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Proximal Femoral Fractures

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❖ Keywords ❖

Intertrochanteric fractures, Subtrochanteric fractures, Dynamic Hip Screw, Proximal Femoral Nail, Gamma Nail, Total Hip Replacement

❖ Abstract ❖

This article is an review article for the management of proximal femoral fractures. With the personal experience of the author of over 25 years, and management by recent and latest technique of closed nailing over 15 years with a minimum follow up of 2 years, presently accepted norms for the treatment are discussed. Almost all the proximal femoral fractures needs surgical stabilisation.

Introduction

Hip fractures in the elderly are frequent, and their number is increasing fast. The incidence of hip fractures worldwide is increasing. The proximal femoral fractures would include intracapsular as well as the extracapsular fractures of proximal femur namely intertrochanteric and subtrochanteric fractures. Numerous factors may affect the risk of proximal femoral fractures including gender, race, age, ethnicity, bone mass, nutrition, use of medications, etc. Medical co-morbidities - especially those affecting mental status, sensory perception, balance, and locomotion are associated with increase risk of hip fractures. Cerebro-vascular diseases such as stroke have been associated with increased risk of hip fracture. The fracture is commonly associated with osteoporosis. The clinical presentation of patient with proximal femoral fracture can vary widely depending upon the type, severity and cause of the fracture. Displaced fractures are clearly symptomatic; such patients usually cannot stand, much less ambulatory. On the other hand, patients with non displaced or impacted fractures may be ambulatory and experience minimal pain. Little controversy exists in the management of intracapsular fractures and two most dreaded complications of these fractures, nonunion and avascular necrosis of the femoral head have been recognised. In contrast, the intertrochanteric and the subtrochanteric fractures pose a number of management dilemmas depending on the fractures configuration and status of the bones. A number of different treatment modalities for management of these fractures have been proposed and tried with varying results for both intertrochanteric & subtrochanteric fractures of proximal femur. Since the treatment modalities of fracture neck femur by way of Osteosynthesis in young individuals and replacement arthroplasty for elderly patient is well standardized (the only discussion required is for nonunion fracture neck femur), the management of intracapsular fractures will not be addressed in this article. The amount of clinical deformity with proximal femoral fracture reflects the degree of fracture displacement. Patient with non displaced fracture may present with virtual absence of clinical deformity, whereas those who sustain a displaced fracture exhibit the classical presentation of shortened and externally rotated deformity. The primary goal of fracture treatment is to return the patient to pre fracture level of function. There is nearly universal agreement that in patients who sustain proximal femoral fracture, this goal can best be accomplished by surgical treatment. In general, the surgery should be performed as soon as possible after stabilisation of all comorbid medical conditions.

Intertrochanteric Fractures

Intertrochanteric hip fractures account for approximately half of the hip fractures in the elderly; out of this more than 50% fractures are unstable. Unstable pattern occur more commonly with increased age and with low bone mineral density . The fracture commonly occurs through bone affected by osteoporosis. The presence of osteoporosis in intertrochanteric fractures is important because fixation of the proximal fragment depends entirely on the quality of cancellous bone present, though the treatment of intertrochanteric fracture has advanced dramatically since last few years. Unstable intertrochanteric fractures are those in which comminution of posteromedial buttress exceeds a simple lesser trochanteric fragment or those with subtrochanteric extension. The results of unstable fractures are less reliable and have a high rate of failure - 8%-25%.

The goal of treatment of any intertrochanteric fracture in the elderly is to restore mobility safely and efficiently while minimizing the risk of medical complications and technical failure and to restore the patient to preoperative status. Restoration of mobility in patients with unstable intertrochanteric fracture ultimately depends on the strength of surgical construct. There are multiple factors and variables (Kaufer 1980) [6], which affects the biomechanical strength of repair. Surgeon independent variables are bone quality, which is related to age and osteoporosis and fracture pattern& fracture stability. Whereas surgeon dependent variables are quality of fracture reduction and choice & placement of implant. Unstable intertrochanteric fractures are technically much more challenging than stable fractures; a stable reduction of an intertrochanteric fracture requires providing medial and posterior cortical contact between the major proximal and distal fragment to resist varus and posterior displacing forces. Hence Surgeons must understand implant options available and should strive to achieve accurate realignment and proper implant placement.

Subtrochanteric Fractures

Subtrochanteric fractures occur ‘between lesser trochanter and a point 5 cm distally and are seen as independent entities or as an extension of intertrochanteric fractures. The common problem for these fractures has been malunion, delayed union or non-union. Malunion in the form of shortening, angular deformity and rotational malalignment were common results after this injury. The main reason has been the area fractured is mainly a cortical bone and often the fracture is comminuted. Another factor responsible is a large bio-mechanical stresses are acting in the subtrochanteric region which results in failure of implant fixation before bony union occurs [30, 32]. Technical failures such as loss of reduction, non-union, implant failure (penetration of implants in the joints, breakages) continue to occur. Although newer modalities of implant fixation have improved the care for these unstable injuries, there still occurs to be implant failure ranging from 8 - 25%. The clinical picture of subtrochanteric fractures resembles the fracture shaft femur or trochanteric fractures. Since the forces required producing this injury are substantial and hence associated injury of the same extremity or elsewhere should always be suspected and assessed. Two different separate group of patients are commonly observed in this subtrochanteric fractures, Either it is seen in old patients following trivial trauma because of osteopenia or it is seen following high energy trauma in young individuals with normal tone. When the fracture is grossly comminuted, consideration of these two groups separately is essential in planning the treatment and predicting its outcome. Many newer designs of implants bas been designed for fixation of subtrochanteric fractures. The newer implants were designed to avoid bending, breakage of plates and nails, the loosening of screws and inadequate fixation. After the failure of A O angled blade Plate many implants were designed like Dynamic Hip Compression Screw, Dynamic Condylar Screw, Modifications of axial compression screw devices like Medoff's device [5]. Angled bade plate with primary bone grafting initially gave good results but with the introduction of axial compression screw, many people started using Dynamic Hip Screw. With the common complication of penetration of hip screw into the joint, other many devices like Medoff's device of sliding of side plate were being used [5]. Few people started using Dynamic Condylar Screw to avoid penetration of screw in the joints.

