patient population, Laparoscopic Adjustable Gastric Banding (LAGB) and Laparoscopic Roux-en-Y gastric bypass (RYGBP) are the two most popular procedures practiced in India today.

LAPAROSCOPIC ADJUSTABLE GASTRIC BANDING (LAGB)

This is a purely restrictive procedure in which an adjustable silicon band is placed on the stomach just below the gastroesophageal junction to create a 15cc pouch. The balloon lining the band is connected by a hollow tube tunneled through the abdominal wall to a small reservoir

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known as access port which is placed subcutaneously and fixed to the muscle sheath in the epigastrium or left hypochondrium. By injecting saline into this reservoir, the balloon lining the band can be inflated to narrow the passage between the gastric pouch and remaining stomach. The procedure of gastric banding works on a simple principle of decreasing the intake capacity of the patient and slowing the rate of emptying the gastric pouch to prolong the time interval between meals. As the entire digestive tract is intact in this procedure, digestion and absorption is normal. Success therefore relies significantly on the patients motivation level and adherence to dietary guidelines. The weight loss in various reported series ranges between 45-55% of EW by end of two years^{2,3,4}.

Complications associated with LAGB include gastric perforation, access port infection, access port leak, outlet obstruction, pouch dilatation, band slippage / erosion. The overall incidence of these complications is 10-15%⁹. A significant advantage of this procedure is its reversibility. It is a simple and safe procedure which is rapidly gaining popularity the world over.

LAPAROSCOPIC ROUX-EN-Y GASTRIC BYPASS (LRYGBP)

The gastric bypass is considered the *gold standard* in treating morbid obesity. The procedure is performed both laparoscopically and by conventional open access.

The *procedure* involves division of the stomach using staples to create a 15-20cc gastric pouch. A 100-150 cm roux-en-y jejunal loop is created using staples. The jejunum is anastomosed to the gastric pouch creating a 1.2 – 1.5 cm wide anastomosis. This gastrojejunostomy may be performed using a circular stapler/linear staples or intra corporeal suturing.

The *principle* underlying gastric bypass has a combination of restriction and malabsorption. The small size of the gastric pouch restricts the intake, the narrow outlet delays the emptying and delayed mixing of digestive juices and food consumed decreases absorption. The weight loss varies from 60-80% of EW at two years following surgery^{5,6,7,8}. Complications of gastric bypass occur in 15-20% of patients⁹. Morbidity and mortality are both higher as compared to

LAGB. This is directly related to the multiple anastomosis required in performing the gastric bypass. Complications include anastomotic leak, haemorrhage, stricture, DVT, PE and dumping syndrome. The latter occurs due to concentrated food rapidly reaching the small gut causing nausea, vomiting, palpitation, dizziness and diarrhea. This unpleasant event usually results in the patient abstaining from foods which may cause this to happen.

Laparoscopic Vertical Gastrectomy (vertical Sleeve Gastrectomy, Greater Curvature Gastrectomy, Parietal Gastrectomy, Gastric Reduction and even Vertical Gastroplasty)

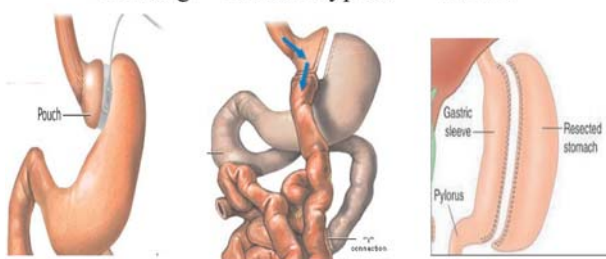
Laparoscopic vertical or sleeve gastrectomy generates weight loss by restricting the amount of food that can be eaten (removal of stomach or vertical gastrectomy) without any bypass of the intestines or malabsorption. The stomach pouch is smaller than the pouch that Duodenal Switch patients have. It is a relatively new operation that can be done either as a stand alone procedure for those who don't have much weight to lose, or as part of a staged operation for high risk patients. The weight loss is projected to be in the range of 45 to 55% (although some studies are reporting a weight loss of 60-80 %) of the excess body weight, which is comparable to that of the Laparoscopic Adjustable Gastric Banding Procedures, however It doesn't have the foreign body problems such as erosion or slippage that can occur with these procedures. In addition to avoiding foreign bodies, the other advantage of the sleeve gastrectomy is that the excess stomach volume is removed, not left in place. This eliminates production of the hormone Ghrelin and thus helps to reduce the sensation of hunger that people have due to high Ghrelin levels. The stomach is restricted by dividing it vertically and removing more than 85% of it. This part of the procedure is not reversible. The stomach that remains is shaped like a tube and measures from 60-150cc. A very important feature of the procedure is that it preserves the pylorus. This maintains the feeling of fullness and avoids dumping and marginal ulcers. The normal satiety mechanism is preserved.

Sleeve gastrectomy can be performed on patients who are considering a LapBand® but are concerned about a foreign body and those who have other medical problems that prevent them from having weight loss surgery such as anemia, Crohn's disease, extensive prior surgery, and other complex medical conditions.

Complications associated with sleeve gastrectomy are - deep vein thrombophlebitis 0.5%, non-fatal pulmonary embolus 0.5%, pneumonia 0.2%, acute respiratory distress syndrome 0.25%, splenectomy 0.5%, gastric leak and fistula 1.0%, postoperative bleeding 0.5%, small bowel obstruction 0.0%, death 0.25%

Sleeve gastrectomy is a safe and effective procedure maintaining integrity of the digestive system and providing the desired alteration to help in weight loss. It is a suitable

Fig.2 Restrictive - Banding Combined – Gastric Bypass Restrictive - Sleeve



surgical alternative for patient who are super obese as also for those who require less weight loss (10).

OPEN BARIATRIC SURGERY

Patients of morbid obesity have been effectively treated by bariatric surgery and life style management in the west for the past 50 years. Open bariatric surgery on these patients with a high surgical risk is associated with significant perioperative morbidity and a prolonged convalescence (11, 12). Technical difficulties include an incision through an anterior abdominal wall, of increased thickness working in a depth with difficulty in accessing areas like the esophageal hiatus, bulky and heavy intraabdominal contents, abdominal wall closure, delayed ambulation due to surgical incision with increased risk of DVT and pulmonary embolism. All complications related to an open incision such as wound dehiscence, incisional hernias, hypertrophic scars etc. An event such as post-operative bleeding or bowel leak requiring re-exploration has a very high incidence of morbidity and mortality.

Introduction of minimal access surgery has significantly shortened convalescence and perioperative morbidity. The laparoscope is able to access and provide excellent vision of nearly the entire abdominal cavity. Appropriate placement of trocars makes handling of entire GI tract comfortable. The puncture wounds made by the trocars do not require a layered closure. The post operative pain is significantly decreased and majority of patients are ambulatory in the post-operative period. This results in a rapid recovery of the patient.

Any surgeon performing bariatric procedures must be well versed with diagnosis and management of complications of these procedures and should possess appropriate and adequate surgical expertise and technical skill to perform the procedure by laparoscopic and open approach.

SUMMARY

Bariatric surgery in India is in the stage of infancy. Patients of morbid obesity require to be managed by a multidisciplinary team comprising the surgeon at the helm with help from, physician, nutritionists, physiotherapists, psychologists and counselors. Protocol based management provides for safe surgery and yields the best results.

Recent studies have shown that the diseases associated with morbid obesity appear at much lower BMI values in the Asian population as compared to Caucasian and, hence, the BMI criteria for classifying obesity have been revised for the Asian population. (Table 1)

Bariatric surgery is slowly growing popular in India. The technology of minimal access surgery has made this surgical option for treating obesity more acceptable.

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Literature Review

Characteristics of Gestational Diabetic Mothers and their Babies in an Indian Diabetes Clinic

Shailaja D kale, SR Kulkarni, HG lubree, k meenakumari, vu despandey, ss rege, j despandey, kj coyaji, cs yajnik

Japi. VOL.53. October 2005

Antenatal information was obtained from hospital records gestational diabetes mellitus GDM was diagnosed by 75g OGTT in clinically high risk women. Anthropometric measurements of mother and the babies were recorded within 24 hours of delivery and a maternal blood sample collected for haematological and biochemical measurements. Between the period Jan 1998 to Dec. 2003, 265 women with gestational diabetes were treated in our unit; 49% had first-degree relatives with diabetes. Compared to non-diabetic mothers (n=215) GDM mother were older (29.0 vs. 26.0 years, p<0.001), more obese (body mass index – BMI 26.0 vs. 22.0 kg/m², p<0.001), centrally obese (waist hip ratio-WHR 0.89 vs 0.86, p<0.001), adipose (sum of 4 skinfolds 98.4 vs. 61.4 mm, p<0.001) and higher blood pressure (Hg, p<0.001). GDM mothers had higher concentrations of plasma triglycerides (195.0 vs. 153.0 mg/dl, p,0.01); blood haemoglobin (11.7 vs 10.9 g/dl, p<0.001) and higher platelet count but lower concentration of HDL cholesterol and albumin. Sixty percent GDM mothers and 34% of non-diabetic mothers were delivered by caesarean-section, 23% of GDM mothers delivered pre term (<37wk). Despite the smaller gestation, babies of GDM mothers were heavier (BW 2950.0 vs. 2824.0g, p<0.0001, adjusted for gender), longer (48.9 vs. 48.0 cm, p<0.01) and more adipose (sum of 2 skinfolds 10.5 vs. 8.5mm). Only 5% of babies born to GDM mothers weighed >4000g but 30% were >90th centile of birth weight of babies born to non-diabetic mothers. Babies of GDM mothers suffered higher neonatal morbidity. GDM mothers in urban India are more obese than non-diabetic mothers, frequently have a family history of diabetes and show metabolic features of insulin resistance syndrome, suggesting high cardiovascular risk. Neonates of GDM mothers are heavier, longer and more adipose than those born to non-diabetic mothers, and suffer higher neonatal morbidity.

G-CiN

Gemifloxacin

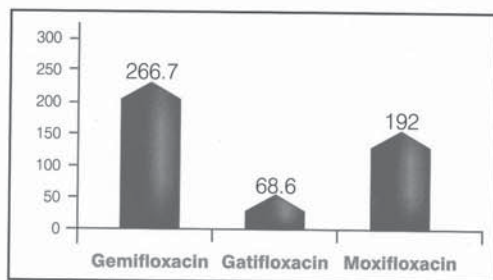


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1. Antimicrob Agents Chemother. 2002;46:413-419.
2. J Antimicrob Chemother. 2003;52:229-246.

 **LUPIN**

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TECHNIQUE AND OUTCOMES OF LAPAROSCOPIC VENTRAL HERNIA REPAIR

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Abstract: Laparoscopic repair of incisional hernia has been clearly demonstrated to be safe and efficacious with low rates of conversion to open, a short hospital stay, a moderate complication rate, and low possibility of recurrence. Capitalizing on the benefits of the open retromuscular, sublay repair, the laparoscopic approach provides adequate mesh overlap as well as allowing for the identification of the entire abdominal wall fascia at risk for hernia formation. The fixation of the prosthesis to the abdominal wall is best provided by transabdominal sutures to secure the mesh during the initial phase of incorporation. Long term follow-up data supports the durability of the laparoscopic repair of ventral hernias in regard to reduced rate of recurrence, low risk of mesh infection and applicability of the procedure to difficult patient populations, such as the morbidly obese and those with prior failed attempts at repair.

INTRODUCTION

One outcome of the greater than 2 million abdominal operations performed in the United States each year is an incisional hernia rate of 3% to 20%¹. As a result, approximately 90,000 ventral hernia repairs are necessary annually. The increasing number of incisional hernias merely reflects the evolution of surgery with the ability to perform larger abdominal operations such as aortic surgery and colectomy. Factors associated with formation of an incisional hernia include wound infection, morbid obesity, previous operations, immunosuppression, prostatism, and surgery for aortic aneurysmal disease. Abdominal wall defects typically occur within the first 5 years after the surgical incision is made but may develop long afterward². These hernias contribute greatly to the long-term morbidity of conventional surgery. Until techniques for the prevention of hernias are established, the repair of incisional hernias will remain an important concern to the general surgeon.

Several hernia repair methods have been described. Primary tissue repair using a "vest-over-pants" technique requires suture approximation of strong fascia on each side of the defect. Recurrence rates after this type of repair range from 31% to 54% during long-term follow-up^{3,4}. The introduction of prosthetics revolutionized hernia surgery with the concept of a tension-free repair. The subsequent rate of recurrence has been lowered to less than 10%⁵. However, the required dissection of wide areas of soft tissue for mesh placement contribute to an increased incidence of wound infections and wound-related complications (12% or higher)^{6,8}. These problems have stimulated a continuing search for new techniques for ventral herniorrhaphy.

The laparoscopic repair of ventral hernias is rapidly evolving with patient and surgeon interest in less morbid herniorrhaphies and the appeal of minimally invasive surgery. The technique is based on the open, preperitoneal repair described by Rives and Stoppa^{7,9}. The placement of a large mesh in the preperitoneal location allows for an even distribution of forces along the surface area of the mesh, which may account for the strength of the repair and the decreased recurrence rates associated with it. The minimally invasive approach embraces the concept that a

retromuscular mesh repair may be more durable, although the mesh is placed one layer deeper on an intact peritoneum in comparison to the open technique. The technique incorporates other fundamental components of the open repair such as wide mesh overlap of the defect and the use of transabdominal fixation sutures to secure the mesh.

The feasibility of laparoscopic ventral hernia repair has been clearly established with large series of patients and good long-term follow-up¹⁰⁻¹². The merit of the minimally-invasive approach will be demonstrated with improved rates of recurrence, reduced risks of wound complications, and applicability of the technique for difficult patient populations.

TECHNIQUE

The technique of the laparoscopic ventral hernia repair (LVHR) is based on the open, preperitoneal repair described by Stoppa⁷ and Rives⁹. After general anesthesia is induced, the patient is positioned supine with the arms adducted at the patient's side allowing for adequate space for the surgeon and assistants. Two video monitors are placed on each side of the patient over the right and left shoulders. In the majority of cases, the bladder and stomach are decompressed with catheters and a first generation cephalosporin is given as a prophylactic antibiotic. We routinely use an Ioban drape to minimize mesh contact with the patient skin. Instruments used for LVHR include a 30-degree angled laparoscope, 5-mm bowel graspers, scissors, and clip appliers. Initial access to the peritoneal cavity is gained using a cut-down technique usually just inferior to the tip of the eleventh rib, usually on the left side (Figure 1). A total of three trocars are placed under direct vision laterally along the anterior to mid-axillary line with balloon-tipped trocars used if needed to avoid air leakage. Often, a fourth 5-mm port is placed contralaterally to facilitate mesh placement and fixation. Room setup and trocar positions are demonstrated in Figure 2. On entrance to the abdominal cavity, adhesiolysis is performed sharply with limited use of electrosurgery or ultrasonic coagulators. Reduction of the hernia is then performed using blunt graspers and sharp dissection and is facilitated by manual compression from the outside. Once the hernia is reduced, the defect is measured, often requiring the use of spinal needles, to determine the

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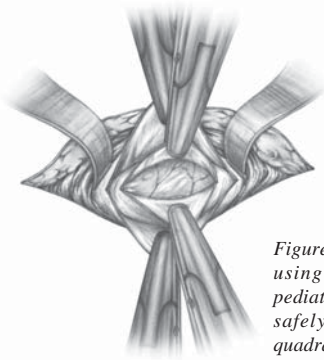


Figure 1. Access to the abdominal cavity using cut-down techniques utilizing pediatric Kocher clamps. This is usually safely accomplished in the left upper quadrant area.

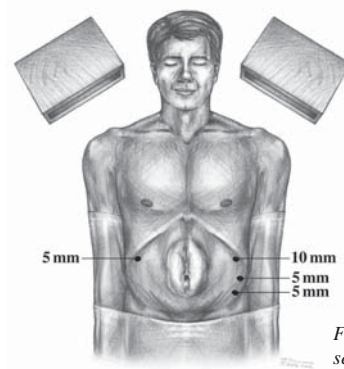


Figure 2. Patient positioning, room set-up, and our trocar strategy.

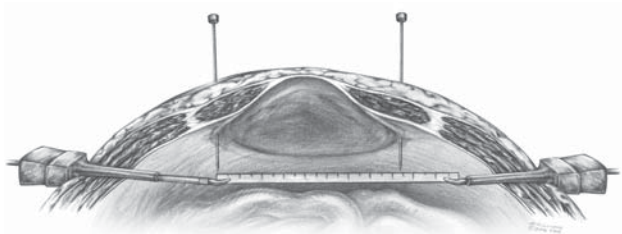


Figure 3. Intracorporeal (direct) measurement of a hernia defect. Spinal needles allow for more precise identification of the edges of the defect. Additional spinal needles may be used for larger than the length of the ruler (typically 12 cm).

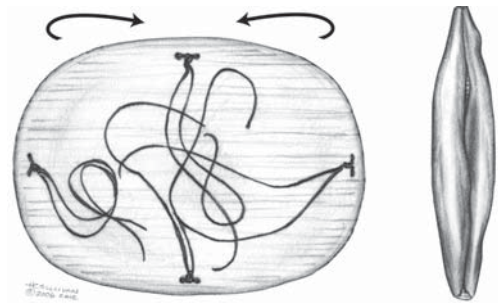


Figure 4. Rolling of the mesh before its introduction into the abdominal cavity.

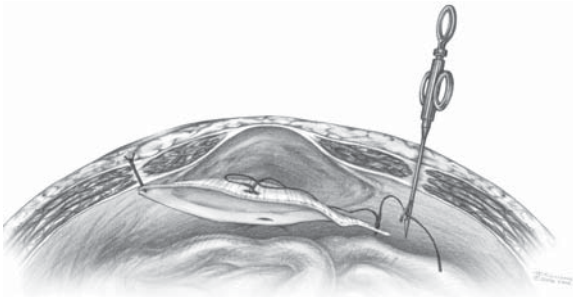


Figure 5. Initial four point mesh fixation.

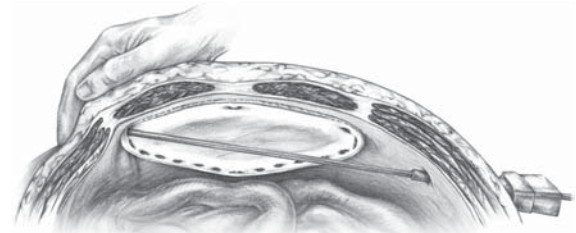


Figure 6. Placement of tacks is done circumferentially along the whole length of the mesh to avoid bowel incarceration. External palpation of the abdominal wall facilitates placement of the tacks and helps to avoid tacking the mesh below the inguinal ligament and above the costal margins.

appropriate size of mesh that is needed. A ruler placed through a 5-mm port is used to measure the dimensions and a mesh is then chosen that will allow at least a 4cm overlap circumferentially (Figure 3).

