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FROM THE PRESIDENT'S DESK

GOA E-Journals are taking big strides with various specialized and zonal issues and when the central zone comes out with an excellent treatise of Orthopaedic knowledge naturally it is going to be one of the finest. Under the very able leadership of excellent communicator, Dr. Umang Gandhi, this issue has been prepared with lot of care and I hope that members will be enthused to go through the same!

Central zone is taking care of a mammoth task of hosting GOACON at SOU on 7, 8 February 25 (for which I am sure that most of you would have already registered, as they are keeping no stone unturned for an excellent academic event), still under leadership of Umangbhai they have took up the task of presenting a very useful collection of excellence across the central zone! All kudos to the central zone and the leader!

GOA was very well represented at the national level in the recently concluded IOACON 24, held at Bangaluru and very happy to share that our past president Dr. Navin Thakkar has been installed as President Elect for IOA! Really a proud moment for all the members of GOA who have shown unwavering support to him!

GOA is organizing box cricket tournament, Zonal tournaments will kick in, in the month of December; do contact your zonal representative for the details. GOA has been very active throughout the year thanks to all the Executives and other active members. Our fellowship program has already started working and selected fellows are already getting trained under various mentors! I urge all the members for active participation in all the activities of GOA. Also for contribution to forth coming journals please be in touch with your zonal representatives.

Thanking and congratulating team central zone once again for bringing out such nice collection which has gone through great brain swarming and even few articles have been rewritten and I salute the dedication of the contributors and Guest editor along with chief editors Dr. Ketan and Dr. Pareen for their insistence for absolute excellence! A big thank you to all the contributors for this edition as without them this journal won't see the light of the day!

Jai GOA!

DR. VIJAY SATA

President, Gujarat Orthopaedic Association
GOA 2024-25

FROM THE DESK OF SECRETARY

The cultural city, the Kala-nagri, the belly of the Banyan tree- Vadodara has always got a special place in the heart. Like the Banyan tree roots, the roots of education of Vadodara are strong, innovative and widespread.

The garba, ગરબા and Gaikwad aficionados are also connoisseurs of science and medicine in general and Orthopaedics in particular.

Of course, this is a full Central Zone edition, hence I do acknowledge and appreciate the contributions and involvement of centres beyond Vadodara- viz. Anand, Nadiad, Kheda as well as Godhra and Dahod. The palette of this volume is equally decorated with your informative articles.

This edition of the GOA E-Journal brings an academic platter of various flavours and aroma of Orthopedics. Trauma, as usual is the eternal favourite and staple for all of us whilst the trend and depths of sub-specialities are developing and increasing.

Dr. Umang Gandhi is always a joy and delight to cherish. His editorship brings in the panache and passion of Orthopaedics amalgamated with a celebration of English language, which is a rare combination to behold. His meticulousness, punctuality and coordination are appreciable privileges.

Dr. Ketan Shah and Dr. Pareen Kantesaria, our chief editors have been our building blocks, our forte, fortune and fortitude. They have never said no to anything anytime. They have been on their toes for almost two years now and their yeoman services truly deserve accolades and applause. Your encores have been the core of the success of these academic E- Journals.

વિશ્વામિત્રી ના મિત્રો , the docs from the land of crocs- you have the exotic exuberance and zestful zeal in all that you do. I am sure, this issue will showcase your knowledge and skills and will enrich the learning of the Orthopedic fraternity of Gujarat.

DR. KETAN THAKKAR

Secretary, Gujarat Orthopaedic Association
GOA 2024-25

GUEST EDITOR'S MESSAGE

It is an honour to be invited once again as a guest editor for this edition of the e-bulletin of GOA. The initiative taken last year, has been carried forward earnestly by the current GOA Team. Nestled amongst the speciality editions and an unique non-academic edition, the Central Zone was entrusted with the task of a regular bulletin. We have tried to keep up with the towering standards set up by the preceding editions and hope that it matches the expectations of all readers.

The process of editing is putting the pieces together and making sense out of them. Liya Delray described editing as dieting, except being far more violent; C.J Cherryh felt that it was perfectly fine to write garbage as long as it was edited brilliantly. However, out here, there have been exquisite contributions and editing it was a walk in the park.

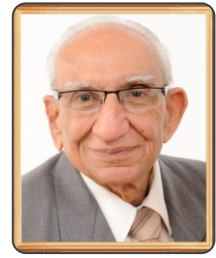
I sincerely thank all those who have contributed for this bulletin. This forum is an ideal ground for budding as well as established talents to showcase their expertise and skills and I sincerely hope that more colleagues make use of this wonderful opportunity provided by GOA. Learning is a continuous process and I sincerely hope that this endeavour from GOA is beneficial to all its members.

I hope that this bulletin is useful to the end user - the members of GOA who read it.

Warm Regards

DR. UMANG GANDHI

OBITUARY



Dr.Suketu R. Trivedi

It is said that : A Good teacher explains - A Superior teacher demonstrates - A Great teacher inspires!
The students at Baroda Medical College (BMC) have been fortunate to have learnt their Orthopaedics from a teacher par excellence.

Dr. Suketu R. Trivedi, alumnus of first batch of BMC and one out of four, who passed out at first attempt, was born on 7th February 1931. After post graduation in Surgery, he joined the Orthopaedics department and continued till he retired as Professor of Orthopaedics.

Dr. Trivedi distinguished himself as a great teacher. But above all, he is remembered for his views on ethical orthopaedic practice which he always stressed upon—never to put principles before the purse---and most (if not all) of his students have lived up to his teachings!

Apart from being a dedicated teacher, he was also a gentleman in the real sense of the word. One hardly ever heard him raise his voice or lose his cool. He exuded a sense of calm confidence and had a way of diplomatically resolving intricate issues.

Moreover, he was extremely well read and was one of the most prolific and articulate speakers one could ever hear and his command over languages was not only commendable but enviable!

Even after his retirement from orthopaedic practice, he continued to enlighten the orthopaedic department periodically with pearls of wisdom pertaining to academics, philosophy and life in general!

A nonagenarian, solid and indefatigable in the face of failing health, Dr Suketu Trivedi symbolised graceful ageing and a spirit of a fighter to the core!

Pranam to him.

Obituary written by
Dr Ashok. J Vaishnavi

OBITUARY



Dr. Padmakar Rajurkar

Heartfelt Tribute to Dr. Padmakar Rajurkar

Navsari lost the senior most and extensively experienced orthopaedic surgeon, in recent past, following a brief illness. His departure has left behind a conspicuous lacuna in the orthopaedic arena.

He was the most versatile, soft spoken, compassionate surgeon with meticulous clinical acumen. He was precise, kind, patient focused and dedicated surgeon for optimal outcome in his entire orthopaedic journey. He handled full array of orthopaedic injuries and kept him away from referral maze, and had ability to access comprehensive care.

It has been always a dilemma of people to choose the right orthopaedic surgeon, who can provide right guidance and support to help, confidently. Patients say, that the best doctors not only cure ailments but also possess the magical ability to restore faith, ignite resilience and bring smiles back to face as he was extremely accommodating healer in terms of pain to purpose.

He was not interested in number of patients treated, but the lasting impact left on each life, touched by healing grace. He was not only precise in clinical practice but was the bones and joints for medical fraternity in this area.

With deep gratitude, we adore and admire an exceptional individual and appreciate his incredible contribution in orthopaedics services in the region by this extraordinary human being.

God bless the pious soul.

OBITUARY



Dr. Kiran C. Patel

An experienced and skilled orthopaedic surgeon who did his MBBS from Surat Medical College and did Post Graduation from VS Hospital, Ahmedabad.

He started orthopaedic consulting practice in 1977 and was associated with Ashirvad Charitable Trust as medical director. He established orthopaedic department at Vijapur in Mehsana district. He organised full treatment Polio camps at Viramgam- Rampura- Bhankoda where total 427 patients were treated and he operated 319 cases.

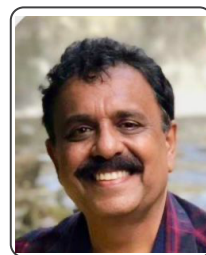
His management and administration talents were immense as reflected in his various posts as Executive member, Council member, President and Director of multiple social, educational, commerce and health associations and societies. He rendered honorary free services to many organisations.

He was the Honorary Orthopedic Surgeon to H.E The Governor of Gujarat in 2009. He was life member of IOA, GOA, AOS, AMA, Gujarat Spine Society, Gujarat Medical Association, Indian Burns Association.

We pay homage and heartfelt condolences to the family of this dedicated, devoted and dexterous member of our association.

Om Shanti

OBITUARY



Dr. Nitin P. Radia

He was born in Beira, Mozambique on 18/11/1963, and received his primary education from Fatima Convent School, Bhavnagar and St Xavier's College, Ahmedabad.

He did his MBBS and M.S. Orthopaedics from B. J. Medical College, Ahmedabad.

Apart from an orthopaedician, he was an avid blood donor (48 times donated) and he participated regularly in conducting numerous blood donation camps organized for welfare of the society at a large.

He was a great socialist and served as a Vice president of Lohana Yuvak Mandar since 1998 and also as a president of International Lohana Health Committee.

His extra curricular interest predominantly included his love towards art & music. He had passed his CEPT exam for drawing & was a very big fan of Jagjit Singh's ghazals.

He started his career at G. T. Sheth Orthopaedic hospital, Rajkot and then at Gondhia hospital; which is now recognized as Wockhardt hospital, Rajkot; where he served for more than 15 years. He started his own private hospital - 'Radia Hospital', in 2006, and served the society to the best of his capacities. He practiced as an Orthopaedic consultant and treated patients until his last days of life even while fighting a hard battle against metastatic Ca Pancreas.

Orthopaedic society of Rajkot misses the gem of the society and prayers for the divine soul to attain moksha.

Om shanti.

EFFICACY OF TRANEXAMIC ACID ON PERIOPERATIVE BLOOD LOSS IN HIP ARTHROPLASTY: A COMPARATIVE STUDY

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ABSTRACT

Background and study aims: Use tranexemic as a measure to ensure hemostasis during surgeries involving the hip region is a topic that is still debated, with scarce literature. The aim of the study was to assess the effectiveness of tranexemic acid administration in improving outcomes of hip arthroplasty.

Materials and Methods: This study is a randomized comparative prospective study. It was conducted in Department of Orthopaedics, GMERS Medical College & Hospital Vadodara from January 2023 to December 2023 on 60 patients undergoing Hip Arthroplasty.

Results: The post Operative means haemoglobin value after 24 hour in Test group was 10.9 ± 1.6 gm% while 10.1 ± 1.4 in control group which was statistically significant. Mean duration of surgery in Test group was 102.7 ± 28.2 minutes versus 125.2 ± 36.5 minutes in control with p value of 0.01 Indicating lesser surgical duration in test group.

Conclusion: Tranexemic Acid is an effective agent to reduce Intraoperative blood loss, reduce surgical time and Improve post operative haemoglobin levels.

Keywords: Total Hip Arthroplasty, Hip Hemiarthroplasty, Tranexemic Acid

INTRODUCTION

With the rapid advancements in the field of orthopaedics and general surgical procedure, both minor as well as major orthopaedic surgeries are much safer than they were even a decade ago[1]. However, certain complications still plague them, one of which is blood loss during the perioperative period. Most orthopaedic surgeries are associated with substantial amounts of blood loss[2]. This, if left unmanaged, can lead to adverse patient outcomes, and in certain cases, even death[3].

It has been estimated that as much as half of all orthopaedic surgeries are associated with transfusion of blood to the patient[4]. This is especially the case in people who already have a lower-than-normal haemoglobin level, as marked blood loss in them can lead to high morbidity and mortality.

Surgeries in and around the hip region have often been associated with a high frequency and quantity of blood loss[5]. Therefore, ensuring successful outcomes in these surgeries require special care in the management of such blood loss. This is achieved by adequate intraoperative hemostasis, which prevents

the formation of hematoma and minimizes blood loss. Successful hemostasis also leads to the achievement of satisfactory postoperative range of movement, and the prevention of adverse events such as pain wound hematoma, seroma formation and arthrofibrosis[3].

In these cases, blood transfusion can literally be a life-saving measure. However, there are certain intrinsic risks associated with blood transfusions too. Blood transfusions are often expensive, with blood being a rare resource. Furthermore, there are certain risk of infection, immunosuppression, allergy, anaphylaxis, volume-overloads etc. that have been documented with even compatible transfusions[7]. Furthermore, socio-cultural factors also preclude blood transfusions in certain cases. Therefore, to achieve and maintain hemostasis during and after an orthopaedic operation, blood transfusion should be considered a last step. For these reasons, other methods, pharmacological as well as non-pharmacological, have been explored which can help achieve and maintain hemostasis in the intra- as well as post-operative periods in orthopaedic surgeries.

While hypotensive anaesthetic procedures have shown some promise in this field, the procedures themselves have been observed to be associated with several complications. These include tissue hypoxia, coronary artery thrombosis, cardiac arrest, temporary and permanent neurologic deficit, failure of technique, resistance and rebound, postoperative reactionary haemorrhage, tissue trauma. Since a number of these adverse events are potentially dangerous, hypotensive anesthesia is uncommonly performed, especially in orthopaedic surgery suites of hospitals with less-advanced infrastructure, such as the secondary care institutions of developing countries such as India.

The other alternative that has been explored, and has been shown to be effective and safe, is the use of antifibrinolytic agents in the management of blood loss. These pharmacological agents include drugs such as tranexamic acid, Epsilon aminocaproic acid (EACA), aprotinin etc. these drugs stabilize clots which form within the surgical wound by competitively inhibiting the plasminogen activators.