❖ Etiology ❖

Most of the hip fractures in the elderly results from simple fall from standing. This is mainly because elderly people are unable to dissipate energy as compared to the young person, and diminished ambulatory speed. Their protective responses are also diminished because of slow reaction time, weakness, disorientation and the side effect of medication. Elderly people also lack shock absorbers such as pad of fat or muscles over the trochanteric region and finally diminished bone strength because of osteopaenia allows fractures to occur with trivial fall.

❖ Classification ❖

Although classification is useful for describing ***intertrochanteric fractures,*** its utility in predicting outcomes in subgroups is questionable. Most of the surgeons prefer classifying the fractures simply as stable and unstable (Evans 1949, Boyd & Griffin) [16] (Fig. 1, 2). AO or OTA classification (Fig 4) of proximal femoral fractures is best to understand stable or unstable nature of the fracture. A truly stable intertrochanteric fracture, is one when reduced has a cortical contact without a gap medially and posteriorly. Medial cortices of proximal fragment and distal fragment are not communited and there is no fracture or lesser trochanter is not displaced. This contact prevents displacement in to varus or retroversion when forces are applied. Whereas in unstable intertrochanteric fracture there is communition of greater trochanter and there is no contact between proximal & distal fragment because of displaced posteromedial fragment. The importance of displaced lesser trochanter fragment, its size and displacement is a key to decide the instability of intertrochanteric fracture. Similarly intertrochanteric fracture with reversed obliquity in which there is inherent tendency of medial displacement of distal fragment secondary to pull by adductor muscle are unstable injury [4]. Another unstable fracture is described by R. Kyle where intertrochanteric fracture is extended in to the fracture neck femur (Fig 3)[1].

