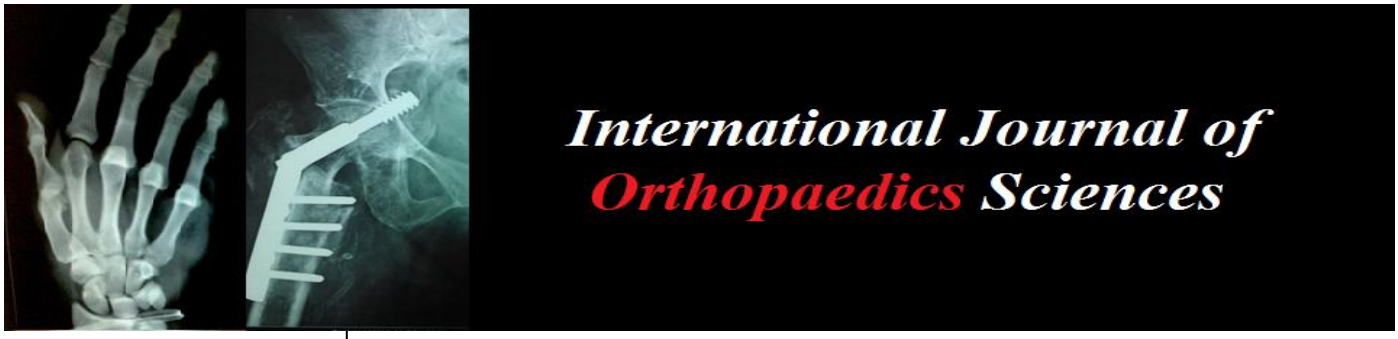

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Analysis of pertrochanteric fractures managed by intramedullary or extramedullary fixation

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Abstract
Fractures of the proximal femur are relatively common fractures seen in elderly with trivial trauma. These fractures are associated with substantial morbidity and mortality. There are various forms of internal fixation devices used for peritrochanteric Fractures. The most commonly used device is the Dynamic Hip Screw with Side Plate assemblies. This is a collapsible fixation device, which permits the proximal fragment to collapse or settle on the fixation device, seeking its own position of stability. The latest implant for management of trochanteric fractures is proximal femoral nail, which is also a Centromedullary and collapsible device with added rotational stability. In view of these considerations, the present study of Surgical Management of peritrochanteric fractures was taken up. This prospective comparative present study was carried out in People's College of Medical Sciences and Research Centre, Bhopal from September 2011 to September 2013. The study consisted a total of 61 patients with pertrochanteric fractures of femur satisfying the inclusion criteria, who are treated with Proximal Femoral nail (30 cases) and Dynamic Hip Screw (31 cases). The advantage with Proximal femoral nail is that a smaller exposure, lesser blood loss, shorter operating time, shorter screening time and less morbidity. (minimizes the jeopardy to the vascularity). It gives a biomechanically sound fixation. In osteoporotic bones Proximal femoral nail fixation carries definitive advantage over Dynamic Hip Screw fixation devices. The incidence of wound infection was found to be lower with PFN which resulted in early ambulation of the patients and lesser duration of antibiotics. The screening time with the help of image intensifier was much lesser in the cases operated by PFN. The implant related complications were much lesser in the patients treated with Dynamic Hip Screw (DHS). However, the rate of union was similar in two groups. (PFN & DHS). Both the implants in their own right are excellent modalities in the management of pertrochanteric fractures of the femur.

