

Orthopedics - Can India lead?

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Abstract: The medicine is an art transformed from an art based on "belief in supernatural force" to art "based on science". This art is learnt by observations of talented physicians and by practice and gradually transmitted to the trainee. Presently the practice has transformed to documented evidence. India is a country of contrasts. We have a wide disparity of health infrastructure. We have simplest of clinical problem to the most, challenging one. We see the natural history of disease. We have a huge number of training posts. In spite of such a huge research potential the scientific contributions to the literature is meagre. We are in an era of evidence based medicine. The developed nations can generate evidence for themselves. The developing nations will have to generate evidence for their clinical problems because we only face them. The orthopaedic community in India have intellectual capacity, technical knowhow and infrastructure to generate evidence for the clinical problems of the developed and developing nations. The availability of knowhow and huge disease burden put India in a commanding position to conduct multicenter collaboration for orthopaedics research and an opportunity for global leadership.

Leader is defined as a person who commands or guides or inspires other. "The leader could be a person, an institution or a country. Can India lead the world in orthopedics? Is this question relevant? We hear so many times that "India is in midst of an economic boom" and said to be a next superpower. The later half of this century belongs to India. India is a largest democracy with largest young population¹. India has the largest number of technocrats in the world. It is the right time to analyse where we stand in orthopedics in global scenario. This will help us to draw better road map to achieve excellence in orthopedics.

EVOLUTION OF MEDICINE

The medicine has evolved with a greater pace in 2nd half of last century. Introduction of asepsis and antibodies have allowed operations to be performed with greater safety. The progress in instruments, metallurgy, implants and technology have allowed surgical correction of lots of ailments. The arthroplasty and distraction histiogenesis were the greatest introduction to surgical armamentarium. The development in trauma surgery, key hole surgery has allowed us to improve functional outcome of an injured limb.

The development in the field of imaging has helped us to identify structural abnormality better and has improved the understanding of pathophysiology and treatment principles of various pathologic entities. First decade of 21st century belong to biotechnology, where we understood how to regenerate and improve the healing of bone, tendon and ligaments with the use of artificial matrices, cytokines and cell transplant. The selective cell function could be stimulated with the usage of ultrasound, electromagnetic field selective stimuli. New age of medicine will improve understanding of human genome. With the use of genes, the delivery of growth factors and biologically active agents will be used to treat injuries and diseases. The development and, or progression of genetic, developmental and degenerative disease might be halted.

PRACTICE OF MEDICINE

It is an art transformed from an art based on, "belief in supernatural force" to "art based on science". The physicians are able to take critical decisions without definite information and it inspires confidence in patients². This art is learnt by observations of talented physicians and by practice and gradually transmitted to trainee. Now the practice has transformed to documented evidence and later on to validated evidence.

The need is the mother of invention. For growth of science to take place, one need to have a problem demanding solution. The efforts to solve the problem start with identification of a cause. Once a cause

is identified than strategies are planned to solve the problem and hence studies are generated. Scientific evaluation of outcome with a longitudinal collection of evidence which stands the test of valid statistics becomes definite evidence. This evidence if reproducible in the hands of various other clinicians, researchers influences the practice of medicine. The evidence once generated should be available beyond the geographic boundaries and human life. The evidence that is retrievable beyond human life contributes to the growth of science and that is how the clinical practice is changed. The best example is modern medicine which has taken tremendous strides while ayurveda has not grown further. The scripts of medicine needs to be evaluated/ interpreted repeatedly. That is why we call it research i.e. re+search. Something that has already been searched is searched again.

ORTHOPEDIC SCENARIO

The world is divided into developed nations which constitute high income group while rest is underdeveloped nations which economically are low income group annual income (\$ 875) lower middle income group (\$ 876 - \$3465 per year), upper middle income group (\$3465-10725) and high middle income group (> \$10725)^{3,4}. Orthopedic practices till now are guided by the developed nations (western world). Whatever advocated by them is followed in principle and practiced successfully. This has worked well till now. In the present era developed countries may not be able to guide clinical practices of developing countries. Developed nations have well organized health services where early diagnosis and prompt treatment is possible for all ailments. They have systematic documentation of patients, effective insurance system, well established safety norms to prevent mass casualties, good patient evacuation protocols, healthy doctor and patient ratio⁵. As a result the infected conditions and nutritional disease are practically eliminated. On the contrary in India we have 16% world population living in 2.4% world land (overcrowding), 72% population live in villages. Our health services are urban based⁶. 75% of health services are run by private sector. Government health care facilities have limited resources with only less than 20% avail public OPD and Less than 45% avail indoor. India has 226 medical colleges with more than 5000 primary health centers⁶. The registered Orthopedic surgeons are between 12 to 15 thousand. i.e. 80-100 orthopaedic surgeons per 10 million population concentrated in metropolitan cities. India has approximately 70,000 traditional bone setters which treat over 60% of trauma patients^{6,7}. Summarily India has gross imbalance of health facilities and orthopaedic surgeons concentrated in cities while 72% population live in rural India.