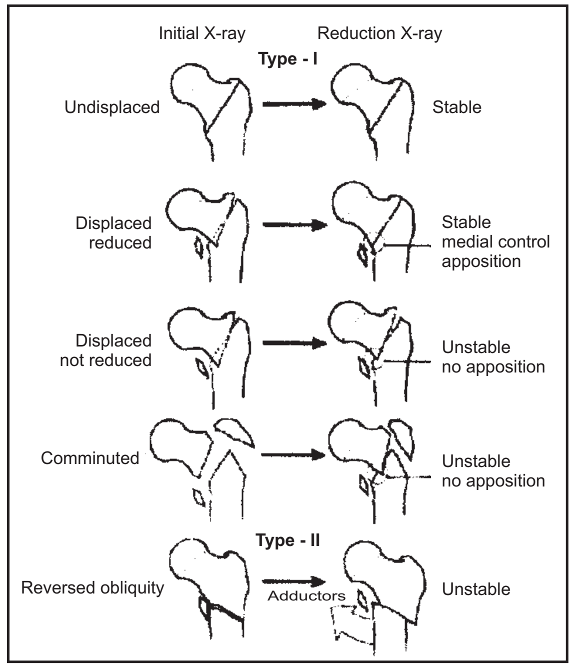

Figure 1 : Showing Evan's classification

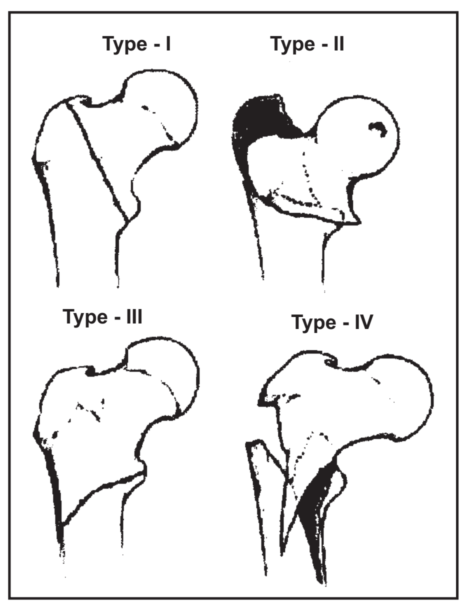

Figure 2 : Showing Boyd & Griffin's classification

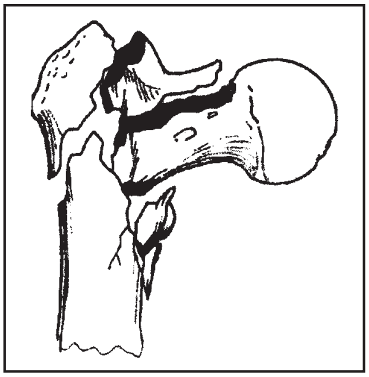

Figure 3 : Showing Kyle's type IV IT fracture extending into the neck of femur

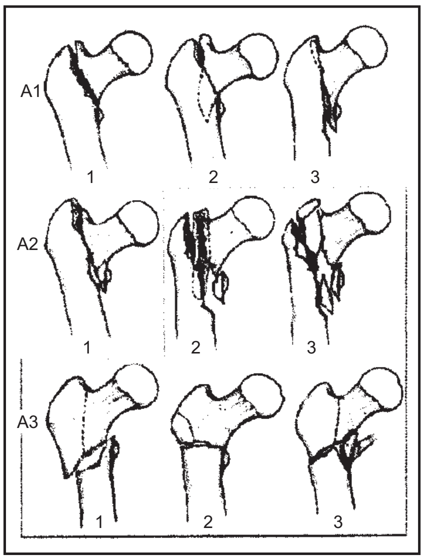

Figure 4 : Showing AO/OTA Classification of Proximal femoral fractures

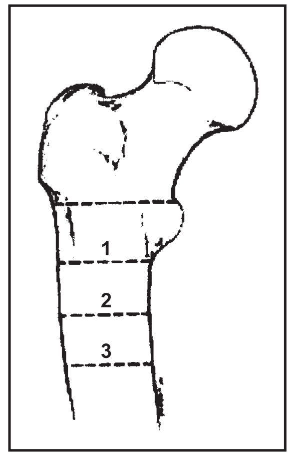

Figure 5 : Showing Fielding & Magliato's classification

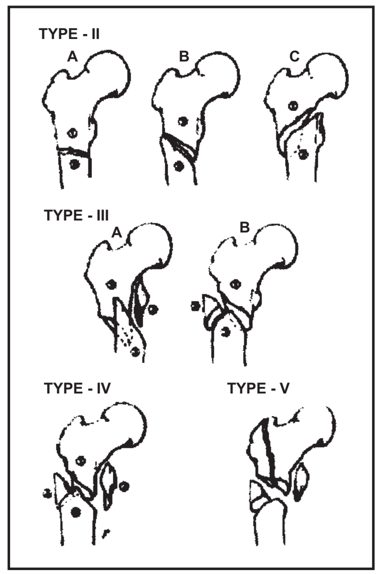

Figure 6 : Showing Seinsheimer's classification

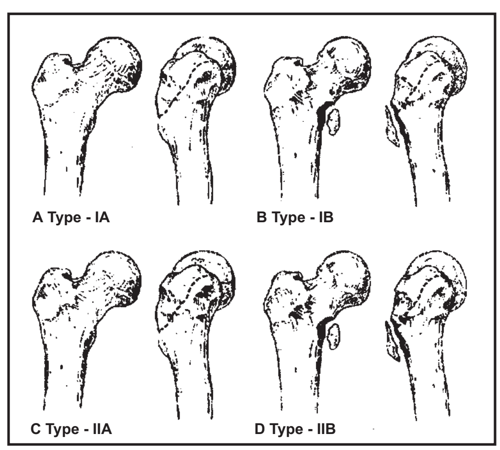

Figure 7 : Showing Russell Taylor's classification

Several classifications of ***subtrochanteric fractures*** have been suggested. In some of the classifications, the subtrochanteric fractures were included in the classification of trochanteric fractures (Boyd and Griffin, 1949)[16]. There are various classifications (Fig 5, 6, 7):

1. Fielding and Magliato [18] - 1966 depending upon the site of fracture in the subtrochanteric area.

2. Seinsheimer's classification [28] -1978 depending upon the number of major fragments and location and shape of fragments.

3. Russell- Taylors classification [25]- depending upon involvement of piriformis fossa and lesser trochanter in subtrochanteric region.

❖ Biomechanical factors ❖

With the better understanding of biomechanics of trochanteric fractures, there has been development of better implants. Koch (1917)[22] analysed mechanical stresses on the femur during weight bearing and found out that compression forces exceeded 1200 lbs per square inch in the medial subtrochanteric area (Frankel and Burstein 1970)[19]. Lateral tensile stresses were 20% less. Rybiki, Simonen and Weis (1972)[26] found out that higher forces were generated with eccentrically placed devices such as plate and screws compared to centromedullary devises. Tencer et at (1984)[29] did biomechanical studies in cadaveric models. Their studies revealed that interlocking centromedullary devices had greater bending stiffness, had nearly normal femoral torsional stiffness and had very high axial Load sustaining capacity (350-400 lbs) of body weight. Schatzkar and Wadell (1980)[27] have shown that compression forces which load medial femoral cortex are considerably greater than the torsional strains on lateral femoral cortex. These large stresses on subtrochanteric area make medial cortical restoration mandatory at the time of surgery to prevent cyclic loading and failure of any device used on tension side of the femur. Velasco and Comfort (1978)[30] reported that as little as 2 mm separation of medial femoral cortex would lead to medial collapse and lateral plate bending and failure of implants.

❖ Management ❖

Since lots of comorbidities are common in geriatric population, a thorough preoperative medical evaluation is necessary. The detailed preoperative work up directly affects the timing of surgery and the operative procedure. Majority of these fractures should be treated operatively for ease of nursing care, rapid mobilisation, decreased mortality, decreased hospitalization and restoration of function. The operative treatment should be considered urgently, but not an emergency procedure. The optimal time for surgical intervention appears to be after the patient is evaluated medically and any transient medical ailment corrected i.e. electrolyte & fluid imbalance. However it should not be delayed more than 48-72 hours unless intervention significantly decreases the operative risk.