Of the antifibrinolytic agents, tranexamic acid has been the main focus of recent research, especially in the context of developing countries such as India. This is because of its ease of use, inexpensiveness, and wide availability in most surgical suites and healthcare institution. Furthermore, it is as one of the essential medicines as per the list maintained by the World Health Organization. Tranexamic acid is a synthetic derivative of lysine, an amino acid. It exerts its antifibrinolytic effect via the reversible blockade of the lysine binding sites on the plasminogen molecules. Intravenous tranexamic acid has been used extensively to reduce haemorrhage during and after a wide range of surgical procedures such as cardiac, orthopaedic and maxillofacial surgeries. However, the use of the agent as a measure to ensure hemostasis during surgeries involving the hip region, is a topic that is still debated, with scarce literature. In this context, the present study was planned so as to assess the effectiveness of tranexamic acid as an agent to minimize the intraoperative and postoperative blood loss in total hip arthroplasty surgeries.

MATERIALS AND METHODS

Study Area

This study is a randomized comparative prospective study. It was conducted in Department of Orthopaedics, Gmers Medical College & Hospital, Vadodara from January 2023 to December 2023.

The study population consisted of patients aged 18 years or above and scheduled to undergo hip arthroplasty in the study institution. Two groups of patients were recruited into the study. Group T patients received intravenous tranexamic acid at 10 mg/kg body weight via the intravenous route 10 minutes before the incision was made, and group C patients did not receive any tranexamic acid before

the procedure.

CRITERIA OF SELECTION OF PATIENTS

- Inclusion criteria

Patients of either sex, aged ≥ 18 years.

Patients with hemoglobin > 10 gm%

Patients scheduled to undergo hip arthroplasty

Patients providing written informed consent to take part in the study.

- Exclusion criteria

Patients with upper tract genitourinary bleeding eg: kidney, ureter

Patients with history of subarachnoid bleed.

Patients with active intravascular clot and disseminated intravascular coagulation.

Patients with renal failure and abnormal renal parameters.

Patients with thromboembolic disorders

Patients with documented coagulopathy

Patients with hypersensitivity reaction to tranexamic acid

Evaluation of the intraoperative blood loss was based on Mop count and blood collection in suction apparatus while Postoperative blood was evaluated based on 24Hr postoperative Hb Level.

Drain tube was not used after surgery and so, drain collection as a mode to evaluate blood loss, was not considered.

The patients were divided into two groups on a consecutive sampling system.

Those who met the inclusion criteria were recruited into the study. After explaining the procedure and methodology of the research to the guardians and obtaining written informed consent from them, a predesigned, pretested researcher-administered questionnaire was used to obtain data relevant to the socio-demographic and clinical characteristics of the study participants.

Then, 5 ml venous blood was collected from each patient and sent to the institutional pathology laboratory in an EDTA vial for the estimation of complete blood count (CBC) and hemoglobin estimation. Thereafter, each patient underwent hip arthroplasty following the standard surgical procedure. In group T patients, an intravenous bolus dose of tranexamic acid 10 mg/kg was administered 10 minutes prior to the incision, while it was not given to the patients in the group C. Another bolus of 10 mg/kg tranexamic acid was administered to the group T patients topically during the intraoperative period post-incision. 24 hours after the surgery, 5 ml of venous blood was again taken from each patient and sent in an EDTA vial to the institutional pathology laboratory for CBC estimation. The blood collected in the suction apparatus during surgery, number of mops used in the surgery were estimated as measures of blood loss. No drain was put in any of the patients.

Tranexamic acid and its pharmacokinetics

Tranexamic acid is a synthetic lysine derivative, which reduces the dissolution of hemostatic fibrin by plasmin. It exerts its anti-fibrinolytic effects by the reversible blockade of lysine binding site of plasminogen molecules. The effect of TXA is mediated by a reversible interaction occurring at multiple sites of the plasminogen molecule. The saturation of the binding sites of the plasminogen molecules by TXA leads to its displacement from the surface of fibrin. The drug acts within 2-3 hours after oral

administration, and immediately after intravenous administration. It reduces the rate of lysis of fibrin by 20-60%[16].

The plasma protein binding of tranexamic acid is about 3% at the therapeutic plasma level and seems to be fully accounted for by its binding to plasminogen. Tranexamic acid does not bind to serum albumin. After an intravenous dose of 1 g, the plasma concentration time curve shows a triexponential decay with a half-life of about 2 hours for the terminal elimination phase. The initial volume of distribution is about 9 to 12 liters. Only a small fraction of the drug is metabolized, and it gets eliminated via urinary excretion. Glomerular filtration excretes 95% of drug unchanged. Within the first 24 hours, 90% of drug gets eliminated. The elimination of the drug is estimated to be around 2 hours.

Tranexamic acid diffuses rapidly into joint fluid and the synovial membrane. In the joint fluid the same concentration is obtained as in the serum. The biological half-life of tranexamic acid in the joint fluid is about 3 hours. Common adverse effects of TXA include headache, dizziness, shortness of breath, nausea, diarrhoea and watery eyes. Rapid intravenous infusion of the drug can cause hypotension. TXA is contraindicated in patients with sub-arachnoid haemorrhage, patients with history of thromboembolic episodes. There is also relative contraindication for patients of heart, kidney, and liver diseases.

RESULTS

In this prospective study, 60 Patient were operated for Hip arthroplasty. 31 out of 60 patients were in the range of 60-79 years age group. 33 out of 60 (55%) patients were female and 27 out of 60 (45%) were male.

Out of 60 patients, 27 underwent total hip arthroplasty (45%) and 33 (55%) patients underwent hemiarthroplasty (55%). In group T out of 30, 13 patients underwent total hip arthroplasty (43.3%) and 17 patients underwent hemiarthroplasty (56.7%). In group C 14 patients underwent total hip arthroplasty (46.6%) and 17 patients underwent hemiarthroplasty (53.4%).

The mean hemoglobin level of the participants of group T was 12.4 ± 1.7 gm%, while that of the group C was 11.8 ± 1.7 gm% at baseline. The two study groups did not differ statistically significantly with respect to their hemoglobin values at baseline.

Intraoperatively, the mean amount of blood collected in the suction apparatus for the study participants in group T was 268.3 ± 96.1 ml, while that in group C was 301.7 ± 93.5 , which was statistically significantly higher than the former.

Study groups did not differ from each other statistically significantly with respect to the number of mops required intraoperatively

The mean duration of surgery in group T was 102.7 ± 28.2 min, while that in group C was 125.2 ± 36.5 min. It was seen that the mean duration of surgery for group T participants was statistically significantly lower than that in the control group patients.

The mean serum hemoglobin of the participants at 24 hours postoperative period of group T was 10.9 ± 1.6 gm%, while that of group C was 10.1 ± 1.4 gm%. The mean hemoglobin of group T was

statistically significantly higher than their control group counterparts.

DISCUSSION

In the present study, the antifibrinolytic agent tranexamic acid was assessed as a drug for the minimization of intraoperative and postoperative blood loss in hip arthroplasty surgeries. Two groups of 30 patients each were selected, with group T receiving 10 mg/kg TA 10 mins before the surgery as well as intralesionally in the intraoperative period, and group C being the control group, who were not given tranexamic acid during their surgery. The findings of the present study are discussed henceforth.

It was observed that the age of the participants ranged from 19 to 89 years, with the mean age of the tranexamic acid group patients was 56.1 ± 16.7 years and that of the control group was 58.7 ± 16.8 years. Most of the study participants were between 60 and 79 years, predominantly representing a middle-aged demographic population. This age distribution is similar to what was seen in other studies, where the procedure is commonly indicated for conditions such as osteoarthritis, rheumatoid arthritis, and other degenerative joint diseases that escalate with age. Majority of patients being between 60 and 79 years indicate the effect of ageing on joint health, exacerbated by lifestyle factors, genetic predisposition, and possibly the onset of chronic conditions prevalent in this demographic population. Similar mean age was reported in their studies by North et al. (64.2 ± 12.8 years), Lin et al. (52.8 ± 14.2 vs 54.1 ± 13.3), and Hines et al. (61.1 ± 8.7 vs 59.6 ± 12.6 years)

Most of the study participants were women (53.3% in group T and 56.7% in group C, p-value 0.795). This observation is indicative of the gender-specific prevalence of conditions necessitating hip arthroplasty, particularly in the Indian context. Firstly, the higher incidence of osteoarthritis among women, especially post-menopausal women, due to hormonal changes and decreased estrogen levels, significantly contributes to the degradation of joint health. This factor is crucial in understanding the gender disparity, as osteoarthritis is a leading indication for hip arthroplasty. In many Indian communities, women are engaged in activities requiring prolonged periods of squatting or sitting on the floor, which may exacerbate hip joint stress and degeneration over time. The findings of the present study are in line with the observations made in other studies conducted globally, with authors such as Gandhi et al. and Wang et al. in their systematic review and meta-analyses reporting a female preponderance in patients requiring hip arthroplasty surgeries.

It was observed that the mean duration of surgery in group T was 102.7 ± 28.2 min, while that in group C was 125.2 ± 36.5 min. It was seen that the mean duration of surgery for group T participants was statistically significantly lower than that in the control group patients. This observation suggests that the administration of TXA may contribute to more efficient surgical procedures by reducing blood loss and improving the visibility of the surgical field. Intraoperative bleeding can often complicate the surgical process, constraining additional time for hemostasis and blood management. By effectively minimizing bleeding, TXA facilitates a smoother and potentially quicker surgical procedure, allowing for a more streamlined operation and potentially reducing the risk of complications associated with prolonged surgery. Furthermore, the reduction in operative time has implications for overall surgical efficiency, resource utilization, and patient outcomes. Shorter surgery durations can lead to less time under anesthesia, potentially reducing the risk of anesthesia-related complications and improving postoperative recovery times. Additionally, improved operative efficiency can enhance hospital throughput, allowing for the treatment of more patients within the same time frames and resources.

The mean hemoglobin level of the patients of group T was 12.4 ± 1.7 gm%, while that of the group C

was 11.8 ± 1.7 gm% at baseline. The two study groups did not differ statistically significantly with respect to their hemoglobin values at baseline. This parity at baseline is crucial as it ensures that any observed postoperative differences in hemoglobin levels can be attributed with greater confidence to the intervention under study rather than preexisting disparities. At the 24-hour postoperative mark, a noteworthy divergence emerged between the two groups. Participants in Group T, who received TXA, exhibited a mean hemoglobin level of 10.9 ± 1.6 gm%, contrastingly higher than the 10.1 ± 1.4 gm% observed in Group C. This difference, upon statistical analysis, was identified as significant, underscoring the efficacy of TXA in mitigating blood loss associated with hip arthroplasty surgery. Similarly lower drop in postoperative hemoglobin levels in patients receiving tranexamic acid in THR surgeries have also been reported by authors such as Yue et al., Wang et al., Chen et al., and Peck et al. Tranexamic acid, an antifibrinolytic agent, functions by inhibiting the conversion of plasminogen to plasmin, thereby stabilizing fibrin clots and reducing bleeding. The observed higher postoperative hemoglobin levels in the TXA group suggest that the drug effectively reduced intraoperative and immediate postoperative bleeding, preserving hemoglobin levels and potentially reducing the need for postoperative blood transfusions. The significance of this finding cannot be overstated. Perioperative blood management is a critical aspect of hip arthroplasty, with implications for patient recovery, the risk of complications, and overall outcomes. Blood loss during and after hip arthroplasty can lead to anemia, increased transfusion rates, and associated risks such as transfusion reactions and infections. By demonstrating a statistically significant reduction in blood loss as evidenced by higher postoperative hemoglobin levels, TXA administration presents a compelling case for its routine use in hip arthroplasty patients.

Furthermore, the implications of this study extend beyond the immediate perioperative period. The maintenance of higher hemoglobin levels postoperatively may facilitate quicker patient recovery, reduce the length of hospital stay, and diminish the overall burden on healthcare resources. Additionally, by potentially reducing the need for blood transfusions, TXA use aligns with broader goals of patient safety and cost-effectiveness in surgical care.

It was further seen that the mean amount of blood collected in the suction apparatus in patients of group T was significantly lower than that collected for the group C patients (268.3 ± 96.1 ml vs 301.7 ± 93.5 ml, p-value 0.021). However, the number of mops required in the two groups did not differ statistically significantly, although it was higher in the group C patients as compared to the group T patients (4.1 ± 0.7 vs 4.3 ± 0.8). Zhou et al. in their meta-analysis of 19 randomised controlled trials also reported a significant lowering of intraoperative blood loss in patients receiving tranexamic acid as compared to controls[16]. In another meta-analysis, Chen et al. also reported that there was a significant decrease in intraoperative blood loss in patients receiving tranexamic acid as compared to those not receiving the drug in the preoperative period.

The reduced volume of blood collected in the suction apparatus in Group T directly reflects TXA's antifibrinolytic mechanism, which stabilizes the formation of blood clots and thus reduces active bleeding. The effectiveness of TXA in decreasing the overall blood loss during surgery is thereby highlighted, potentially contributing to lessened transfusion requirements and improved patient outcomes. Conversely, the non-significant difference in the number of mops required might suggest that while TXA effectively reduces the volume of free-flowing blood that can be suctioned, it has less impact on blood loss that is absorbed or handled by surgical mops. Surgical mops are often used for blotting and absorbing blood from surfaces not easily accessible by suction, indicating that while TXA reduces overall bleeding, it might not significantly alter the distribution of blood loss within the

surgical field. However, a higher count of surgical mops used in the control group patients reiterate the effect of TA in the reduction of blood loss in patients receiving the agent. Reduced intraoperative blood loss can contribute to faster patient recovery, decrease the likelihood of postoperative complications associated with significant blood loss, and potentially shorten hospital stays[28].