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We have wide spectrum of patients from simplest of clinical problems to most challenging cases. Most of our hospitals at periphery i.e. PHC's have poor infrastructure with suboptimal operation theater setup. We get at one end a large number of fresh fractures while at other end we get late presentations of the fractures and ununited fractures with broken implants and infected nonunions (fig No 1). Even for non traumatic conditions we get patients in very early stage of disease to a very advanced stage of disease because some patient had no access to treatment or are partially or wrongly treated. Thus we see a Natural history of disease.

ORTHOPEDIC EDUCATION IN INDIA

India has 226 medical colleges with 396 M.S. orthopaedic and 225 diplomas in orthopedics trainees and about 198 trainee of national board of examination⁶ (NBE). There is no standardized curriculum for Postgraduate programme in orthopedics. We do have general guidelines provided by medical council of India (MCI) and NBE⁷. The training programme lacks structured course content and is trainer oriented. The trainee is taught what the trainer does the best or clinical problems of a specific geographical area. The full compliment of various subspecialties to provide wholesome postgraduate education is lacking in most of medical colleges⁷. The service component takes precedence over training component in government. hospitals. Hence trainee gets little time to discuss and learn the problems from the teacher and mentor in view of heavy patient's load. While NBE trainee are enrolled in self finance/ sustained hospitals which do not have adequate clinical material to train post graduate students. The teacher excels in certain specific subspecialty hence trainees are not trained holistically. Most of them don't get enough hands on training in these hospitals.

Undergraduate Orthopedic education enjoys a priority position in MBBS course. The orthopedics not being a separate subject and still included in General Surgery hence importance of evaluation is decided by General Surgery. Even students do not consider it a priority subject.

HEALTH SERVICES IN INDIA

India is a great paradox as far as health services are concerned. The health services are looked after by private and public sector. Public sector has tremendous intellectual capacity. They lack state of art infrastructure with heavy patient load. 300-600 patients are seen in out patient departments every day with 60-90 emergency patients seen per day. The patients with simplest clinical problems to most advanced clinical problems are looked after by them. They are basically general orthopaedic hospitals. The doctor's patient ratio is poor hence are over burdened by patients. The documentation and record keeping of the patients is very poor. Since most of the population is migratory (living on rented accommodation) long continuous follow-up is not available. On the other hand the corporate hospitals have state of art technology. But they have a limited clinical work in volume and spectrum of diseases. The surgeons working here are not generalist but are subspecialty experts.

The best services can be delivered when the quantum of work in matched by available infrastructure. We have the worst scenario because we do not know the burden of musculoskeletal trauma and disease in whole country and in a geographic area. We are in trauma epidemic. 71% of our vehicles are two wheelers hence likely to have fatal or severe musculoskeletal injury. Deaths due to road traffic accidents have increased to 3 times from 1980 to 2002. According to a projection for year 2005 against one death on road we have 20 serious injuries and 50 minor injuries and if we have 8, 50000 deaths

on road (as was projected for 2005 AD) than 1.7 million will suffer from major injuries needing admission and 4.25 million minor injuries⁷. We can not plan trauma services unless we have data of musculoskeletal disease burden for our country. Unfortunately we have not yet started collecting data on musculoskeletal disease burden and we have no ready roadmap to provide effective health services covering the whole population and evacuation plan for disasters.

Evidence based clinical treatment

We are in an era of evidence based medicine where clinical decisions should be based on scientific evidence. Developed nation have enough clinical material and infrastructure with good documentation to generate evidence for them. They cannot generate evidence for clinical problems of developing countries as they do not face these clinical problems. The undeveloped countries will have to generate evidence for their clinical problems. This is true for India and rest of two third developed world.

