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Comparative analysis between dynamic hip screw and proximal femoral nail the management of intertrochanteric femoral fracture

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Abstract

Peritrochanteric fractures are common in the elderly people. The frequency of these fractures has increased primarily due to the increasing life span and more sedentary life style brought on by urbanization.

There are various forms of internal fixation devices used for Peritrochanteric Fractures. The most commonly used devices are the Dynamic Hip Screw (DHS) with Side Plate assemblies and proximal femoral nail (PFN).

The present study was conducted in 30 cases of stable intertrochanteric fractures of femur, classified according to AO classification. All patients were regularly followed up and Harris Hip Score was used for evaluation for the results. All the patients of stable intertrochanteric fracture treated with PFN or DHS were allowed partial weight bearing at 4 weeks and full weight bearing at 15 weeks.

Most of the patients treated with DHS had excellent outcome (86.66%) as compare to the patient treated with PFN having excellent outcome in 53.33%. Among complications for PFN difficult reduction was seen in 1 patient (6.6%), greater trochanter fracture was seen in 1 patient (6.6%), Hip pain was seen in 1 patient (6.6%) and shortening (> 1cm) was seen in 1 patient (6.6%). In DHS, common complications were superficial infection in 1 patient (6.6%), Hip Pain in 1 patient (6.6%) and shortening (> 1cm) in 3 patients (20%).

The range of motion calculated by the Harris Hip Scoring system treated by both the implants i.e. PFN and DHS was good and was almost the same (95% CI:0.83P1.30,P=0.72). Both implants had equal time of union and had few complications in stable fractures but at long term follow up most of patient operated with PFN complained of implant related complications like greater trochanter Pain and anterior thigh pain.

Keywords: Dynamic Hip screw (DHS), Proximal Femoral Nail (PFN), Harris Hip Score

Introduction

Pertrochanter fractures are of intense interest globally as they are the most frequently operated fracture type, have the highest post operative fatality rate of surgically treated fractures and have become a serious health resource issue because of high cost of care required after injury.

Since this fracture is more common in the elderly patients, early and adequate fixation is very important so as to mobilize them at the earliest and prevent complications of recumbancy. Taking all the factors into consideration surgery by internal fixation of this fracture is the ideal treatment modality.

Trochanteric fractures 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, trochanteric fractures continues to consume a substantial proportion of our health care resources and remains a challenge to date.

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 ^[1] (DHS) and Proximal Femoral Nail ^[2, 3, 4] (PFN), which is also a collapsible device with added rotational stability.

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Materials & methods

The Present study was conducted in 30 cases of stable peritrochanteric fractures of hip admitted in the department of orthopaedics in our institute for duration of one year from Dec 2016 to Dec 2017. Patients were randomized into two groups of 15 patients each. The first group was managed with PFN while second group was treated with DHS.

Isolated stable trochanteric fractures operated within 10 days of injury and with no previous treatment were included in this study whereas trochanteric fractures other than stable two part trochanteric fractures, bilateral intertrochanteric fractures, open injuries, vascular injuries and pathological fractures were excluded from this study. Patients were subjected to either Dynamic Hip Screw (DHS) or Proximal Femoral Nailing (PFN) depending on the alternate stable trochanter fracture to eliminate bias.

For PFN after confirming satisfactory fracture reduction an appropriate size nail as determined pre operatively by X-ray

(figure1) was assembled to the insertion handle and was inserted manually as far as possible into the femoral opening. The antirotation screw was inserted first to prevent the possible rotation of the medial fragment and reduce chance of varus when inserting the compression screw. The compression screw was inserted in the caudal area of femoral head using cannulated screw driver. Final position confirmed with image intensifier. Distal locking was performed with two cortical screws and post operative x –ray done. (figure 2)

Pre operative evaluation done for proper size of DHS plate on x –ray (figure3). For DHS¹ proper size of Richard's screw was measured by direct measuring gauge and inserted. The DHS¹ plate was slide into shaft of Richard's screw. With the impactor, the plate was hammered against cortex of femur. The plate was fixed to the femoral shaft in usual manner, traction was released and compression achieved by tightening the top screw and then post operative x-ray done. (figure 4)

