

# 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 Schultz<sup>1</sup>. 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 period<sup>2</sup>. 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 formation<sup>3</sup>.

Recurrence after TEP has been reported to be as low as 0.4%<sup>4</sup>. Phillips EH et al have reported recurrence in patients with small mesh size (6 x 10 cm)<sup>5</sup>. 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                          |
|--|--|
| • Patient with small direct hernias. (Grade 1)                 | • Patient with obstructed hernia. (Grade 5)            |
| • Patient with incomplete indirect sacs. (Grade 2)             | • Patient with complete irreducible hernias. (Grade 5) |
| • Patients fit for general anaesthesia.                        | • Obese patient  |
| • Patients who can safely withstand longer duration of surgery | • 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 technique<sup>6</sup>, but if appropriate skills are achieved, the reported results are excellent, reproducible and quite different from those reported by inexperienced surgeons<sup>7</sup>.  
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 repairs<sup>8</sup>. 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

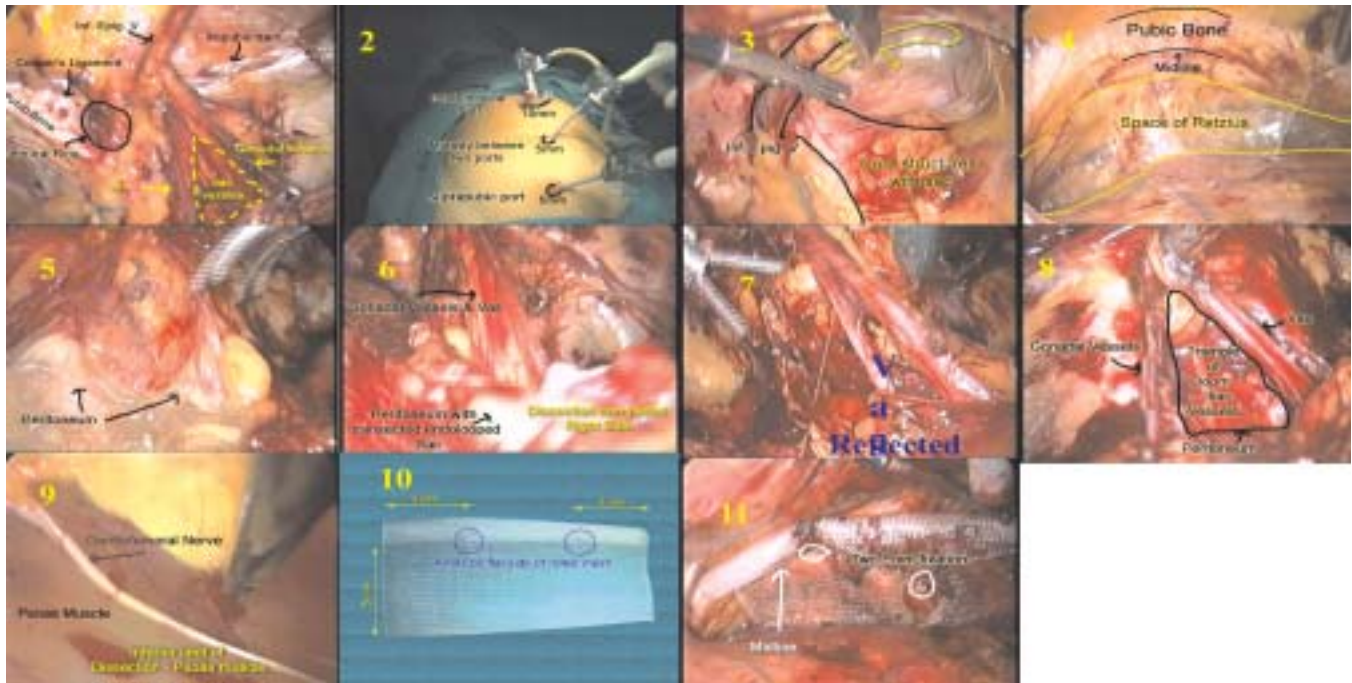


Fig. 1 Dissected preperitoneal space for right inguinal TEP repair  
 Fig. 2 Port sites for B/L TEP repair for inguinal hernia  
 Fig. 3 Use of sharp dissection for creation of preperitoneal space lateral to inferior epigastric vessels  
 Fig. 4 Pubic bone and retro-pubic space in the midline

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 trial<sup>9</sup> reported a significant difference in the number of recurrences<sup>10</sup>. 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

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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 31<sup>st</sup> December, 2007; Free paper sessions will be encouraged; An excellent scientific program of practical importance will be presented;

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