❖ Surgical Treatment ❖

Usually regional anaesthesia is preferred over GA. The most common means of surgical fixation is reduction and fixation with compression hip screw and side plate or lately intramedullary sliding hip screw. Other options are compression hip screw augmented with trochanteric stabilizing plate, or MedofFs plate [5]. However in few cases primary prosthetic replacement & total hip joint replacement may be preferred. Use of prophylactic antibiotic has lowered the incidence of wound infection after surgery, though duration of antibiotic treatment remains controversial. Similarly, every patient who sustains proximal femoral fractures in elderly should receive thrombo prophylaxis while awaiting surgery.

Compression Hip Screw & Side Plate

The compression hip screw remains the standard implant in the management of intertrochanteric and subtrochanteric fractures in elderly [1, 8, 14, 15, 23]. The fracture reduction should be assessed by evaluating major fragment translation and angulation between the head neck fragment and femoral shaft. Only few millimeters translation in AP & lateral plane should be accepted. An acceptable neck-shaft angulation is between 5 degree of varus and valgus upto 15-20 degrees. Fracture reduction is a variable that can be controlled by the surgeon; poor fracture reduction is associated with fixation failure and should not be accepted.

Problem fractures may be improved by manipulating the extremity while it is out of traction to unlock the keyed fragments, and then repositioning the limb. Posteromedial fragment that includes the lesser trochanter is rarely aligned by closed methods; though direct open reduction of these fragments is usually unnecessary. Residual posterior sag of femoral shaft or apex posterior angulation can be easily improved with external support & elevating the femoral shaft. Open reduction should be performed when acceptable reduction cannot be achieved even after careful attempt of closed reduction. The approach for open reduction should expose as much the fracture zone is necessary which allows direct manipulation of the fragments through the lateral exposure.

Implant placement in DHS is very important to avoid complications & prevention of the cutting out of implant. Usually 135 degree of compression screw is passed on the guide wire, which is positioned in the apex of femoral head (Fig 8). The position of this screw is critical for successful fixation. Although one should avoid superior and anterior screw placement, Baumgaertner et al (1995)[3] devised the method to measure the distance of the screw tip from the apex of femoral head-TAD. These authors recommend optimal position of screw should be in the centre and very deep on both AP & lateral views. To avoid complications and to ensure proper impaction, the barrel of hip screw device must not cross the fracture site. There must be enough room for the implant to collapse before the screw impinges on the barrel. Lately after observing the disengagement of the sliding screw from the barrel, many authors now recommend leaving the top compression screw in the sliding device.

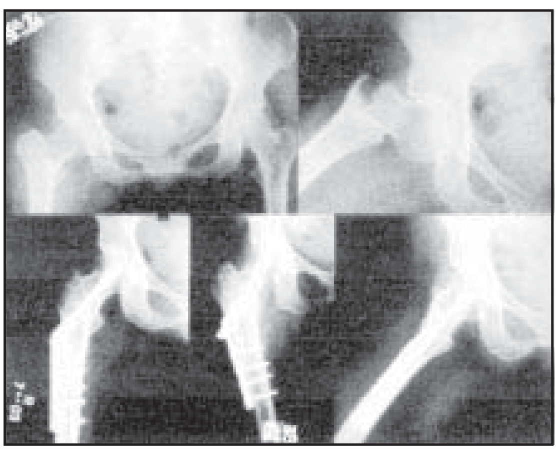

Figure 8 : Showing Displaced Intertrochanteric fracture treated by DHS in a 65 yrs lady

AO Angle blade plate

Both Schatzkar and Waddell [27, 31] recommended the use of AO blade plate in selected subtrochanteric fractures. A subtrochanteric fractures where anatomical restoration of medial femoral cortex is possible, it may be fixed by AO blade plate and if possible fixation by interfragmenlary compression of media cortical fragments should be done.

Waddell reported failure of AO blade plate in about 20% of fractures (1980) (Fig. 9, 10). In 1980 Kinast et al [21] presented a study of subtrochanteric fractures fixed by 95 degrees AO blade plate by using new method of fracture fixation. The blade plate is introduced into proximal fragment first and fracture is reduced indirectly using AO distractor and the plate is then fixed to femur by screws avoiding soft tissue stripping.

Similarly DCS (Fig. 11) can also be used in subtrochanteric fractures.