After the mesh is cut to the desirable size, four size zero permanent monofilament or ePTFE sutures are placed at the mid-point of each side of the mesh and marks are placed to orient the mesh. The mesh is then rolled up from both edges and placed through a 5- or 10-mm trocar (Figure 4). Two Maryland graspers are then used to unroll the mesh making sure to maintain proper orientation. The sutures are then pulled through the abdominal wall using a suture passer and a 4cm overlap of mesh is confirmed (Figure 5). Sutures are then brought up against the abdominal wall and tied with the knots buried in the subcutaneous tissue making sure to keep the mesh taut. The perimeter of the mesh is then stapled to the posterior fascia using a 5-mm spiral tacker at approximately 1 cm intervals (Figure 6). Additional full thickness sutures are placed circumferentially every 3 to 6 cm by using the suture passer. This

transabdominal fixation is crucial to ensure that the mesh will not be displaced over time. The knots are tied in the subcutaneous tissue and the skin is released to avoid dimpling.

OUTCOMES TALK

Recurrence: The rate of recurrence following hernia repair depends on many factors including type and technique of repair. In a recent review of the recent larger series with mean follow-up more than 12 months, the overall rate of recurrence for LVHR is 4.3%¹³. One of the most critical technical points of the laparoscopic repair that may significantly impact the rate of recurrence is the method of mesh fixation. While the most widespread technique used in LVHR utilizes transfascial sutures and tacks to adequately fixate the mesh, described above, some surgeons have tried to reduce operating time and possible postoperative discomfort by eliminating, or decreasing the use of transfascial sutures and relying on the laparoscopic tacker for fixation^{12,14}. Carbajo and associates¹² have the largest series without suture fixation with over 270 repairs

using two layers of tacks to fix the mesh, the so called “double-crown” technique. With an average follow-up of 44 months, they reported 12 recurrences (4.4%)¹². While this represents and acceptable recurrence rate, the authors believe that transfascial sutures remain essential for adequate mesh fixation.

The physics of mesh fixation during laparoscopic ventral hernia repair do not support the sole placement of tacks. The majority of meshes used for laparoscopic ventral hernia repair are roughly 1mm thick and the spiral tacks used are 4mm long and take up a 1mm profile on the surface of the patch. A perfectly placed tack can be expected to penetrate only 2mm beyond the mesh. With the large number of obese patients undergoing hernia repair and with the subsequent large amount of preperitoneal fat, it is unlikely that a 2mm purchase of tack will reach the fascia in most cases. The strength of transfascial sutures and tacks has been studied by our group and other authors^{15,16}. Van’t Riet and coauthors demonstrated in a porcine model that the tensile strength of sutures in transabdominal mesh is 2.5 times greater than that of tacks¹⁶.

Another recognized cause of recurrence following ventral hernia repair is a missed hernia. The laparoscopic approach affords the surgeon the ability to clearly and definitively define the margins of the hernia defect and to identify additional defects that may not have been clinically apparent preoperatively. Complete visualization of the fascia underlying the previous incision allows identification of smaller “Swiss-cheese” defects that could be missed in an open approach¹⁷.

Mesh Infection: One of the greatest benefits of the LVHR is the reduction in wound and mesh infectious complications. In open ventral hernia repairs wound problems are not unexpected secondary to the large amount of soft-tissue dissection required for retromuscular placement of large pieces of mesh. Dr. Stoppa reported a 12% “wound sepsis” rate in his classic article on inguinal and incisional hernia repairs⁷. While overall infectious complications are reported to be low, they remain a serious complication with severe consequences. Skin pathogens are responsible for most mesh infections and the use of an iodine-impregnated, adhesive drape on the abdomen may help in avoiding contact with the mesh to the skin. Infections of polypropylene mesh can usually be managed locally with surgical drainage and excision of exposed, unincorporated segments, while meshes containing expanded polytetrafluorethylene (ePTFE) typically require entire removal of the mesh prosthetic. There is one reported success, however, of local drainage of ePTFE and placement of a vacuum-assisted wound device¹⁸. When evaluating wound and mesh infectious complications from series with at least 50 patients the overall rate of occurrence is 1.7%¹³ (Table 1) and compares favorable to the reported range of 12% to 18% found after open hernia repair^{7, 8, 19, 20}.

Seroma: Seroma formation is not unique to the laparoscopic approach. Most seromas develop above the mesh and within the retained hernia sac. The rate of seroma formation in reported series varies depending on when the investigators evaluate for it. The mean incidence of seroma formation at a range of 4 to 8 weeks is 11.4% in the large reported series¹³ (Table 1). Whether these are aspirated under sterile condition or allowed to resolve, seromas rarely result in long-term problems. It is imperative that surgeons inform their patients preoperatively about the likelihood of a seroma and subsequent treatment entailed. Large seromas are fortunately

Table 1. Wound and mesh complications in large series of laparoscopic ventral hernia repairs (e”50 patients)

Name	Year	# pts	Seroma	Mesh Infection	Wound Infection	Fistula
Sanchez ³⁰	2004	85	8	0	0	0
Franklin ¹¹	2004	384	12	1	3	0
LeBlanc ²⁷	2003	200	15	4	0	0
Bower ²²	2003	100	1	2	0	0
Eid ¹⁴	2003	79	3	0	0	0
Bencini ¹²	2003	50	8	0	0	0
Carbajo ¹²	2003	270	32	0	0	1
Rosen ¹¹	2003	100	4	2	4	0
Heniford ²⁸	2003	850	21	6	9	0
Bageac ¹⁴	2002	159	22	0	4	2
Aura ³⁸	2002	86	2	0	0	0
Rafopoulos ³⁶	2002	50	7	1	2	0
Ben-Haim ³⁷	2002	100	11	0	0	0
Gilliam ³⁶	2002	100	3	0	0	0
Kirschstein ³⁹	2002	103	“most”	2	3	0
Berger ³⁶	2002	150	139	0	0	0
Birgisson ³⁸	2001	64	3	0	2	0
Chowbey ⁴¹	2000	202	49	0	5	0
Toy ⁴²	1998	144	23	2	3	0
OVERALL		3276	363 (11.4%)	20 (0.6%)	35 (1.1%)	3 (0.1%)

uncommon, however can place tension on the skin which can cause necrosis and be associated with risk of mesh infection. Aspiration is recommended for seromas that enlarge or persist before they reach these extremes¹⁰.

Persistent Pain : After laparoscopic ventral hernia repair, patients will occasionally complain of persistent pain and pint tenderness at a transabdominal suture site. Transabdominal suture site pain after laparoscopic ventral hernia is not uncommon and occurs in 1% to 3% of patients in the reported series using transabdominal sutures^{10,11,21,22} and typically resolves within 6 to 8 weeks²³. While little is known regarding the etiology of this pain, possible explanations include local muscle ischemia or that the transabdominal suture entraps an intercostal nerve as it courses through the abdominal muscles. The first line of treatment can be a course of nonsteroidal anti-inflammatory therapy or simply additional time. If the pain persists, injecting local anesthesia at the painful suture sites has good results. In a study conducted by the authors, 92% of patients undergoing treatment with an injection had complete relief of their symptoms²⁴.

Morbid Obesity: The morbidly obese population represents a significant portion of the patients that present for repair of a ventral hernia. Obesity has been clearly established as a risk factor for development of incisional hernias. Sugerman and colleagues reported that severe obesity (BMI e”35 kg/m²) was a greater risk factor for incisional hernia and recurrence than chronic steroid use²⁵. This group has shown that severely obese patients, and especially those with *central obesity*, have increased intraabdominal pressure²⁶. This higher pressure creates more strain on the mesh placed for the hernia repair, which is probably responsible for the increased incidence of *incisional hernia* and rate of recurrence following repair. The laparoscopic approach is ideal in the obese patient due to the smaller wounds and theoretically, decreased wound complications²⁷.

Complications of ventral herniorrhaphy such as wound infection and recurrence are elevated in the obese population. Laparoscopic ventral hernia repair can be safely performed in the morbidly obese

patient. The morbidly obese (BMI e'' 40) have significantly longer operative times, larger hernia defects, and higher rates of recurrence. Over a nine-year period, Heniford and colleagues demonstrated that this population was nearly four times more likely to have a recurrence after laparoscopic ventral hernia repair (7.8% versus 2.0%)¹⁰. Birgisson et al. reported an increase in operative times and defect sizes as well. In their experience, sixteen patients with a body mass index e'' 40 had 5 minor complications (31%) but no major complications or recurrences at a mean of 8.5 months²⁸.

PREVIOUS FAILED REPAIRS

The laparoscopic approach is an excellent choice for recurrent hernias that have failed prior attempts at repair. Laparoscopic entry into the peritoneal cavity avoids dissection through the previous operative site. This technique is ideal for patients with failed preperitoneal or onlay repairs using prosthetics because the dissection avoids disrupting these meshes and risking infection. However, the "battlefield abdomen" with numerous failed repairs and several pieces of mesh complicated by infection may be better served by an open repair. Multiple defects resulting in the "Swiss cheese" abdomen are well suited for laparoscopic hernioplasty. The intraabdominal view better identifies all of the defects and allows for better prosthetic coverage.

Patients with failed prior open attempts at repair demonstrate significantly longer operative times (134 minutes versus 111 minutes). Those with previous repairs have a higher rate of complications (17.8% versus 10.4%) and a greater than 3 times increased risk of hernia recurrence (7.1% versus 2.3%). The rate of conversions to open surgery is no different¹⁰. Patients with failed open repairs and previously placed intra-abdominal mesh frequently present for laparoscopic repair. In the larger series, those with prior repairs range from 21% to 34%^{10, 12, 21} and the number of previous repairs ranges from 1 to 11¹⁰. These patients are more technically challenging, but they can be safely treated with a laparoscopic approach to their recurrent defect.

QUALITY OF LIFE

Outcomes following hernia repair typically center around recurrence and infection rates. With improvement in these traditional outcomes more emphasis is now being placed on functional outcomes such as quality of life. We recently reviewed our preliminary data on quality of life outcomes of laparoscopic and open ventral hernia repairs. We found that at six months postoperatively, LVHR afforded a significantly better quality of life than open hernia repair using both a generic and hernia specific quality of life survey²⁹. Quality of life information will continue to be an important outcome measure in regards to hernia repair especially evaluating different types of mesh prosthesis and different techniques of repair.

CONCLUSION

Laparoscopic repair of incisional hernias results in a low rate of conversion to open surgery, a short hospital stay, and an acceptable overall complication rate. Additionally, the procedure results in extremely low risk of infection and a low risk of recurrence. The laparoscopic approach appears to be effective in complex patients, especially those who are obese and who have had failed prior open repairs. With sufficient long term follow-up to support the durability of the procedure, laparoscopic ventral hernia repair should be considered the standard of care.

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RECURRENCE IN ENDOSCOPIC TOTAL EXTRAPERITONEAL REPAIR (TEP)

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Abstract: The success for any hernia surgery is based on its recurrence rate. Two principles proved to decrease the recurrence rate currently in practice are: 1. Tensionless repair, 2. prosthetic repair. Both principles apply in endoscopic groin hernia repair. The incidence of recurrence following endoscopic groin hernia repair is comparable and even better to current established open hernia repairs. Recurrences however do occur and are more often early recurrences reported immediately after surgery to 1-1/2 years following endoscopic groin hernia repair.

We began endoscopic total extraperitoneal repair for groin hernias in our surgical practice in 1994. During 1994-2006 we have performed 4063 repairs with 12 recurrences reported on follow - up period of 12 years. During this period we had an average follow up of 82%. Mean follow - up period was 2.6 years. On critically evaluating the cause of recurrence, the following observations were made: a) Three hernias recurred as a result of a small mesh; b) In 2 recurrences, rolling of the medial margin of mesh was the cause of recurrence; c) In 5 recurrences, improper placement of mesh was the underlying cause. d) In 2 patients, the hernia was missed.

Preventive measures were subsequently proposed and incorporated into our protocol with a further decrease in recurrence rate reported in the last 2 years. The causes and prevention of hernia recurrence following endoscopic total extraperitoneal mesh repair will be discussed in detail.

INTRODUCTION

Endoscopic total extraperitoneal repair (TEP) for treatment of inguinal hernia was first described by Dulucq et al followed by Mc Kernan and Laws in early 1990 and reported by Schultz¹. The main advantage of TEP approach is that entire dissection is done in extraperitoneal space without transgressing into abdominal cavity. Laparoscopic groin hernia repair totally reinforces the myopectineal orifice of Fruchaud.

RECURRENCE IN TEP

Most important end point of any hernia surgery is the rate of recurrence. Several studies have focussed on causes of recurrence after endoscopic hernia repair. Some surgeons have cited early displacement, folding or invagination of mesh during early postoperative period². Lowan et al have reported factors leading to recurrence including surgeons inexperience, inadequate dissection, insufficient prosthesis, overlap of hernial defects, improper fixation, folding and twisting of prosthesis, missed hernias and mesh lifting secondary haematoma formation³.

Recurrence after TEP has been reported to be as low as 0.4%⁴. Phillips EH et al have reported recurrence in patients with small mesh size (6 x 10 cm)⁵. Here we present our experience of more than a decade of TEP repair and lessons learnt regarding causes of recurrence.

ABOUT SIR GANGA RAM HOSPITAL (SGRH)

The Minimal Access & Bariatric Surgery Centre at Sir Ganga Ram Hospital, the first of its kind in the subcontinent, was founded in 1996 to exclusively focus on evaluation, development and expansion of procedures and techniques in minimal access or key hole surgery. Minimal Access Surgery (MAS) introduced a

sweeping revolution in surgical practice ever since its dramatic entry more than a decade ago. We perform more than 2500 basic and advanced laparoscopic surgeries per year including about 500 endoscopic hernia repairs.

Factors influencing recurrence are:

- Patient related
- Equipment related
- Surgeon related
- Technique related

Patient related factors

Improper patient selection in early period of experience may become leading cause of increased recurrence.

We have proposed a classification system based on expected level of intraoperative difficulty of endoscopic hernia repair. This functional classification grades groin hernias according to preoperative predictive level of difficulty of endoscopic surgery.

SGRH CLASSIFICATION FOR TEP REPAIR

Grade I

● Small, direct, reducible hernia

- Swelling appears on coughing / straining & disappears on lying down
- Finger breadth-size defect in the functional direct floor (Hesselbach triangle)
- Endoscopically – minimal dissection of sac from fascia transversalis is required.

Grade II

● Small, indirect, incomplete, reducible hernia

- Hernial swelling limited to inguinal canal
- Endoscopically – The sac can be reduced completely and may not require transection or ligation
- Moderate-size direct hernia
- Swelling is present in standing and reduces in the

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supine position

- Thumb-sized defect in the direct floor
- Endoscopically, the sac needs to be dissected off from the fascia transversalis
- **Reducible femoral hernia**

Grade III

● Moderate size indirect reducible inguinal hernia

- Hernial swelling (sac) extends beyond superficial ring, up to the neck of scrotum but does not descend to the testis
- Endoscopically – This type of hernia will require transection of sac and ligation of its proximal part of sac.

● Large reducible direct hernia

- Involvement of the entire direct floor
 - Big bulge on clinical examination over the triangle of Hesselbach
- Endoscopically, creation of space in the midline is difficult. There is anatomical distortion – stretching and lateral displacement of inferior epigastric vessel.

● Recurrent groin hernia

- Endoscopically – difficult dissection in region of spermatic cord and the space lateral to it.

Use two separate meshes for bilateral hernias

Grade IV

● Large reducible indirect inguino scrotal hernia

- Large sac extending up to the testis. The testis can not be palpated separately from hernia in erect position
- The sac may contain omentum or small bowel, which require manual reduction in supine position
- Endoscopically – The internal ring is enlarged with a wide mouthed sac. There is difficulty in dissecting sac from cord structures. Medial displacement and stretching of the inferior epigastric vessels may occur. Inadvertent opening of peritoneum may lead to pneumoperitoneum and dissection of sac becomes difficult.
- There is higher incidence of post-operative seroma / haematoma because of traction on sac.
- The chances of damage to the cord structures are increased.

Grade V

● Large, complete, indirect inguinal hernia, which is only partially reducible or irreducible

● Irreducible femoral hernia

- The sliding component includes the bowel or bladder
- Endoscopically the sac is bulky. There are adhesions between contents of the sac and sac wall. The sac often needs to be opened and the contents reduced laparoscopically. Injury to the contents (bowel, bladder & omentum) while reducing them is likely.

No suture or tacks below iliopubic tract – AVOID NEURALGIA

A Beginner should operate	A Beginner should not operate
<ul style="list-style-type: none"> • Patient with small direct hernias. (Grade 1) 	<ul style="list-style-type: none"> • Patient with obstructed hernia. (Grade 5)
<ul style="list-style-type: none"> • Patient with incomplete indirect sacs. (Grade 2) 	<ul style="list-style-type: none"> • Patient with complete irreducible hernias. (Grade 5)
<ul style="list-style-type: none"> • Patients fit for general anaesthesia. 	<ul style="list-style-type: none"> • Obese patient
<ul style="list-style-type: none"> • Patients who can safely withstand longer duration of surgery 	<ul style="list-style-type: none"> • Patient unfit for general anaesthesia.

Equipment related factors

- The core equipment required for any laparoscopic procedure is the endovision system, which consists of the telescope, endovision camera, light source, fibreoptic cable and video monitor.
- Better vision results in better surgery.
- We recommended use of a 3 chip camera and a 10mm 30° Telescope.
- Poor vision can lead to surgical difficulties and complications.
- An electronic insufflator is necessary for all laparoscopic surgeries but for an extraperitoneal hernia repair, high capacity insufflator i.e. 18-30l / min is required because of small working space and loss of space when pneumoperitoneum occurs.

Surgeon related factors

- There is no question that the endoscopic approach is difficult and intense study is required to master this technique⁶, but if appropriate skills are achieved, the reported results are excellent, reproducible and quite different from those reported by inexperienced surgeons⁷.

Before attempting the endoscopic repair of complex or bilateral hernias a surgeon must learn the endoscopic anatomy and technique by repairing simple ones. The learning curve can be steep and sometimes prolonged but with proper instruction and supervision operative times can become short and equal to open approaches, with comparable results.

- In the hands of experienced surgeons beyond the learning curve, time for laparoscopic repairs are usually equal to or even shorter than times reported for open repairs⁸. Hernia surgery should only be attempted after adequate experience of minimum of 50 to 100 basic laparoscopic procedures.