The very basis of Cochrane collaboration in generating reliable and robust evidence is systematic reviews and metanalysis^{9,10}. For systematic review we require well conducted studies on clinical problems. The well conducted studies and RCT's, for the problems of India and other developing countries can only be conducted in those countries where they are prevalent. The management planning for whole diaphyseal bone loss following chronic hematogenous osteomyelitis (fig.2), sequalae of chronic hematogenous osteomyelitis, nonunion in a scarred leg with viable foot (fig. 3a) can only be given by us. We need to publish the credible data to document that 3-6 months old neglected traumatic dislocation of hip if openly reduced can give a fully mobile hip¹¹. Lots of studies were conducted on TB spine by medical research council of United Kingdom¹². This work was started 40 years ago on a clinicoradiologically diagnosed typical TB spine lesions. Now United kingdom has no reason to work on TB spine as they have practically eliminated infective clinical problems. MRI has improved our understanding of pathophysiology of TB spine¹³. On the other hand when we see a TB spine with severe kyphosis (fig. 3b) the question come to our mind what could have been done to prevent the development of such a severe kyphosis. We could have prevented it by diagnosing at early stage before a kyphosis developed by modern imaging. All patients with long standing back pain can not be imaged by MRI as we have limited resources to be used judiciously. Hence we need to give clinical predictor for early diagnosis of TB spine. If a patient with long standing 6-8 weeks or more localized back pain with or without constitutional symptoms and on plain X-ray shows a reduction in intervertebral disc height should be suspected to have underlined



Fig1: X-rays of two patients show broken implant with ununited fractures. The fracture ends show no evidence of attempted callus formation.



Fig2: X-rays of two patients showing loss of whole diaphysis of femur and tibia following chronic hematogenous osteomyelitis.

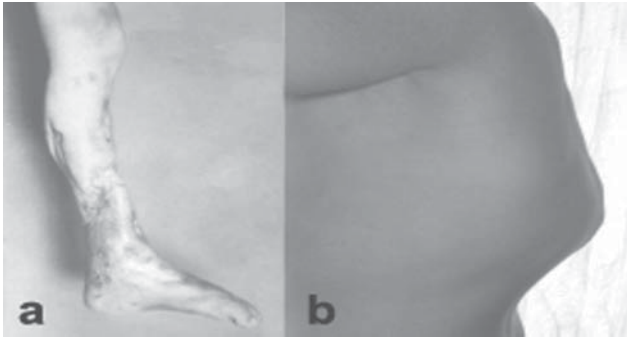


Fig3: (a) Clinical photograph of a patient with scarred leg (multiply operated limb) with ununited leg fracture. (b) clinical photograph of the patient showing severe kyphosis because of TB spine reported for the first time to hospital for treatment.

infective pathology¹⁴. Such case should be scanned by magnetic resonance imaging. In case of persistent neck pain if prevertebral soft tissue is found to be increased than normal values it should be investigated for underline pathology¹⁵.

MRI of a patient of TB spine without neural deficit may show intra spinal cord compression. We need to give evidence that all cases of TB spine with MRI based cord compression does not warrant surgery and it may resolve by non-operative treatment as we know that upto 76% canal encroachment may be compatible with intact neural status in a typical vertebral body lesion¹⁶.

All cases of advanced tubercular arthritis of hip do not need excision arthroplasty and in good percentage of cases a functional joint with available range of motion in functional range is possible. Neglected fracture of neck of femur is very common in low income countries. We need to define evidence based criteria that which hip can be salvaged.

CAN INDIA GENERATE EVIDENCE

The orthopaedic community in India have clinical problems at hand, the intellectual capacity, the technical knowhow and infrastructure to do research and generate evidence. India can give evidence for high income countries also because we have approximately 220 million (20% of total population) privileged populations; who can match in financial capacity globally. This number is more than United Kingdom and insured population of USA. We have expertise and state of art centers. The number of patients for these clinical problems are sufficient to conduct research.

We can generate evidence for both developed and underdeveloped countries. Sir AL Eyre brook once wrote orthopaedic surgery practiced in developing country differ from the western world as they have different spectrum of disease because of uncontrolled disease process and less satisfactory condition to function^{11,16}. The needs of patients from developing countries are different than that of developed world. He believed that poverty in material resources does not match with poverty of intellect. Lot more can be learnt from the developing countries¹⁷. The popularity of Jaipur foot in Asian countries over SACH is a direct reflection of difference in the need of patients of Indian subcontinent¹⁸.

