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Management of Extracapsular Fractures of Hip with Proximal Femoral Nailing

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Abstract : *Peritrochanteric fracture is a major cause of hospital admissions in elderly people.Conservative methods of treatment results in malunion with shortening,limitation of hip movement and complications of prolonged immobilization.This study is done to analyze the surgical management of Peritrochanteric fractures using Proximal Femoral Nail(PFN).This is a prospective study of 40 cases of fresh trochantric and subtrochanteric fractures admitted to Katuri medical College,Guntur in two years.Cases were taken according to inclusion and exclusion criteria.Out of 40 cases, 25 were trochanteric and 15 were subtrochanteric.In Trochanteric class 40% were Boyd and Griffin type 2, in Subtrochanteric class 33.3% were Sinsheimer type 3a and 20% were 2b.Mean duration of hospital stay is 20.67 days and mean time of full weight bearing is 16.5 weeks.Out of 40 cases 2 cases expired before first follow up time of 6 weeks and 3 cases were lost for follow up.Out of 35 remaining cases 22 were Trochanteric and 13 were Subtrochanteric.Good to excellent results are seen in 90.9% cases of trochanteric fractures and 88.57% cases in subtrochanteric fractures.PFN is an excellent implant for the treatment of Peritrochanteric fractures.The terms of successful outcome include a good understanding of fracture biomechanics, proper patient selection,good preoperative planning,accurate instrumentation,good image intensifier.*

Keywords - *PFN; Peritrochanteric; Subtrochanteric; Trochanteric*

I. Introduction

The Fractures of Proximal Femur can be Classified as intracapsular and Extracapsular(Peritrochanteric) fractures. Peritrochanteric fractures includes intertrochanteric and subtrochanteric fractures.Peritrochanteric fractures are devastating injuries that most commonly affect the elderly and also in young, have a tremendous impact on both the health care system and society in general. Despite marked improvements in implant design, surgical technique and patient care, peritrochanteric fractures continues to consume a substantial proportion of our health care resources.The incidence of trochanteric fractures is more in the female population compared to the male due to osteoporosis. The trochanteric fractures can be managed by conservative methods and there is usually union of the fracture. If suitable precautions are not taken the fracture undergoes malunion, leading to varus and external rotation deformity at the fracture site and shortening and limitation of hip movements. It is also associated with complications of prolonged immobilization like bedsores, deep vein thrombosis and respiratory infections. Since this fracture is more common in the elderly patients, the aim of treatment should be prevention of malunion, and early mobilization. Taking all the factors into consideration surgery by internal fixation of the fracture is ideal choice.There are various forms of internal fixation devices used for Trochanteric Fractures; of them the most commonly used device is the Dynamic Hip Screw with Side Plate assemblies.The more latest implant for management of trochanteric fractures is proximal femoral nail, which is also a collapsible device with added rotational stability. This implant is a centromedullary device and biomechanically more sound. It also has other advantages like small incision , minimal blood loss.Pertrochanteric and subtrochanteric fractures of femur posses clinical, structural,anatomical and biomechanical characteristics that distinguish them from intracapsular fractures. Subtrochanteric fractures comprises about 10 to 34% of hip fractures[1].Subtrochanteric fractures are complicated by malunion and delayed or nonunion. The factors responsible for these complications in Subtrochanteric fractures are high stress concentration, predominance of cortical bone and difficulties in getting biomechanically sound reduction because of comminution and intense concentration of deforming forces[2].The present choice of treatment of Subtrochanteric fractures is open reduction and internal fixation. Many internal fixation devices have been recommended for use. In Subtrochanteric fractures, because of high incidence of complications reported after surgical treatment with each implant. A lack for satisfactory implant in surgical treatment of Subtrochanteric fractures has led to series of evolution in design of a perfect implant.Subtrochanteric femoral fractures are associated with high rates of non-union and implant failure, regardless of the method of fixation. Only recently has a better understanding of biology, reduction techniques and biomechanically improved implants allowed for subtrochanteric fractures to be addressed with consistent success.In spite of the advances in anesthesia,nursing care and the surgical

techniques,hip fractures remain a significant cause of morbidity and mortality in the elderly population. In view of these considerations, the present study of Surgical Management of Peritrochanteric Fractures is taken up.

II. Aims&Objectives

1. To assess the stable fixation and early mobilization of patients.
2. To analyze the anatomical and functional outcome of treatment of peritrochanteric fractures using Proximal Femoral Nail.
3. To compare the results with standard studies and draw .conclusions.