Therefore, the findings of the present study indicate that tranexamic acid, when administered in the pre-operative and intraoperative period, is an effective agent in the prevention of blood loss in patients undergoing either total hip arthroplasty or bipolar hemiarthroplasty surgeries.

CONCLUSIONS

In our study, we discovered that Tranexamic acid is an effective agent to reduce Intra Operative Blood loss in Hip Arthroplasty.

Tranexamic acid may contribute to more efficient surgical procedures by reducing blood loss and improving the visibility of the surgical field. Inter operative bleeding can often complicate the surgical process containing additional time for hemostasis and blood management.

The Test group had significantly reduced drop in postoperative hemoglobin level compare to control group.

LIMITATION

Larger number of sample size or a multicentric study would have been more conclusive with respect to the conducted study.

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COMPLEX OR ATYPICAL CLUB FEET

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INTRODUCTION

Congenital idiopathic club foot is a deformity which typically occurs in an otherwise healthy child. Ponseti technique has been accepted worldwide as the preferred management for children with club feet. Most of the club feet typically respond to 4-6 cast manipulations.

However, a small percentage of club feet are severe and very difficult to treat with standard protocol. These club feet are classified as complex or atypical club feet.



FEATURES OF COMPLEX CLUB FEET

The complex clubfoot is short and stubby. First metatarsal is usually short and hyperextended while the hindfoot is in severe equinus and varus. The forefoot is adducted and all metatarsals are in severe plantar flexion. There is a deep crease across the sole of the foot and another above the heel. The severe equinus is concurrent with severe plantar flexion of the metatarsals and apparent shortening of the foot and toes.

WHY ARE THEY DIFFICULT TO TREAT?

In the complex clubfoot, it is the gastrosoleus and the plantar intrinsic muscles and ligaments that are more severely involved. The medial ligaments and tendons of the foot can be stretched easily, but the cavus and the equinus strongly resist correction.

The deformity worsens as a result of attempts to hyperabduct the midfoot and forefoot, as is done in typical clubfeet. The forefoot adduction is corrected easily after the first or second manipulation and casting but the metatarsals remain in stiff plantar flexion and the calcaneus remains fixed in equinus.

Additional attempts to correct the heel varus by abducting the foot causes hyperabduction of the severely plantar-flexed metatarsals. Because of the rigid flexion of the heel and metatarsals, the plaster cast also slips off easily, making the deformity worse and damaging the edematous skin of the dorsum of the foot.

MODIFIED PONSETI METHOD FOR COMPLEX CLUB FEET

Complex club foot casting requires precise identification of the subtalar joint.

The forefoot has to be grasped with one hand while feeling the malleoli from the front with the thumb and index finger of the other hand. The thumb and index finger then are moved forward to clasp the head of the talus and feel the navicular on one side and the anterior tuberosity of the calcaneus on the other side. Motion at the subtalar joint can be felt when the foot is slowly abducted, and the anterior tuberosity of the calcaneus moves laterally under the head of the talus.

In these severe complex clubfeet, this motion is minimal at first but can be felt after removal of the second or third plaster cast.

Correction also requires clear identification of the head of the talus, which is difficult to locate because it is less prominent than the anterior tuberosity of the calcaneus. To ascertain the position of the talar head, the index finger should rest over the posterior aspect of the lateral malleolus while the thumb of the same hand applies counter pressure over the lateral aspect of the head of the talus, not on the very prominent tuberosity of the calcaneus.

Adduction of the forefoot corrects easily after one or two manipulations and plaster cast applications (changed weekly). However, the metatarsals remain in severe plantar flexion and the hindfoot in severe equinus. The foot is arched downward and often slips up inside the cast worsening the deformity. To prevent slippage of the plaster cast, hyperflexion of the metatarsals and rigid equinus were corrected simultaneously by grasping the foot by the ankle with both hands while the thumbs under the metatarsals pushed the foot into dorsiflexion as an assistant stabilizes the knee in flexion.

Care was taken not to hyperabduct the metatarsals and hindfoot. Knee is immobilized in 110 deg flexion unlike in standard Ponseti protocol.

Patients require an average of five to ten casts for full correction.

All patients require a tendo achilles tenotomy to correct equinus, avoiding damage to the posterior tuberosity of calcaneum which is usually very high given the severity of equinus. Some patients may also require percutaneous plantar fasciotomy to correct residual cavus.

The foot should not be abducted beyond 40°.

Final mean ankle dorsiflexion at the end of the correction should be 10°.

Well-moulded shoes attached in 40° external rotation to a foot abduction bar are indispensable to prevent relapse in short, stubby complex clubfeet.

CONCLUSION

In conclusion, complex club feet do not respond well to standard Ponseti protocol and require modified Ponseti Method for correction.

Trick is to identify these clubfeet early at presentation and make necessary tweaks to the technique so as to achieve a good correction

SKINNY K-WIRE TECHNIQUE FOR COMMINUTED FRACTURES OF DISTAL HUMERUS **REVIEW OF ORIGINAL SERIES AND PERSONAL EXPERIENCE**

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Distal humerus fractures are 2%-7% of all adult fractures and 30% of elbow fractures. Intraarticular distal humerus fractures specifically pose a challenging problem for treating orthopedic surgeons. Most commonly, these fractures result from high energy injuries in young adults or low-energy falls in the elderly. Reconstruction of the articular surface is often technically difficult owing to poor bone quality, limited cancellous bone to support fixation, and multiple articular and metaphyseal fragments in severely comminuted fractures. The advent of locking plates placed orthogonally or in parallel have resulted in better fixation and improved clinical outcomes, but there remains a small subset of patients with poor bone quality and highly comminuted, AO/OTA type C distal humerus fractures which are challenging to treat, with difficulty achieving bony union and attaining a functionally acceptable extremity. Recently, there has been a trend toward treating these patients with total elbow arthroplasty, but in practise, the solution is often complicated by infection and mechanical failure. Even a successful total elbow entails strict, permanent activity restrictions which may require an active older patient to significantly change their lifestyle. We describe a novel surgical technique which we have found produces high rates of union, functional range of motion, and excellent clinical outcomes as defined by QuickDASH and PROMIS scores in even the most fragile, comminuted distal humerus fractures.

The Original Article describing the technique has been presented by Jeffrey J. Olson MD and George S.M Dyer MD under the auspices of Harvard Combined Orthopaedic Society program, Boston, MA USA.

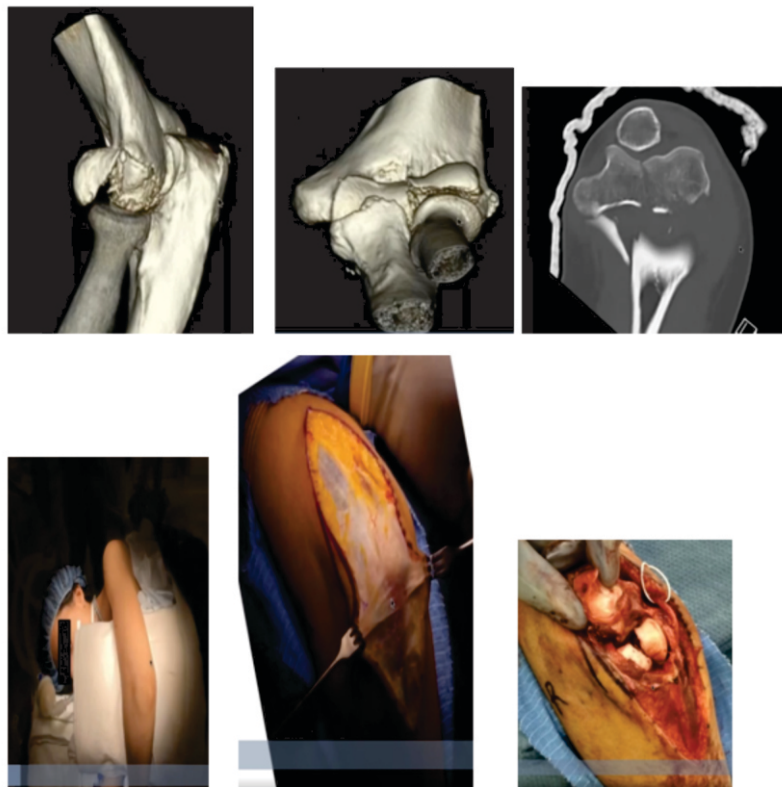
It has been well documented with a retrospective case series of 30 patients with AO/OTA type B and C intra-articular distal humerus fractures who underwent ORIF from 2014-2019 utilizing a novel surgical technique that focuses on reconstructing a comminuted articular surface through meticulous, transverse fixation of the tiny articular fragments with long, thin Kirchner wires, which are then bent over and trapped under locking compression plates to create a fixed angle support to the meta-diaphysis.

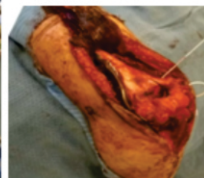
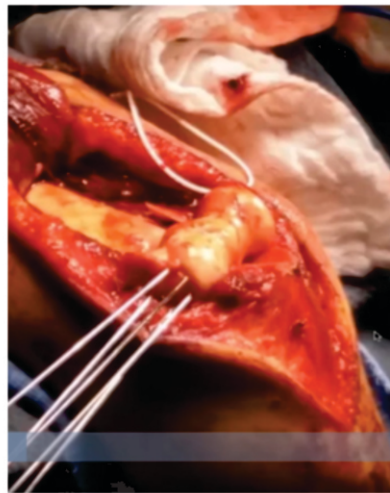
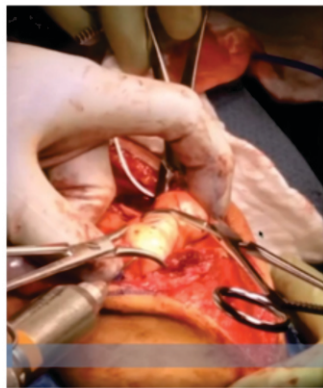
SURGICAL TECHNIQUE

Patients are positioned in the lateral decubitus position with the operative arm at 90 degrees of shoulder abduction and elbow at 90 degrees flexion, supported by a firm bump. A sterile, self-contained low-profile tourniquet (HemaClear, OHK Medical Devices, Grandville, MI) is used to limit blood loss. All patients receive perioperative antibiotics (cephalexin or appropriate alternative) before incision. A direct posterior incision is used and dissection is carried out down to the triceps fascia. Medial and lateral skin flaps are elevated and the ulnar nerve is identified medially and released along the cubital tunnel from the proximal mid-arm down to the two heads of the flexor carpi ulnaris and is tagged with a vessel loop for protection and handling. In most cases, an olecranon Chevron osteotomy is used to obtain adequate exposure to the articular surface of the distal humerus. A para-tricipital approach may be used if adequate exposure of the articular surface can be achieved without osteotomy. The articular fragments are then identified, aligned anatomically and clamped in compression with reduction forceps. The fragments are then secured utilizing numerous 1.25-mm Kirschner wires passing transversely from the lateral to medial column, creating a rigid articular block with a reconstructed joint surface. Rather than cutting them off, the long wires are bent 90 degrees proximally and moulded to the shaft so they

become a critical part of the definitive fixation. The metaphyseal fragments are realigned and fixed provisionally, thereby linking the articular segment and distal humeral shaft. Polyaxial locking, anatomically contoured distal humerus plate(s) are subsequently utilized to create the final construct. Before plate application, the long, skinny wires used for the articular block are cut flush along the medial column, bent over the lateral column, and trapped beneath the lateral column plate to prevent migration and effectively to unify them into a fixed-angle fixation device. If the sharp ends poke out medially, they are cut flush. The plate(s) are then fixed first proximally to the humeral shaft, clamped in compression from medial to lateral to the articular block, and then fixed to the articular segment distally with combination of locking and nonlocking screws. Polyaxial distal locking screws allow for intentional interference placement of screws with the wires, maximizing fixation in the distal articular segment. In no case was there difficulty placing screws due to the existing presence of the wires. Attention is then turned back to the olecranon osteotomy, which is repaired by any appropriate method (tension band wire, an intramedullary screw, or a plate). In our series, a 7.3-mm cannulated screw was used for fixation most often. Before closure, in 19 (61%) of the previous cases, the ulnar nerve was transposed subcutaneously to avoid contact with the medial plate; the remainder were left decompressed in situ. The wound is then irrigated and closed in standard fashion.

Postoperative protocol and follow-up protocols comprises of Patients being splinted in a posterior slab splint postoperatively allowing for 10-14 days of soft tissue rest. Patients do not routinely receive radiation therapy or nonsteroidal anti-inflammatory medication for heterotopic ossification prophylaxis postoperatively. At their two-week visit, early, unlimited range of motion with limited weight-bearing is initiated. No splint, sling, or other orthosis is used beyond two weeks. Range of motion is measured at occupational therapy sessions or postoperative visits using a goniometer. Postoperative radiographs are used to assess healing of the fracture and the osteotomy site.