Keywords: Trochanteric fractures, PFN, DHS, morbidity

Introduction
Fractures of the proximal femur are relatively common fractures seen in elderly with trivial trauma. Commonly these fractures are classified either as extracapsular or intracapsular fractures of neck of the femur. These fractures are associated with substantial morbidity and mortality; approximately 15% to 20% of patients die within 1 year of fracture due to various complications. After 1 year, patients appear to resume their age-adjusted mortality rate. Most proximal femoral fractures occur in elderly individuals as a result of only moderate or minimal trauma. The frequency of these fractures has increased primarily due to the increasing life span and more sedentary life style brought on by urbanization. In younger patients these fractures usually result from high-energy trauma. Despite similar locations of the fracture, the differences in low- and high-velocity injuries in older versus younger patients outweigh the similarities. More often than not, high-velocity injuries are more difficult to treat and are associated with more complications than low-velocity injuries. Intertrochanteric fractures usually unite if reduction and fixation are properly done, and, although malunions may be a problem, late complications are rare. A wide area of bone is involved, most of which is cancellous, and both fragments are well supplied with blood. 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. Peritrochanteric fractures mainly comprise of fractures of trochanter and subtrochanteric region.

Despite marked improvements in implant design, surgical technique and patient care, peritrochanteric fractures continues to consume a substantial proportion of our health care resources, remains a challenge to date. The incidence of trochanteric fractures is more in the female population compared to the male due to osteoporosis. In a Swedish study of more than 20,000 patients, the incidence of hip fractures in women doubled every 5.6 years after the age of 30 years. 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. The most commonly used device is the Dynamic Hip Screw with Side Plate assemblies. This is a collapsible fixation device, which permits the proximal fragment to collapse or settle on the fixation device, seeking its own position of stability. The latest implant for management of trochanteric fractures is proximal femoral nail, which is also a centromedullary and collapsible device with added rotational stability. In view of these considerations, the present study of Surgical Management of Peritrochanteric Fractures was taken up. It is usually associated with other co-morbid conditions like diabetes, hypertension, renal failure in elderly age group which makes treatment of this fractures, a difficult task. Increased dependency in activities of daily living, and a history of other osteoporosis related (''fragility'') fractures are also found to be associated with intertrochanteric fractures. Early and adequate fixation is very important in these patients so as to mobilize them at earliest and prevent complications of recumbency.

In the unstable fractures which are difficult to manage with dynamic hip screw alone. Rates of complications like screw cut out, shortening of limb, varus deformity of proximal femur, and even non-union are higher in unstable fractures as compared with stable fractures.

Hence the need for any other better fixation device or any modifications in design of dynamic hip screw or any add-on fixation device with D.H.S is felt.

Material and methods

This prospective comparative present study was carried out in People's College of Medical Sciences and Research Centre, Bhopal from September 2011 to September 2013. The study consisted a total of 61 patients with pertrochanteric fractures of femur satisfying the inclusion criteria, who are treated with Proximal Femoral nail (30 cases) and Dynamic Hip Screw (31 cases). Patients with age 18 years and above and those who were willing for atleast 6 months follow up were selected. Patients with polytrauma, compound fractures, immature skeleton and those with pathological fractures were excluded from the study. Majority of the fractures were treated with closed method of reduction followed by either operated by Proximal Femoral Nail (PFN) or Dynamic Hip Screw (DHS).

After the patient with trochanteric fracture was admitted to our hospital, all the necessary clinical details were recorded in proforma. The investigations done routinely on all the patients preoperatively include blood, urine and X-rays. 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. After the completion of the hospital treatment, patients were discharged and called for follow up at outpatient level at regular intervals for serial clinical and radiological evaluation. The patients were followed up every month for clinical and radiological assessment till fracture union and function recovery.