TECHNIQUE RELATED FACTORS

- Most important endpoint of any hernia surgery is the rate of recurrence. It is the single most important factor which judges all repair methods. Several studies have focussed on causes of recurrence after laparoscopic hernia repair.
- Good understanding of endoscopic anatomy of

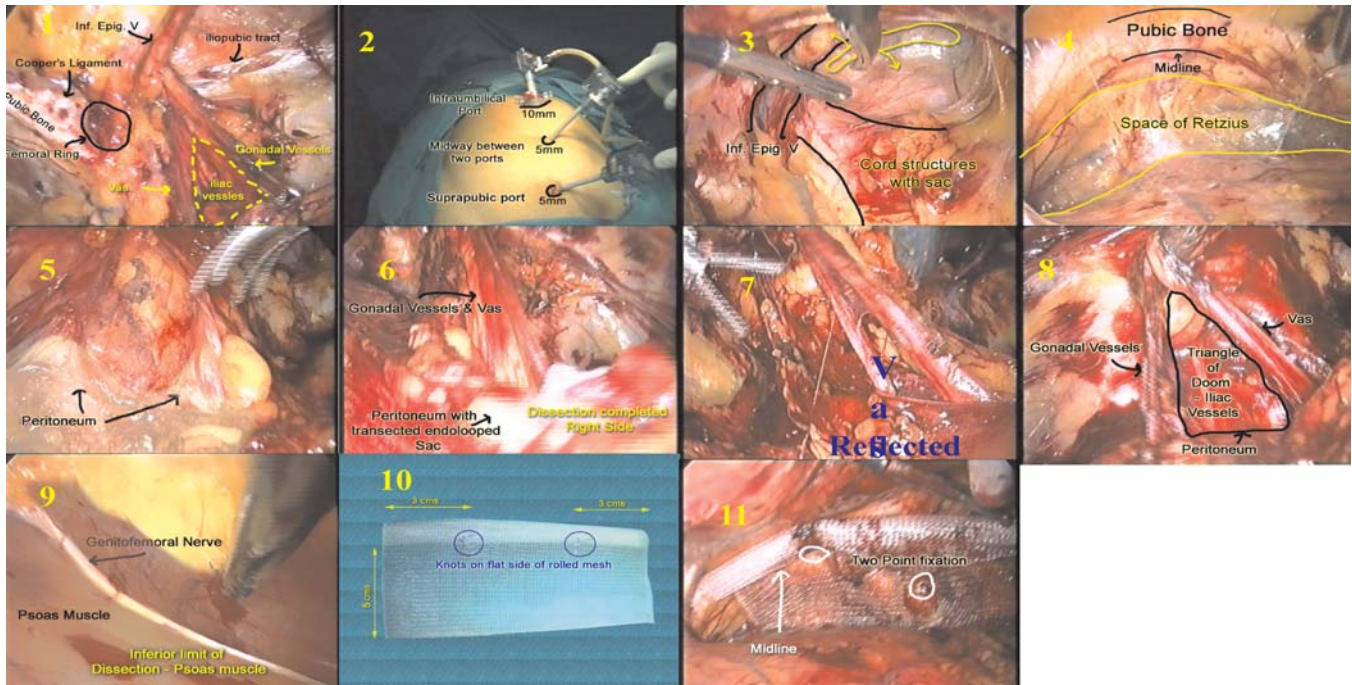


Fig. 1 Dissected preperitoneal space for right inguinal TEP repair
 Fig. 2 Port sites for B/L TEP repair for inguinal hernia
 Fig. 3 Use of sharp dissection for creation of preperitoneal space lateral to inferior epigastric vessels
 Fig. 4 Pubic bone and retro-pubic space in the midline

Fig. 5 Peritoneal knuckles attached with loose areolar tissue
 Fig. 6 & 7 Complete parietalization of spermatic cord structures
 Fig. 8 Triangle of doom
 Fig. 9 Inferior limit of dissection – psoas muscle
 Fig. 10 SGRH technique of rolling the mesh
 Fig. 11 Placement of rolled mesh using two point fixation

preperitoneal space is an important prerequisite for performing endoscopic total extraperitoneal repair for groin hernia. It is a potential space created between fascia transversalis above and peritoneum below [Fig. 1].

- The lateral extent is from one anterior superior iliac spine to the other. The region which marks site of femoral and inguinal hernias lies within a quadrangle known as myopectineal orifice of Fruchaud.
- The anatomical space includes the preperitoneal space of Bogros and Retzuis and endoscopic view is in horizontal plane from level of umbilicus.

Laying the mesh on the roof and not the floor - AIDS IN BETTER PLACEMENT OF MESH

- Creation of preperitoneal space is an important step and all precautions should be taken. An infraumbilical, transverse 12- mm incision is made on anterior rectus to avoid inadvertent opening of peritoneum. A space is created and balloon is introduced and inflated with 100 – 150 ml saline. The balloon is made by tying two fingerstalls of size 8 latex surgical gloves on 5 mm laparoscopic suction cannula and hassan’s trocar is introduced. Accessory ports which are 5 mm should be put in midline under vision to avoid haemorrhage and

injury to bladder [Fig. 2].

- Injury to peritoneum during trocar insertion can lead to pneumoperitoneum with decrease in working space. The urinary bladder should be kept empty at the time of surgery.
- Sharp dissection is done with use of short burst of cautery, which helps in creating adequate space and ensuring proper haemostasis. This space has loose areolar tissue, and blunt dissection can lead to staining of tissue[Fig. 3].
- First structure to identify is the pubic bone and next is the cooper’s ligament which may get occluded by direct hernial sac[Fig. 4].
- Even in cases of direct inguinal hernia, an indirect sac should be looked for along cord structures and treated. In indirect hernia, sac should be separated from cord structures, reduced/ ligated & cut.

Use large mesh (15 x 12 cm) – MESH SHRINKS POST OPERATIVELY

- Dissection should be done closer to deep ring.
- In case of direct inguinal hernia after reduction of inguinal hernia sac, margins of defect should be free of all adhesions otherwise peritoneum can slide along

adhesions and cause recurrence[Fig. 5].

- The peritoneum should be well reflected proximally from cord structures and complete parietalization should be done[Fig. 6&7].
- Indirect sac should be transected in case of complete inguinal hernia and occluded using endloop or free suture tie, to avoid pneumoperitoneum.
- No dissection should be done in triangle of doom[Fig. 8]. Lateral limit of dissection is anterior superior iliac spine and psoas muscle, avoiding injury to cutaneous nerves (genitofemoral N., Latreal cutaneous N. of thigh) [Fig. 9].
- The minimum size of mesh to avoid recurrence is 15 cm x 12 cm.
- To handle a mesh of this size in restricted preperitoneal space is not easy. Thus we have developed a technique of introducing a rolled mesh in this space for easy handling and accurate fixation. The mesh is rolled like a carpet to 2/3 of its length leaving five cm free and stay sutures are tied using absorbable sutures 3 cm away from margins to keep the rolled mesh in position[Fig. 10]. The rolled mesh is introduced through 10-mm subumbilical port and free margin of mesh is pushed into retropubic space medially and psoas muscle laterally.
- A two-point fixation at cooper's ligament should be done to prevent migration. In case of large deep inguinal ring, lateral fixation should be done above iliopubic tract[Fig. 11].
- After cutting the stay sutures mesh is unrolled to lie within the preperitoneal space and none of the edges of the mesh should be partially rolled at the time of exsufflation as this may lead to further rolling and the likelihood of future recurrence of hernia.

**Post-operative Bulge may be seroma or haematoma –
WAIT AND WATCH**

CONCLUSION

In the current analysis of 23 trials comparing TEP repair with open mesh and sutured repairs, only one trial⁹ reported a significant difference in the number of recurrences¹⁰. Among 994 patients undergoing inguinal hernia repair, a lower recurrence rate after TEP than after open hernia surgery using various techniques was observed. None of the other trials showed any significant differences in the recurrence rates.

We began endoscopic TEP repairs for groin hernias in year 1994. Till 2006 we have performed 4063 repairs with 12 recurrences reported on follow-up of 12 years. During this period we had a follow up of 82% with mean follow up period of 2.6 years.

The observations and recommendations made in this article are following our experience of more than 4000 cases over a decade.

**Adequate dissection, complete coverage of myopectineal orifice and proper fixation -
MUST FOR ENDOSCOPIC INGUINAL HERNIA REPAIR**

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Conference News

13th ANNUAL INTERNATIONAL CONFERENCE of INDIAN ACADEMY OF ECHOCARDIOGRAPHY will be on **February 8 -10 , 2008 at Ashoka Hotel, New Delhi (India)**

SCIENTIFIC HIGHLIGHTS OF CONFERENCE

Stress on clinical echocardiography with emphasis on role in management issues; Lectures to cater to all levels of echocardiographers & cardiologists; Meet the expert sessions with active interaction with faculty; Interesting live workshops; Daily sessions on interesting case studies; Young Investigator award session; Orations of general interest for participants; **Natesa G Pandian Gold Medal For Best Case Presenter:** (a) The award is applicable to members of IAE (b) age of the presenter must be below 45 years (c) presentation time will be 8 mins (d) the relevant CD containing brief history, relevant investigations, well edited echo images and final diagnosis must be sent to HQ, IAE by 30 November, 2007. (e) 10 best cases will be selected and the presenters will be informed by 31st December, 2007; Free paper sessions will be encouraged; An excellent scientific program of practical importance will be presented;

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PRESENT STATUS OF LAPAROSCOPIC PANCREATIC SURGERY

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Abstract : Pancreatic surgery has higher morbidity and mortality than other forms of gastrointestinal tract surgery because of problems like pancreatic fistula and loss of pancreatic function. However, advances in laparoscopic techniques and equipment have expanded the role of laparoscopic surgery to a degree that could not have been imagined like as Whipple's procedure. This review discusses the current status of laparoscopic pancreatic surgery and the role of the procedures involved, i.e., laparoscopic pancreatic resection, pancreatic cancer staging and diagnosis, and laparoscopic applications for the treatment of pancreatitis. Recent reports on laparoscopic surgery of the pancreas are encouraging and support the advantages of laparoscopy. We consider that well selected enucleation and laparoscopic distal pancreatectomy, with or without spleen preservation, are acceptable and recommendable for the treatment of benign or low malignant diseases of the pancreas. Moreover, surgeons and the laparoscopic industry have developed new techniques and devices that increase convenience, ease, and the safety of complicated laparoscopic surgeries, and these efforts will undoubtedly increase the role of laparoscopic or minimal invasive surgery for the treatment of pancreatic disease.

INTRODUCTION

Pancreatic surgery has higher morbidity and mortality than other forms of gastrointestinal tract surgery, due to associated problems like pancreatic fistula formation and loss of pancreatic function. Until recently laparoscopic surgery of the pancreas was limited to laparoscopic staging or to the evaluation of periampullary cancer for detecting small metastatic nodules or local invasion.^{1,2}

Advances in laparoscopic techniques and instrumentation have expanded the role of laparoscopic surgery to a degree that could not have been imagined like as Whipple's procedure.³

This review discusses the current status of the laparoscopic pancreatic surgery and the role of its associated procedures for the treatment of pancreatic disease.

PANCREATIC RESECTION

1. Distal pancreatectomy

Although laparoscopic pancreatic surgery is considered to be an advanced and demanding procedure, many surgeons have tried laparoscopic distal pancreatectomy due to its technical simplicity and its avoidance of the need for anastomosis as compared with other difficult pancreatectomy.⁴⁻¹⁸ The most desirable and acceptable indication of laparoscopic distal pancreatectomy is chronic pancreatitis and benign/low grade malignant lesions of pancreas.

Over 200 cases of laparoscopic distal pancreatectomy have been reported in the English literature, largely in association

with the treatment of benign or low malignant diseases of the pancreas. Laparoscopic distal pancreatectomy has been associated with reductions in blood loss, morbidity, and hospital stay and much improved cosmetic results as compared with open surgery.(Table 1) However, the role of laparoscopic distal pancreatectomy for the treatment of malignancy remains controversial. Although the short-term results of the limited number of laparoscopic distal pancreatectomies reported to date appear favorable, at least in cases of benign or borderline malignancy.⁴

Table 1. Published articles (with over 10 cases) on laparoscopic distal pancreatectomy¹³⁻¹⁸

Author (year)	Number of patients	Morbidity (%)	Distal pancreatectomy with splenectomy (%)	Spleen-preserving distal pancreatectomy (%)
Patterson et al. (2001)	15	26%	12 (80%)	3 (20%)
Park and Heniford (2002)	23	17.4%	11 (48%)	12 (52%)
Fabre et al. (2002)	13	30.7%	3 (23%)	10 (77%)
Edwin et al. (2004)	17	38%	12 (71%)	5 (29%)
Dulucq et al. (2005)	21	23%	5 (23.8%)	16 (76.2%)
Mabrut et al. (2005)				
-European multicenter study-	82	32.6%	24 (29.2%)	58 (70.8%)
Our series (submitted in Surg Endosc)	31	35.4%	18(58%)	13(42%)

Between 2000 and 2006, we performed 31 laparoscopic distal pancreatectomies in our department. The most common indication for laparoscopic distal pancreatectomy was a cystic pancreatic tumor, e.g., a mucinous cystic neoplasm or a solid pseudopapillary neoplasm. (Table 2) When we compared the clinical results of laparoscopic surgery by

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Table 2. Clinicopathological characteristics of our laparoscopic distal pancreatectomy cases

	Laparoscopic DP (n=31)	Open DP (n=62)	p-value
Age	46.7±16.7	47.5±14.9	0.821
BMI (kg/m ²)	22.2±2.2	23.0±3.4	0.233
Size (cm)	3.95±2.3	6.15±4.1	0.006
Pathology			1.000
MCN	8	16	
SPN	7	14	
IPMN	6	12	
SCA	4	9	
Islet cell tumor	2	3	
*Etc.	4	8	
Malignancy			0.079
Benign	16	22	
Borderline	12	35	
Malignancy	3	4	

Abbreviations : MCN=mucinous cystic neoplasm, SPN=solid pseudopapillary neoplasm, IPMN= intraductal papillary mucinous neoplasm, SCA=serous cystadenoma.

*, pancreatic pseudocyst (3), lymphoepithelial cyst (2), acinar cell tumor (2), pancreatic endocrine carcinoma (1), SPEN (1), cystic lymphangioma (1), insulinoma (1), endocrine tumor (1)

age and sex and with pathologic diagnosis-matched open surgery results (n=62), no statistical differences were found in terms of operation time, morbidity, or recurrence. (Table 2) However, differences between mean lengths of hospital stay and mean hospital charges were statistically significant. Mean length of hospital stay was shorter in the laparoscopic group than in the open surgery group (11.5 vs. 13.5, $p=0.04$), whereas mean hospital charge in the laparoscopic group was more expensive (USD 4884 vs. 3401, $p<0.001$) (Table 3). No mortality occurred in either group.

We conclude that laparoscopic distal pancreatectomy is a safe and feasible equivalent to open distal pancreatectomy in terms of early and late outcome for benign and borderline lesions of pancreas. Moreover, high hospital charges are offset cosmetic results and early functional recovery.

Spleen preservation and method of preservation are important issues of laparoscopic distal pancreatectomy, and surgeons showed diverse surgical method preferences. (Table 1) Spleen-preserving distal pancreatectomy was introduced by Mallet, et al in 1943,⁵ and as knowledge of the immunologic role of the spleen has increased, so efforts have intensified to conserve the organ.^{6,7} Two techniques are employed during spleen-preserving operations. The first involves splenic artery and vein transection such that the left gastroepiploic vessels and short left gastric vessels

will supply the spleen (Warshaw's technique),⁸ whereas in the second the splenic artery and vein are preserved. This second method demands more advanced instrumentation and skill in terms of dividing the transverse branch of splenic vessels, whereas the former technique is usually selected for laparoscopic surgery because of its technical accessibility and shorter operative time.^{9,10} However, this technique may result in splenic infarction and splenic abscess formation due to insufficient blood flow to the spleen.^{11,12}

In our series, 13 patients underwent laparoscopic spleen-preserving distal pancreatectomy and splenic vessels were mostly preserved. (Figure 1)(Table 4) The rate of complication was 30.7%, but no splenic infarction or

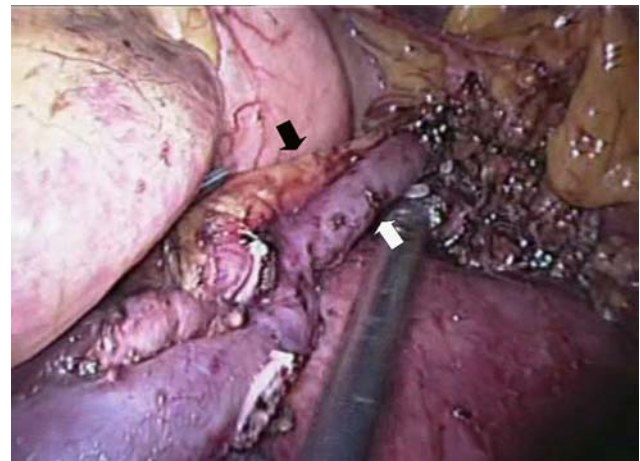


Figure 1. Laparoscopic spleen preserving distal pancreatectomy. Black arrow: preserved splenic artery
White arrow: preserved splenic vein

Table 3. Perioperative outcomes of laparoscopic and open distal pancreatectomy at our center.

	Laparoscopic DP (n=31)	Open DP (n=62)	p-value
OP time (min)	217.7±55.8	194.8±63.7	0.093
Transfusion (yes)	1	7	0.261
Postoperative hospital stay (days)	11.5±4.1	13.5±4.9	0.049
Complication			
Total	11	12	0.167
Pancreatic leakage	4	5	
Fluid collection	6	3	
Others	1	4	
Mortality	0	0	1.000
Recurrence	0	1	1.000
Cost (US dollar)	4884.2±1845.1	3401.4±1247.5	<0.001

Table 4. Perioperative outcomes: Spleen sacrificing vs. preserving laparoscopic distal pancreatectomy

	Spleen-sacrificing LDP (n=18)	Spleen-preserving LDP (n=13)	p-value
OP time (min)	193.9±53.0	250.8±42.1	0.020
Transfusion (yes)	0	1	0.419
Postoperative hospital stay (days)	11.3±4.30	11.7±3.92	0.782
Complication			1.000
Total	7	4	
Pancreatic leakage	2	1	
Fluid collection	5	2	
Others	0	1*	
Mortality	0	0	1.000
Recurrence	0	1	0.419
Cost (US dollars)	4,240.1±1364.6	5,600.8±2210.1	0.740

abscess was encountered. The only difference noted between the spleen-preserving group and the spleen-sacrificing group was operation time. Therefore, we conclude that spleen-preserving laparoscopic distal pancreatectomy is a technically feasible procedure, although it requires more operative time.

2. Pancreatoduodenectomy

Laparoscopic pancreatoduodenectomy is a technically challenging but feasible procedure.^{14, 19}

Our group described several of pancreatoduodenectomy for a low grade malignancy lesion of the pancreatic head.²⁰ However, a lack of tactile sensation, difficulties localizing lesions, and the anatomic complexity of peripancreatic organs combined to make laparoscopic pancreatoduodenectomy difficult.²¹

Even Dr. Gagner, the initiator of laparoscopic pancreatoduodenectomy, concluded that this procedure offers no advantage in terms of patient outcome and may be associated with increased morbidity.²² Nevertheless, laparoscopic experience has allowed some surgeons to claim promising results for laparoscopic pancreatoduodenectomy.^{17,23}

However, this operation has many pitfalls, because pancreatoduodenectomy requires meticulous anastomosis to reduce morbidities associated with pancreatic leakage, and adequate dissection to remove diseased tissue. On the other hand, it can be expected that technical advances, like robotic surgery, will continue to make pancreatoduodenectomy by minimal invasive surgery more feasible and safe.