DISCUSSION

For extra-articular or simple intra-articular distal humerus fractures in patients with good bone mineral density, conventional plating techniques alone are a good option. Union rates of 92%-100% with good to excellent range of motion, low pain, and good functional outcome scores have been achieved in multiple studies looking at modern techniques with both parallel and orthogonal configurations of plates and screws, precontoured, locking, or nonlocking. However, in low intercondylar fractures with a high degree of comminution in osteoporotic bone, engaging the small articular fragments with distal screws is challenging. More recently, surgeons have foregone fixation for total elbow arthroplasty (TEA) given the challenging nature of reconstructing the articular surface in these fragile, comminuted fractures. Frankle et al demonstrated superior clinical outcomes and significantly less revision surgery with total elbow arthroplasty compared to ORIF in women older than 65 with intra-articular distal humerus fractures. However, there is a high-rate infection and revision with total elbow arthroplasty. Prasad et al reported a 31% rate of aseptic loosening, although only two patients were symptomatic and required revision surgery and Peretta et al reported a 57% revision rate when total elbow was indicated for trauma. Survival was 75% at five years and 55% at 10 years for all total elbows. TEA is far from the perfect solution for low, comminuted intra-articular distal humerus fractures. It serves most appropriately for low-demand patients who can better tolerate the activity restrictions imposed on them by a total elbow arthroplasty procedure.

Here, we describe a technique that offers patients with highly comminuted fractures and poor bone quality a potentially better option than TEA. In our study, 100% of fractures healed at mean time of 11 weeks. This construct withstood an early active range of motion protocol, resulting in a functional mean arc of motion of 102 degrees.

Our surgical technique focuses on first achieving direct anatomic reduction of the articular surface, clamping the spool in compression, and capturing the small articular fragments using multiple Kirschner wires. This first creates a solid articular block, and by bending these wires and unifying them to the shaft, it effectively makes them into a fixed angle construct. Pin pull out is nearly impossible as our wires are left long, bent over the lateral column, and secured deep to the lateral column plate. Although we developed this independently, we note that in 2012, Kamrani et al described a similar “pin and plate” technique using articular wires. However, they secured their wires proximally in one spot with a 3-hole recon plate, risking wire migration distally at the bone/wire interface. They reported a high union rate with good ROM and DASH scores. However, they could not attribute all of their success to their technique as it was used in combination with Herbert screws and tension band wiring in multiple cases. In our study, the same technique was used in all patients.

We report a mean arc of motion of 104 degrees, low pain score, and excellent QuickDASH and PROMIS scores. Even the oldest and most osteoporotic patients have been able to return to their normal activities of daily living. Younger ones have returned to labour and physically demanding jobs, and activities they enjoy, without restriction.

This technique has its complications, as does any way of managing these challenging injuries. Rates of postoperative complications after distal humerus fixation are reported as high as 44-53%. Nonunion, hardware failure, heterotopic ossification, ulnar nerve paresthesias, and symptomatic hardware are the most common. Olecranon nonunion is a potential problem when osteotomy is used to access the articular surface. Nonunion rates following ORIF of distal humerus fractures are reported to be between 2 and 10%. In the present study, there were zero nonunions of the distal humerus, similar to results of more recent published series of simpler fractures. Heterotopic ossification (7-9%) is a significant problem after ORIF of distal humerus fractures, causing stiffness and pain which calls for reoperation.

In our series, one patient formed heterotopic bone requiring excision with subsequent improvement in motion. Infection rates are reported from 6 to 15% based on two large systematic reviews of distal

humerus fractures. Ulnar nerve paresthesias are very common after ORIF with rates ranging from 0 to 51%. A recent meta-analysis published in 2018 found the rate ulnar nerve injury after distal humerus fixation to be 19.3%. In our study, we report a 38% rate of postoperative ulnar nerve paresthesias although 10 of 12 (83%) experience improvement by the final follow-up. There was a higher rate of postoperative paresthesias when ulnar nerve transposition was used (53% vs. 17%, $P = .045$). One patient developed ulnar nerve motor weakness and intrinsic wasting which did not recover. Symptomatic hardware was also common in our practice with 26% of patients undergoing hardware removal. Recent studies have reported similar rates of hardware removal between 12 and 31%. We acknowledge the limitations to our study and surgical technique. All these surgeries were performed by a single orthopedic surgeon whose practice is mostly complex upper limb trauma, and thus it may not be generalized to all treating orthopedic surgeons. The surgical technique is associated with a high rate of secondary procedure, particularly removal of hardware.

Elbow range of motion was functional, but still limited. There was a high rate of ulnar paresthesias, particularly when the ulnar nerve was transposed. It is unclear how much is attributable to initial nerve injury in the setting of severe soft tissue trauma, and how much from the technique itself. Our study is retrospective and some data are inconsistently reported or incomplete in the electronic medical records. Physical examinations were not standardized with the goal of collecting data for research purposes. However, the most important clinical data were captured consistently including elbow ROM, functional scores, and patient-reported outcome scores. As with most trauma studies, follow-up is short. It is our practice to obtain radiographs only until the fracture unites, unless there is a clinical reason for more. Because 100% of fractures healed, this leaves the possibility of missing radiographic evidence of asymptomatic post-traumatic arthritis. Furthermore, given the short duration of follow-up, it is possible more patients will request hardware removal at a later date. It is also possible that patients who later develop post-traumatic arthritis would report greater pain and lower functional outcome score. QuickDASH and PROMIS scores could worsen with longer follow-up.

OUR CASES

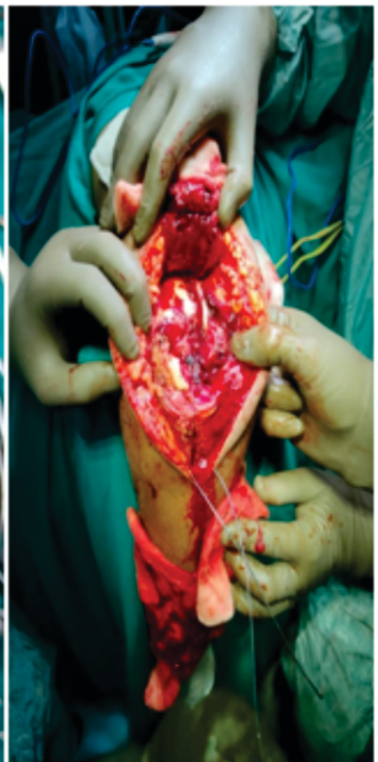
CASE 1

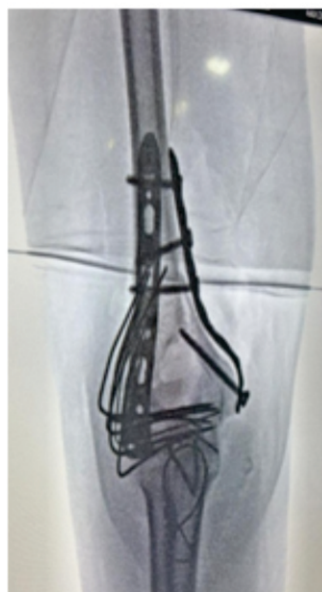
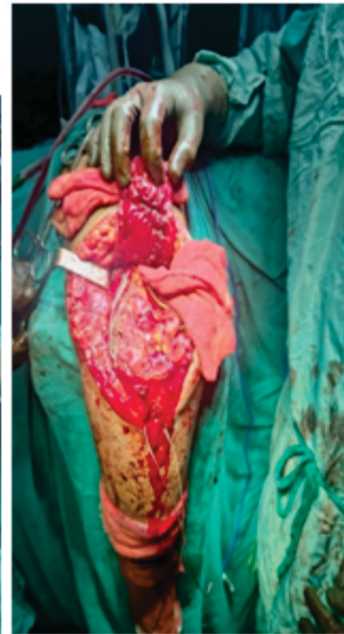
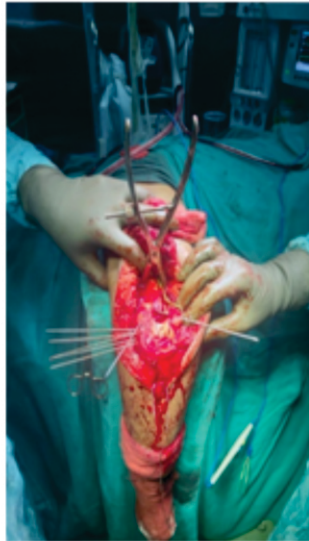


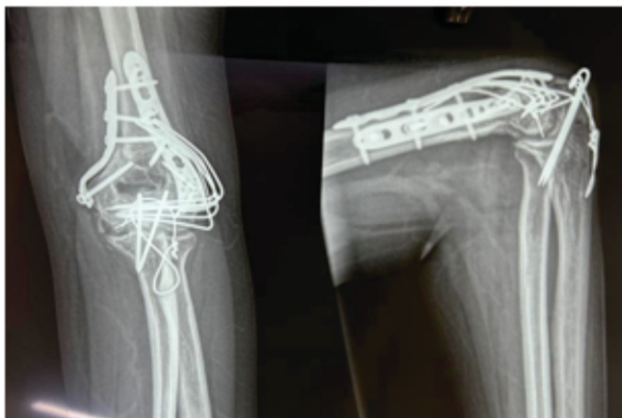
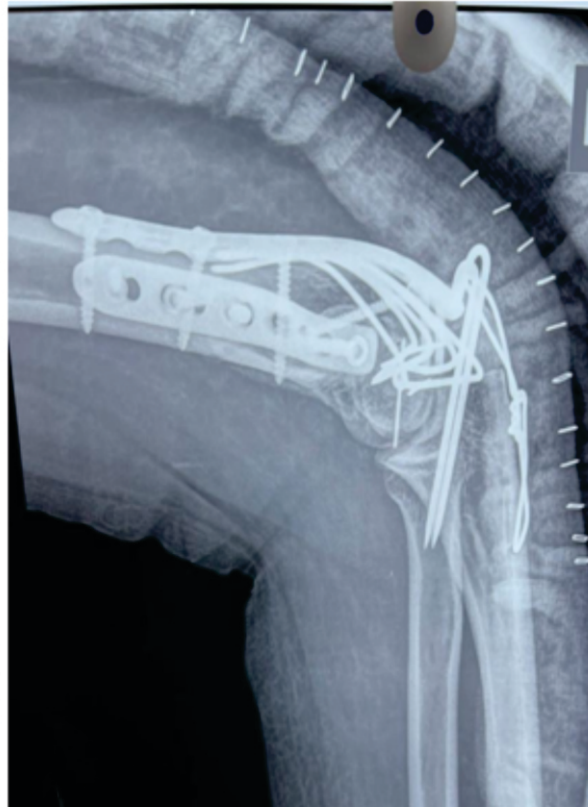
Young Male, RTA

Comminuted, Intraarticular fracture of distal Humerus.

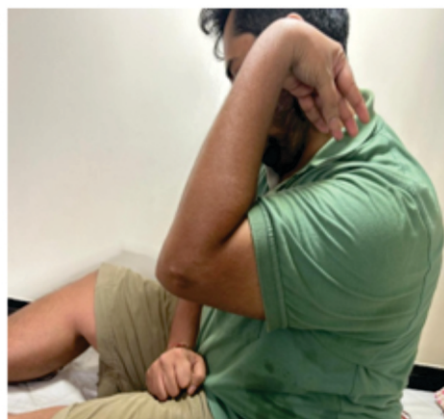






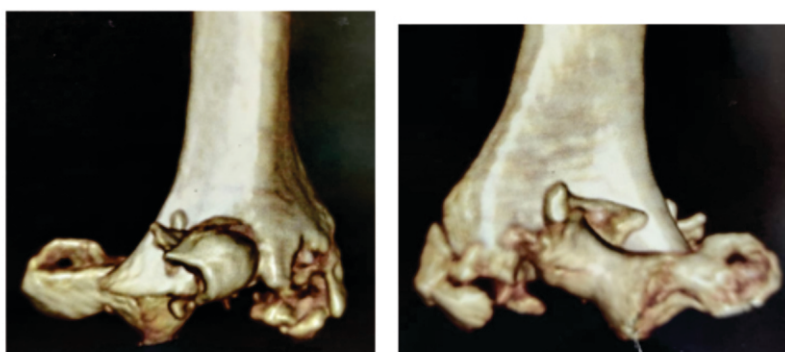
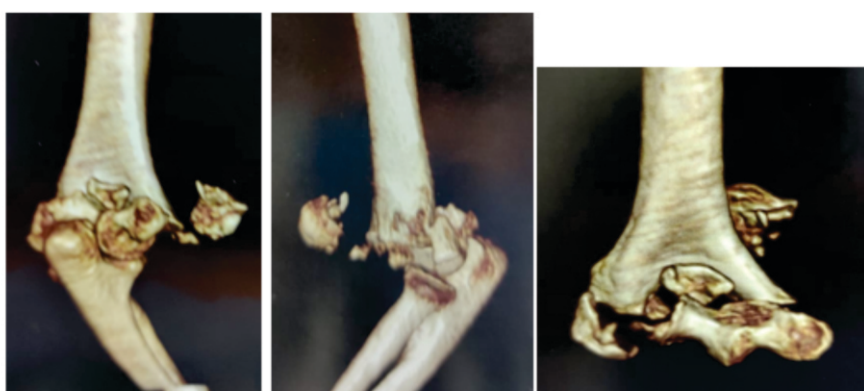
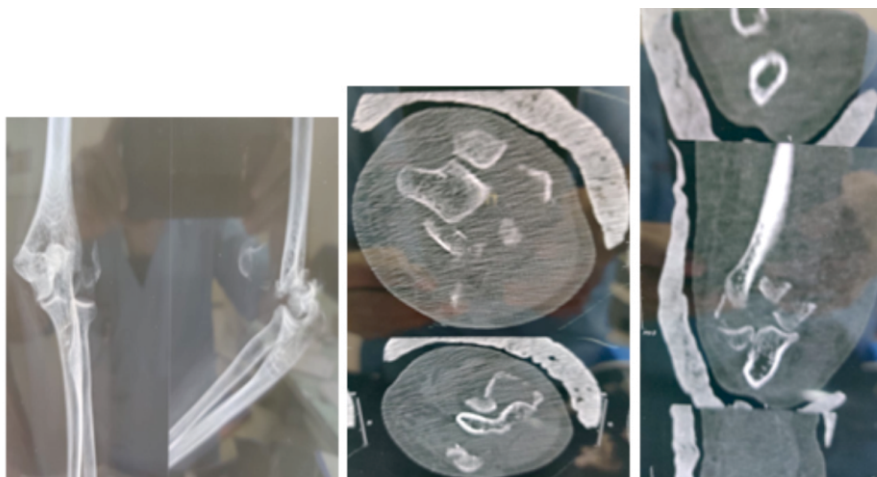