III. Methodology

The present study consists of 40 adult patients of peritrochantric factures of femur satisfying the inclusion criteria , who are treated with Proximal Femoral nail in Katuri Medical College,Guntur.Inclusion criteria**:** Sub trochanteric fractures, Stable and unstable intertrochanteric fractures (Reverse oblique fractures and Inter trochanteric fractures with loss of posteromedial cortex).Exclusion criteria:Inter trochanteric fractures involving piriformis fossa, Open hip fractures, Pathological fractures, Periprosthetic fractures,Peadiatric fractures (before physeal closure).After the patient with subtrochanteric or trochanteric fracture was admitted to hospital all the necessary clinical details were recorded in proforma prepared for this study.After the completion of the hospital treatment patients were discharged and called tor follow up at outpatient level at regular intervals for serial clinical and radiological evaluation.The patients were followed up till fracture union and function recovery after surgery at regular interval and if necessary subsequent follow up was done.As soon as the patient with suspected subtrochanteric or trochanteric fracture was seen, necessary clinical and radiological evaluation done and admitted to the ward after necessary resuscitation and splintage using skin traction.All the patients were evaluated for associated medical problems and were referred to respective departments and necessary treatment was given. Associated injuries were evaluated and treated simultaneously. All the patients were operated on elective basis after overcoming the avoidable anaesthetic risks. Pre-op planning:l) Determination of nail diameter: Nail diameter was determined by measuring diameter of the femur at the level of isthmus on an AP x ray.2) Determination of neck shaft angle: Neck shaft angle was measured on the unaffected side on an AP x-ray using goniometer. 3)Length of the nail: A standard length PFN nail (250mm)is used in all our cases.

The implant consists of a proximal femoral nail, self tapping 6.4mm hip pin, self tapping 8 mm femoral neck screw, 4.9 distal locking screws, and an end cap.proximalfemoral nail is made up of either 316L stainless steel or titanium alloy which comes in following sizes- Length: standard PFN -250 mm Long PFN- 340, 380, 420mm, Diameter: 9,10,11,12 mm, Neck shaft angle range: 125^0, 130^0, 135^0 .The nail is having 14mm proximal diameter. This increases the stability of the implant. There is 6 mediolateral valgus angle, which prevent varus collapse of the fracture even when there is medial comminution.The distal diameter is tapered to 9 to 12 mm which also has grooves to prevent stress concentration at the end of the nail and avoids fracture of the shaft distal to the nail. Proximally it has 2 holes the distal one is for the insertion of 8 mm neck screw which acts as a sliding screw, the proximal one is for 6.4 mm hip pin which helps toprevent the rotation. Distally nail has two holes for insertion of 4.9 mm locking screws, of which one is static and the other one is dynamic which allows dynamization of 5 mm. In our study, the nail is available in angles of 125º, 130º, 135º to match with various Femoral Neck – Shaft Angles And Diameters Of 9,10,11,12 Mm Sizes And The Total Length Of Nail Is 250mm. The Proximal End Of The Nail Also Has Threads For Insertion Of End Cap Which Prevents In Growth Of Bone Into The Nail.FEMORAL NECK SCREW:This Is An 8.0mm Screw Which Bears 80-90% Of Load Under Axial Loading And Gives Main Stability In The Proximal Fragment For Fracture Fixation The Screw Is Available In Lengths From 70-110mm.ANTI ROTATION HIP SCREW: This Is A 6.4 Mm Stabilization Screw, Which Bears 10-20% Of Load And Provides The Rotational Stability For The Proximal Fragment And The Screw Is Available In Lengths From 70-110mm.DISTAL LOCKING SCREWS :These Are 4.9 Mm Screws Inter Locking Screws

After Treatment: Postoperatively, Patients Pulse, Blood Pressure, Respiration, Temperature Were Monitored. Foot End Elevation Is Given Depending On Blood Pressure. Antibiotics Were Continued In The Post Operative Period. .Analgesics Were Given As Per Patients Compliance. Blood Transfusion Was Given Depending On The Requirement. Sutures Removed On 10th Postoperative day.Patients were encouraged to sit in the bed after 24 hours after surgery. Patients were taught quadriceps setting exercises and knee mobilization in the immediate post operative period. Patient was taught gait training before discharge from the hospital.Only in very unstable fracture patterns weight bearing was not advised. Rest of the patients were encouraged to weight bear partially with axillary cruthes or walker depending on the pain tolerability of individual patient.Discharge :Patients were discharged from the hospital when independent walking was possible with or without walking aids.Follow up :All patients were followed up at an interval of 6 weeks till the fracture union is noted and then after once in 3 months till l year.At every visit patient was assessed clinically regarding hip and knee function,walking ability, fracture union, deformity and shortening.Modified Harris Hip scoring system was

used for evaluation.X-ray of the involved hip with femur was done to assess fracture union and implant bone interaction.