WHAT SHOULD WE DO?

a) We need to create a systematic and scientific health data base to know the burden of musculoskeletal disease. This will help in deciding goals of the health need of country so that minimum basic orthopaedic care to whole population can be planned and

the burden of patients in tertiary care hospitals can be reduced so that they can contribute to research also.

- b) We need to strengthen undergraduate courses by teaching and evaluating on “what they must know areas”. Orthopedics should be regards as specialty to be taught as seriously as general surgery and general medicine. Postgraduate student should be trained to be competent to perform routine orthopedic surgery procedure by defining must know areas. We should start discriminating between a trainee and service providing doctor and postgraduate students should not be used as work force. We need to make our teaching structured and evaluation objective. The knowledge of research method should be must to ensure developing scientific temper. The mindset of teachers and trainers and the examiner must reconcile clearly and loudly that orthopaedic trainee would be examined essentially for fundamentals of basics of orthopedics.
- c) We need to create a cadre of “clinician scientist”. The clinical practice and research has to go hand in hand. We need to produce thinking orthopaedic surgeons and not the technicians.
- d) The teacher should act as mentor. The leader has not only to define problems, but mobilize resources, motivate people and severe as a symbol. He has not only to act as leaders but also to groom future leader.
- e.) Publications

The research done and observations seen are needed to be documented in published literature to be used in future by one and all. This is only possible if we publish our observations. There is no substitute for good analytic work and publication in peer reviewed journal. Nothing is more satisfying than seeing one’s name printed in an article in a peer review journal. Very little contributions are available in published literature from India. It is unfortunate that from India where 600-700 dissertation thesis are conducted every year and have more than 300-400 state of art institution publishes only few articles. For a publication one needs to have a clear research question being tested. Once a research question is defined the variables are to be chosen to test research question. The evaluation tool should be scientific and observations statistically significant to ensure that results are valid. The conclusions drawn should be based on observations and an answer to research question.

6. India is a country where the availability of knowhow and huge disease burden puts us in a commanding position to conduct multi center collaboration for Orthopaedic research and thus gives us opportunity for global leadership¹⁹. The state of art public and private hospital can be used for medical tourism to provide cheap and reliable treatment to one and all through out the world. The money thus generated could be used for further research and improve the quality of health services provided in public sector. There is no dispute that India can be a world leader in orthopedics. We should resolve to do because opportunity comes from the adversity. If we resolve to do than the day is not far when India will be world leader in orthopedics.

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LITERATURE REVIEW

Long-Term Outcome on Kidney Retransplantation: A Review of 100 Cases From a Single Center S. Barocci, U. Valenteb, I. Fontanab, etal. *Transplantation Proceedings, 2009; 41; 4;1156-1158*

Renal transplantation has become an effective form of treatment for end-stage renal failure. Unfortunately, as a consequence of immunological and nonimmunological pathogenic mechanisms, chronic allograft nephropathy is responsible for the loss of a large proportion of kidney grafts after several years and return to dialysis. We have reported herein our 24 years of experience with second kidney transplantations. Of 1302 kidney transplantations between January 1983 and June 2007 performed in our transplantation center, 100 were second transplantations. Kidney retransplantation was performed in 74 men and 26 women of overall mean age of 35.4 ± 12.6 years. Cadaveric donor grafts were transplanted in 92 patients, whereas the remaining 8 were living-related donor kidneys. At 1, 5, and 10 years after kidney transplantation, patient survival rates were 100%, 96%, and 92%, respectively, whereas graft survival rates were 85%, 72%, and 53%, respectively. Immunosuppressive therapy included induction therapy with polyclonal anti-lymphocyte antibodies (ALG/ATG) or (starting from 1999) monoclonal anti CD 25 antibody. Our results demonstrated good outcomes for kidney retransplantations with allocation based on anti- HLA antibody identification together with induction immunosuppression.

Hepatocellular Carcinoma and Liver Transplantation: A 12-Year Experience

M.A. Varonaa, J.M. Del Pinoa, M. Barreraa, etal. *Transplantation Proceedings, 2009; 41; 3;1005-1008*