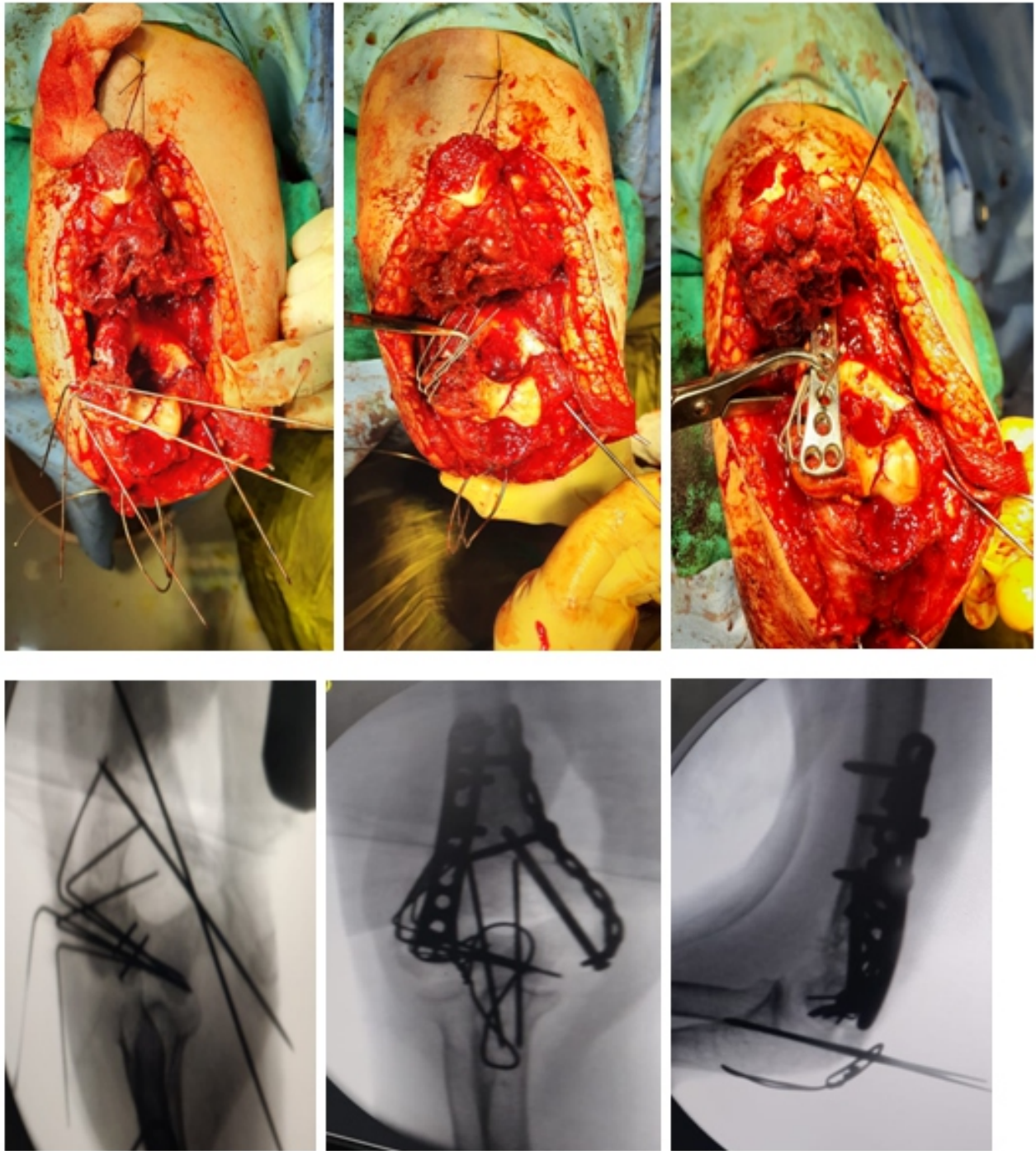
5 months follow-up



Clinical Pictures showing ROM after five months.

CASE 2





CONCLUSION

We have tried to reciprocate the original surgical technique along with few of our own modifications, so as to address the problem of achieving adequate fixation in very distal humerus fractures.

A substantially larger series would be required for us to compare our results with the original group. However, initial results are very promising.

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AN EX-FIX CONSTRUCT USED AS AN ALIGNMENT GUIDE FOR ASSESSMENT OF INTRA-OPERATIVE HIP-KNEE-ANKLE AXIS IN DEFORMITY CORRECTION

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Coronal plane deformities of lower limb are often challenging and require a thorough pre-operative planning, accurate intra-operative assessment and execution. Intra-operative confirmation of correct restoration of lower limb alignment [Hip-Knee-Ankle (HKA) axis] is more often than not assessed by gross visual inspection, which can be fallacious. Various methods described in literature for intra-operative assessment include cable method, axis board, specialized alignment rods (used in total knee arthroplasty) with a connector, computer assisted surgeries, etc [1, 2, 3].

Novel technologies like navigation and robotic surgery are very costly and not easily available in all centres, especially in developing countries. We describe a simple method to assess the HKA alignment while performing coronal deformity correction around the knee using external fixator components which are commonly available with every centre.

Apparatus required for assessment of alignment includes external fixator rods and tube to tube connector clamps (Figure 1).

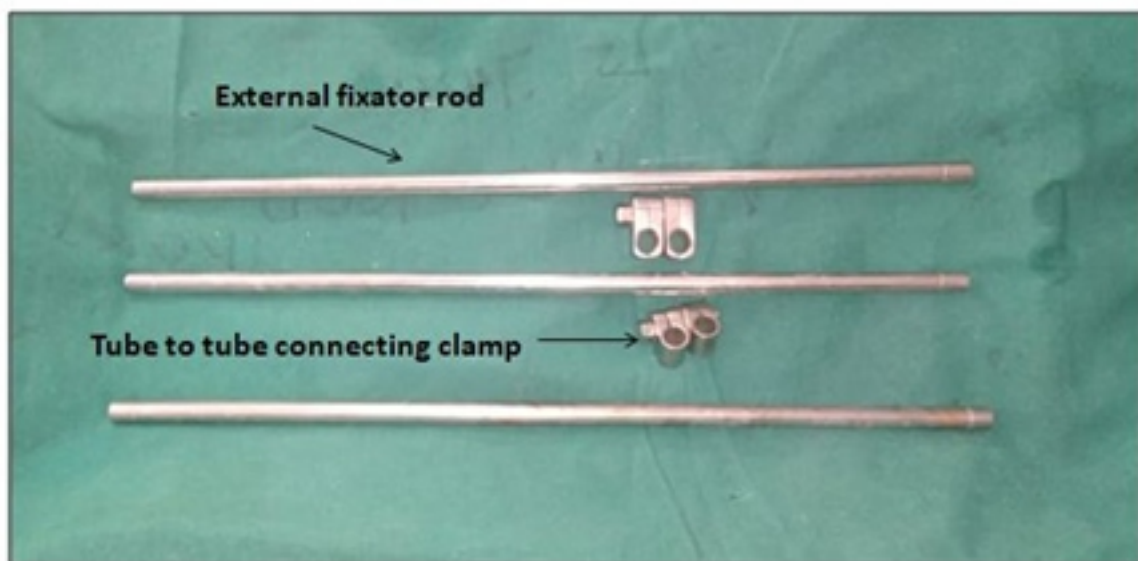


Figure 1: Apparatus required for alignment guide.

Connect two or three external fixator rods using tube to tube connector clamp (as shown in figure 2) to match the length required. By doing this, the rods will be aligned in exact straight line in one plane (Figure 2A), while in another plane (90 degree to previous one), they will be in different parallel lines (Figure 2B).

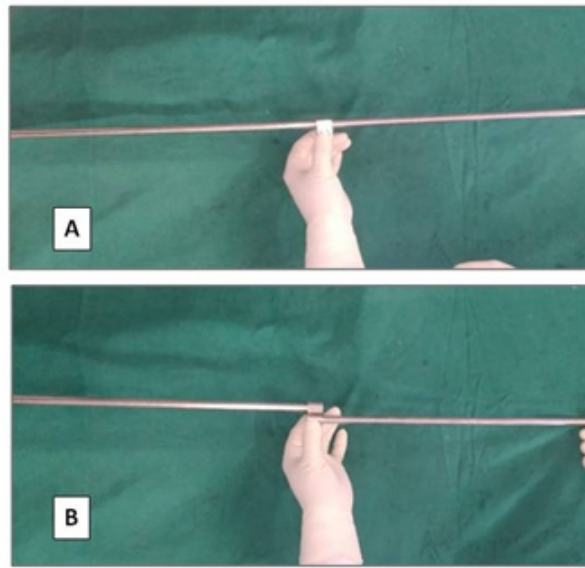


Figure 2: Method of assembling the external fixator construct

2A: Profile in which rods are aligned in exact straight line in one plane.

2B: Profile in another plane (90 degree to previous one) in which connected rods are parallel, but not along same straight line.

This construct can then be used as an alignment guide by keeping it in the profile where rods are in straight line. Under C-arm guidance, one can place the upper end and lower end of the construct along the centre of femoral head and the centre of ankle joint, respectively and assess where exactly is it passing through the knee joint (Figure 3-A, B, C and D).



Figure 3: Demonstration of use of the external fixator construct as an alignment guide

3A: Alignment guide construct placed along left lower limb.

3B: Upper end placed along the femoral head centre under C-arm guidance

3C: Alignment assessed at knee with C-arm image

3D: Lower end placed along centre of ankle joint.

We have shown the application of this method using external fixator set from Greens®Surgicals Private Limited. However, external fixators from any manufacturer can be utilized for this purpose. We believe this simple method can be easily used by any orthopaedic surgeon in any centre without any additional efforts or cost.

Conflict of interest: None

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HOW TO INCREASE FUNCTIONAL ABILITIES WITH A MEGA PROSTHESIS USING A MESH - A FUNCTIONAL PERIOSTEUM

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ABSTRACT:

Background: Diagnosis of a malignant bone tumor has been confusing to a general orthopaedic surgeon. Advancement in radio and chemotherapy fields and better diagnostic modalities helped a lot in the improvement of results of limb salvage surgery. In limb salvage surgeries after tumor resection, replacement with mega-prosthesis is one of the standard methods^{1, 11}. To improve functional outcomes, we have used mesh in our study^{1, 10}. Despite of extensive research, we could not find such a study showing comparison and long-term follow up of such kind involving different regions of the body.

Aims and Objectives: Our study aims to evaluate the results of the use of mesh in limb salvage surgeries done for malignant bone tumors by comparing range of movements with a group of patients in which mesh was not used. The objective is to assess the clinical and functional outcomes of the patients. We did a study involving all commonly involved regions like distal femur, proximal tibia, proximal femur, and proximal humerus.

Material and methods: A retrospective study of 19 patients was carried out. We included patients with a minimum follow up of 6 months. Study includes all common regions of the body affected by malignant bone tumor (lower end femur, upper end tibia, upper end femur and upper end humerus) operated by limb salvage surgery and mega-prosthesis replacement¹. Two study groups, one without mesh and one with the use of mesh were compared. We have used mesh in primary reconstruction surgery.

Results: Results were evaluated by the Musculo Skeletal Tumor Society (MSTS) scoring system.

Conclusion: Use of mesh induces fibrosis and provides anchorage to soft tissues and muscles in limb salvage surgery. Thus achieves good range of active movements and can lessen the time for immobilization. Thus it helps psychosocial rehabilitation of the family and society^{5,6}.

KEYWORDS:

Orthopedic oncology surgery, Limb salvage surgery, Mega-prosthesis, Bone cancer surgery, Mesh in Orthopaedic Oncology, Psychosocial rehabilitation in bone cancer

MeSH terms: Prolene mesh, Limb salvage surgery, Mega-prosthesis, Orthopaedic Oncology

THE ARTICLE

INTRODUCTION

The diagnosis of the malignant bone tumor has been confusing to a general orthopaedic surgeon. Advancement in radio and chemotherapy fields and better diagnostic modalities helped a lot in the improvement of results of limb salvage surgery. Three main components of limb salvage surgery include

(a) tumor resection, (b) replacement with mega-prosthesis and, (c) soft tissue reconstruction. Soft tissue reconstruction is a major part after replacement and adherence of muscle to the metallic prosthesis is the key to achieve the movements after such surgeries^{1, 10}.

There are various methods to achieve adhesion of muscles to metallic prostheses like Hydroxyapatite coating at sites of major tendon insertion, use of bone plug, and the use of mesh^{1,10}. Our retrospective study of use of mega-prosthesis in limb salvage (19 patients) includes different regions like distal femur, proximal tibia, and upper-end humerus. We used mesh in some cases and compared the results of the movements. We have calculated and compared the results by the MSTS system in both groups⁷. Despite of extensive research, we could not find such study showing comparison and long-term follow-up of such kind involving different regions of the body.

Usually malignant bone tumor affects young patients, who are main earning members of the family. Giving better outcomes will ultimately enhance their earning capacity and will be of definitely help for the society. It will ultimately help in the psychosocial rehabilitation of the family and society as a whole^{5,6}.