3. Other miscellaneous pancreatectomy or palliative procedures

Enucleation is the second most common procedure conducted using laparoscopic pancreatectomy. According to a review by Tagaya et al,²⁴ laparoscopic enucleation has

been used to treat relatively small benign or low grade malignancies (<2 cm in diameter), e.g., islet cell tumors and tumors located on the surface of the pancreas removed from the pancreatic duct. Tumor location is an important success factor of laparoscopic enucleation, and some advocate that enucleation is a safe and simple procedure under laparoscopic ultrasonographic guidance.²⁵ The enucleation of pancreatic cystic tumors offers the possibility of complete tumor removal without loss of pancreatic parenchyma, possible diabetes, and splenectomy. However, enucleation seems to be a debatable procedure in patients with pancreas cystic tumors, and does not address the malignant potential of these tumors, and thus, should be used cautiously in selected cases to avoid inadequate tumor margins.¹² In addition, the incidence of pancreatic fistula after tumor enucleation has been reported to be 30% to 75%, which is relatively higher than that of conventional pancreatectomy.²⁶⁻²⁸ Moreover, considerations of oncological and operational safety require that surgeons exercise caution when selecting indications for laparoscopic enucleation.

Some pioneers have developed more intricate procedure like laparoscopic central pancreatectomy and ventral pancreatectomy.²⁹ Laparoscopy may also be used in a palliative context for locally invasive or metastatic pancreatic/periampullary cancers. Many patients with periampullary cancer have symptoms associated with biliary or gastric outlet obstruction, and traditionally these patients have been managed by open bypass surgery.⁴ More recently, however, minimally invasive laparoscopic approaches to gastric and biliary bypass have been successfully applied, and have been shown by non-randomized comparative studies to be safer and to be associated with reduced periods of hospitalization than open surgery.³⁰⁻³³

However, although endoscopic procedures for palliative treatment have been enormously developed and have achieved early success rates for endoscopic stent which is comparable to those of surgery with reduced morbidity and hospital stays, the long-term results of endoscopic procedures are not as satisfactory.³⁴ Thus, randomized comparisons of laparoscopic biliary bypass and metal biliary stents in unresectable periampullary cancer are warranted.

LAPAROSCOPIC DIAGNOSIS/STAGING

Laparoscopic diagnosis and staging are controversial in patients with suspected pancreatic cancer. Its main role is to detect occult intra-abdominal metastatic disease, though during the procedure any suspicious lesion can be biopsied and peritoneal cytology can also be obtained by instilling normal saline into the peritoneum.³⁵⁻³⁷

The yield of laparoscopy for the detection of metastatic disease, especially of small peritoneal lesions not been detected by imaging modalities, ranges from 15 to 46%.³⁸⁻⁴² Moreover, recent studies have showed lower yields for

laparoscopy than for improved non invasive imaging modalities like multi detector CT. The yield of laparoscopy alone is clearly impaired by its inability to detect locally advanced or intra-parenchymal liver disease. To overcome this obvious limitation, laparoscopic ultrasound has been added to laparoscopic staging, and this leads to a marked increase in yield and accuracy.³⁵ Studies that have compared laparoscopy and laparoscopic ultrasound with radiological staging modalities have produced controversial results. However, several studies have found that laparoscopy and laparoscopic ultrasound are more accurate than contrast-enhanced CT at determining T Stage.^{43,44}

In contrast, three recent large studies using contrast-enhanced multi-detector CT imaging as a baseline radiological investigation were unable to confirm this, and found yields as low as 10-15% and accuracies of 35-56% for laparoscopy.^{45,46} Despite the use of a pre-operative staging algorithm including laparoscopic ultrasound, up to 20% of patients were still found to be unresectable at the time of laparotomy, mainly because of local invasion.⁴⁷ Moreover, as diagnostic yields have effectively fallen, due to improvements in non-invasive imaging, the additional costs of laparoscopy have been called into question, particularly since it requires separate anesthesia. Thus, at present, laparoscopy has a limited role in the staging of pancreatic malignancies.³⁵

LAPAROSCOPIC APPLICATION TO PANCREATITIS

The role of surgery in the management of acute pancreatitis is markedly reduced because less invasive intervention and intensive medical care are evolved. Although some clinicians advocate a non surgical approach even in cases of infected necrotizing pancreatitis, due to the improved results of medical or interventional treatment,⁴⁸ current indications for surgery in pancreatitis are infected necrotizing pancreatitis, an organizing pseudocyst, or related complications.

The treatment of infected necrosis has changed dramatically during the last few years, and a multimodality approach has emerged, whereby a combination of several techniques are used in a single patient, and the risks of intervention are weighed against the need for adequate sepsis control.⁴⁹

Minimally invasive surgery has consistently been shown to be associated with reduced inflammatory response activation than equivalent open surgery, and some evidence suggests that local sepsis and inflammatory response may also be lessened by minimally invasive rather. It has been suggested that by minimizing the massive inflammatory injury associated with open pancreatic necrosectomy, a minimally invasive approach to the management of infected pancreatic necrosis may lessen the risk of multiple organ failure, and reduce respiratory and wound morbidity in necrotizing pancreatitis.^{49,50}

The laparoscopic approach depends on the localization of pancreatic necrosis. The alternatives are an intraperitoneal approach, direct entry of the retroperitoneal space, and an intraperitoneal transgastric approach. Our group experienced three successful cases of laparoscopic necrosectomy using a multiple approach technique for necrotizing pancreatitis. (Figure 2) The potential benefits of minimal invasive techniques have yet to be proven, because of a sparsity of reports that deal with severely ill patients, and thus, the superiority or inferiority of laparoscopic over endoscopic or radiologic intervention must be proved by randomized prospective study.

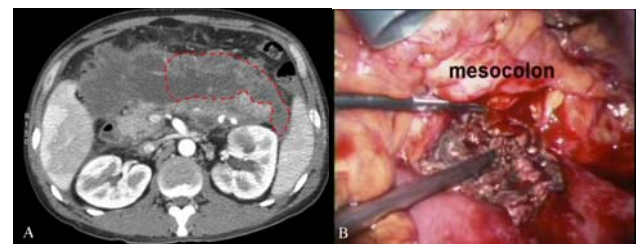


Figure2. A 30 year old man, with severe necrotizing pancreatitis.

(A) CT shows severe necrosis around pancreas. Demarcated area was approached and debrided using the transmesocolic method (B), the other was approached using a transgastric or extrapancreatic approach

The management of pancreatic pseudocyst complicated acute or chronic pancreatitis represents another important role of laparoscopy in pancreatitis. Pseudocysts complicate 5-10% of acute pancreatitis attacks and often arise as a result of disruption of the pancreatic duct in the presence of gland necrosis. Large (≥ 6 cm diameter), persistent (≥ 6 weeks), and symptomatic pseudocysts are indications for drainage, which is best achieved endoscopically or surgically.⁴

Endoscopic transmural (transgastric or transduodenal) drainage may be possible in some patients with pancreatic pseudocysts, and is best reserved for pseudocysts that complicate chronic pancreatitis (rather than acute pancreatitis) in the head or body of the gland, and those with a wall thickness of < 1 cm.⁵¹ Surgery remains the gold standard for the management of large, persistent and symptomatic pseudocysts. Internal drainage is conventionally achieved through a pseudocyst-gastrostomy or pseudocyst-jejunostomy, procedures that are now safely and effectively accomplished laparoscopically.⁴ Transgastric (via anterior gastrostomy),⁵² endogastric,^{53, 54} a posterior approach through the lesser sac, and Roux-en-Y pseudocyst-jejunostomy have been described.⁵⁵ Although reported cases of laparoscopic management of pseudocysts are limited, the data presented is promising, and support the advantages of a relatively short postoperative hospital stay and rapid recovery.⁵²⁻⁵⁵

Because no randomized controlled trial has compared the laparoscopic, open approaches and endoscopic procedures

in terms of the internal drainage of pseudocysts, it is impossible to clarify which provides the most effective treatment for patients with pseudocysts in different situations.

CONCLUSION

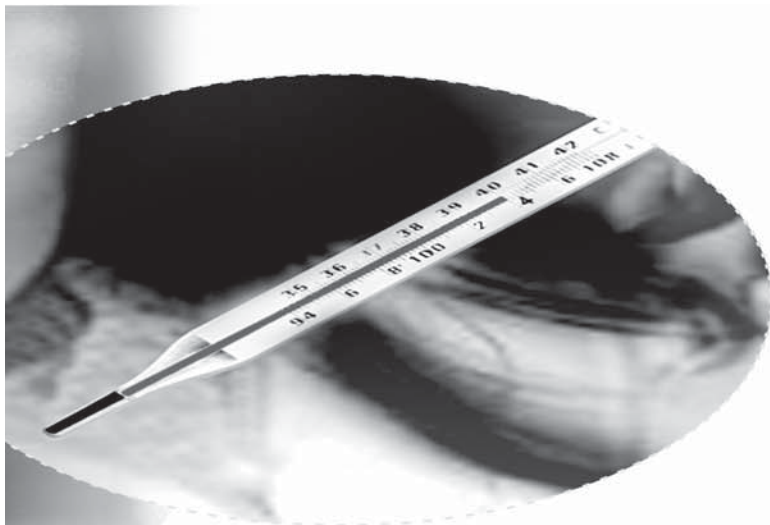
The anatomical complexity of the pancreas and high postoperative morbidity have hindered evaluations of laparoscopic surgery with respect to early functional recovery, and thus, have probably retarded the adoption of laparoscopic surgery for the management of pancreatic diseases. Nevertheless, recent reports on pancreatic laparoscopic surgery are encouraging and maintain consensus option concerning the merits of the technique. The authors believe that well selected cases of enucleation and laparoscopic distal pancreatectomy with or without spleen preservation are currently both acceptable and recommendable for the treatment of benign or low malignant diseases of pancreas. Most reports on advanced laparoscopic pancreatectomy have concluded that these procedures are feasible and safe when conducted by skilled laparoscopic surgeons. However, technical feasibility does not obviate sound clinical judgment, and caution should be exercised before new technologies are adopted in the absence of well designed clinical trials.⁵⁶

However many surgeons and the laparoscopic industry have developed new techniques and devices that are more convenient and increase the safety of laparoscopic surgery, and their efforts will undoubtedly increase the role of laparoscopic or minimal invasive surgery for the treatment of pancreatic disease.

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MINIMALLY INVASIVE COLORECTAL SURGERY

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Abstract : The addition of laparoscopy in the armamentarium of surgeons dealing with surgical conditions of the abdomen led to the appreciation of reduction in the avoidable trauma of access while retaining the completeness of the required surgical procedure. This resulted in the understanding of the principles of Minimally Invasive Surgery done by all approaches – endoluminal, laparoscopic, laparoscopy assisted and reduced incisions for open surgery.

Colorectal surgery includes all surgical procedures carried out to treat diseases of the colon and rectum and has benefited from the increasing application of the principles of minimally invasive surgery of which Laparoscopic colonic surgery is a part.

The training for becoming a colorectal surgeon includes acquiring skills in colorectal surgery and laparoscopic surgery and once the training has been adequately mastered, various surgical techniques are possible through minimal invasive colorectal surgery: Total laparoscopic colorectal surgery, Laparoscopic assisted colorectal surgery, Handport assisted colorectal surgery. Special instruments have been demonstrated which help in performance of minimally invasive colorectal surgery like: 30 degree 10 mm telescope, bowel graspers, newer energy delivery devices – ultracision, ligature etc, Endo GI staplers including circular staplers and handport. The procedures for benign diseases include segmental colonic resection, total abdominal colectomy, Hartmann's procedure and reversal, management of rectal prolapse, ileostomy / colostomy, adhesiolysis, malignant diseases like colonic carcinoma & rectal carcinoma., endoluminal rectal surgery. The concept of minimal invasive colorectal surgery has led to an increase number of surgery performing for malignant diseases. Over the years, the concern of adequacy, harvesting of lymph node and port site metastasis have considerably dampened early enthusiasm for its role in malignant cases. Minimal invasive anal surgery has been the development of new technology of fistula surgery leading to biological glues and collagen plugs which are least traumatic. The most significant surgery in minimal invasive rectal surgery is the development of stapled anopexy on the basis of Longo's technique. In this technique, excision of mucosal prolapse and preservation of hemorrhoidal tissue had led to a new surgical procedure of stapled anopexy. This has revolutionized the underlying pathophysiology of hemorrhoidal disease with a paradigm shift.

INTRODUCTION

The addition of laparoscopy in the armamentarium of surgeons dealing with surgical conditions of the abdomen led to the appreciation of reduction in the avoidable trauma of access while retaining the completeness of the required surgical procedure. This resulted in the understanding of the principles of Minimally Invasive Surgery done by all approaches – endoluminal, laparoscopic, laparoscopy assisted and reduced incisions for open surgery.

Colorectal surgery includes all surgical procedures carried out to treat diseases of the colon and rectum and has benefited from the increasing application of the principles of minimally invasive surgery of which laparoscopic colonic surgery is a part.

Since its first described case in 1991, laparoscopic colon surgery lagged behind minimally invasive surgical methods for other intra-abdominal organs in terms of acceptability, dissemination and ease of learning.

Several factors account for this difference, including a steep learning curve for the surgeon, the need for laparoscopic intra-abdominal vascular control, the time required to perform the procedure, the need for larger incisions to retrieve specimens, and concerns over the oncologic safety of the procedure in malignant disease.

Only recently with the publication of several large, randomized controlled trials – notably COST and COLOR, trials, has laparoscopic surgery for colon cancer been demonstrated to

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be at least equivalent to traditional laparotomy in terms of adequacy of oncologic resection, disease recurrence and long-term survival.

Colon, like gall bladder is anatomically amenable to be dealt laparoscopically. The reasons may be the single pedicle or the peripheral location of the colon. The ease with which retroperitoneum or mesorectum is dissected due to presence of loose areolar tissue adds to anatomical justification for laparoscopic surgery.

SKILLS & TRAINING

The number of cases that is needed to reach proficiency varies from 30 to 70 for laparoscopic colon resections. SAGES (The Society of American Gastrointestinal Endoscopic surgeons) have cited that performing 20 procedures is necessary to attain the level of expertise that is required to undertake laparoscopic resection of colon cancers on a curative basis. As many laparoscopic skills are common to all advanced laparoscopic operations, experience in a specific operation enhances the acquisition of skills that are necessary to perform others.

MASTERY OF MONOPOLAR CAUTERY

In spite of availability of wonderful laparoscopic hemostatic devices (Harmonic scalpel, ligasure etc) it is essential for all laparoscopic surgeon to learn all aspects of safe electrocautery for dissection and hemostasis, and practice cost containment .

ENHANCING USE OF THE NONDOMINANT HAND

The minimal use of the non dominant hand is a major

obstacle in advance MIS (minimally invasive surgery). The non dominant hand has to be trained for critical tasks (Eg. Dissection, cutting, tissue manipulation, suturing)

INTRACORPOREAL KNOTTING AND SUTURING

Tying of knots and intracorporeal suturing is considered an advanced skill in laparoscopy, even though it is basic in all types of open surgery. Empirically, some trainers suggest that learners must complete at least 50 sutures and knots before expecting decent intraoperative performance.

- A. New hemostatic devices such as ultracision, Harmonic scalpel and the bipolar vessel sealer (ligasure) has probably helped the surgeons the most.
- B. Second generation and access devices include a wound contouring system that maintains system in place. The self-sealing nature of these new constructs provides a functional "port" into the abdomen, allowing the surgeon to insert or withdraw a hand at will.
- C. Recently, a new "chip-on-a-stick" video laparoscope have been introduced. These new designs of laparoscopic cameras involve the placement of a single CCD chip at the tip (patient's side) of the laparoscope, immediately behind the lens. It has several advantages, including improved image quality and resolution, reduced possibility of inadvertent camera damage, less cumbersome video cables, and potentially smaller laparoscope shaft diameter.
- D. Another recent advancement in camera technology is the development of three-dimensional (3D) video imaging systems for minimally invasive surgery. Early experimental data have demonstrated that specific tasks such as laparoscopic suturing or knot tying can be performed faster and more accurately using a 3D video imaging system.

ADVANTAGES

Like other minimally invasive surgical procedures, minimally invasive colorectal surgery offers numerous short-term benefits, including reduced postoperative pain, potentially improved quality of life, shorter hospital stay, quicker recovery of bowel function, decreased analgesics requirement, and potential costs savings. Also early return to work, early initiation of chemotherapy/radiotherapy are added advantages.

MINIMAL INVASIVE COLORECTAL SURGERY – TECHNIQUES

Since the early days of laparoscopic colon surgery, techniques and technologies have evolved to render this procedure more amenable to routine use by general surgeons. Many new techniques and technologies have emerged in an attempt to flatten the learning curve, in part by relying upon skills of surgeons acquired in open surgery. These are :-

- Total laparoscopic colorectal surgery
- Laparoscopic assisted colorectal surgery

- Handport assisted colorectal surgery

Total laparoscopic colorectal surgery – The total surgery is performed under laparoscopic vision. As it involves use of staplers, the cost may become prohibitive.

Lap assisted colorectal surgery – The most practical approach in the present technology, this involves mobilization and preliminary mesenteric division laparoscopically, followed by exteriorization of the mobilized segment through a small incision in the abdominal wall, and subsequent resection and anastomosis. Using this technique, the procedure is not unnecessarily prolonged, costly or difficult and the shortcomings can be overcome.

Handport assisted colorectal surgery – Simply, stated, hand assisted laparoscopic surgery (HALS) involves the insertion of a hand inside the abdomen during a laparoscopic procedure, while maintaining pneumoperitoneum to facilitate the dissection. This has become possible since the development of hand port devices. It allows for providing the much valued tactile sensation and dissection to the surgeon. The potential benefits are of great significance. Special instruments required for performance of minimally invasive colorectal surgery apart from the other conventional Laparoscopic equipment are :-

1. 30 degree 10 mm telescope.
2. Bowel graspers
3. Newer energy delivery devices – Ultracision, ligature etc.
4. Endo GI staplers including circular staplers
5. Hand port

Procedures for Benign Disease - Minimally invasive colorectal surgery has been used for tackling many benign conditions, some of which include

1. **Segmental colonic resections, total abdominal Colectomy** – Due to theoretical long term advantages like fewer adhesions formation, decreased rate of bowel obstruction, decreased likelihood of chronic pain, and decreased incidence of infertility or wound hernias, Laparoscopic procedures have been employed for either segmental colonic resections or total abdominal colectomies. The mobilization of the colon had been done as in open surgery –lateral to medial. Recent operators have developed medial to lateral approach which allows for less handling of the bowel itself and better mobilization of mesentery.
2. **Hartmann's procedure and Reversal, Management of rectal prolapse** – Good risk patients who have rectal prolapse and constipation should be considered for Laparoscopic sigmoid resection and rectopexy. The advantages are preservation of the native compliant rectum, removal of redundant sigmoid colon, alleviation of constipation, and low recurrence rate (<3%). Imperfect anal continence is not a contraindication to a rectopexy.
3. **Ileostomy / Colostomy, Adhesiolysis** - Either in loop or end colostomy, it is recommended that such resections be performed by experienced laparoscopists. Good data exists from a number of non randomized studies highlighting the advantages of Laparoscopic procedures for adhesiolysis.

4. Malignant Diseases –Clonic carcinoma

5. **Endoluminal rectal surgery** - Endoluminal rectal surgery involves the use of specialized equipment including operating proctoscope, insufflation and magnified, stereoscopic vision to improve the accessibility visualization, and precision of resection of lesions throughout the rectum. It provides access to the entire rectum, therefore any lesions or abnormalities within the rectum are potentially amenable to endoluminal rectal surgery. Indications can be neatly divided into benign and malignant categories.