Results

Most of the cases belongs to age group between 50-60 years. Mean age in years for group operated by PFN was 68.7 and in group operated by DHS was 60.7 years. Mean age in years both groups combined was 57.5. There was a male preponderance in our patients. Most common mode of injury in older patients was trivial fall (domestic fall). Majority of mode of Injury was simple fall (domestic fall) followed by road traffic accident (RTA). In the study, we have 42 (69%) intertrochanteric fractures with variable degree of comminution. Of the above comminuted fractures, 35 cases (57% of total) were of unstable fracture pattern. In both the groups i.e. 2 patients in PFN and 1 patient in DHS we found complication of urinary tract infection (UTI). All the complications were attributed to delayed removal of catheter in these patients. Superficial would infection was seen in 4 cases in total, 1 case in patient operated by PFN while 3 cases were seen in those operated by DHS. This was perhaps attributed to low immunity status of patient as the patient was of asthenic built and more soft tissue exposure, which is more in cases operated by DHS. But, it was statistically not significant. Among the cases that were operated by Proximal Femoral Nail (PFN) there was 1 case with 'Z' effect, while in 3 cases (10%) we have seen reverse 'Z' effect. In the DHS group, 1 patient had implant cut out, while one patient had cortical screw loosening. We found the mobilization of patients operated by both PFN and DHS was almost same but the weight bearing of patients from the PFN group was earlier. Average time of union in all our 61 patients was about 15 weeks. There was comparatively less blood loss in patients managed by proximal femoral nail as compared to patients of Dynamic Hip Screw group. The mean blood loss in PFN group was about 100 millilitres while in the DHS group it was 166 millilitres. This was statistically highly significant. The average time of screening by image intensifier was significantly lesser in cases operated by PFN as compared to those operated by DHS. There was less exposure in cases operated by PFN (Mean 60.13 sec.) as the anteversion angle was most of the time achieved by rotation of the jig visualised externally, while in DHS, the anteversion was to be revised in the lateral view and so the screening time was marginally more (Mean 67.61 sec.). This was not statistically significant. The range of motions (Harris Hip Score) that is flexion, abduction, internal and external rotations were good to excellent in most of the cases operated by both the devices. We had on an average 67% good to excellent range of motion in all the patients. The fair to poor range of motion was attributed to the poor compliance of the patients for regular physiotherapy and also in some cases due poor reduction achieved at the time of surgery, thus not getting the best possible result. In our study good to excellent results were seen in 20 cases (66%) operated by PFN, 21 cases (68%) operated by DHS. This is statistically non significant (p value >0.05 by independent sample t-test). In our study, we considered various intraoperative parameters such as duration of radiographic screening-more exposure in case of comminuted fractures with difficult reduction. We took less exposure time in cases of intertrochanteric fracture where

reduction was not a problem. There was less exposure in cases operated by PFN (mean 60.13 sec.), as the anteversion angle was most of the time achieved by rotation of the jig visualised externally, while in DHS, the anteversion was to be revised in the lateral view and so the screening time was marginally more (Mean 67.61 sec.). This was not statistically significant (p value >0.001). Blood loss-measured was by mop count (each fully soaked mop containing 50ml blood and also by weighing the mop preoperatively and post-operatively). The mean blood loss seen in case of PFN was 101.6 ml, while in cases of DHS, it was 166.6 ml. As measured by independent t-test, this was statistically significant (p value <0.0001). The Average time of fracture union in all our 61 patients was 15 weeks (Range: 11 weeks to 20 weeks).

Discussion

Operative treatment in the form of internal fixation permits early rehabilitation and offers the best chance of functional recovery, and hence has become the treatment of choice for virtually all fractures in the trochanteric region. Amongst the various types of implants available i.e. fixed nail plate devices, sliding nail/screw plate and intramedullary devices, the compression hip screw is most commonly used but, recently techniques of closed intramedullary nailing have gained popularity.

In this study an attempt was made to survey, evaluate, document and quantify our success in the management of pertrochanteric fractures by using Proximal femoral nail (PFN) and Dynamic Hip Screw (DHS) implants and compare the result in these two groups. Most of patients in present study were from age group of 5th to 7th decade of life 64. Mean age in years for group operated by PFN = 68.7. Mean age in years for group operated by DHS = 60.7. Mean age in years both groups combined = 64.7. This signifies the fact that patients from these age groups are involved in low energy trauma like domestic fall (fall at home) [1, 2]. Gallaghar *et al* (1980) reported an eight fold increase in trochanteric fractures in men over 80 years and women over 50 years of age [3].