AIMS AND OBJECTIVES

Our study aims to evaluate the results of the use of mesh in Orthopaedic oncology surgeries in terms of movements in comparison to surgeries where mesh was not used.

The objective is to assess the functional and clinical outcomes of the patients. Mesh was used in all surgeries done after 2016, January in limb preservation surgeries involving commonly involved areas like lower end femur, upper end tibia, upper femur and upper humerus.

MATERIALS AND METHODS

A retrospective study of 19 patients with a minimum follow up of 6 months (ranged from 7 months to 5.5 years with a mean of 4.4 years) was carried out in a rural tertiary care cancer hospital in the department of Orthopaedic Oncology. Consents from patients and IRB approval were taken.

Patients operated from June 2014 to March 2020 are taken in the study. The mesh was used after January 2016. So, a comparison could be done regarding the advantage of use of the mesh.

Distributions of various regions are shown in Table 1.

Table 1 - Region wise distribution of cases

Sr. No.	Region involved	Number(June 2014 to January 2016)	Number(January 2016 to March 2020)
1	Proximal femur	01	03
2	Distal femur		06
3	Proximal tibia	02	04
4	Upper Humerus	01	02
	Total	04	15

Inclusion and exclusion criteria are mentioned in Table 2.

Table 1 - Region wise distribution of cases

Inclusion criteria	Exclusion criteria
Patients operated for limb salvage surgeries. Patients who came for follow up at least at 6 months.	Patients who gave a history of allergy to mesh or had complications related to mesh used in abdominal surgery (1-patient).

SURGICAL TECHNIQUE

Out of 19 cases, mesh was used in 15 cases. 4 patients were of the upper end tibia, 2 were of the upper end humerus and 6 were of the lower end femur and 3 were of upper end femur mega-prosthesis replacements. Prolene material mesh of 15X15 cm size was used [Figure 4, 5, and 6].

In all cases, standard oncology resection principles were followed. MRI measurements after pre-operative chemotherapy were taken and 3cm wide marginal resection was done. Frozen section from the proximal canal was done in all cases and surgery was done only after confirmation of negative margins. In all cases postoperative specimens were reported margin free (8-10mm). Postoperative chemotherapy was given as per the advice of an onco-physician.

In cases of upper end tibia replacement, a plug of bone was kept at the patellar tendon insertion site after tightly wrapping the mesh around the implant (by Ethibond no.5 or Fiber wire no.2 suture material). So, a tight sleeve of mesh is created between bony plug and patellar tendon.

For upper end humerus, the mesh was put on the glenoid. Its edges were sutured with a labrum. The pear shape of the glenoid was cut and the outer margins were wrapped around the head and rotator cuff margins were sutured with Ethibond No. 5. Greater tuberosity tip was not excised in cases not involving it by tumor (following principles of wide marginal excision). In cases with involvement of greater tuberosity, rotator cuff tendon was attached directly to the holes provided in the implant with mesh as an interface.

For Proximal femur replacement same principle as proximal humerus replacement was applied. In the cases in which we have preserved the tip of the greater trochanter, it was sutured with the implant holes with mesh in-between. In the cases in which the bone was not preserved, the abductors or the preserved muscles and iliopsoas tendon were sutured with tip of greater trochanter (prosthesis) and lesser trochanter site (prosthesis)¹.

In cases of lower end femur replacement; tightly wrapped mesh was sutured with inner most layer of preserved muscles, and the knee was kept in flexion to keep muscles in optimum tension.

Antibiotics were given intravenously for five days till the drain was removed (maximum 5 days). Oral antibiotics were continued for around 10 days further (till suture removal). Splintage was given to immobilize the part to induce fibrosis for around 4 to 6 weeks. During time of immobilization period, static physiotherapy was advised followed by dynamic exercises after around 6 weeks. In all patients with lower limb involvement, partial weight bearing was started from next day of surgery with a walker. Use of a tripod/ walking stick was advised after 8-10 weeks.

RESULTS

The cases which were operated by mesh (operated after January 2016) showed a good range of movements in terms of Shoulder abduction (for Proximal humerus replacement) [Figure 1, 2 & 3] and knee extension [Figure 3 & 4] (less than 10 degrees of FFD) (for Proximal tibial and distal tibial replacements).

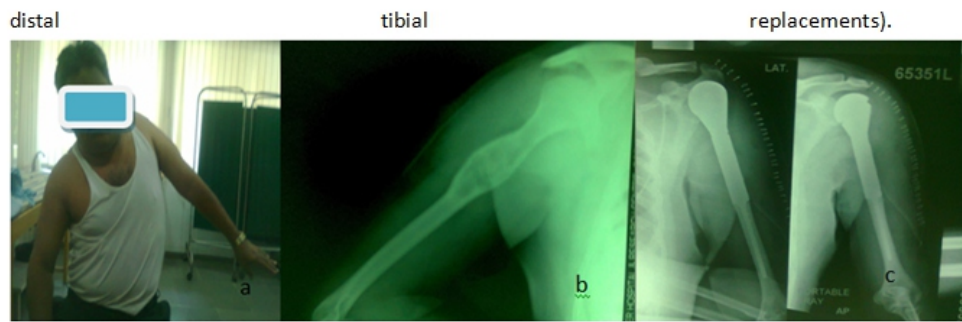


Figure 1 (case operated without mesh); (a) Post operative movement, (b) Pre operative X-ray, (c) Post operative X-ray

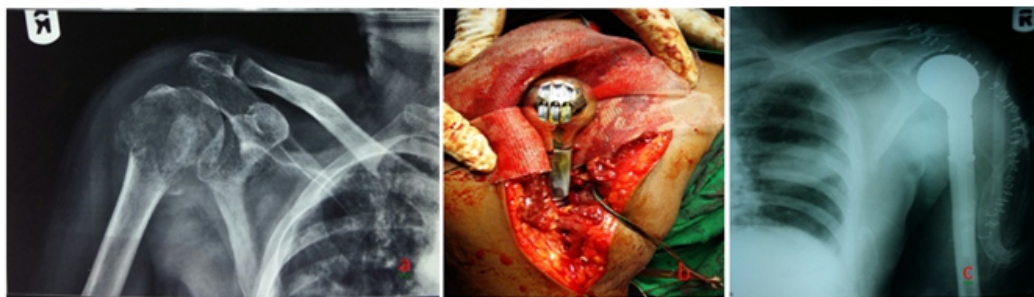


Figure 2 (case with mesh); (a)Pre operative X-ray, (b) Intra operative photograph, (c) Post operative X-ray



Figure 3 (case operated with mesh); (a) Forward flexion, (b) Extension, (c) Abduction, (d) External rotation

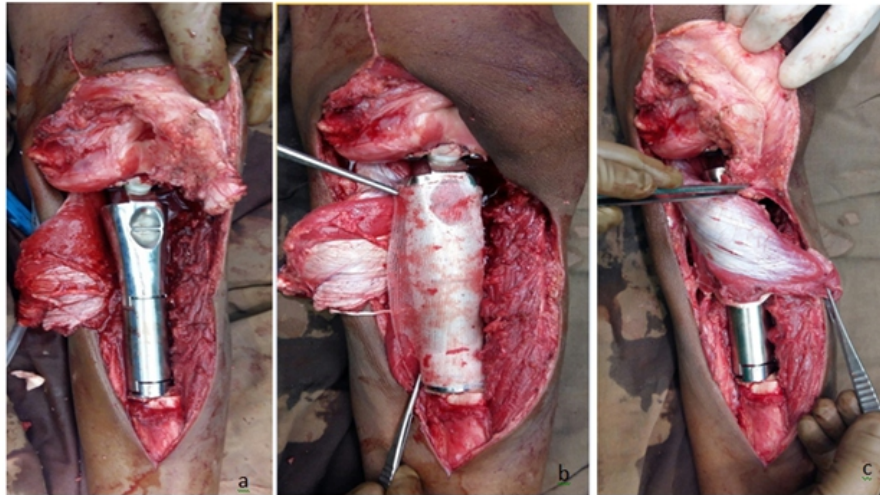


Figure 4 (use of mesh in Proximal tibia replacement); (a) Prosthesis in situ, (b) mesh wrapped around prosthesis, (c) gastrocnemius flap around mesh



Figure 5 (results of the movements in case with and without mesh); (a)&(b) with mesh; (c)&(d) without mesh



Figure 6 Mesh used for repair

Results found on evaluation by MSTS score system are shown in Table 3 and 4.

Region involvedKnee

Table 3 – Results found as per MSTS scoring system

Region involved	MSTS score (without mesh)(Maximum 35)	MSTS score (with mesh)(Maximum 35)
Knee (Upper tibia & Lower femur)	13	23
Upper end femur	14	25
Upper end humerus	9	20

Region wise distribution of particular MSTS score are displayed in Table 4.

Table 4 – Region wise distribution of particular MSTS score

Involved region	MSTS score
Knee (Upper tibia & Lower femur)	-Functional activity -Emotional acceptance
Upper end femur	-Hip abduction
Upper end humerus	-Deformity (ROM)/Stability -Shoulder abduction strength -Combined movements

Follow-up in our study ranged from 7 months to 5.5 years with a mean of 4.4 years. In further evaluation, we are now planning to do a prospective study of starting early mobilization at 4 weeks instead of 6 to 8 weeks.

DISCUSSION

Preservation of limb is the best option for bone malignancies. Apart from limb salvage, good function preservation is important for better living. In last decade, there are new advancements in techniques for limb saving surgeries¹¹. We had 5 female and 14 male patients (total 19) in our study. The age group is from 9 years to 70 years with a mean age from 15 to 25 years. We have started using mesh in January 2016 in the department of Orthopaedic oncology tertiary cancer care hospital.

After an extensive search, we could find a few relevant references⁹. Some have used mesh in revision tumor surgeries (after complication e.g. dislocation of the prosthesis)³. Another author surveyed the use of mesh in proximal humerus surgery⁴.

There were 3 patients with upper end humerus involvement, 4 with upper femur involvement, 6 were with lower end femur involvement, and 6 with upper tibia involvement (total 19). We have evaluated our results as per the MSTS rating system at the time of follow-ups of 6 months, 12 months and, 24 months. Apart from that, we have considered an active extension of less than 10° as a good functional result for lower extremity surgeries and abduction of more than 60° as good functional result for upper extremity surgeries (keeping in mind requirements of activities of daily living), It is seen that, patients in whom we have not used mesh, were able to get movements of knee extension

with around 20 degrees of extension deficit. The extension deficit/lag was less or there was full extension of the knee joint in the patients operated with mesh⁹. In all upper tibial replacement cases, medial gastrocnemius flap was done as a standard manner as described in textbooks².

Hydroxyapatite coated implants are much more expensive than non coated implants. By cutting down the cost of the implant, we reduce the cost of surgery. Mobilization of joint occurs only by the soft tissues in case where the mesh was not used. Mesh provides anchorage to soft tissues. By making a tight sleeve of mesh around the implant it works like a periosteum on which muscles and other soft tissues get the attachment. Mesh is tightly wrapped around the implant and kept in place by sutures passed through it and the holes provided in the implant at proper anatomical sites².

Infection is always worrisome complication for such surgeries⁸. No foreign body reaction or infection due to the mesh was found in our study. One complication of flap necrosis in upper tibia replacement was tackled by revision flap after a week of first surgery. Neither foreign body soft tissue reaction nor signs of infection noted in the same case. Despite less numbers, we have included all commonly involved regions by bone malignancies. It can be considered a positive point for our study. Though our follow-up is long, still longer follow-up will definitely help us.

CONCLUSION

Use of mesh induces fibrosis and provides anchorage to soft tissues and muscles in limb salvage surgery. Thus achieves good range of active movements and can lessen the time for immobilization. Thus it helps psychosocial rehabilitation of the family and society^{5, 6}.

CONFLICT OF INTEREST

None

ACKNOWLEDGEMENT

We acknowledge the immense help received from the scholars whose articles are cited and included in references of this manuscript. The authors are also grateful to authors / editors / publishers of all those articles, journals and books from where the literature for this article has been reviewed and discussed.

We acknowledge the patients, their family members, hospital staff, and all others who directly or indirectly participated in the study.

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CASE REPORT - TREATMENT DONE USING MASQUELET TECHNIQUE

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INTRODUCTION

Reconstruction of diaphyseal bone defects still represents a major challenge. Several approaches are used in bone reconstruction with the common objective to regenerate bone loss and restore function. However, it is difficult to achieve these objectives in some pathological situations, such as when a large bone defect is associated with loss or infection of the surrounding soft tissues.

This may occur after large bone resection following tumours or infected tissue removal or as a consequence of severe traumatic injuries. The most commonly used methods for reconstruction of large bone defects are the vascularised fibula autograft and the Ilizarov bone transfer technique. Autologous bone grafting alone is not recommended if the defect exceeds 5 cm because of the risk of resorption despite good soft tissue coverage.

Recently, Masquelet proposed a procedure combining induced membranes and cancellous autografts. He first described this technique back in 1986 for the reconstruction of extensive diaphyseal bone loss up to 25 cm in length, without the need for vascularised autograft. Overall, this technique allows the reconstruction of wide diaphyseal defects even if the recipient site has been irradiated or infected, provided that an envelope is previously created to protect and revascularise the bone graft.

THE MASQUELET TECHNIQUE

The reconstruction requires a two-staged approach. At the first operation, radical soft tissue and bone debridement is undertaken. A polymethyl methacrylate (PMMA) cement spacer is implanted at the site of the bone defect and the limb is stabilised with an external fixator. The cement spacer has two roles. The first one is mechanical as it obviates fibrous tissue invasion of the recipient site. Moreover, as the spacer behaves as a foreign body, absence of infection after two months is an excellent witness of adequate local conditions for bone grafting. The second role is biological by the induction of the surrounding membrane that will revascularise the bone graft and prevent its resorption. Finally, in the first stage of the Masquelet technique, the soft tissue envelope is repaired (with vascularised flap transfer if required).