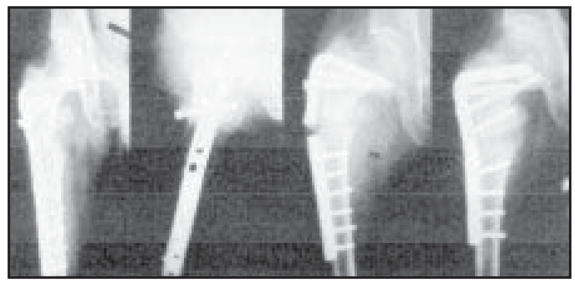

Figure 9 : Showing Ang. Bl. Plate - Implant Failure - Bone Graft. Mandatory

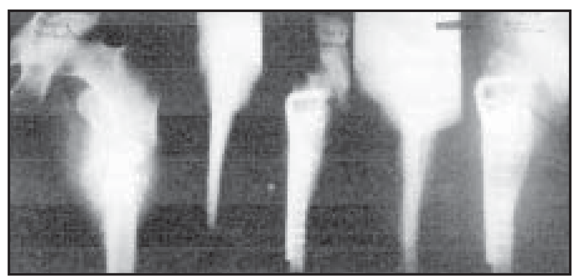

Figure 10 : Showing Intertrochanteric fracture treated by Ang. Bl. Plate

Figure 11 : Showing Subtrochanteric fracture treated by DCS

Intrainedullary Sliding hip screws

Intramedullary hips screws combine the sliding hip screw with intramedullary nail, which is distally interlocked (Gamma Nail (Fig No. 12, 13, 14) [20, 23, 24], PFN Proximal Femoral Nail (Fig No. 15), Russell Taylor Nail (Fig No. 16, 17)). Short nails with jig guided distal locking nails, as well as full-length nails are available. This type of fixation was started as early as 1967 with the use intramedullary nail by Zickel RE. [33, 34, 15] The implant placement is done by closed procedure by percutaneous manner to minimize the fracture zone insult and reduce the perioperative blood loss. There is decreased bending moment on the compression screw because of shaft fixation is intramedullary. Nail acts as intramedullary buttress to prevent excessive shaft medialisation and impaction in the line of axis can be achieved by compression before distal interlocking. Since it's a closed procedure usually performed on traction table, the positioning of the patient tends to produce varus angulation. This can be overcome by increasing the traction to maintain fracture reduction. Fracture reduction in acceptable position is prerequisite for closed nailing interlocking. The proximal fragment can be manipulated by a special instrument in the desirable position and maintained while passing the guide wire and during reaming with the help of this device. After acceptable reduction and correct positioning of guide wire in both the planes is achieved the proximal femur is aggressively reamed by gradual serial reaming to accommodate intramedullary nail of 17, 18 mm size. An appropriate diameter 10-12 mm intramedullary nail is used and placed in the canal by simple manual force only. Lag screw insertion in to femoral head is then done through outrigger guides. Central positioning of guide wire in femoral head in lateral view can be achieved by elevating the jig to correct the sag of femoral shaft and the limb should be abducted to correct the coxa vara in good center position in AP view and then the guide wire should be passed. Subsequently after reaming the neck and head compression screw should be passed and axial traction should be released and distally the nail should be interlocked through the jig (Fig. 12, 13, 14).

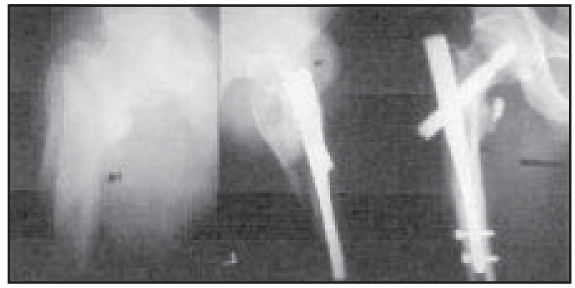

Figure 12 : Showing unstable inter-sub trochanteric fracture treated by Gamma nail

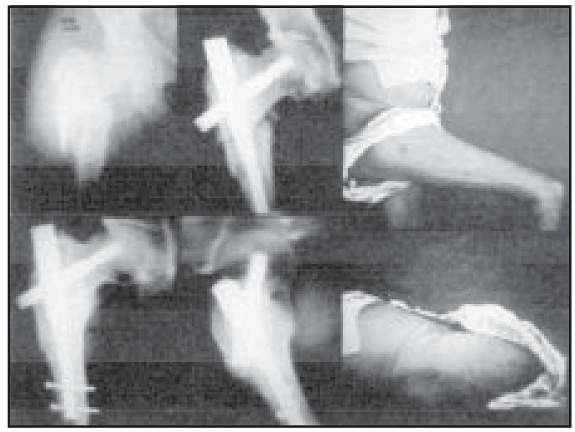

Figure 13 : Showing unstable sub trochanteric fracture treated by Gamma nail

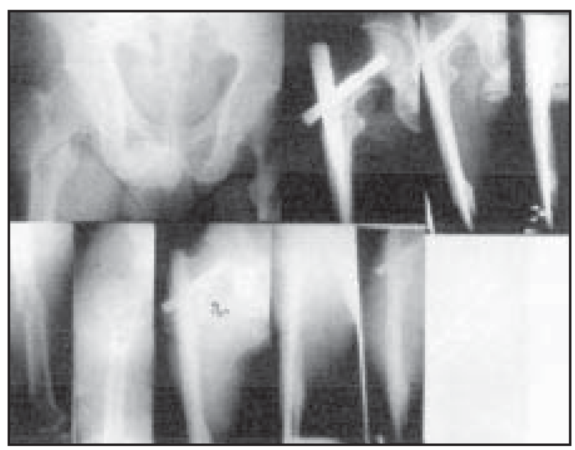

Figure 14 : Showing Ipsilateral Trochanteric with shaft fracture treated by Gamma nail - 3 yrs follow up

Baumgaertner et al (1998)[3] found no significant differences between intramedullary sliding hip screw and compression hip screw, even when compared in unstable fractures. Where as Hardy et al 1998 showed that sliding hip screw was associated with improved early mobility and significant decrease in limb shortening in unstable fractures.