- a) **Benign diseases** – In the case of benign disease, any lesion that can be safely excised or corrected with minimal functional consequences is appropriate. They include – rectal polyps, carcinoid tumors, retrorectal masses, anastomotic strictures, extrasphincteric fistulae and pelvic abscess.
- b) **Malignancies** – For malignancy, the technical ability to excise the lesion must be combined with the ability to cure the disease. They include malignant polyps, T1-T2 rectal cancer, palliative excision of T3 cancer.
- c) **Stricture and prolapse repair** – Endoluminal rectal surgery has been effectively used to treat anastomotic strictures, rectal prolapse, high extrasphincteric fistulae and for transrectal drainage of pelvic collections.

Absolute Contraindications – Septic shock with diffuse peritonitis

Relative contraindications – These include morbid obesity, liver cirrhosis, severe acute inflammatory bowel disease, large abscess or phlegmon, severe cardiovascular or pulmonary disease, large abdominal aneurysm, pregnancy, multiple laparotomy coagulopathy, blood dyscrasias.

LAPAROSCOPIC RECTOPEXY

A plethora of operations is used to treat rectal prolapse. The choice of operation depends on many factors, including the age and sex of the patient, associated constipation, degree of incontinence, history of repairs, comorbid conditions and the expertise of the surgeon.

Good risk patients who have rectal prolapse should be considered for laparoscopic rectopexy. The left colon is mobilized from middescending colon to sacral promontory. The presacral space is entered, and the rectum and mesorectum are mobilized posteriorly to the coccyx. The rectum is straightened and suspended from the presacral fascia. A prolene mesh is placed posteriorly to rectum and fixed to sacrum. The mesh is then fixed to lateral rectal wall by nonabsorbable sutures. A recent meta-analysis combined data from studies in the literature that compared laparoscopic with open rectopexy. Not surprisingly, laparoscopic rectopexy required 60 minutes longer to perform than did open rectopexy. Laparoscopic rectopexy required 3.5 days fewer in the hospital on average. Overall operative morbidity was similar between the groups. Recurrence rates were similar; however, follow-up generally was short, and ranged from 12 to 31 months.

TRANSANAL ENDOSCOPIC MICROSURGERY (TEM)

Transanal endoscopic microsurgery (TEM) is unique when

compared with other minimally invasive techniques, particularly abdominal laparoscopic surgery. TEM involves the use of specialized equipment including an operating proctoscope, insufflation and magnified, stereoscopic vision to improve the accessibility, visualization and precision based on the anal sphincter and bony confines of the pelvis are overcome have become accessible with the use of TEM, this does not change the indications for local excision of rectal masses, particularly rectal cancer.

Laparoscopic surgery, though innovative and beneficial, does not allow surgeons to perform any procedures previously not possible. TEM allows surgeons to transanally excise lesions that previously were inaccessible. TEM is a safe procedure associated with a shorter hospital stay and lower perioperative morbidity and mortality when compared with transabdominal rectal resections. No studies have been compared with transabdominal rectal resections. No studies have compared functional results between TEM and abdominal / rectal resections, but TEMP appears to be associated with minimal functional consequences. Finally, oncologic results vary, but TEM seems to be associated with lower local recurrence rates when compared with standard transanal excisions, and for early stage rectal cancer may provide identical oncologic outcomes to radical resection.

CONCERNS

Though laparoscopic colon surgery can be utilized for both benign and malignant cases, but initial concerns over port site metastasis, adequacy of oncologic resection and harvesting adequate number of lymph nodes have considerably dampened early enthusiasm for its role in malignant cases. With the better understanding of cause of port site metastases and following oncological principles the incidence of port site metastasis has decreased. As such, the evidence till date indicates that patients undergoing laparoscopic resection of colon malignancies are at no increased risk of port site metastasis compared with those undergoing open surgery. It appears that early reports of high rates of port site recurrences were in fact related to surgeon inexperience and inappropriate handling of the tumor laparoscopically.

The goals of laparoscopic colectomy performed in the setting of colon cancer are the same as for open surgery. Those involve appropriate vessel ligation, adequate resection with 5 cm proximal and distal resection margins and radical mesenteric lymphadenectomy. Many of these elements have been evaluated in the content of clinical trials. A recent metaanalysis reviewed five randomized controlled trials reporting specifically on number of recovered lymph nodes within surgical specimens and adequacy of resection margins. There was no difference between laparoscopic and open resection groups.

With the increase in technical skills and expertise, also with better instrumentation ever increasing number of cases are being done laparoscopically. In spite of all these, few contraindications do remain such as diffuse peritonitis with septic shock. Few conditions like morbid obesity, cirrhosis, severe acute inflammatory bowel disease, pregnancy, coagulopathy and blood dyscrasia not only post problem when dealt laparoscopically, but even in open procedures

also.

SHORTCOMINGS

Although the shortcomings of laparoscopic colonic surgeries are probably higher than the risk in open surgery, the risks are probably greater because of surgeon's inexperience with the laparoscopic procedure. Having experienced proctors minimizes the risk of complications attributed to inexperience. With the present technology and in view of the various shortcomings, the most practical approach is to perform the mobilization and preliminary mesenteric division laparoscopically, followed by exteriorization of the mobilized segment through a small incision in the abdominal wall and subsequent resection and anastomosis. Using this technique, the procedure is not unnecessarily prolonged, costly or difficult and the shortcomings can be overcome. Should the conditions not exist for a safe and relatively short laparoscopic procedure, the operation should be converted to the traditional open one. This is not to be seen as a sign of inadequacy or failure, but rather one of a surgical maturity and good judgement.

MINIMALLY INVASIVE SURGERY FOR ANAL DISEASES

Fistula in ano – the commonly performed procedures for fistula like fistulotomy and fistulectomy left very large wounds necessitating painful defecation and painful dressings for long durations. The development of the core out technique with a step ladder excision of long fistulous tracts has resulted in reducing the morbidity of fistula surgery.

Excision with primary closure and other forms of **flap transfers** have been described but are not particularly popular.

Biological glues and **collagen plugs** to make the fistula surgery even less traumatic are under investigation and preliminary use. They hold significant promise for a change in the approach to anal fistula surgery.

STAPLED ANOPEXY

Excisional hemorrhoidectomy has been the most definitive and reliable treatment of both internal and external hemorrhoidal disease till recent past. In 1997, Antonio Longo introduced a new technique. This operation utilized a modified circular stapler, inserted through the anus, and used to excise a circular ring of mucosal tissue from the anal canal, well above the dentate line. The absence of making any incision in the anoderma results in maintenance of normal anal anatomy and restoration of normal physiological function. It improves cosmesis and allows rapid healing. The indications of stapled

anopexy are almost the same as for Milligon-Morgan hemorrhoidectomy. The patients with fourth-degree hemorrhoids that is, irreducible internal hemorrhoids – may not be good candidates for stapled anopexy. Abscess or gangrenous hemorrhoids are absolute contraindications, because these conditions will not be treated by stapled anopexy. Concomitant fistulotomies, sphincterotomies, biopsies and excisions can safely be performed, along with stapled anopexy. There is a rapidly growing body of evidence regarding the efficacy of stapled hemorrhoidectomy. The operative time for stapled anopexy has been demonstrated to be shorter than excisional hemorrhoidectomy. The main benefit of this operation is reduced pain, which also translates into quicker return to work or normal daily activities. Most of the trials report similar incidence of delayed bleeding between stapled and excisional groups.

Overall stapled anopexy is a safe and effective procedure for hemorrhoids that offers a less painful alternative to excisional hemorrhoidectomy. If the results continue, as they are presently, then stapled anopexy may become the new standard of care for the operative treatment of internal hemorrhoids.

The principles of minimally invasive surgery as applied to colorectal diseases have led to the development of newer techniques for providing a safe and satisfactory outcome with a heightened patient acceptability. Till now the disadvantage of high cost has been a problem which on the analysis of savings by way of reduced pain, hospital stay, early return of bowel activity leading to an early return to work makes the overall expenditure much more acceptable than was hitherto thought. It is now a responsibility of those who utilize these techniques to propagate them and with adequate training make sure that the facility of minimally invasive colorectal surgery becomes available to a large number of patients with no additional harm.

In the past few years that I have delved in the development of colorectal surgical techniques I have had the good fortune of being helped assisted by a series of colleagues in the Department whose contributions have been of immense value and I extend my grateful thanks to all of them. I am thankful to Ms Pooja for the excellent secretarial work.

RECOMMENDED READING

1. *Shackelford Surgery of Alimentary tract, 5th Edition, 2003. Laparoscopic colorectal Surgery, Page 204, Chapter 15. Tonia M Young Fadok*
2. *Corman Colorectal Surgery, 5th Edition 2005. Laparoscopic colorectal Surgery, Page 1225, Chapter 27. Marvin L Corman*
3. *The EAES Clinical Practice Guidelines on Laparoscopic resection of colonic cancer, Page 161. Chapter 8 of EAES Guidelines for Endoscopic Surgery. Neugebauer EAM, Sauerland S, Fingerhut A et al.*

ETHICAL GUIDELINES FOR BIOMEDICAL RESEARCH

The need for uniform ethical guidelines for research on human subjects is universally recognised. It has acquired a new sense of urgency as the critical issues in the area of biogenetic research involving human subjects have become acute. Apart from the mandatory clinical trials on new drugs, a number of diagnostic procedures, therapeutic interventions and prevention measures including the use of vaccines, are being introduced which involve human subjects. Further the advent of new medical devices and radio-active materials and therapeutic benefits of recombinant DNA products have added a new dimension to the ethical issues that need to be considered before evaluating these for their efficacy, utility and safety.

Any research using the human beings as subjects shall bear in

mind the following principles of : i) **essentiality**, (ii) **voluntariness**, **informed consent**, (iii) **non exploitation**, (iv) **privacy and confidentiality**, (v) **precaution and risk minimisation**, (vi) **professional competence**, (vii) **accountability & transparency**, (viii) **maximisation of public interest and distributive justice** (ix) **institutional arrangements** (x) **public domain** (xi) **totality of responsibility** and (xii) **compliance**.

Recent advances in the field of **Assisted Reproductive technologies, organ transplantation, Human genome analysis, and gene therapy** promise unquestionable benefits to mankind. At the same time, they raise many questions of law and ethics, stimulating public interest and concern.

(Source : ICMR Publication 2000)

ADVANCES IN LAPAROSCOPIC UROLOGIC SURGERY: LAPAROSCOPIC RADICAL PROSTATECTOMY

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Abstract : Surgery for cancer prostate had been a big challenge and it took 35 years after Terrance Millins did first retropubic radical prostatectomy in 1947. Since then, in next 20 years, there had been a constant change in surgery for this ailment. The major impact has been that of Prostate Specific Antigen (PSA) which contributed to early diagnosis. This in turn helped improving the surgical outcome and functional results. While the technique of open surgery evolved, laparoscopy was also tried for this operation. The technique took some time to develop and refine, and today, it has become a promising way of performing radical prostatectomy. In this review, the various techniques, and the variations will be described; then validity, advantages and disadvantages and the results will be discussed.

INTRODUCTION

Prostate cancer is the second most common cancer in men, after skin cancer, in the United States. It is the third most prevalent cancer in European men. In India, it is sixth in the list of cancer in men. In 1982, Walsh and Donker introduced the anatomic technique of nerve-sparing radical prostatectomy. Open radical prostate surgery became a more attractive treatment for organ-confined prostate cancer. The first successful laparoscopic radical prostatectomy was performed by Schuessler in 1992 and was reported by Schuessler et al¹ in 1997. It did not gain widespread acceptance because of its extreme technical difficulty (operative times ranged 8-11 h, average hospital stay of 7.3 d) and the fact that it provided no advantage over the standard open radical retropubic prostatectomy.

Guillemot and Vallancien^{2,3,4} in 1998 and Abbou et al¹ in 2000, two groups from France, repopularized the laparoscopic approach. Operative time was 4-5 hours, the urethrovesical anastomosis demanded extremes of technical skill, and the average blood loss was 402 mL. With advances in medical technology, improved optics, and other laparoscopic aids, laparoscopic radical prostatectomy began to be performed in several centers around the world. However, the technical demands of the surgery prevented its widespread use by the average urologist.

LRP (Laparoscopic Radical Prostatectomy) developed as transperitoneal technique, the first step being the dissection of seminal vesicles in the rectovesical pouch. Later on, this step was omitted and anterior approach was found convenient for this dissection. Raboy⁵ Abbou⁶ popularized extraperitoneal approach for LRP. While transperitoneal approach has advantage of space and familiarity of anatomy, it has disadvantage of peritoneal contamination in the event of urinary leak and increased risk of bowel (1.2%) and bladder injury. The extraperitoneal route is more anatomical, and has advantage of freedom from bowel, bladder injury and less problems in cases of anastomotic leak. It also requires less head tilt downwards during the surgery, hence more anesthesia friendly. The problems of extraperitoneal include lack of space and tension on suture line during anastomosis as the bladder is not mobilized. Also extended lymph node dissection is not possible in this approach although, such dissection is not required. Obturator

and iliac node dissection can be done easily. Most surgeons in France are doing LRP by this approach.

There are only few centers in India where LRP is being performed. We have started extraperitoneal approach in Dec.2005. Since then, we have performed 20 prostatectomies. Continence outcome were good (100%) at the end of 2-6 months. Potency status is undetermined as we have not completed 2 years. Oncologic outcome is comparable with western experience.

SURGICAL TECHNIQUES

Transperitoneal approach

The widely used transperitoneal approach is the Montsouris I technique described by Guillemot and Vallancien^{2,3,4} from the Institut Mutualiste Montsouris, University Pierre et Marie Curie, Paris, France. The patient is placed supine with the arms at the sides and the legs spread apart. The patient is placed in extreme Trendelenburg position. One surgeon and one assistant perform the operation, with a right-handed surgeon standing on the left side of the patient. The Montsouris group uses the AESOP voice-controlled robot to hold the telescope.

Five ports are placed in a diamond configuration, (1) a 10-mm telescope port at the umbilicus, (2) a 10-mm port at the right iliac fossa, (3) a 5-mm port at the midpoint between the umbilicus and the pubis symphysis in the midline, (4) a 5-mm port at the midpoint between the left anterior superior iliac spine and the umbilicus, and (5) the final 5-mm port at the right pararectal line at the level of the umbilicus.

Lymph node dissection is performed if required. The peritoneum is incised to enter the space of Retzius, thereby causing the bladder to fall posteriorly. The endopelvic fascia is incised, and the levator muscle is pushed laterally to free the prostate gland. Dorsal vein is ligated. The bladder neck is identified and incised anteriorly and then posteriorly. Vas and seminal vesicles are delivered, taking care of the respective arteries and neurovascular bundles at the tip of seminal vesicles. Denonvelier's fascia is incised and dissection is done posteriorly between rectum and prostate.

The lateral pedicles are then dissected and neurovascular bundles are separated without use of energy. Urethra is transected to free the prostate gland with the seminal vesicles. The urethrovesical anastomosis is performed either with interrupted 3-0 resorbable sutures on a five-eighth circle needle (The Montsouris group) or with continuous sutures (others). A drain is placed, and the ports are closed.

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Variations: Rassweiler et al⁷ from Klinikum Heilbronn, University of Heidelberg, Heilbronn, Germany, routinely perform retrograde approach i.e. urethral division first and then proceed upwards as in open surgery.

Other variations are - delayed ligation of dorsal vein, after incising bladder neck and pedicles. This is the commonest practice nowadays as the control of vein is easier when the prostate is free. In still other variation, the dissection is started at bladder neck, even before incising the endopelvic fascia. There are proponents of bladder neck preservation (Gaston.R) which is said to improve immediate continence. There are variations in suturing techniques. The latest being Van Velthoven's⁸ single knot continuous suture technique.

Laparoscopic extraperitoneal approach

This approach was first described by Raboy⁵, from Staten Island University Hospital, Staten Island, NY, in 1997, and popularized by Abbou¹ et al. Patient is supine and steep Trendelenburg position is unnecessary.

A 1-cm infraumbilical incision is made. Preperitoneal space is entered over posterior rectus sheath. Space is enlarged with balloon inflation. Hasson canula is placed in this space. Once the space is developed, the steps of the surgery are the same as in transperitoneal approach.

ADVANTAGES OF LAPAROSCOPIC RADICAL PROSTATECTOMY

The advantages are related to magnification, improved vision and its ability to approach the depth of pelvis. This is responsible for reduction of blood loss. It has less morbidity and the recovery is faster as in other laparoscopic surgery. Because of continuous suture under vision, the anastomosis is better; hence catheter can be removed from 3-7days. While the above advantages are clearly appreciated, the oncologic and functional outcome in terms of continence and potency sparing potentials, are as good as in open surgery.

RESULTS

Operative outcomes

Following is a summary of some of the published series from major centers experienced in laparoscopic radical prostatectomy.

As can be appreciated, the mean OR time for laparoscopic radical prostatectomy is approximately 4.5 hours. Abbou has reported significantly shorter times with the extraperitoneal approach in a small series of 20 patients, and this has been reproduced by Dorschner et al. The mean intraoperative blood loss varies widely between series, from 185-1230 mL with an average of 400-450 mL. Mean catheterization times are 4-6 days, and patients stayed for a mean of 5 days in the hospital.

The laparoscopic approach compares very favorably with open radical prostatectomy in terms of blood loss, hospital stay, and catheterization times. Operative times for laparoscopic prostatectomy are significantly longer than for open surgery, even after the learning curve has been mastered. In a 1999 report, Guillonneau also showed that the costs for laparoscopic approach are less than the open approach by \$1200, indicating that the laparoscopic approach is economically viable.

Table 1. Outcomes of Operative Parameters Using Laparoscopic Radical Prostatectomy

Series	No. of Patients	Mean Age, yrs	Mean Preoperative Gleason Score	Mean Preoperative PSA, ng/mL	Mean OR* Time, hrs	Mean Hospital Stay, d	Mean Catheterization Time, days	EBL [†] , mL	Transfusion Requirements, %
Bhayani et al (2003)	33	57.4	6.06	6.74	348	2.97	14	533	NA
Guillonneau and Vallancien (2000)	120	64	6	11.2	239	6	6.6	402	10
Rassweiler et al (2001)	180	64	6	13.3	271	10	7	1230	31
Abbou et al (2003)	230	64.1	5.8	10.7	271	NA	5.8	NA	2.6
Türk et al (2001)	125	62	6.1	9.7	255	8	5.5	185	2
Hoznek et al (2002) (Extraperitoneal)	20	67	6.3	11.7	169	6.4	4.2	442	10
Dorschner et al (2003) (Extraperitoneal)	70	63.4	NA	12.5	155	8.2	NA	350	1.4
Bollens et al (2001) (Extraperitoneal)	50	63.3	6	9.14	317	NA	NA	680	13

*Operating room

†Estimated blood loss

FUNCTIONAL OUTCOMES

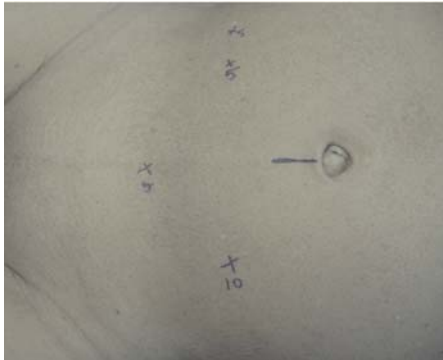
Relatively fewer papers are available dealing with functional outcomes following laparoscopic radical prostatectomy. Most series are from the French surgeons as shown below.