At the second stage, approximately 6–8 weeks later, the cement spacer is carefully removed ensuring that the formed "induced membrane" is minimally disturbed; and the defect is filled with morcellised cancellous autologous bone graft (with additional bone graft substitute if the graft is insufficient, not exceeding a 1–3 ratio) and the bone is usually stabilised with a plate or other means of fixation. The histological and biochemical characteristics of the induced membrane have also been evaluated. It has been shown that the induced membrane becomes highly vascularised and secretes a combination of important growth factors, such as VEGF, TGF-beta 1 and BMP-2. Additionally, it has been demonstrated that the induced membrane formed around the foreign body (cement spacer) during the interval

between surgeries prevented resorption of cancellous bone graft and also had a positive effect on consolidation of the defect.

CASE REPORT

A 20-year-old male presented to SSGH hospital with a history of trauma resulting from a road traffic accident (RTA).

A thorough examination of the patient was conducted, including assessment of vital parameters such as temperature, pulse, and blood pressure. The patient's general condition was stabilized.

Once the patient was stabilized and all associated injuries were managed or ruled out, he was sent for X-rays. X-rays of the injured limb were taken in anteroposterior (AP) and lateral views.

The patient was diagnosed with an open grade fracture with a 10 cm bone loss in the middle third of the left femoral shaft, along with a fracture of the left acetabulum, a fracture of the left femoral neck, bilateral distal humerus fractures, and a left distal radius fracture.

Appropriate slab and splinting were applied according to the fractures.

INJURY X RAYS (For this article, We would stick to images of femur fracture only)



TREATMENT

Patient was first operated with External fixator and debridment for the open femur injury
All the fractures were addressed thereafter....

i) Bilateral bipillar plate for distal humerus fracture ii) Volar plate on left Radius side

iii) Acetabular plate iv) FNS(Femoral Neck System) for neck of femur fracture

v) Masquelet technique for shaft femur fracture with bone loss(2 stages)

STAGE 1 TREATMENT FOR FEMUR FRACTURE

External fixator was removed. Thorough wound debridement was done.
Bone gap was filled with antibiotic cement after achieving limb length.
Fracture stabilized using distal femur plate.
Patient was kept non-weight bearing.
Knee ROM was started from post op day 1.

INTRAOPERATIVE IMAGES

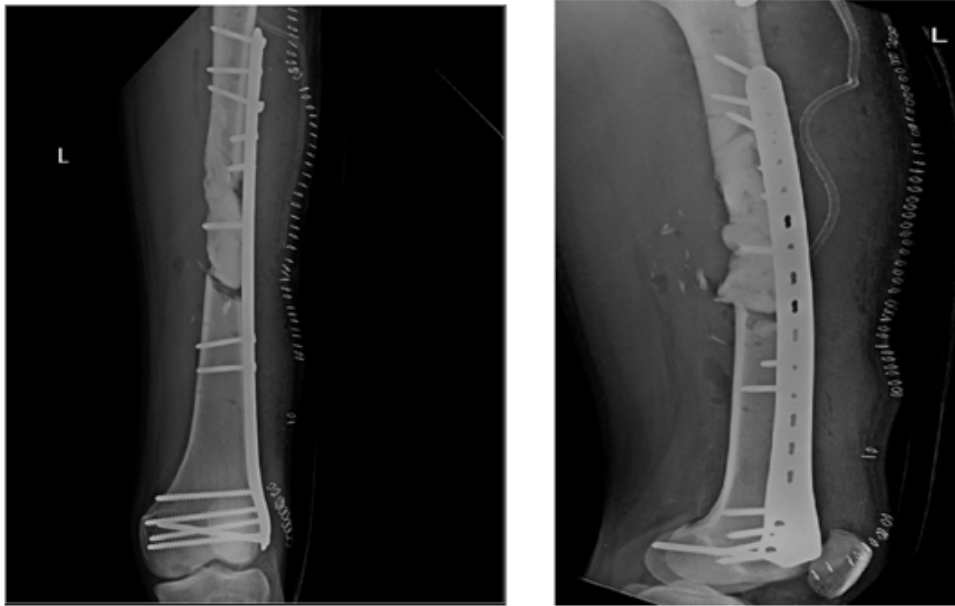
Bony defect measurement taken of 10 cm



Placement of bone cement after proper moulding



IMMEDIATE POST-OP X RAYS



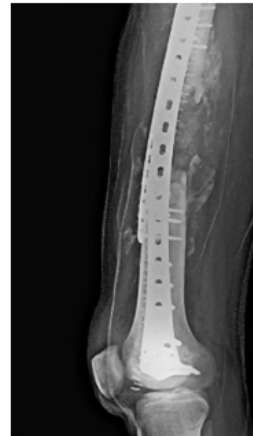
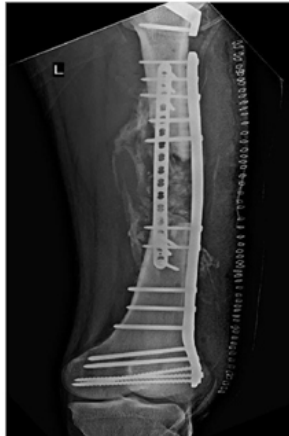
STAGE 2 OF TREATMENT

After 6 weeks, cement spacer was removed with minimal disturbance to induced membrane. In place of cement spacer, autologous cancellous bone grafts were placed from PSIS. Additional plate was used to support the graft.

INTRAOPERATIVE IMAGE SHOWING MEMBRANE FORMATION AFTER SIX WEEKS



POST-OP X RAY AFTER BONE GRAFTING



1 MONTH FOLLOW UP



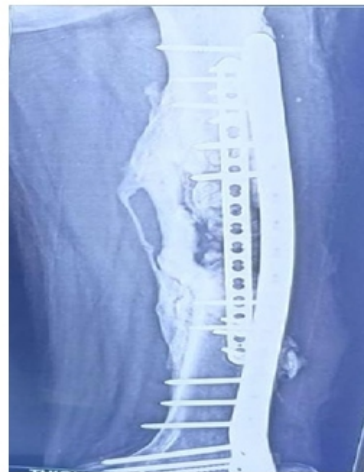
4 MONTH FOLLOW UP



6 MONTH FOLLOW UP



10 MONTH FOLLOW UP



CLINICAL IMAGES





TRAUMATIC AVULSION OF BONY INSERTION OF INFRASPINATUS TENDON - AN INTERESTING CASE

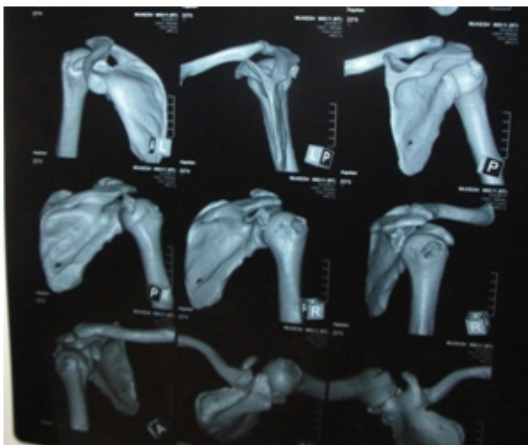
DR MALHAR DAVE MS(ORTHO)
VADODARA

CASE DETAILS

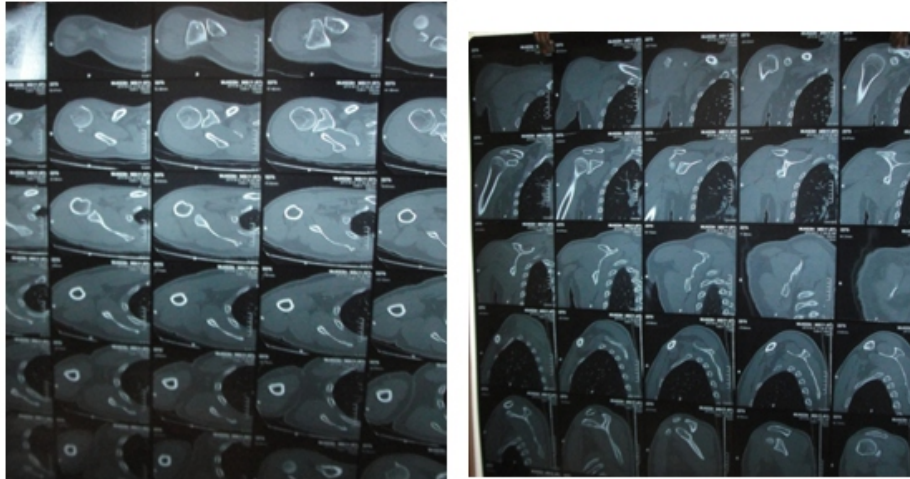
Male 40 years Old
History of slippage from 2 wheeler
Pain with inability to move right shoulder
External rotation restricted



INJURY XRAY



INJURY CT SCANS



The infraspinatus muscle is a rotator cuff muscle that helps stabilize and move the shoulder joint. It's primarily responsible for external rotation of the shoulder.

Isolated tears of the infraspinatus muscle are relatively uncommon, but can occur. Isolated infraspinatus tears are usually atraumatic, but can be caused by the pulling forces of the subscapularis muscle and the upper gleno-humeral ligament. This can happen when the shoulder is hyperextended, abducted, and externally rotated.

Delayed diagnosis of an avulsion injury can lead to shoulder instability, biceps tendon complications, and impingement problems. Hence, identification of injury and suitable treatment is necessary.



SURGICAL TECHNIQUE





Lateral Position

Skin incision - vertical from angle of acromion about 5cms

Deltoid split approach protecting the axillary nerve

Dislaced fragment of tuberosity with attached infraspinatus as well as the crater on humerus identified

Reduction of fragment done by pulling it towards the crater with arm in external rotation

Stabilisation done using two 3.5mm anchors with fiber wire and one 4mm cannulated cancellous screw.

Deltoid split approximated and wound closure done in layers.



POST SURGERY XRAY

Post Surgery, limb immobilised with 45 degree external rotation of shoulder, for three weeks. After three weeks, immobilisation continued in neutral shoulder rotation for three more weeks. Shoulder mobilisation started thereafter (after six weeks of surgery)

CONCLUSION

Going through the literature, we could only find couple of such cases being reported and hence, we would like to draw the attention of readers towards this unusual injury.

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CASE REPORT - SUTURE ANCHOR FIXATION OF INFERIOR POLE OF PATELLA FRACTURE

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Case Details

A 49 year old male patient having history of road traffic accident, came to emergency department for knee injury right knee. Significant knee effusion was present along with tenderness and loss of active extension.

Treatment history

Patient was admitted with following xray findings:



Xray was suggestive of fracture of inferior pole of patella.

After investigations, surgery was planned. Conventionally, in such fracture, inferior pole excision with re-suturing of patellar tendon was described in literature. But in this case, we intend to salvage the inferior pole of patella. So fixation of the fracture was planned.

Method

The fracture was approached through anterior midline approach. After removal of hematoma, the bone quality was evaluated and 2 suture anchors were considered to use for fixation. 5 mm titanium anchor with no 5 ethibond suture was taken. The suture anchor was inserted into proximal fragment of patella. The thread of ethibond no.5 were pulled out through two drill holes in the distal pole of patella and tied at the distal aspect of inferior pole of patella with reduction of fracture fragment. The ends of ethibonds on either of the suture anchor were tied together at the end of fixation. Wound was closed conventionally.

Following are the xray findings after the surgery



Follow up

Surgical wound behaved without any complications. During postoperative period of first months after total suture removal, following were clinical aspect of patient.



Knee range of movement at end of 1 month postoperative period was nearly full with regard to the fracture of inferior pole of patella.

Inference

With advent of newer implants available, the bone preservation following fracture of inferior pole of patella is advantageous for patient while maintaining bone integrity with full range of motion. Conventional surgical method of distal patella pole excision and resuturing of patella tendon requires immobilization for more postoperative period leading to reduced knee range of motion. Suture anchor fixation of inferior pole patella along with ethibond, gives stability of fracture along with preservation of bone and early functional recovery following surgery.

A CASE REPORT -MANAGEMENT OF INTER-PROSTHETIC FRACTURE WITH MINIMAL INVASIVE PLATE OSTEOSYNTHESIS

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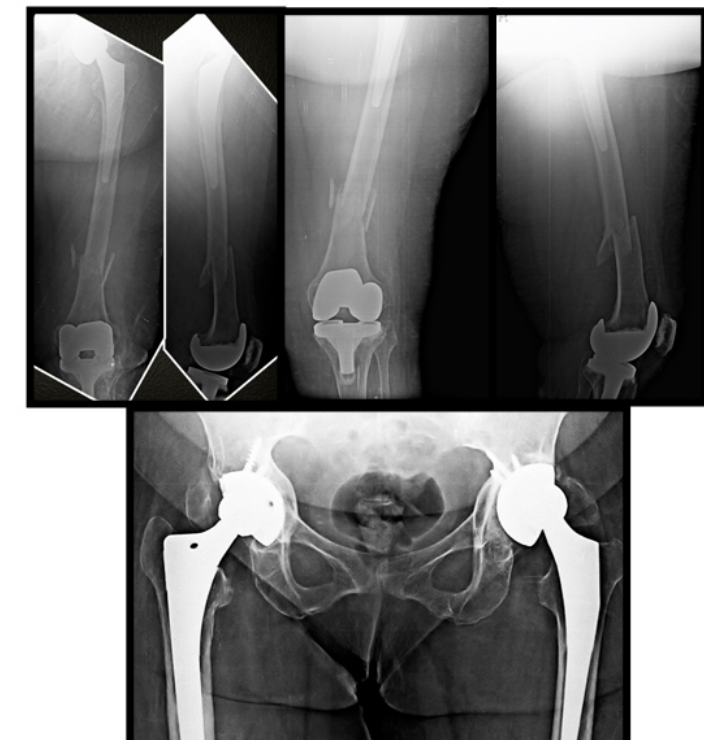
INTRODUCTION

Inter-prosthetic fracture - fracture between Ipsilateral Hip and Knee Arthroplasty - it tends to occur in elderly individuals with osteoporosis. This is a therapeutic challenge because of constrained space for fixation, presence of stem in canal, compromised medullary blood supply and often associated co-morbidities. It tends to occur more in the supra-condylar region than in the diaphyseal region.