Background: Orthotopic liver transplantation (OLT) for patients with cirrhosis and concomitant hepatocellular carcinoma (HCC) in early stages is the treatment of choice, with an acceptable recurrence rate and excellent survival. Aim: We sought to evaluate (1) the accuracy of preoperative imaging; (2) the impact of pre-OLT treatments on survival and recurrence; and (3) the influence of beyond Milan criteria selection on global outcomes. **Methods:** We studied a cohort of 65 patients with HCC among 300 consecutive OLTs over a single 12-year experience. We analyzed the overall outcomes of survival and recurrence, the accuracy of preoperative diagnosis and staging the influence of neoadjuvant treatment prior to OLT, and the effect on overall outcomes beyond the Milan criteria in our series. **Results:** The 65 transplants were performed for HCC, mostly in association with hepatitis C virus and alcoholic cirrhosis with HTP. At a mean follow-up of 40.32 months, the recurrence rate was 5.7% among the 61 HCC confirmed by histopathology. The overall survival was 30.07. Actuarial survivals at 1, 5, and 10 years were 82%, 77%, and 62%, respectively. Six retransplants occurred among the seven graft losses albeit with poor survival after the second graft. Most explants showed low pTNM stages with favorable microscopic features. Preoperative imaging tests failed to achieve an accurate diagnosis in 15.38% of the series. The role of alpha-fetoprotein (AFP) and hepatic biopsy was irrelevant. Unfavorable histopathologic factors predicted a greater recurrence rate, but had no influence on survival. Neither recurrence nor survival were modified by pre-OLT therapy. **Conclusions:** In our series, AFP, hepatic biopsy, and pre-OLT treatment had limited roles. Radiological imaging techniques underestimated HCC staging and lead to a misdiagnosis to an expected degree. Despite these findings, this single institution experience with OLT for HCC showed excellent survivals with a low recurrence rate including cases of patients beyond the Milan criteria.

Impact of Hepatitis B and C Virus Infections on Kidney Transplantation: A Single Center Experience

L. Santosa, R. Alvesb, F. Macariob, etal. *Transplantation Proceedings, 2009; 41; 3;880-882*

Objective: The impacts of hepatitis C virus (HCV) and hepatitis B virus (HBV) infections on patient and renal graft survivals are controversial. This study sought to evaluate the effects of pretransplantation HCV and HBV infections on renal transplant patients and their grafts at our center. **Patients and Methods:** We retrospectively examined 1224 renal transplantations performed between 1992 and 2006, including 28 HBsAg positive; 64, anti-HCV; 9, anti-HCV plus HBsAg positive; and 1123, negative for anti-HCV and HBsAg. The mean posttransplantation follow-up was 5.6 ± 4.1 years. Results: The prevalences of HBV infection were 6.2% in 1994 and 2.3% in 2006 and those of HCV infection were 6.8% in 1998 and 5.2% in 2006. The rejection rate was higher among HBV+ (46.4%) and HCV+ (40.6%) groups than the negative groups (31.5%), but it was not significant. There were no significant differences in patient and graft survivals among the groups. The major cause of patient death was liver failure among patients with concomitant HBV+ and HCV+ infections and cardiovascular disease among HCV+ and negative patients. **Conclusions:** There has been a decrease in the prevalence of recipients with hepatitis virus infections over the last 15 years. Patient and graft survivals were not affected by HCV or HBV infection.

Influence of Dialysis Duration and Modality on Kidney Transplant Outcomes L. Resendea, J. Guerrab, A. Santanab, etal. *Transplantation Proceedings, 2009; 41; 3;837-839*

Background: The influence of pretransplantation dialysis on kidney transplant outcomes has been the subject of longstanding interest. Although increased time on dialysis prior to kidney transplantation is associated with decreased graft and patient survivals, analyses of the impact of dialysis modality on kidney allograft outcome have produced conflicting results. **Objective:** The objective of this study was to evaluate the influence of dialysis duration and modality on the function and survival of renal allografts. Patients: We retrospectively reviewed the clinical data of 421 adults who received first kidney transplantations from cadaveric heart-beating donors performed in our unit from May 1989 to May 2007. Three hundred seventy-four patients (88.8%) were on hemodialysis (HD) prior to kidney transplantation, including 247 patients (58.7%) on treatment for at least 24 months. Results: Patients with a dialysis duration ≥ 24 months were significantly older (45.9 vs 42.8 years; $P = .013$). Renal function at 3, 12, 60, and 96 months was similar between the 2 groups. Longer duration on dialysis was associated with poorer overall graft and patient survivals. No differences were observed in renal function or graft and patient survivals comparing HD or peritoneal dialysis (PD). Multivariate analysis confirmed the lack of correlation between dialysis duration or modality and allograft failure. **Conclusion:** Longer dialysis duration influenced overall graft and patient survival. However, dialysis modality showed no influence on graft function or survival.