Continence rates vary from 85-90%, and potency rates range from 40-59.9% according to unilateral or bilateral bundle preservation. Patient self-reported survey results are probably more reflective of morbidity results because the ratings of physicians and patients may be divergent. Especially in embarrassing clinical aspects, such as sexual and urinary symptoms, significant differences may occur between physician and patient assessments, as reported by Penson and Litwin⁹ in 2003. The much greater postoperative sexual and urinary dysfunction rates reported in recent surveys of patients after radical prostatectomy support that concept.

Preservation of neurovascular bundles, younger patient age, and an experienced surgeon are the main factors associated with the best results regarding erectile function; however, these factors are similar for both open and laparoscopic approaches (Menon, 2001; Walsh, 2000; Bollens, 2001; Walsh, 2000; Stolzenberg, 2003). Earlier concerns of higher positive margin rates following laparoscopic radical prostatectomy have been shown to be incorrect in the recently published series (Bhayani, 2003; Katz, 2003; Rassweiler, 2003; Weizer, 2003).

ROBOTIC ASSISTED LRP

Robotic surgery for cancer prostate uses Da Vinci robotic system which is an extension of laparoscopic surgery. The advantages are



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Ports for Extraperitoneal LRP



Prostate removed by Extraperitoneal approach

3D vision, special instruments having 7 degrees of movement, removal of tremors. The biggest advantage is the anastomosis which is done rapidly and precisely. The surgeon sits away from the patient and does the surgery sitting comfortably. The disadvantages are the prohibitive cost of machine and the instruments and loss of tactile sensation. In USA, robotic surgery is on a very rapid rise and it may become the surgery of choice in future.

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Table 2. Outcomes of Functional Parameters Using Laparoscopic Radical Prostatectomy

Series	Number of Patients	Positive Margin, %	PSA Elapse, %	Definition of Potency	Patients Achieving Potency, %	Definition of Continenace	Patients Achieving Continenace, %
Rassweiler et al (2001)	180	16	5	Erection with aids	50	No pads	97 at 12 mo
Guillonneau et al (2003)	1000	22	10 at 3 y	NA	NA	NA	NA
Guillonneau and Vallancien (2000)	120	19	5.3	Spontaneous erection	45	No pad	73.3
Dorschner (2003)	70	21.4	NA	Erection with aids	30 at 3 mo	No pad	72 at 3 mo
Abbou (2002)	235	NA	NA	Intercourse without aids	49.3 at 12 mo	No pads	90 at 12 mo
Abbou et al (2001)	200	16.8	NA	Erection	56	No pads	83 at 12 mo
Abbou (2003)	230	26.5	NA	Erection	46 at 12 mo	No pads	89 at 12 mo

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ROLE OF DIAGNOSTIC LAPAROSCOPY IN PATIENTS OF CHRONIC ABDOMINAL PAIN

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Abstract: Chronic abdominal pain with no obvious etiology is a challenge to physicians and surgeons. Traditionally diagnostic laparoscopy has been used to evaluate the patients, when all imaging and noninvasive investigations have been exhausted. This study was taken up to determine the efficacy of diagnostic laparoscopy in determining the etiology of abdominal pain. This study was a prospective study wherein all patients underwent a set of noninvasive investigations and then a diagnostic laparoscopy was performed on each of them. Adhesions were the commonest finding seen on diagnostic laparoscopy. Diagnostic laparoscopy was definitive in most of the cases in reaching to a final diagnosis. Pain relief in follow up of patients was also analyzed to know the therapeutic effectiveness of laparoscopic adhesiolysis. In conclusion, diagnostic laparoscopy if done early in case of chronic abdominal pain saves time, money and also agony of the patient.

INTRODUCTION

The management of patients with chronic abdominal pain, where no obvious etiology has been found on repeated investigations, remains a challenge to physicians and surgeons alike. It is not uncommon for patients with chronic abdominal pain to be evaluated by a myriad of physicians and surgeons and often end up with psychiatrists when no cause has been found.

Laparoscopic techniques in the diagnosis and therapy of such patients with chronic abdominal pain are being increasingly used. The role of laparoscopy as a diagnostic modality in relation to other imaging studies continues to be evaluated. Traditionally, laparoscopy has figured very late in the diagnostic algorithm, after all other routine imaging investigations have been done. It may be practical to bypass traditional imaging studies and opt for diagnostic laparoscopy, given its advantages in diagnosis and the availability of a therapeutic option in the same setting. This will help to reduce the economic impact to the patient and will lead us to the diagnosis much earlier, offsetting the cost of an increased number of diagnostic laparoscopies being performed.

This study was designed to determine the efficacy of laparoscopy in determining etiology of pain of unknown origin in patients with a history of recurrent or chronic abdominal pain of longer than 3 months duration.

MATERIALS AND METHODS

This was a prospective study carried out from January 2001 to November 2006 in the Department of General Surgery at Sir Ganga Ram Hospital, New Delhi. The study comprised of 104 patients who underwent diagnostic laparoscopy for chronic abdominal pain.

All patients who attended the surgical outpatients of one of the surgical units, with chronic abdominal pain were entered into the study, provided they fulfilled the following criteria:

- The patients should be aged 12 years and above.
- They should have had chronic abdominal pain of at least 3 months duration.
- Pain due to gallbladder disease, peptic ulcer and renal origin had been excluded clinically and on imaging (where appropriate).

Exclusion criteria: The patients were excluded if they

- Were unfit for general anesthesia.
- Known to have intraabdominal malignancy.

A detailed history was taken from each patient and a full examination was performed. All female patients additionally underwent gynecological examination by a gynecologist. All patients underwent the following investigations.

- Complete hemogram
- Liver function test
- Renal function test
- Blood sugar (random)
- Erythrocyte sedimentation rate (ESR)
- Mantoux test
- X-Ray abdomen
- Chest X-Ray
- Ultrasound scan (whole abdomen)
- Barium meal follow through
- CT scan (whole abdomen)

Any additional investigations like colonoscopy, hysterosalpingography, etc. were also performed on these patients if indicated.

All patients subsequently underwent diagnostic laparoscopy, with tissue biopsy wherever possible or necessary.

Patients underwent an ultrasound examination. Specifically excluded were conditions like cholelithiasis, renal/ureteric calculus disease and deep pathology within the solid organs (liver, spleen and pancreas). Other pathologies which were specifically looked for were ascites, mesenteric lymph nodes, uterine or ovarian pathology and omental caking.

A barium meal follow through was performed by administering 200ml of barium sulphate orally and taking x-rays of the abdomen at regular interval till the contrast reaches the

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ascending colon. Gastroduodenal pathology was looked for. Bowel strictures were identified by a persistent narrowing with proximal dilatation. The ileocaecal region was examined to look for any hold-up or deformity. Transit time till caecum was measured. Fast transit time was defined as less than 40 minutes. All patients underwent CT scan (spiral) of whole abdomen, using the GE light speed machine. The patients were given oral contrast (30 ml diluted to 1600 ml), as well as intravenous contrast (80 ml) and rectal contrast only if indicated. Abdominal cuts were taken at a 6-mm distance.

The patients underwent preanesthetic check-up. All patients subsequently underwent diagnostic laparoscopy after obtaining a written consent. All procedures were performed using standard laparoscopic techniques under general anesthesia. If there was a previous upper midline incision scar or massive intraabdominal adhesions were suspected, a blunt trocar was introduced under vision. Pneumoperitoneum was undertaken by insufflating 3-4 liters CO₂ into the abdominal cavity; the intraabdominal pressure was adjusted to 15 mm Hg. A 10-mm periumbilical incision was chosen for the 0° / 30° camera. Depending upon the intra-abdominal findings the secondary trocars were placed under direct vision.

Careful inspection of the entire abdominal cavity was performed, starting from the pelvis to right iliac fossa, left iliac fossa, right and left paracolic gutters and then to the hepatic and splenic regions. The entire small bowel and mesentery were inspected in retrograde fashion starting from the caecum. After identification of the lesion a decision for necessary therapeutic intervention or taking a suitable biopsy was taken. In cases of intraabdominal adhesions, complete adhesiolysis was performed as close to the abdominal wall as possible with a monopolar electrocautery scissor. Bowel resection, if needed, for small bowel pathology was achieved by extending the midline port incision to 4.0 cm to bring the small bowel loop out. Conversion to open laparotomy was done in a few patients who required a right hemicolectomy. Standard general anesthetic and postoperative care was given in all cases. Postoperative follow up was done till discharge from the hospital.

The patients were reviewed after one week in the outpatient department (OPD), when they were called for the removal of sutures or clips. Relief from the pain was also inquired for and noted. Follow up visits were repeated at 3rd month, 6th month and 1 year intervals after surgery. The few outstation patients were interviewed telephonically. Every patient was asked about the extent of relief of the original pain symptoms, any residual problem and quality of life after surgery.

The data from all these patients was grouped into:

1. Non-invasive investigations (but also included cytology, wherever applicable).
2. Findings of diagnostic laparoscopy.

These were analyzed to evaluate the accuracy rate (false positives, false negatives) of the two modalities with a view to lay down guidelines for the place of diagnostic laparoscopy in patients of chronic abdominal pain.

RESULTS

Patient Characteristics

From January 2001 to November 2006, 104 patients were included in the study. There were 52 women and 52 men with a mean age of 31.5 years (range 14-65 years). The mean duration of abdominal pain was 3.25 years (range 3 months to 20 years). The mean follow up was 4.2 years (6 months to 6 years)

Pain Character

Pain was described as colicky or continuous pain. Out of 104 patients 72 complained of colicky pain whereas 32 patients had continuous abdominal pain. Sixty out of 72 patients (83.33%) having colicky abdominal pain had relief after diagnostic laparoscopy. On the other hand 24 out of 32 patients (75%) having continuous abdominal pain had relief after diagnostic laparoscopy.

Primary Site of Abdominal Pain

The umbilical region was the primary site of pain in the maximum number of patients (68 patients) i.e. 65%, followed by the right iliac fossa (28 patients). None of the patients had the primary site of pain as right & left hypochondrium, right & left flank and left iliac fossa.

Associated Symptoms

Most patients had varied symptoms along with chronic abdominal pain. Symptoms at presentation were vomiting, malena, bleeding per rectum, constipation, etc. The most common symptoms were vomiting, weight loss, anorexia, borborygami and abdominal distension.

History of Tuberculosis

Sixteen patients had a drug history of ATT (antituberculous therapy). Out of these 16 patients, 4 patients had received ATT for cervical lymph node tuberculosis. The rest 12 patients had taken ATT for pulmonary tuberculosis. Four among these 12 patients were a defaulter who had stopped ATT after 2-4 months of initiation. Out of these 16 patients, 12 had a final diagnosis of abdominal tuberculosis. The 4 who didn't had abdominal tuberculosis, had ileal strictures which turned out to be non-specific inflammatory strictures on histopathological examination.

Previous Abdominal/Groin Surgery

Forty four (44%) out of 104 patients had a history of previous abdominal/groin surgery for different reasons. Appendectomy was the commonest surgical intervention performed previously.

Aggravating & Relieving Factors

Food was the aggravating factor for pain in 56 patients. One patient specifically described that his abdominal pain was aggravated only after consumption of nonvegetarian food. Out of 56 patients, pain increased immediately after food in 12 patients, but had a delayed onset in 44 patients. The remaining 48 patients had no relationship of abdominal pain with food intake.

Anemia was defined as Hb<10gm% in this study. Out of 104 patients, 32 patients were found to be suffering from anemia. Of these 32 patients, 30 had a final diagnosis reached prior to discharge.

In only 2 cases no diagnosis could be made even after diagnostic laparoscopy.

Contrast Enhanced Computerized Tomographic Scan

CECT scan was the last imaging investigation which used done before diagnostic laparoscopy. Both intravenous and oral contrast was given in every patient. In some patients an additional rectal contrast was also given. CECT scan was normal in 60 patients out of the 104 patients. Forty four patients had positive findings, out of which in 40 patients these findings lead to the final diagnosis. Remaining four patients had findings such as a small splenic cyst, liver hemangioma which did not help in getting to the final diagnosis.

Diagnostic Laparoscopy (Fig.1)

In all patients, diagnostic laparoscopy was performed and a detailed examination of the abdominal viscera along with biopsy of appropriate tissues was performed in a few patients. The mean operation time was 61.5 minutes (range 25-125 minutes). Only 4 patients out of 104 had no positive findings on laparoscopy. (Table 1)

Accuracy of diagnostic laparoscopy

The accuracy of diagnostic laparoscopy is based on the table no.2

- i. Sensitivity (true positive) = 100%
- ii. Specificity (true negative) = 33.33%
- iii. Positive predictive value of diagnostic laparoscopy = 92.00%
- iv. Negative predictive value of diagnostic laparoscopy = 100%
- v. False negatives = 0.00%

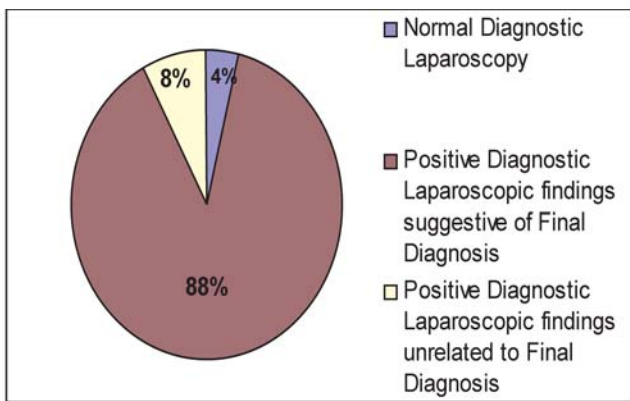


Fig.1: Yield of diagnostic laparoscopy

vi. False positives = 66.66%

The findings on diagnostic laparoscopy correlated well with the final diagnosis in most of the cases. In twelve cases the final diagnosis could not be made despite all the investigations including diagnostic laparoscopy.

FOLLOW UP

80 patients were followed up for the period ranging from 3 months to one year; showed variable pain relief. (Fig. 2)

Table 1:

Laparoscopic findings	n (number of times seen)	Laparoscopic findings	n (number of times seen)
Adhesions	60	Lymph nodes	50
Fimbrial cyst	20	Tubercles	16
Bowel wall abnormality	16	Appendicular pathology	16
Free fluid	12	Distended bowel	4
Bowel stricture	12	Bands	4
Tubo-ovarian mass	4	Internal hernia (caecum)	1
Endometriosis	4	Inguinal hernia (indirect)	4
No abnormal findings	4		

Table 2: Contingency table for diagnostic laparoscopy

Laparoscopic findings	Diseased	Notdiseased	Total
Positive	92	8	100
Negative	0	4	4
Total	92	12	104

DISCUSSION

A patient with chronic abdominal pain is a challenge for the surgeon. This heterogeneous group of patient has usually been investigated with noninvasive methods without much help. Quite a few studies have reported the usefulness of diagnostic laparoscopy in these patients. These studies suggest that diagnostic laparoscopy is an ideal investigation in patients who have chronic abdominal pain, especially if they have had previous laparotomy or pelvic

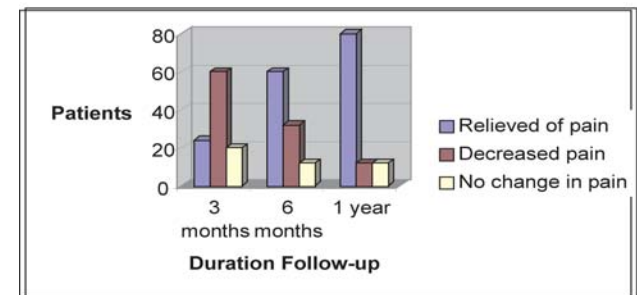


Fig.2: Change in pain on follow-up

inflammatory disease in their history or recurrent attacks of right lower quadrant pain^{2,5}. In a study of patients with chronic abdominal pain by Salky et al.⁶² found that 44% of patients had undergone an abdominal surgery previously. Similarly, in our study 44 (42%) out of 104 patients had a history of previous abdominal/groin surgery for different reasons. Of these 44 patients organic pathology was detected in 40 (90.9%) patients. Of these 40 patients, 28 (70%) patients had adhesions as the cause of their pain. These adhesions were missed by all other investigative modalities and were picked up only on diagnostic laparoscopy.

Adhesions are a substantial cause of hospitalization, mainly because of chronic abdominal pain, infertility and intestinal

obstruction. Kresch et al.³ noticed that adhesion that restricts the movement or distensibility of organs and those that involve the parietal peritoneum or bowel are more likely to cause pain than adhesions involving other sites. Typically the pain caused by adhesions is well localized due to local peritoneal tension, suggesting that the cause of the pain is the traction of the peritoneum, which is very sensitive. However, in our study a simple omental adhesion to the scar site or a flimsy adhesion was the common type of adhesion found. All our patients were relieved completely of their pain after adhesiolysis indicating that simple omental adhesion could also be cause of symptoms. In our study, adhesions were a cause of chronic abdominal pain in 32 patients (30.7%). All these underwent complete adhesiolysis laparoscopically and at a 1-year follow up 24 patients (75%) were completely free from pain, whereas 4 patients (12.5%) had a substantial decrease in pain intensity. Four patients weren't relieved at all and continued to have similar pain in abdomen. Overall laparoscopic adhesiolysis has proved to be beneficial in around 87.5% patients.

Lavonius et al.⁴ found organic disease in 68% of all patients who underwent a diagnostic laparoscopy for chronic abdominal pain. Seventy-eight percent of the patients who underwent a therapeutic procedure reported a positive outcome in terms of relief of their symptoms. In our study we were able to find organic disease in 88.46% (92 out of 104) of patients. Eighty-eight of these 92 patients (95.65%) had a symptomatic relief from pain at a 1-year follow up.

Fayez et al. had reviewed appendectomies for chronic lower abdominal pain. Ninety-five percent were relieved of their symptoms and 92% of the removed appendices revealed abnormalities. At laparoscopy, the appendix appeared abnormal in all cases, and no other pelvic-abdominal abnormality was noted. In our study 12 patients underwent appendectomy, as the appendix appeared abnormal on laparoscopy. All these appendix were also abnormal histologically. All these 12 patients had a relief of their symptoms postoperatively.

Lavonius et al. reported 6 patients who underwent diagnostic laparoscopy with no therapeutic procedure and reported improvement in their pain after the laparoscopy, which suggests a placebo effect of laparoscopy. In our study 4 patients reported improvement in their pain, even though no organic pathology had been found and no therapeutic procedure had been performed except for a mesenteric lymph node biopsy / omental biopsy (which was reported as reactive lymphadenitis). Psychological factors are known to play an important part in the experience of chronic pain, and the importance of "peace of mind" should not be underestimated.