Similarly the proximal femoral fractures can be easily managed by Russell Taylor nail or proximal femoral Nails (Fig. No. 15, 16, 17).

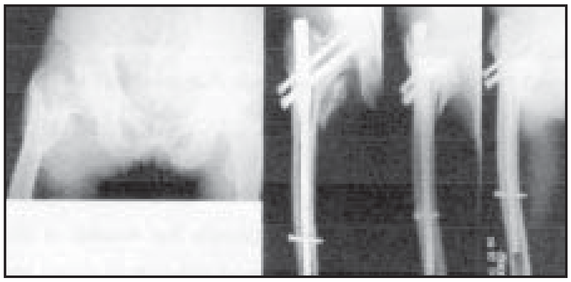

Figure 15 : Showing Comminuted Intertrochanteric fracture treated by PFN

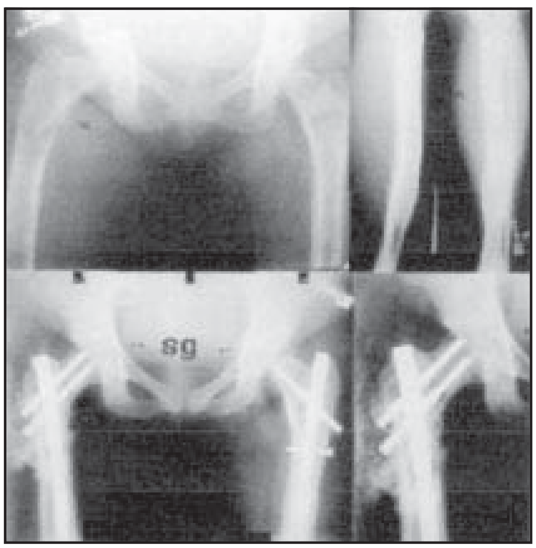

Figure 16 : Showing subtrochanteric fracture femur in a 45 yr. Female with Fibrous dysplasia treated by PFN

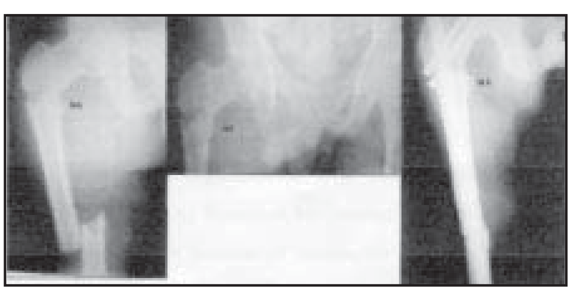

Figure 17 : Showing Ipsilateral Trochanteric & shaft fracture treated by Russell Taylor -Reconstruction nail

Use of Bone grafts, Bone Substitute

Plenty of bone grafts, cancellous or corticocancellous bones are used especially in unstable comminuted fractures to enhance and stimulate bone healing. Autografts with plenty of cancellous bone represents good choice to stimulate bone formation. To avoid the morbidity at donor site the bone substitutes and BMP can also be used in comminuted fractures. Fresh frozen bone grafts is less immunogenic, but preserves BMP, which promotes osteoinduction. Synthetic bone grafts composed of calcium, silicon or aluminium can also be considered in selected cases. Silicon base grafts incorporate in the form of Silicate (Silicon dioxide) as bioactive glasses or glass-ionomer cement. Calcium phosphate & carbonates based grafts are capable of osteoconduction & osteointegration (Fig No. 18). Many are prepared as ceramics like tricalcium phosphate, hydroxyapatite. Alumina ceramics bonds to bone in response to stress and strain between the implant & bone.

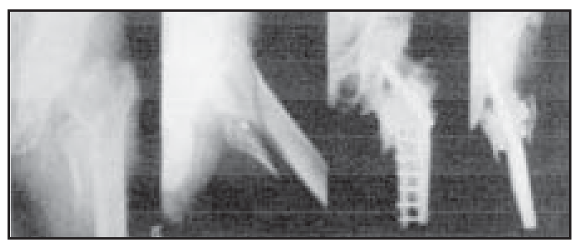

Figure 18 : Showing Unstable Intertrochanteric Fracture treated by DHS & Bone cement

Augmentation with Bone Cement

In elderly with severe osteoporosis the use of cement augmentation of proximal fixation is recommended. If the lag screw does not have purchase within the femoral head, the screw should be removed, polymethyl methacrylate cement injected in to the femoral head and the screw reintroduced. Similarly with in patients with severe osteoporosis side plate fixation by cortical screw can be improved by augmenting with bone cement. It is used to grout & load the distribution for implant, acrylic bone cement (PMMA) functions by mechanically interlocking with bone. PMMA cement never gained wide acceptance because of exothermic reaction, inability of remodeling, risk of inhibition of fracture healing due to release of monomers, fibrous sheathing & poor bondage with adjoining bone. Newer bone cement - Calcium phosphate (Norian SRS) & glass ionometric cement is biodegradable cement. New glass ionometric cement was first used for dental filling; it has no disadvantages of PMMA.

Aim of cement is :

1. To create mantle around the screw thread of implant to enhance holding capacity.

2. To fill the fracture void especially prosthesis in femoral head or around femoral calcar & posteromedial defect in trochanteric fracture.