Cleveland *et al* [4] pointed out there are higher incidences of multiple fractures, as of the same or opposite side, which may occur at different occasions. This fact directs one's attention to the underlying instability and inherent weakness of the bone structure of the elderly which predisposes them to the injury. More wide spread measures to correct or prevent osteoporosis should be instituted. The elderly should be freed of potential danger of poor lighting, slippery floor, wet slippers etc.

Due to early fixation of such fractures and early mobilization, these patients could gain full range of movement at an early date with minimal loss of productivity. Most of patients from present study were males. There was a male preponderance in our patient. Amongst them majority were in 5th-7th decade of life. Most of the females were in the age group of 5th - 7th decade. Cleveland *et al* [4] in their study had 87.7% of female patients. H. B. Boyd and L. L. Griffin [5] in their study of 300 cases found a marked sex difference. 226 (75.8%) of the patients were females and 74 (24.2%) were males. St. Urnier K.M., Dresing K. (1995) [6] suggested that pertrochanteric fractures ordinarily appears to women 10-15 years later than to men.

In this series of 28 patients, 67.85% of patients were male and 32.15% were females. Males were affected more because of their exposure to trauma during their day-to-day life was greater. Most of our patients were 50 years and above, and in them domestic fall (fall at home) and trivial trauma was main reason behind fracture. This may be attributed to the following factors as enumerated by Cummings and Nevitt in 1994 [7]. Inadequate protective reflexes, to reduce energy of fall below a certain critical threshold. Inadequate local shock absorbers e.g. muscle and fat around hip, inadequate bone strength at the hip on account of osteoporosis or osteomalacia. Horn & Wang [8] stated that mechanism of injury is not direct but due to failure of Stress resisting forces during sudden bending or twisting. A direct blow on the lateral side of thigh would result in contusion, comminution on the lateral surface of the greater trochanter and cause valgus deformity.

In our present study, most of the cases were of unstable fracture pattern (i.e. AO type 31 A 2). This also correlated with the finding of Jacobs and coworker (1980) [9] that incidence of comminuted unstable intertrochanteric fractures is increasing. In patients, treated with PFN as well as DHS, two patients in PFN group and one patient in DHS group were found to complication of urinary tract infection (UTI).

Accordingly, appropriate treatment in the form of antibiotics was given. Superficial wound infection was seen in 4 cases in total, 1 case in patient operated by PFN while 3 cases were seen in those operated by DHS.

The patient who was operated by PFN had infection in distal lock site. While the 3 cases operated by DHS had superficial wound infection at the suture site. This may be attributed to low immunity status of patient as the patient was of asthenic built and belonging to low socioeconomic status & more soft tissue exposure, which is more in cases operated by DHS. In all these patients, treatment of IV antibiotics was prolonged, in our protocol we gave IV antibiotics for 5 days but in presence of wound infection we continued use of IV antibiotics for 10 days. Dressing of wounds were done as per necessity [10]. In all the cases the wound healed in the end. In the series of Dr. G.S Kulkarni [11], there were two cases of deep infections which were treated by removal of implant. The infected sinuses thus healed after implant removal.

A. Bodoky, U. Neff, M. Heberer & F. Harder [12] from the department of surgery, Basel university of Switzerland advocated the use of two doses of cephalosporin antibiotics preoperatively in the patients managed with internal fixation of hip fractures. According to their study antibiotics prophylaxis significantly reduced the incidence of wound infection. In present study, the cases that we operated by Proximal Femoral Nail (PFN) we have encountered 'Z' effect in one case while in three cases (10%) we have found reverse 'Z' effect. In patients with unstable intertrochanteric fractures treated with proximal femoral nailing, technical or mechanical complications seem to be related to the fracture type, operating technique, and time to weight bearing rather than the implant itself [13, 14].