Abdominal tuberculosis can present either as a tubercular peritonitis or gastrointestinal tuberculosis. In our study 36 cases turned out to be of abdominal tuberculosis (34.6%). Out of these, 8 patients had peritoneal tuberculosis, 8 had ileocaecal tuberculosis and the remaining 20 had tuberculous lymphadenopathy (mainly mesenteric lymph nodes). Similar to the findings of Apaydin et al.¹ tuberculous peritonitis in both the patients were diagnosed only at diagnostic laparoscopy. The only investigation other than diagnostic laparoscopy which was helpful in diagnosing peritoneal tuberculosis was the Mantoux test which was positive in all 8 cases. Similar to as is reported in literature, the diagnosis of

ileocaecal tuberculosis was the easiest. Almost all the investigations including ultrasonography, barium meal follow through and CT scan were positive before the diagnosis was confirmed by diagnostic laparoscopy. Suri et al.⁷ described abdominal lymphadenopathy as the commonest manifestations of tuberculosis on CT. Similarly in our study CT scan diagnosed abdominal tuberculosis in 24 out of 36 cases (66.66%). Out of these 24 cases, abdominal lymphadenopathy was seen in 16 patients. The remaining patients had bowel wall abnormality and omental thickening. Out of the 16 cases with a previous history of tuberculosis (pulmonary/extra-pulmonary), 12 cases were found to have abdominal tuberculosis at diagnostic laparoscopy.

In the era before CT scan and MRI, patients had contrast radiography performed as a part of their diagnostic workup. As per Salky et al.⁶ these preoperative evaluations were not very helpful in delineating pathology. Even with all these preoperative evaluations, a firm diagnosis consistent with the findings at laparoscopy was made in only 4% of the patients. The diagnostic rate of diagnostic laparoscopy is so much higher than that of preoperative studies in this series that it is clear that patients with persistent chronic abdominal pain were better served with laparoscopy, which yielded a firm diagnosis in 76% of cases. Similarly in our study preoperative imaging studies confirmed the diagnosis in only 38.46% (40 out of 104 patients) of cases. Diagnostic laparoscopy yielded a firm diagnosis in 88.46% (92 out of 104 patients) cases.

CONCLUSIONS AND SUMMARY

In summary, we have found that patients with complaints of chronic abdominal pain are likely to benefit from diagnostic laparoscopy if the following criteria are met:

- i. The patient has a prior history of abdominal surgery.
- ii. The patient has a prior history of tuberculosis.
- iii. The patient has a localized abdominal pain.
- iv. Other pathologic causes like gallstones, renal stones have been ruled out.

The present study supports laparoscopic adhesiolysis alone as a satisfying final treatment for chronic abdominal pain caused by adhesions. Laparoscopy is a rapid, accurate, simple, inexpensive and safe modality in the diagnosis of tuberculous peritonitis. Ultrasonography, BMFT and CECT scan have a low yield in patients of chronic abdominal pain. The only area of high yield is in cases of gastrointestinal tuberculosis (lymph nodes, bowel wall abnormality). A decision of using diagnostic laparoscopy early contributes to an early diagnosis and commencement of treatment of chronic abdominal pain.

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NEW FRONTIERS IN LAPAROSCOPIC SURGERY : ROBOTIC SURGERY

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Abstract : Robotic surgery is **computer-aided surgery** which provides secure and precise procedure that the operator wants. The surgeon has control over the system's functions by means of a computer interface that creates an instinctive environment when he is sitting at the console. The movement of the instruments is controlled by motion-scale function, elimination of tremor, remote master-slave manipulator system. Robotic surgery can be used for a number of procedures including: general surgery (i.e. laparoscopic adrenalectomy, gastric bypass), gynecological surgery (i.e. cystocele repair, hysterectomy, tubal ligation), thoracic surgery (esophagectomy, lung biopsy, tumor resection), urological surgery (donor nephrectomy, prostatectomy, and ureter harvest), vascular surgery (aortic abdominal aneurysm and vena cava tumor).

“Robotic surgery is not a transition technology, as is laparoscopic surgery, but it is the fulfillment of the promise that was begun by laparoscopic surgery.”

- Richard Satava

INTRODUCTION

Since the widespread introduction of minimally invasive surgery (MIS) in the early 1990s, initially with laparoscopic cholecystectomy, extensive evidence has demonstrated its advantages over open surgery – faster recovery with less pain and fewer complications. The reason why MIS is so explosively popularized all over the world is that there is a significant difference in postoperative quality of life of the patients with MIS from that with open surgery. The patients who underwent MIS not only had less incision on the skin surface or less postoperative pain, but also could receive earlier recovery to normal life or normal activity after MIS than after conventional open surgery.

DISADVANTAGES OF LAPAROSCOPIC SURGERY

Although there are clear benefits, MIS also has some disadvantage for the surgeons. Long instruments placed through fixed entry points creating a fulcrum effect, the surgical field viewed on a 2-D screen and with the camera under an assistant's control, create an unnatural environment where the surgeon loses orientation, the eye –hand-target axis, and visual depth perception. All these obstacles reduce the surgeon's normal dexterity and limit his ability to deal with difficult situation. Surgeons are now put into a tough condition since more strict and correct preoperative evaluation of the patients, less complication rate or less operation mistakes are mandatory. Because it is different from open surgery, once complications occurred it led to more invasive major operation, followed by a life-threatening incident. This new phenomenon was due to MIS. It is mainly because of the technical difficulties in movement of instruments or limitation of surgical field

through the endoscope, and no tactile sensation or force feedback sensation. The surgeon has to perform complex procedures such as intra-corporeal ligature or suturing in the limited condition. However, a systematic training system has not yet been established for MIS all over the world because MIS had developed so quickly since early 1990s.

RISE OF THE ROBOTIC SYSTEMS

More recently, robot-assisted surgery has emerged as a popular method. Robotic arms allow the surgeons for finer control and remote presence and provide a computerized interface between the patient and the surgeon. Nearly all the manipulations of robotic surgery are performed by fingers, hand and wrist, while laparoscopic surgery is performed mainly with the wrist, forearm and shoulders. This makes the robotic systems inherently more precise and dexterous, since the fingers, hands and wrist have more than 25 degrees of freedom and the wrist, forearm and shoulder have only 8 degrees of freedom. The human hand is used for precision and dexterity, while the arm and shoulders are used for power.

DEFINITION OF ROBOT

The word “Robot” is taken from the Czech robota, meaning forced labor, has evolved in meaning from dumb machines that perform menial, repetitive tasks to the highly intelligent anthropomorphic robots of popular culture. The term was coined in K. Capek's play R.U.R. “Rossumi's Universal Robots” (1920)

DEFINITION OF ROBOTIC SURGERY

Robotic surgery is the use of robots in performing surgery. Three major advances aided by surgical robots have been remote surgery, minimally invasive surgery, and unmanned surgery. Major potential advantages of robotic surgery are precision and miniaturization. Further advantages are articulation beyond normal manipulation and three-dimensional magnification.

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HISTORY

The history of surgical robotics begins with the Puma 560, a robot used in 1985 by Kwoh et al to perform neurosurgical biopsies with greater precision. Three years later, in 1988 Davies et al performed a transurethral resection of the prostate using the Puma 560. This system eventually led to the development of PROBOT, a robot designed specifically for transurethral resection of the prostate, at Imperial College, London.

In 1992, ROBODOC, a robotic system was designed to mill out precise fittings in the femur for hip replacement surgery. ROBODOC was the first surgical robot approved by the FDA. Intuitive Surgical Inc. carried out further development of robotic systems, with the introduction of the Da Vinci Surgical System and Computer Motion Inc. with the AESOP and the ZEUS robotic surgical systems. Later in 1994, Intuitive Surgical purchased Computer Motion and discontinued development of the ZEUS System.

Dr. Ralph Damiano at the Milton S. Hershey Medical Center, Pennsylvania performed the first coronary bypass surgery in a human patient using robotic arms.

Today, the Da Vinci System is FDA cleared for a variety of surgical procedures including surgery for prostate cancer, hysterectomy and Mitral valve repair and used in over 800 hospitals in the Americas and Europe. The Da Vinci System was used in over 48,000 procedures in 2006 and sells for about 1.2 million dollars.

WHAT IS THE DA VINCI SURGICAL ROBOTIC SYSTEM?

The robotic surgical system is a computer-enhanced minimally invasive surgical system consisting of three components:

1. Robotic Cart
2. Surgical Console
3. Endoscopic Instrumentation stack

The system has technical features which significantly augment the quality and control of the visual field and thus enhance the dexterity of the surgeon. It delivers a high quality three dimensional (3-D) vision to the surgeon manning the console. This technology allows intuitive telemanipulation with tremor abolition, motion scaling and endo-wristed instruments. This is essentially what gives this technology an edge over the endoscopic technology which has been prevailing over the last 2 decades and overcomes some of the pitfalls of conventional laparoscopy which have probably limited the capabilities of the surgeon in the field of minimally invasive surgery¹⁵.

This technology has been proposed to overcome some of the drawbacks of traditional MIS i.e.

- a) Two dimensional imaging
- b) Motion restrictions
- c) Motion scaling
- d) Poor ergonomics

This technology includes master-slave tele-manipulator systems. The goals of these surgical systems are to enhance manipulation capabilities and to increase the performance precision. Robotic surgery is what is called Computer-aided surgery. It provides secure and precise procedure that the

operator wants. The surgeon has control over the system's functions by means of a computer interface that creates an intuitive (Instinctive) environment, when he is sitting at the console. The movement of the instruments is controlled by motion-scale function, elimination of tremor, remote master-slave manipulator system. The self fail system is supported by checking the total system about 1200 times every second, or by quick retrieval of the instrument from the body and it allows us to shift to conventional surgery within 10 seconds.

ROBOTIC CART

The robotic cart of the da Vinci system is composed of three or four mechanical arms attached to a mobile base, which is connected to the operating console via a cable. The center arm holds the camera system and the two lateral arms hold the surgical instruments. The camera arm grasps a disposable standard 12mm port and the camera unit, which passes through it. The lateral arms attach to special 8mm metal ports supplied with both blunt and sharp trocars. The cart is locked in place but is not attached to the operating table. The whole system runs off the main power system and has a 5- minute internal power backup. The central arm holds and moves the camera system (Insite vision system, Intuitive Surgical, Inc.). There are zero-and 30-degree cameras (looking up or looking down) available. The camera has a dual lens system with two-three-chip cameras housed and spatially separated within one 12-mm casing. Thus, two complete optical systems are incorporated, representing the left and right eyes. The projection of the two spatially separated images in the binocular viewer allows true 3-D image perception at the console.

There is a range of instruments available with the system, which can be easily and rapidly changed by the assistant surgeon. There are 6 degrees of freedom at the instrument tip and a 7th degree of freedom is supplied by the action of the instrument itself (e.g. cutting or grasping). The instruments are designed to mimic the movement of the surgeon's hands, wrists and fingers. Their extensive range of motion allows precision that is not available in standard minimally invasive procedures.

Surgeon console containing the master controls that the surgeon uses to manipulate the instruments. The handles or "Masters" translate the surgeon's natural hand and wrist movements into corresponding, precise and scaled movements. The instruments are only able to move when commanded by the surgeon. The surgical console consists of the binocular viewer of the Insite vision system, the instrument controllers, the system setup and control panels, and a series of foot control pedals.

ENDOSCOPIC INSTRUMENTATION STACK

The endoscopic stack incorporates all the features of a standard endoscopic stack: a monitor, a CO₂ insufflator, a light source, and a camera unit. There is a 2-D monitor for the benefit of the scrub team, assistant surgeons, and observers. The light source comes from two high-intensity illuminators. There are two camera control units, two image synchronizers, and a focus controller that allow the production of the high quality 3-D image at the console.

BENEFITS OF ROBOTIC SURGERY

Benefits to Patient

- Reduced pain and trauma to the body
- Less blood loss and need for transfusions
- Less post-operative pain and discomfort
- Less risk of infection
- Shorter hospital stay
- Faster recovery and return to work.
- Allows for a minimally-invasive approach in surgery which means much less scarring and improved cosmesis

Benefits to surgeon

- Greater precision and dexterity
- Where fine suturing techniques are required
- Robotic arms eliminate the tremor of a surgeon's hands
- Improved technique for surgery
- Reduced fatigue during surgery
- Comfortable seated position at robotic controls.

Limitations

- Current equipment is expensive to obtain, maintain, and operate
- If one of the older model non-autonomous robots is being used, surgeons and staff need special training
- Data collection of procedures and their outcomes remain limited

WHAT ALL A ROBOT CAN DO FOR SURGEONS?

Robotic surgery can, in fact, be used for a number of procedures within multiple specialties including: general surgery (i.e. laparoscopic adrenalectomy, gastric bypass), gynecological surgery (i.e. cystocele repair, hysterectomy, tubal ligation), thoracic surgery (esophagectomy, lung biopsy, tumor resection), urological surgery (donor nephrectomy, prostatectomy, and ureter harvest), vascular surgery (aortic abdominal aneurysm and vena cava tumor). There are no laparoscopic procedures that can be performed by Robotic surgery. There are a number of emerging robotic procedures that will not be able to be performed by laparoscopic technique.

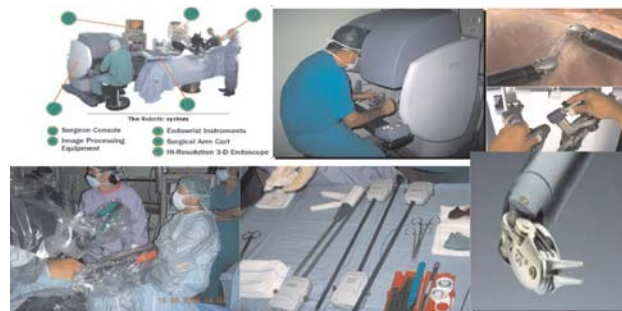
However, the number of surgical applications of robot-assisted surgery are increasing slowly, mainly due to the high investment and running costs of the devices even though the initial benefits exist. But new applications must be developed as the full range of robotic application is still to be implemented. The initial concept of robotics in surgery involved operating at a remote site from the surgeon. The ability to transpose surgical and technical expertise from one site to a distant site (i.e.: proctorship, assisting developing country or remote area like) was thought to expand surgical application. Although simple surgical procedures have been performed remotely, there are some difficulties for an extensive

clinical use because of high costs, transmission delay and medical and legal issues.

THE LEARNING CURVE

The FDA requires manufacturers to train surgeons before they can use robotic surgical systems on patients. Ogden says there is a significant learning curve involved. "As it stands now, it takes 12-18 patients before surgeons feel comfortable and before surgeons are able to perform the procedures as quickly as with standard techniques," he says.

Paul Nolan of Computer Motion says typical training for surgeons who buy the ZEUS system involves up to 40 hours, including experience at animal and cadaver labs.



THE FUTURE OF ROBOTIC SURGERY

Robotic surgery is in its infancy. Many obstacles and disadvantages will be resolved in time and no doubt many other questions will arise. Many questions have yet to be asked; questions such as malpractice liability, credentialing, training requirements, and interstate licensing for tele-surgeons, to name just a few.

Telerobots may also serve as the assistant surgeon as well as the operating surgeon. Telemedicine, telerobotics and virtual reality systems are rapidly evolving in conjunction with the rapid growth of the capabilities of computer systems.

By providing the use of a variety of technologies to enhance the capabilities of human surgeons, robotics will become an increasingly vital component in the medical world. Doctors of the next century must learn to use this information to complement their capabilities in order to provide better patient care.

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FAST TRACK SURGERY: CURRENT CONCEPTS

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Abstract: The concept of fast track surgery, which could be expressed as multimodal control of perioperative pathophysiology, seems to be a highly promising approach to improve surgical outcome. The principles and techniques embodied in this approach will eventually be integrated into the care of all surgical patients. To achieve this goal resources should be allocated for evaluation and documentation of the effects of fast track surgery and related systems on cost, postoperative morbidity, safety, and overall patient well being. Many multicenter trials are needed to effectively establish the yet unproven superiority of fast track surgery in long-term surgical outcomes. Fast track module based upon peri-operative optimization can be a meaningful step in improving both the outcomes as well as optimal utilization of constrained health resources.

INTRODUCTION

Surgery is undergoing revolutionary changes due to newer approaches to pain control, the introduction of techniques that reduce the perioperative stress response, and the use of minimally invasive operations. Subsequently, many surgical procedures (such as arthroscopic surgery, laparoscopic cholecystectomy, eye surgery, sterilisation procedures, herniorrhaphy, and cosmetic operations) are routinely performed on an outpatient basis. Recently published pilot studies suggest that when these newer approaches are used in patients undergoing more complex elective surgical procedures, postoperative complications can be reduced, length of hospital stay decreased, and time to recovery shortened. This review of recent advances made in this newly developing specialty of fast track surgery will emphasise techniques that facilitate early recovery after major surgical procedures.

WHAT IS FAST TRACK SURGERY?

Fast track surgery combines various techniques used in the care of patients undergoing elective operations. The methods used include epidural or regional anaesthesia, minimally invasive techniques, optimal pain control, aggressive postoperative rehabilitation, early enteral (oral) nutrition and ambulation. The combination of these approaches reduces the stress response and organ dysfunction and therefore greatly shortens the time required for full recovery.

Recent advances in understanding perioperative pathophysiology have indicated that multiple factors contribute to postoperative morbidity, length of stay in hospital, and convalescence. Major improvements in surgical outcome may therefore require multifaceted interventions. Ambulatory surgery has become routine for many procedures with a well documented record for safety and low morbidity, even in patients at high risk.

Studies have evaluated somewhat similar approaches toward larger operations which carry more risk. Preliminary results from predominantly non-randomised trials have been positive. These studies have included high risk elderly patients undergoing operations such as segmental colonic resection, prostatectomy, and aortic aneurysmectomy. These preliminary data indicate topics for further randomised trials; the data need to be confirmed and

extended to include end points of reduced costs, preserved safety, and patient satisfaction.

The preliminary results for fast track surgery have been encouraging. Abdominal procedures like Inguinal hernia repair¹, Cholecystectomy (laparoscopic² mini-incision), Fundoplication, Open and laparoscopic³ colorectal procedures, Complex pelvic-colorectal procedures, Rectal prolapse, Pancreaticoduodenectomy, complex biliary tract procedures have all shown reduced hospital stay, early mobility and return to work and decreased morbidity emphasizing the importance of adopting principles of fast track surgery. Similar results were obtained for other procedures like Mastectomy⁴, vascular procedures, various urologic procedures, Neurosurgery and gynecologic surgeries.

PREOPERATIVE EVALUATION AND EDUCATION

The aims preoperatively should be

1. Optimize organ functions for patients with cardiac disease, chronic obstructive lung disease, diabetes mellitus, and other disorders, according to current recommendations.
2. Promote abstinence and other pharmacologic means to stop substance abuse in chronic alcoholics^[5] and smokers.
3. Education of patients about perioperative care before the operation reduces the need for pain relief, can include instruction on relaxation techniques which can be used after the operation, reduces anxiety, and improves outcome.