The goal of augmenting was not to fully prevent sliding, but to avoid excessive sliding to prevent fracture displacement & varus angulation (Fig. No. 19).

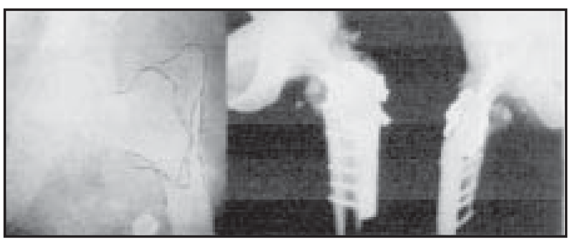

Figure 19 : Showing Unstable Intertrochanteric Fracture treated by DHS & Bone cement

Prosthetic Replacement

Prosthetic replacement in fresh intertrochanteric fracture is not routinely done. Recommendations for acute prosthetic replacement currently are limited to unstable fractures in patients with rheumatoid arthritis or pathologic fractures. Cemented hemiarthroplasties and bipolar replacement are considered in unstable intertrochanteric fractures. Haentejens et al 1989 compared the results of primary bipolar replacement and blade plate fixation, and Chan & Gill 2000 reported few complications after cemented hemiarthroplasties. Earlier this procedure was done as a secondary treatment for the salvage of failed intertrochanteric fractures [13].

Unstable intertrochanteric fractures, especially badly comminuted are common situations where fracture goes in to nonunion along with lot of morbidity and at times mortality. To overcome such situation and to prevent morbidity presently these patients are infrequently subjected to primary total hip joint replacement (Fig. No. 20, 21, 22) [35]. This has two advantages; it reduces the chance of nonunion and avoids morbidity and repeated surgeries.

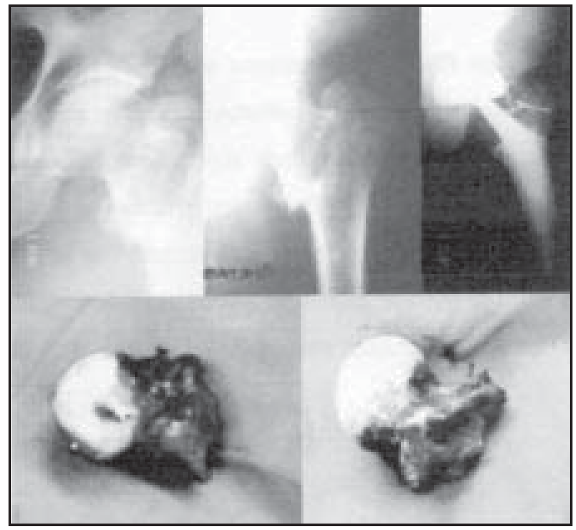

Figure 20 : Showing Unstable Intertrochanteric Fracture treated by Primary Total hip replacement

Figure 21 : Showing Unstable Intertrochanteric Fracture treated by Primary Total hip replacement

Figure 22 : Showing Unstable comminuted Intertrochanteric Fracture treated by Primary Total hip replacement

Postoperative Care

Intraoperative antibiotic therapy should be continued for 24-48 hours. Deep vein thrombosis is a concern in every elderly person with hip fractures, and although there is debate as to what the best regimen might be, perioperative prophylaxis should be instituted in all hip fracture patients. A primary goal of treatment in any elderly patient of hip fractures is immediate mobilisation. Patients with unstable fractures tend to self-limit weight bearing more than those with stable fractures do. It appears to be of no benefit to order restriction of weight bearing in lucid patients. Patient should be allowed to bear the weight as tolerated. Every patient must be evaluated for underlying osteoporosis after the surgical fixation of fracture.

❖ Discussion ❖

Early operative treatment of trochanteric fractures reduces both mortality and morbidity (Laskin, Gruber and Zimmerman 1979, Cedar 1980, Nue moller et al 1985 and Pillar et al 1988), giving best chance of early independency and reducing the risks of prolonged bed rest. Sliding nail plate system gives good results for both stable and unstable trochanteric fractures (Ecker, Joyce and Kohl 1975, Doppelt 1980, Jensen Sonneholm and Tondevold 1980, Waddall 1980, Herrlin et al 1989) with reported complication rates of 3% to" 15%. Their strength is adequate for physiological load of normal gait (Kaufer et al 1974, Jenson 1980, Larsson et al 1988). Complications such as superior cutting-out are related to the position of lag screw (Doherty and Lyden 1979, Manoli 1986, Simpson et al. 1989, Davis et al. 1990). Penetration of lag screw is due to its failure to slide (Matthews et al 1981, Simpson et al 1989) and the rare lateral pulling out of side-plate is caused by varus movement acting on the screws (Matthews et al 1981, Wolfgang et al 1982, Amis et al 1987) The Gamma Nail attempts to combine the advantages of sliding lag screw with those of intramedullary fixation while decreasing the moment arm as compared with that of sliding nail plate. It can be inserted by closed procedure which retains the fracture haematoma, an important consideration in fracture healing (Mckibbin 1978, Latta et al 1980) and reduces both exposure and dissection. Insertion of Gamma Nail was accomplished by small incision with little dissection, the advantages of closed fixation for diaphyseal fractures (Kempf, Grosse and Beck 1985, Klemm and Bomer 1980, Wiss et al 1986, Browner and Cole 1987, Zuckerman et al 1987, Brumback 1988).