Low rates of femoral shaft fractures and fixation failure suggest that the PFN is useful for treating stable and unstable trochanteric fractures [5]. In one case (3.3%) which was operated by DHS, complication of implant cut out was seen.

During postoperative period as per pain and tolerance of patient, they were made to standup with help of support on 4-5th post operative day. Then gradually within next 2 to 3 days there were made to do non weight bearing walking with support (Walker). Early mobilization of knee was permitted as soon as possible according to patients tolerance preferring to start on the 2nd post operative day.

Patients were discharged after suture removal with instruction to non weight bearing mobilization with support.

Even in the cases operated by DHS, we started Quadriceps drill on the 2nd post operative day followed by mobilisation of knee as per the pain tolerance of patients.

Further the patients were made to stand with the help of walker on the non operative side and made to non weight bearing mobilization. Patient were instructed not to weight bear early but in older patients (>70 years) we noticed that

some of them bore weight early on the operated side without signs of pain and in subsequent follow up there was good clinical and radiological union found. In the series of B. Mall [15] (30 patients) average time of ambulation was 14 days. In the series of Dr. G.S Kulkarni [11] ambulation was usually started after 11-12 days after the stitch removal. Average time of union in our 61 patients was about 15 weeks (Range:12 to 21 weeks) There is some controversy regarding criteria for time of fracture union in different studies. Some use radiological while some use radiological and clinical union.

We used criteria for union as presence of bridging callus at fracture site. Most of the fracture circumference with density similar to adjacent cortical bone. Clinically, absence of pain at fracture site. In a case series by Kevin D. Harrington [16], the time for radiological union was 16 weeks. In our study, we considered various intraoperative parameters such as duration of radiographic screening-more exposure in case of comminuted fractures with difficult reduction. We took less exposure time in cases of intertrochanteric fracture where reduction was not a problem by Proximal femoral Nailing (PFN). As compared to those peritrochanteric fractures operated by Dynamic Hip Screw (screening time-60 seconds), we found out the radiation exposure was definitely lesser as compared to cases operated by Proximal femoral nail (screening time- 80 seconds). Radiation exposure was needed in placement of guide wire and position of the Richard's screw. Placement of plate and cortical screw insertion did not need facility of the image intensifier. Secondly, Blood loss-measured by mop count (each fully soaked mop containing 50ml blood) more blood loss was seen in patients who were operated by DHS. As the incisions taken in fractures treated by Proximal femoral nailing (PFN) are small, the mean blood loss was relatively lesser (120 ml) as compared to those treated by Dynamic Hip Screw (180 ml). But with meticulous dissection and taking care not to damage the perforator we could get a good exposure even in cases operated by DHS. Thus even in our cases operated by DHS the mean blood loss measured was also comparable to that of PFN. The range of movement calculated by the Harris Hip Scoring system treated by both the implants i.e., PFN and DHS was good and was almost the same. The range of movements namely flexion, extension, external and internal rotation was good in most cases, excellent in a few. Very few there were poor results. These fractures are more commonly seen in elderly people particularly in 5th to 7th decades of life [1]. Common mechanism of injury is trivial trauma due to fall [17]. In older patients apart from osteoporosis as major risk factor, anemia, cachexia, cognitive dysfunction, visual impairment, social dependence are some other factors which makes these people more prone for such fractures.