Overall there are around less than 200 reported cases in literature. With increase in frequency of arthroplasty in last two decades, incidence of inter prosthetic fractures are likely to also increase in the future.

CASE REPORT

This is a case of sixty year old obese lady who underwent Bilateral Hip arthroplasty 10 years back and Bilateral knee arthroplasty 5 years back. She had history of Left Hip dislocation 6 weeks back, and past history of long term steroid use. She sustained Inter-prosthetic fracture on left side following trivial fall at home. It was a Vancouver type C injury, Su type I injury, Pires et al type IIA injury.



Objective of treatment :

- Adequately span the fracture with adequate overlap over Femur Stem
- Achieve length and rotational alignment
- Optimal balance between biology and mechanics
- Early rehabilitation.

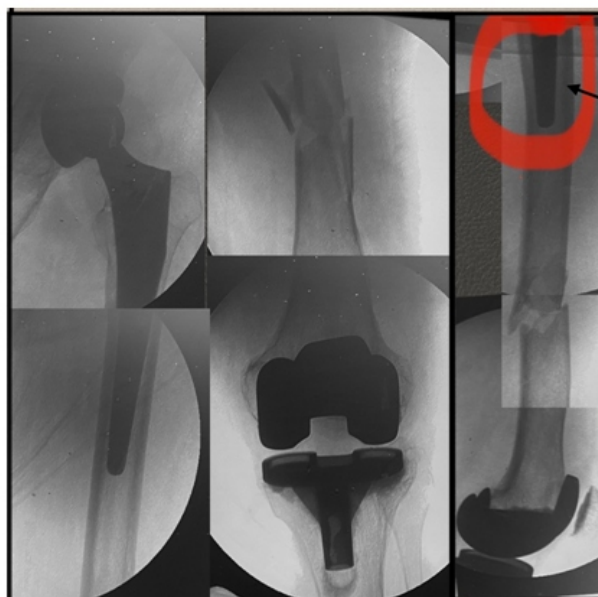
Treatment strategy :

Open reduction vs Minimal invasive plating - Open reduction is considered as Gold standard for such injury, although off late there are articles suggesting biological plating that span the entire inter prosthetic zone to eliminate additional stress risers. These show reliable union rate without adjuvant bone grafting.

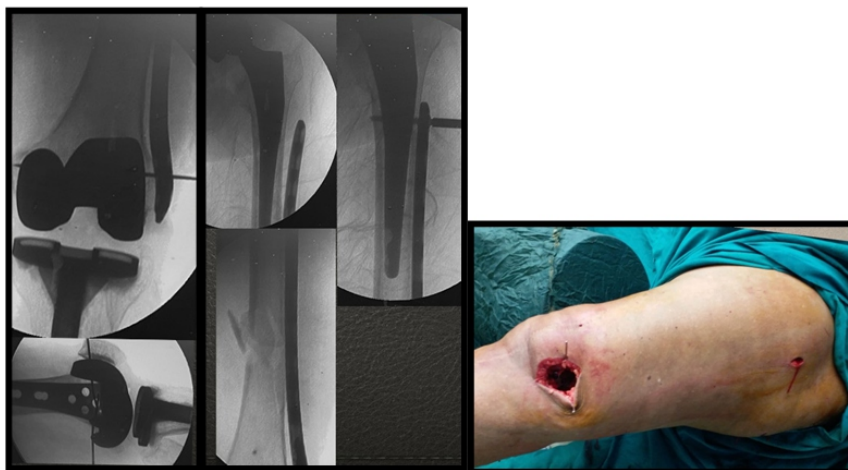
Simple table vs Traction table - Conventionally Distal Femur plating is done on simple table as it allows adequate control of distal fragment retroversion correction. Here main concern was to have optimal assessment of proximal Femur lateral view in C arm, patient being Obese it would be difficult to assess proximal Femur lateral image in supine position. Unaffected limb is kept in 90-90 degree position at Hip and Knee.



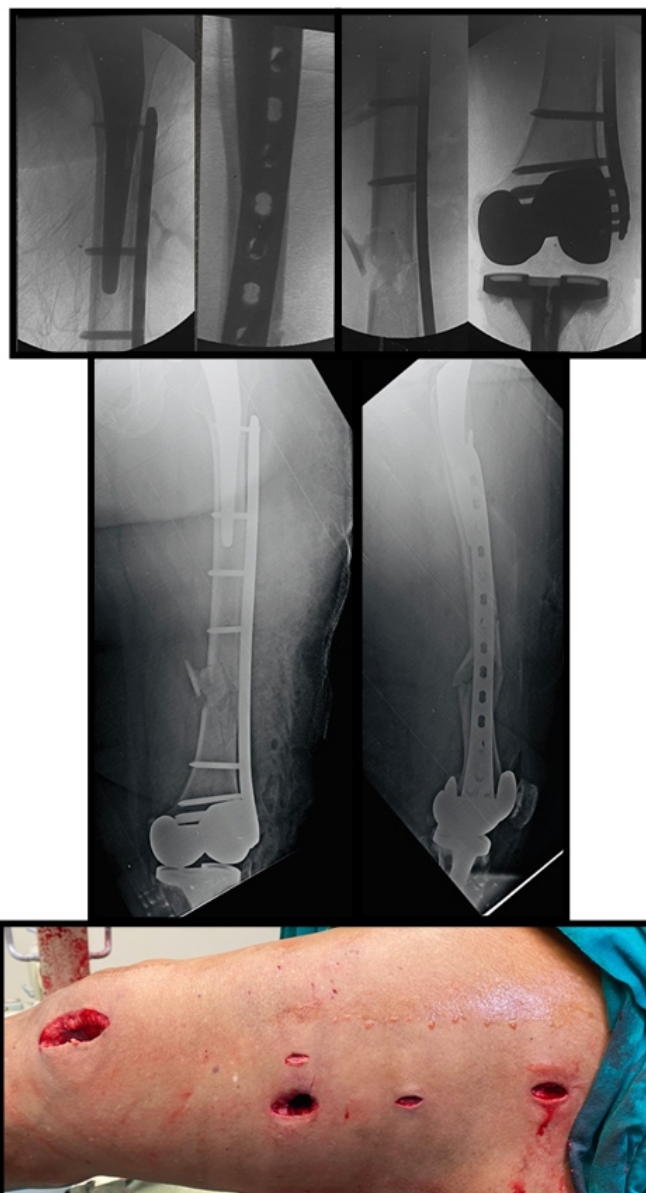
Traction Images : revealed Distal fragment in neutral position, length achieved and adequate space around Hip stem to insert Screws.



Provisional Fixation : Lateral para-patellar approach used, 15 hole Distal Femur LCP slid sub muscularly and fixed provisionally with 2 x 1.8 mm K wires at distal end and 1 x 4.5 mm cortical screw proximally.

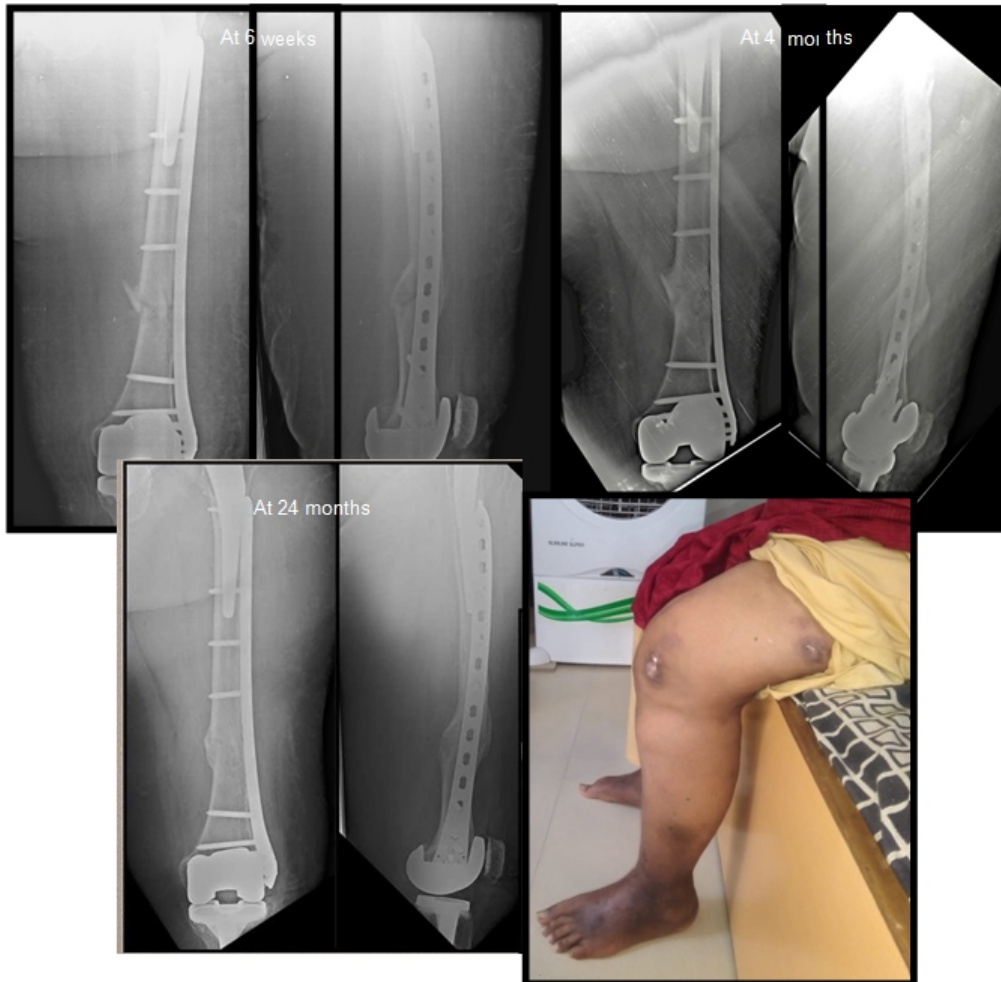


Final Fixation - done with inserting remaining locking screw at appropriate holes.



Post operative protocol : Quadriceps strengthening exercises and Knee bending exercise started from second post operative day, she was kept nil weight bearing for four weeks, followed by partial weight bearing with walker for another four weeks. From 8 weeks to 16 weeks she was walking full weight bearing with walker initially followed by full weight bearing with stick.

Follow up images : At 6 weeks, 4 months and at 24 months



Fracture healed with secondary intention with ample callus formation at far cortex, with good functional knee range of motion.

Conclusion :

There are many ways in which this injury can be addressed. Open reduction and internal fixation with single / dual plate, inter fragment screw, circlage, bone graft etc.

The main factor to take into consideration is stability of implant - in presence of unstable implant, revision and fixation should be done while in presence of stable implant, fixation alone is sufficient.

Another issue to take into consideration is to span adequately tip of stem - at least twice diameter of shaft or if possible span most, if not entire length to avoid stress riser.

Optimal balance between biology and mechanics gives good functional outcome.

**VETERAN SURGEON AND YOUNG SURGEON FORUM AWARDS
AND ORATION AT GOACON 2025**

There are 2 different awards being conferred by Gujarat Orthopaedic Association. These are-

- (1) **Veteran Surgeon's Forum (VSF)**
- (2) **Young Surgeon's Forum (YSF)**

CRITERIA FOR APPLICATION:-

- (1) Life membership of Gujarat Orthopaedic Association is mandatory.
- (2) The presenter at GOACON 2025 has to be compulsorily registered as a regular delegate.
- (3) The first one is for Orthopaedic Surgeons above the age of 50 years and the second one is for colleagues below the age of 50 years- before the prescribed cutoff date of 20th December, 2024.
- (4) Applicants should produce unpublished and innovative work.

PROCEDURE: -

- (1) Applicants have to send 2 separate sets of the manuscript - one with the name, age, email and contact mobile number of the applicant and the other one without any indications of the identity of the applicant (blind) to have unbiased judgement and merit by the judges
- (2) The format has to be MS word file OR PDF file.
- (3) There will be objective analysis and assessment by the selection committee appointed by the Gujarat Orthopaedic Association. This will be based on the following-
 - a) content of study- 20%
 - b) methodology- 40%
 - c) evidence based conclusions- 20%
 - d) relevance to current practice - 20%

Last date of submission: **20th December 2024.**

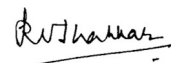
WHOM/ WHERE TO SEND: -

Dr. Ketan Thakkar
Secretary, GOA
Email : ketznbizz@yahoo.com
Mobile: 9825078085

After final evaluation by the committee, the selected candidates will be notified to present their work as an oration at the GOACON 2025 at Statue of Unity on 7th- 8th February 2025. The duration of the oration will be 20 minutes each for VSF and YSF.



Dr. Vijay Sata
President



Dr. Ketan Thakkar
Secretary

Humour in Orthopaedics