Presently the Gamma Nail has been modified (AP Gamma nail)[20] basically meant for Asian population. Gamma nailing achieves stable fixation of subtrochanteric fracture with equal length and rotational stability with following advantages: less surgical trauma, less screening time, less blood loss, early rehabilitation, ease of implantation, early weight bearing.

Functional Outcome

Functional outcome for elderly patient with unstable intertrochanteric fractures are difficult to assess and depend on many factors in addition to fracture care. Successful fracture care does not always correlate with a successful outcome. Only about 50% of patients can be expected to regain their preinjury function; the other half becomes more dependent in some manner.

Medical Complications

Medical complications after surgical fixation of unstable intertrochanteric fractures are frequent; myocardial infarction, pneumonia and urinary tract infection are the most common. Pulmonary embolism and uraemia are also infrequently seen in immediate postoperative period. Reported mortality rates for the first postoperative year are around 20-25%.

Mechanical Complications

1. Loss of Proximal fixation : Following are the frequent causes of failure of sliding screw.

1. Cutting out of the compression screw from the femoral head.

2. Pulling off of the side plate from the femoral shaft.

3. Disengagement of sliding hip screw from the barrel.

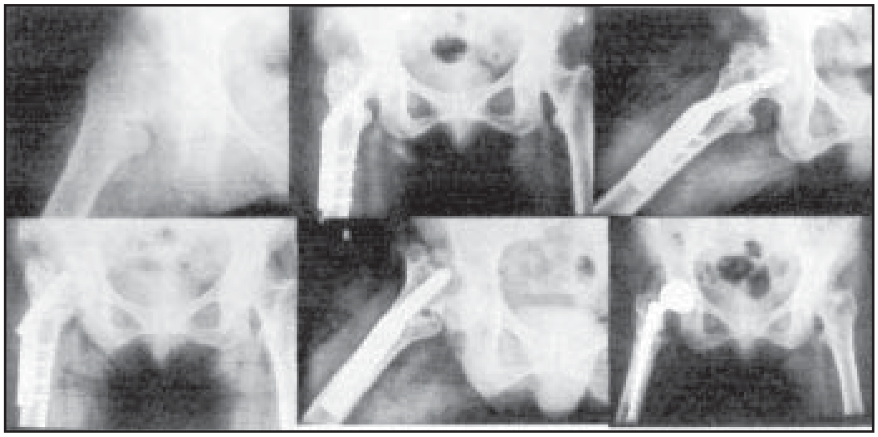

Figure 23 : Showing intertrochanteric fracture in 70 yrs old lady well stabilized by DHS, had implant cut out and failure of union treated by cemented Bipolar prosthesis after 6 mnths.

4. Failure of the hip screw.

Migration of compression hip screw with cutout from femoral head remains the most common mechanical complication after surgical fixation (Fig. 23).

A review of severe unstable fractures revealed a 56% failure rate of cutout and nonunion.

2. Femoral shaft fractures : As a complication of unstable intertrochanteric fracture fixation, femoral shaft fracture is almost completely related to short intramedullary fixation. Femoral shaft fracture can occur at the time of implantation or postoperatively. Almost all the fractures occurred with standard Gamma nails which were short, large diameters and had 10 degree of valgus offset, which created stress riser at the tip of nail. The Gamma nail has been redesigned and newer devices like PFN, Russell Taylor nail were designed with less valgus curvature. Femoral fractures were associated with larger diameter intramedullary nails and aggressive surgical insertion.

3. Nonunion : Nonunion of unstable intertrochanteric fracture is less frequent complication than hardware cutout. The well vascularised metaphyseal bone makes nonunion less likely than in femoral neck fractures. Most reports of nonunion are associated with instability or loss of reduction.

4. Painful hardware : Painful hardware after open reduction and internal fixation is probably underreported in studies of hip fractures. The pain is often thought to result from backed out compression screw irritating femoral musculature, but nonunion must be excluded as a cause of residual pain. One might be required removal of compression hip screw postoperatively in these patients of unstable intertrochanteric fractures because of persistent thigh pain.

Conclusions

Trochanteric fractures are difficult to manage and needs surgical fixation most of the time. The simple fractures can be easily dealt by simple surgical procedure like Dynamic hip compression screw or intramedullary sliding hip screw. However many times injury is an outcome of high energy trauma where the fracture is comminuted in a young patient with good quality of bone. All displaced and unstable subtrochanteric fractures either in porotic bone (elderly patient) or comminuted unstable fractures needs very aggressive treatment of surgical fixation. After achieving a stable fixation early mobilisation is necessary and simultaneously the complications like shortening, coxa vara should be prevented. This was well managed by closed procedure of Gamma nailing, where proximal fragment was well controlled by a sliding hip screw and distally the nail was interlocked by two screws controlling the rotational instability. Lately the primary prosthetic replacement is performed for difficult and comminuted intertrochanteric fractures to avoid morbidity and repeated surgeries.

With personal experience of more than 10 years of Gamma nailing, Russell Taylor nail and Proximal Femoral Nails with a follow up of more than 2 years, the outcome of this fracture appears good and excellent in the majority of the patients with unstable proximal femoral fractures. However in few selected cases of Intertrochanteric fractures there is role of augmentation with cement and primary prosthetic replacements.

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