Conclusion

The advantage with Proximal femoral nail is that a smaller exposure is required than for a sliding screw, it may therefore be associated with significantly lesser blood loss, shorter operating time, shorter screening time and less morbidity. (minimizes the jeopardy to the vascularity) There may also be mechanical advantages, because the shaft fixation is nearer to the centre of rotation of the hip, giving a shorter lever arm and a lower bending movement on the device. It gives a biomechanically sound fixation. In osteoporotic bones Proximal femoral nail fixation carries definitive advantage over Dynamic Hip Screw fixation devices. We found that Proximal femoral nails prove to be more useful in difficult fractures like the reversed obliquity fractures. The incidence of wound infection was found to be lower with PFN which resulted in early ambulation of the patients and lesser duration of antibiotics. The screening time with the help of image intensifier was much lesser in the cases operated by PFN as compared to cases operated by DHS. The implant related complications were much lesser in the patients treated with Dynamic Hip Screw (DHS). However, the rate of union was similar in two groups. (PFN & DHS). Both the implants in their own right are excellent modalities in the management of pertrochanteric fractures of the femur.

References

1. Babhulkar Sudhir S. Management of trochanteric Fractures Department of -Orthopaedics, Indira Gandhi Medical College, Nagpur, Indian journal of orthopaedics. 2006; 40(4):210-218.
2. Leung KS5 So WS, Sien WY, Hui PW. Gamma nail and dynamic! Hip screws for peritrochanteric fractures. J Bone Joint Surg (Br), 1992.
3. Gallangher JC, Melton LJ, Riggs BL *et al*. Epidemiology of fractures of the proximal femur in Rocester, Minnesota. Clinical Orthop. 1980; 150:163-171.
4. Mather Cleveland. A ten year analysis of intertrochanteric fractures, JBJS. 1983; 63B:218.
5. Boyd HB, Griffin LL. Classifications and treatment of Trochanteric fractures. Arch Surg. 1949; 58:853-866.
6. St. Urmer KM, Drerring K Pertrochanteric Fractures: Zentralbl Chir. 1995; 120(11):862-72.
7. Cummings SR, Nevitt MC. Non- skeletal determinants of fractures: the potential importance of mechanics of falls. Osteoporosis Int, 1994, S67-70.
8. Horn and Wang: Mechanics of trochanteric anatomy of trochanteric fractures; Br. Jr. of Surgery. 1964; 51:574.
9. Jacobs RR, McClain O, Armstrong HJ. Internal fixation of intertrochanteric hip fractures, Clin Orthop Related Res, 146, 62.
10. Pavelka T, Matejka J, Cervenkova H. Complications of internal fixation by a short proximal femoral nail. Acta Chir Orthop Traumatol Cech. 2005; 72:344-354.
11. Kulkarni GS. Treatment of trochanteric fractures of hip by modified Richard's compression and collapsing screw, Indian Journal of Orthopedics. 1984; 18(1):30.
12. Bodoky A, Neff U, Herberz M, Harder F. Antibiotic prophylaxis with two doses of cephalosporin in patients managed with internal fixation for a fracture of hip JBJS. 1993; 75(1):61-65.
13. Proximal femoral nail for unstable peritrochanteric fractures a panacea? by Dr Sanjay Bhandari. Journal of Maharashta Orthopaedic Association Vol 2 year 1, 2005.
14. Short proximal femoral nail fixation for trochanteric fractures, Wasudeo M Gadegone, Yogesh S Salphale Department of Orthopaedics and Traumatology, Chandrapur Multispeciality Hospital, Chandrapur, India, Journal of 'Orthopaedic Surgery. 2010; 18(1):39-44.
15. Mall B, Susheel Kumar Pathak, Vineet Malhotra. Role of dynamic compression hips screw in trochanteric fracture of Femour. Indian Journal of Orthopaedics. 1999; 33(3):226-228.
16. Kevin D. Harington, San Francisco, James O, Jhoston: The management of comminuted unstable intertrochanteric fractures. JBJS. 1973; 55A(7):1367-76.
17. Biomechanical evaluation of the proximal femoral nail. Schipper IB, Bresina S, Wahl D, Linke B, Van Vugt AB, Schneider E. University Hospital Rotterdam Dijkzigt, Dept. of Traumatology, Rotterdam, Netherlands, Clin Orthop Relat Res. 2002; (405):277-86.