OPTIMISING ANAESTHESIA

Recent developments in techniques in anaesthesia have optimised conditions for surgeons to operate while allowing for very early recovery of vital organ function after major procedures. Thus, the introduction of rapid short acting volatile anaesthetics (for example, desflurane and sevoflurane), opioids (for example, remifentanyl), and muscle relaxants have facilitated expansion of ambulatory surgery for minor to moderate procedures. The use of anaesthetic techniques that provide for minimal carryover of opioid effects into the recovery period, supported by other non-opioid analgesic methods, may minimise postoperative complications and facilitate recovery after major procedures. Neural blockade techniques have been developed in recent years to provide attenuation of the surgical stress response, thereby reducing postoperative organ dysfunction and allowing early recovery⁶. Regional anaesthetic techniques that use local anaesthetics can reduce the classic

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pituitary, adrenocortical, and sympathetic responses to surgery⁶. Neurogenic blockade (either by administering a local anaesthetic in the spinal or epidural space or by using local anaesthetic techniques that block the nerve impulses from an area) improves postoperative nitrogen economy and glucose intolerance but does not modify inflammatory or immunological responses. Relevant to clinical care, continuous neural blockade for 24 to 48 hours is necessary for a pronounced reduction in perioperative stress in major surgery. Moreover, the systemic effects of local or regional anaesthesia/analgesia or, the stress response are greatest in procedures on the lower body (lower extremities or pelvis) compared with upper abdominal and thoracic operations. The effects of regional anaesthetic techniques are manifest by improved pulmonary function, decreased cardiovascular demands, reduced ileus, and improved pain relief⁶. A recent meta-analysis of regional anaesthetic studies showed a 30% reduction in morbidity compared with general anaesthesia⁶.

OPERATIVE TECHNIQUES

Minimal invasive surgery

The use of minimal invasive abdominal surgical techniques, such as laparoscopic cholecystectomy, has not reduced the early endocrine mediated metabolic response to surgery, but this approach has been associated with a decrease in various inflammatory responses and immunodysfunctions. Pulmonary function seems to be improved and postoperative ileus reduced with minimal invasive approaches.

Intraoperative normothermia

Operating rooms are cold. Patients are inadequately clothed and receive anaesthetics which hamper their homeostatic defenses to cold. As a result, patients undergoing operations lasting over two hours often become hypothermic, with a fall of core temperature of 2-4 [degrees] C. During rewarming cortisol and catecholamines are released, which augment the stress response of the operation⁷. Keeping patients warm has been associated with a threefold decrease in the rate of wound infection, a reduction in operative blood loss, a decrease in untoward cardiac events, including ventricular tachycardia, and a reduction in nitrogen excretion and patient discomfort⁷. Maintenance of a normal temperature during surgery is central to reducing the stress of the surgical procedure and reducing the risk of organ dysfunction.

POSTOPERATIVE CARE

For the first 24 hours bed rest is undesirable as it increases muscle loss and weakness, impairs pulmonary function, and predisposes to venous stasis and thromboembolism. Nasogastric tubes and drain placements have not shown benefit. Oral intake is commonly limited in the postoperative period. Presently there are no available clinically effective drugs that enhance gastric emptying, and with the attenuation of ileus associated with epidural anaesthesia, oral intake can often be successfully initiated six hours after surgery, even after colonic operations which use an anastomosis. Postoperative pain should be vigorously treated as it may amplify the surgical stress responses and organ dysfunction and prolong recovery. After minor to moderate operations patients should receive non-opioid analgesics, such as non-steroidal anti-inflammatory agents, to avoid side effects related to use of opioid drugs, which prolong recovery. Major surgical procedures with high intensity pain and subsequent organ dysfunction induced by stress require the use of invasive analgesic methods, such as

continuous epidural analgesia, to hasten recovery. Optimal management of acute pain after major procedures is a prerequisite for fast track surgery and should be used for all surgical patients. ***Nausea, vomiting, and ileus*** The ability to resume a normal diet is essential for a successful fast track surgical programme after both minor and major procedures. Principles for rational prophylaxis and treatment of nausea and vomiting have been developed, and several agents including droperidol, antiserotonergic drugs, and analgesic regimens with reduced use of opioid drugs will reduce these symptoms. The use of multifaceted regimens for nausea and vomiting in combination with dexamethasone requires further evaluation. Postoperative ileus, which is predominantly caused by a combination of inhibitory neural sympathetic visceral reflexes and the intestinal inflammatory response, may be considerably alleviated by a combination of epidural local anaesthetics, analgesia with reduced use of opioid drugs, minimally invasive surgery, and pharmacotherapy⁸. Preliminary studies show that such regimens, when combined with early enteral nutrition, may almost completely prevent paralytic ileus after colonic resection.

The second to fifth postoperative day

Recovery from an operation depends on several factors, including the resolution of pain and fatigue. Fatigue in the early post operative period is related to altered sleep within the hospital setting because of noise, environmental disturbances, drugs, and possibly inflammatory factors. Loss of muscle strength and loss of weight because of reduced food intake have been related to fatigue, which occurs after a week or so. Reduction of surgical stress, early enteral nutrition, and mobilisation are therefore important interventions which counteract fatigue and aid recovery.

FUTURE DEVELOPMENTS AND CONCERNS

The initial promising results from the fast track surgical programs studied suggest that such programs can achieve major care improvements in terms of reducing postoperative stay. At present, however, sufficient scientific documentation is lacking for many commonly performed major operations. Thus, there is a need for additional data, in particular, data on the potential positive effects of fast track surgery on postoperative morbidity. The necessary data would probably be best obtained through multicenter trials using identical protocols⁹.

As yet, it has not been conclusively demonstrated that reducing the duration of hospitalization necessarily reduces morbidity, though data from studies addressing colonic and vascular procedures suggest that nonsurgical (i.e., cardiopulmonary and thromboembolic) morbidity may be reduced and overall postoperative recovery (assessed in terms of exercise performance and muscle power) enhanced. More study is required in this area. Future trials should also focus on identifying any factors that might be limiting even more aggressive early recovery efforts, so that more effective fast track programs can be designed. Finally, studies are needed to identify potential high-risk patient groups for whom fast track surgery may not be appropriate or who may need to be hospitalized for slightly longer periods to optimize organ function.

All of the studies on the economic implications of fast track surgical programs and critical pathways have documented substantial cost savings. It should, however, be borne in mind that the last portion of a hospital stay is much less expensive than the initial portion; thus, the cost savings in this area may turn out to be smaller than

they would at first appear¹⁰⁻¹². This should not hinder development of ways and means in fast track surgery because a reduction in morbidity and early return to work adds to cost benefits.

The basic concept of fast track surgery, which could be expressed as multimodal control of perioperative pathophysiology, seems to be a highly promising approach to improving surgical outcome. The principles and techniques embodied in this approach should eventually be integrated into the care of all surgical patients as they lead to shorter hospital stay, early return to work and less postoperative pain and morbidity for most, if not all, surgical procedures.

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Drug Profile

Darusentan : A promising drug for resistant hypertension

Introduction: Resistant hypertension is defined as inability to reduce blood pressure to less than 14/90 mm Hg using an adequate and appropriate triple-drug regimen, including an oral diuretic, with all three drugs near the maximum recommended dose¹ about 10% to 30% of hypertension patient for the remain of developing cardiovascular and renal complications.

Mechanism of Action: Endothelin (ET) is a small peptide hormone that is believed to play a critical role in the control of blood flow and cell growth. Elevated endothelin blood levels are associated with several cardiovascular disease conditions, including pulmonary arterial hypertension (PAH), chronic kidney disease, hypertension, acute myocardial infarction, chronic heart failure and stroke². Endothelin 1 (ET-1), which consists of 21 amino acid residues is the predominant isoform of the endothelin peptide family, which also includes ET-2 and ET-3³. It exerts various biological effects, including vasoconstriction and the stimulation of cell proliferation in tissues both within and outside cardiovascular system. ET receptors have been divided into two different subtypes, ETA (ET-1 selective) and ETB (nonselective for the isopeptides)⁴. ETA receptors are distributed predominantly in vascular smooth muscle, cardiac myocytes and intestine, whereas ETB receptors are found on endothelial cells, cerebral cortex, kidney and trachea. The binding of endothelin to ETAREceptors located on smooth muscle cells causes vasoconstriction. However, the binding of endothelin to ETB receptors located on the vascular endothelium causes vasodilation through the production of nitric oxide and prostacyclin. In addition, ETB receptors in the lung are a major pathway for the clearance of ET-1 from plasma⁵. The activity of the ETB receptor is thought to be counter-regulatory, protecting against excessive vasoconstriction. Hence, selective ETA receptor antagonists can counteract negative effects of endothelin by preventing vasoconstriction and cell proliferation, while preserving the beneficial effects mediated through ETB receptor (Blocking the Beast while Leaving the Beauty Untouched) Dr. experimental stands the drug has shown benefit in lung to oxide. Darusentan is a member of a class of therapeutic agents known as endothelin receptor antagonists (ERA) that is selective for the ETA receptor and is being developed as an oral therapy for the treatment of uncontrolled hypertension based on the evidence that it significantly reduces both systolic and diastolic blood pressure in patients who have failed to achieve optimal blood pressure even with multiple drugs.

Darusentan acts through a different mechanism than existing anti-hypertensive therapies. It is an ERA that is selective for the ETA receptor and can block the negative effects of endothelin by preventing vasoconstriction and cell proliferation, while preserving the beneficial effects associated with ETB receptor stimulation.

Pharmacokinetic parameters: the affinity of darusentan for ETA receptors is about 130 times than that for ETB receptors. The compound demonstrates high potency, high oral bioavailability and has a long half-life (16-18 hrs) that is suitable for once daily dosing⁵. In addition, the compound does not induce or inhibit the Cytochrome P450 metabolic pathway.

Adverse effects: Darusentan is well tolerated and exhibits favorable safety profile. In the trials with darusentan, headache was the most commonly reported adverse event, with no relevant difference among placebo and active treatment groups. Other frequent adverse events include flushing and peripheral edema were dose-dependent. Whereas, previous clinical trials with other ERAs in patients with hypertension demonstrated dose-related hepatotoxicity requiring withdrawal of therapy for safety reasons, there were no treatment-related elevations in liver enzymes with darusentan. **Clinical Trials:** Earlier studies with darusentan in patients with Chronic heart failure did not show significant improvement in clinical outcome⁶. Subsequently, trials in patients with uncontrolled hypertension or resistant hypertension were undertaken.

Preclinical trial : In a rat model of genetic hypertension, animals from the salt-sensitive (SBH/y) and salt-resistant strains (SBN/y) were either salt-loaded with deoxycorticosterone acetate (DOCA) and salt or fed a normal diet. Salt-loading in SBH/y increased systolic blood pressure by 75 mm Hg and urinary albumin excretion 23-fold (P<0.0001). However when darusentan was administered in additional salt-loaded groups it attenuated the rise of systolic blood pressure (50%) and urinary albumin excretion (63%, P<0.01, respectively)⁷. Clinical Trials: In 2000, Hy-

perension Endothelin Antagonist Treatment (HEAT) study which was a randomized, double-blind, placebo-controlled, dose-ranging trial evaluated the safety and efficacy of darusentan in 392 patients with moderate essential hypertension (Stage-II). The result of this study demonstrated that darusentan produced statistically significant reductions in diastolic and systolic blood pressures in a dose-dependent manner and was well tolerated⁵. In July 2004, a Phase 2b randomized, double-blind, placebo-controlled clinical trial was undertaken to evaluate the safety and efficacy of darusentan in patients with resistant hypertension, patients with systolic blood pressure greater than or equal to 140 mmHg despite treatment with full doses of three anti-hypertensive medications, one of which was a diuretic were enrolled in the study. A total of 115 patients were randomized to darusentan or placebo at approximately 30 investigative sites in the United States. Patients underwent forced titration every two weeks through 10,50,100 and 150 mg of darusentan or placebo until the target dose of 300 mg once daily was achieved. The treatment period was ten weeks followed by a two week drug withdrawal period. The trial results demonstrated that 300 mg of darusentan dosed once daily provided statistically significant, placebo-corrected reductions of 11.6 mmHg in systolic blood pressure and 5.8 mmHg in diastolic blood pressure. Based on encouraging results of Phase 2 trials, company has initiated Phase 3 clinical trial in June 2006 and is presently recruiting patients for this trial. This trial is entitled DORADO – Fixed Doses of Darusentan as Compared to Placebo in Resistant hypertension. It is a randomized, double-blind, placebo-controlled, multi center, parallel group study to evaluate the efficacy and safety of fixed doses of darusentan subjects with resistant systolic hypertension receiving combination therapy with four or more antihypertensive drugs, including a diuretic. Indication & dosage: Darusentan is indicated in resistant hypertension and has shown efficacy at dose of 300mg daily Through trials with darusentan were undertaken as potential therapy for congestive heart failure receptor blockers which have an associated risk of hepatotoxicity, darusentan is well tolerated with no such risk. Conclusion: ET antagonists are promising new agents in the treatment of cardiovascular diseases. Darusentan could be the first of a new class of agents for treating resistant hypertension. Although it is primarily being investigated as antihypertensive drug but various preclinical studies with darusentan in experimental models of acute lung injury have also shown promising results comparable to inhaled Nitric oxide (iNO) by improving gas exchange and preventing an increase in mean pulmonary artery pressure⁸. More information about darusentan is available on websites

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MYTHS AND REALITIES OF RURAL LAPAROSCOPIC SURGERY: FIVE YEAR EXPERIENCE - EXCLUSIVE USE OF THE AIR AS INSUFFLATING MATERIAL UNDER REGIONAL AND LOCAL ANESTHESIA

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Abstract: Due to paucity of resources, practice of surgery is a challenge in remote rural areas of India. In last five years 746 laparoscopic operations were performed at our clinic in a remote rural village of Distt Kullu H.P India. Due to deep rooted myths in rural population initial acceptance was very poor. Non availability of gases like Oxygen, Carbon-dioxide and nitrous oxide forced us to work with use of atmospheric air as insufflating agent. Procedures had to be performed under local and regional anaesthesia keeping insufflating pressure at 12-14 mm Hg with appropriate patient monitoring. There was no serious complication. Only 31 cases out of 746 were converted due to various problems. I present my experience of laparoscopic surgery in a rural setting without any back up resources being available.

INTRODUCTION

Eighty percent of Indian population lives in rural area and 80% of rural population is poor. Conditions of health care facilities are very poor in small towns and villages of India. More than 85% of surgeons are working in big town and metro-cities. So far the rural population access to modern health care facilities is very poor, because of lack of basic infrastructure and poor economic condition.

MATERIAL AND METHODS

I started my practice in the year 2002 in a small village of Distt. Kullu (H.P.)- INDIA. During my practice I faced many problems, some of which are common with any other surgeon and faced now and then during practice. But some problems were entirely due to rural setup. The problems I faced were due to lack of man power, trained staff, professional help for emergency backup, lack of drugs and their inability in local markets.

Carbon dioxide, Nitrous oxide and Oxygen were not easily available and had to be brought up from a distance of 300 KM. Because of all this I had to work with exclusive use of atmosphere air as insufflating material, and under regional (subarachnoidal and epidural) and local anesthesia.

RESULTS

During period (Jan.2002 to Feb.2007)

The laproscopic surgeries were performed

- Cholecystectomy 155
- Appendicectomy 85
- Adhesiolysis 30
- Diagnostic 100
- Ascites Drainage 100
- Hydatid Cyst Liver 100
- Blunt Abdominal Trauma 10
- Perforations 5

- Ectopic 20
- Gynae-Procedures 70
- Liver abscess 20
- PID 20
- Infertility 20
- Malignancy (Biopsy) 11

Complications and difficulties

Initial acceptance was very poor due to deep rooted myths in general population. Proper preoperative counselling about laparoscopic surgery, was done explaining in detail about likely complications (Table) and need for conversion.

Tables 1 Complications of lap. surgeries in rural set up

Name	Cases	Remarks
Air Embolism	Nil	
Needle & Trocar injuries	Nil	
Thermal injuries	Nil	
Hemorrhages	23	Five cases opened control bleeding.
CBD injuries	Nil	
Biliary leakage	05	Diagnosed by presence of bile in drain, exploration Done there was slip of clip From cystic duct.
Postoperative right shoulder pain and Discomfort due to residual subperheenic air	18	Can be minimized by complete evacuation of Air after procedure.

Conversions : Total of 31 Cases were converted; most cases were converted due to difficult cholecystectomies; case were converted to control bleeding.

Pneumoperitoneum : Due to non availability of carbon dioxide, cylinder had to be refilled from a distance of 300 kms at Roper Punjab. Carbon-dioxide itself has its own disadvantages like hypercarbia, acidosis and cardio respiratory problems. So I started working with air as insufflating material. We used Alfa *air insufflators* calibrated

for various pressures and flow rates. It provides insufflation pressure up to 25 mm Hg. The risk of air-embolism was reduced by working at low pressure on 12-14 mm Hg and meticulous common place technique. Meticulous homeostasis was achieved during dissection so that no venules are left open for air-embolism. There had been no explosion and fire injury during use of electrocautery. The only disadvantage of air is the discomfort produced by residual subphrenic air, as air is absorbed very slowly. This can be minimized by complete evacuation of air at the end of procedure.

Anesthesia

We used local anesthesia for small procedures like lap-biopsy, diagnostic lap, ascites drainage and chromotubation. For upper abdominal surgery epidural anesthesia was used and lower abdominal procedures were carried out under subarachnoidal anesthesia. This was done to avoid the complications of general anesthesia reduce the cost of anesthesia, as spinal anesthesia is much cheaper as compared to GA. There have been no cardio respiratory problems at insufflations pressure of 12-14 mm Hg, under spinal anesthesia.

DISCUSSION AND CONCLUSIONS

In rural areas the surgeon has to live up to the popular acceptance of patients, However there are deep rooted myths which are to be addressed. The *myths* are:- (a) gas is filled in abdomen during surgery and patient suffers life long with "GASTIC". (b) it is not possible to remove specimen through the small hole. (c) laparoscopic surgery is incomplete. (d) it is a "current" operation. (e) it is a costly operation.

The most important point in the regard is excellent communication skills and explanation of procedure in detail, with emphasis on laparoscopic surgery to the patient and likely need for conversion in case of any complication. He must build on an excellent rapport, and take responsibility of training of staff in operative steps and handling of costly equipments. He should also develop excellent report with other professional colleagues for back up.

The complications in relation to needle and trocar placement can be prevented by proper techniques and following basic principles of laparoscopic surgery.

Procedure-related complications can be avoided by adhering to basic principles and meticulous dissection and setting danger limits. Every possible complication should be kept in mind and should be detected during procedure at the earliest as we do not have access to CT and ERCP.

Reopening and referral to higher centers makes a surgeon and the procedure very unpopular. It can tarnish his image and career to no ends. This is more evident in rural areas. Complications related to pneumoperitoneum can be tackled by proper monitoring. With proper monitoring, use of proper technique, appropriate pressure, and complete homeostasis there is no chance of air embolism with the use of atmospheric air as insufflating material. There is practically no chance of explosion and fire injury with the use of air with electrocautery. Cost of surgery is also reduced with use of air. Complications related to GA are also reduced with use of spinal and local anesthesia and there is further reduction of cost. But strict patient monitoring and pre-operative fluid loading is must. There must be arrangement of GA and endotracheal intubations in case of any unexpected complication. There should be arrangement of inverter/generator in hospital as power failure is very frequent in rural areas. Surgeon has to keep himself updated about latest technologies. He must get himself trained by attending CME programmes and workshops and should do ethical surgery. He has to develop excellent communication skills and must display excellent PR skills to convince the patient that he has their best interest at heart. He must be meticulous to minimize complication. He needs to be an excellent teacher to his staff and a faithful healer to people.

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