IV. Results

In our series, majority of the cases i,e,I6 (40%) were in the age group of 41-60 years, followed by 12 (30%) cases in the age group 61-80 years. The youngest patient was 22 years old and eldest patient was 94 years. The mean age was 55,18 years.In the present series, male were more commonly involved. Majority of the patient were males 31 cases (77.5%) and 9(22.5%) were females.18 cases (45%) affected were due to Slip and Fall, 16 cases (40%) due to RTA, and 6 cases (15%) due to Fall from height. Slip and fall was the most common mode of injury.Right side was involved in 23 (57.5%) cases and left in 17(42.5%), right side was more commonly involved than left side.In the present study, majority of the cases i.e. 10 (40%) had type2, followed by 9(36%) cases had type 3 ,type1 -3(12%),type4 -3(12%) Boyd and Griffin type. Type I 0 0%,Type IIa 2(13.3%),Type IIb 3(20%),Type IIc 2 (13.3%),Type IIIa 5(33.3%),Type IIIb 3 (20%),Type IV,V 0%.All the cases included in our study group were fresh fractures who underwent surgery at the earliest possible in our set up. The delay was due to associated injuries, medical condition of the patients. All the patients were operated at an average interval of 7 days from the date of trauma.Intra Operative details:Mean duration of screening (in seconds) 80,Mean duration of operation (in minutes) 90,Mean blood loss (in milli litres) 120.Intra operative complications: In four of our patient we had to do open reduction. In two cases we failed to achieve anatomical reduction. In three patients we failed to put derotation screw. We had one occasion of cortical screw neck breakage during distal locking. We had three cases of fixation of fracture in varus angulation.Post operative complications -Immediate complications : We had one case of superficial wound infection post operatively, which was managed with regular dressing, culture and sensitivity and appropriate i.v antiobitics.No deep infection was seen Delayed complications:We encountered three cases of delayed union and three case of mal union (varus <10 degree).Two case had shortening more than 1 cms who were treated with sole raise.We had no cases of nonunion or implant failure or cutting out of screws.Two patient had knee stiffness. Patient improved after vigorous physiotherapy.Delayed complications:Delayed union 3 (7.5%),Varus malunion $<10^0$ 3(7.5%), Implant failure,Non union 0%,Shortening of >lcms 2(5%),Knee joint stiffness 2 (5%).The average duration of hospital stay was 20,67 days.The mean time for full weight bearing was 16.5 weeks.All patients enjoyed good range of hip and knee range of motion except two who improved with physiotherapy. Post operative mobility was aided in immediate post operative period but later all patients were ambulatory independently with or with out walking aid after 6 weeks.Follow up: All patients were followed at 6 weeks , 12 weeks, 6 months and some patients upto one year and further if necessary .Three patients failed to attend the first follow up and were lost for follow up. At each follow up radiograph of operated hip with upper half femur was taken and assessed for fracture union and implant failure and screw cut out. Anatomical Results:Anatomical results were assessed by presence or absence of deformities, shortening,hip and knee range of motions.In our study two patients had shortening >lcm, three patients had varus malunion <10 degrees. Functional Results: In our series of 40 operated cases 2 cases expired before first follow up due to associated medical problems and old age , 3 cases were lost for follow up. Functional and anatomical results are assessed taking the remaining 35 cases into consideration using Harris Hip Scoring System (Modified),Intertrochanteric -22,Subtrochanteric -13 Functional results of Inter trochanteric fractures:Excellent 12(54.54%),Good 8 (36.36%),Fair 2 (9.1%),Poor 0%.Functional results of Subtrochanteric fractures Excellent 4 (30.76%),Good 7(53.84%),Fair 2 (15.39%),Poor 0%. According to Harris Hip Scoring System (Modified) ,Good to excellent results are seen in 90.9% cases of trochanteric fractures and 84.6% cases in subtrochanteric fractures. Overall, we had Good to excellent results in in 88.57% ,Fair in 11.42 % .we had no case with poor results.

V. Discussion

The treatment of peritrochanteric fractures of the proximal femur is still associated with some failures. The reasons are disregard for biomechanics,overestimation of the potentials of new surgical techniques or new implants or poor adherence to established procedures. High stress concentration that is subject to multiple deforming forces, slow healing time because of predominance of cortical bone, decreased vascularity, high incidence of complications reported after surgical treatment compels the surgeon to give a second thought regarding selection of the proper implant.The most common current modes of fixation are Blade plate systems, Sliding screw systems and Intramedullary devices. From the mechanical point of view, a combined intramedullary device inserted by means of minimally invasive procedure seems to be better in elderly patients. Closed reduction preserves the fracture haematoma, an essential element in the consolidation process. Intramedullary fixation allows the surgeon to minimize soft tissue dissection there by reducing surgical

trauma, blood loss, infection, and wound complications.PFN is a novel, modern intramedullary implant based on experience with the gamma nail. The currently used gamma nail as an intramedullary device also has a high learning curve with technical and mechanical failure rates of about 10%.The gamma nail is susceptible to

fail at its weakest point, the lag screw-implant interface.The Arbeitsgemeinschaft fur osteosynthesefragen (AO ASIF) in 1996,therefore developed the proximal femoral nail with an antirotational hip pin together with a smaller distal shaft diameter which reduces stress concentration to avoid these failures. Proximal femoral 'nail has all advantages of an intramedullary device ,such as decreasing the moment arm, can be inserted by closed technique, which retains the fracture haematoma an important consideration in fracture healing, decrease blood loss, infection, minimizes soft tissue dissection and wound complications.

VI. Conclusion

Though the learning curve of this procedure is steep, with proper patient selection, good instrumentation, image intensifier and surgical technique, PFN remains the implant of choice in the management of Peritrochanteric fractures.

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