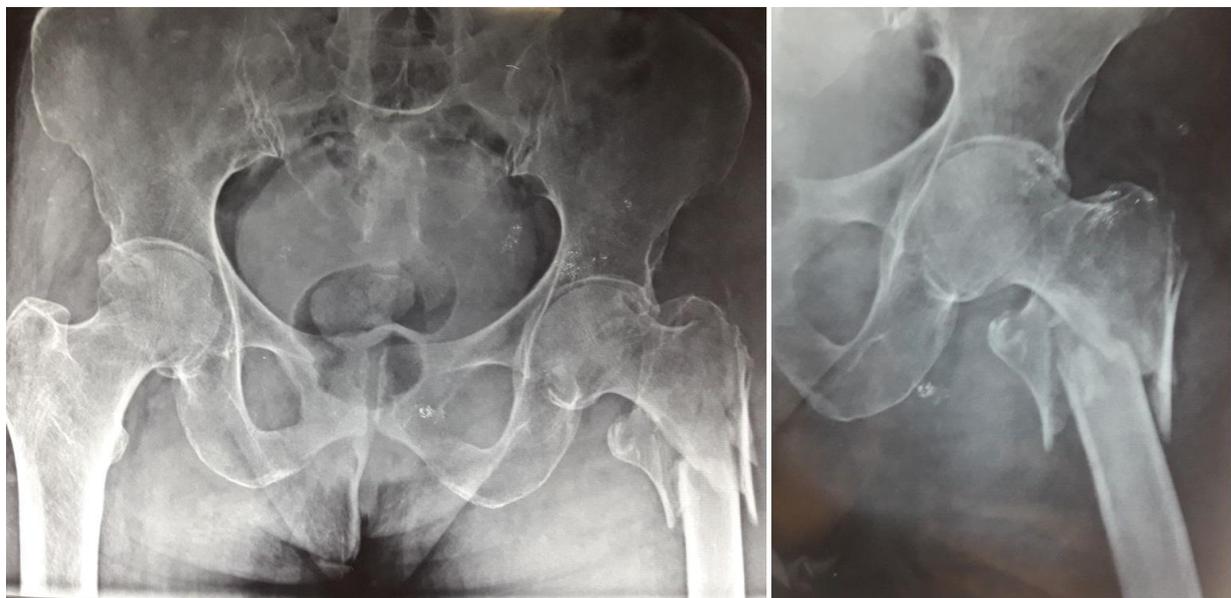


Fig 1: x ray showing fracture intertrochantric fracture left side.

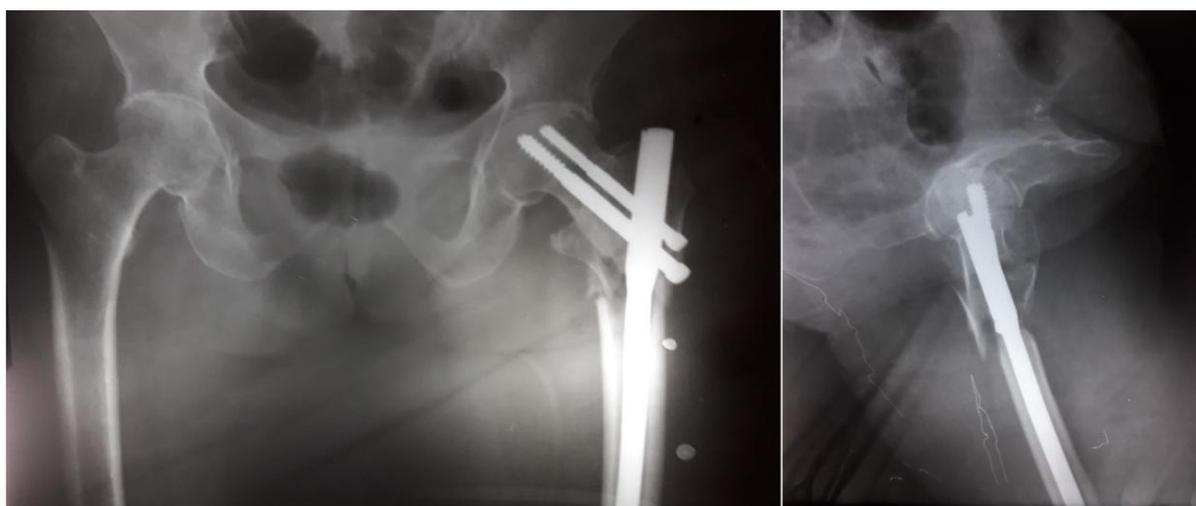


Fig 2: X-ray showing post operative AP and lateral view of PFN.



Fig 3: X-ray showing AP and Lateral view of fracture intertrochantric femur left side.



Fig 4: X-ray showing post operative DHS.

Results

In this study 30 patients, 15 for each PFN^[2, 3, 4] and DHS^[1], were selected with stable trochanteric fractures according to AO classification. Post surgery all patients were followed up at an interval of 6 weeks, 3 months, 6 months and 1 year. Harris Hip score was used for evaluation of results.

Mean age in this study was 43.36 years, 76% of patients (23/30) were in the age group less than 50 years. 63% of patients were males (19/30). 53% of fractures were caused by road traffic accident (RTA) (16/30). Mean duration of surgery for PFN^[2, 3, 4] was 62.6 mins (Range 45-85) and mean duration of surgery for DHS^[1] was 66 mins (Range 50-85). Average amount of blood loss was 410 ml in cases treated with DHS^[1] and 396 ml in cases treated with PFN^[2, 3, 4].

Among complications for PFN^[2, 3, 4], difficult reduction was seen in 1 patient (6.6%), greater trochanter fracture was seen in 1 patient (6.6%) hip pain was seen in 1 patient (6.6%) and shortening (> 1cm) was seen in 1 patient (6.6%). For DHS^[1] common complications were superficial infection in 1 patient (6.6%), hip Pain in 1 patient (6.6%) and shortening (> 1cm) in 3 patients (20%).

All the patients of stable I/T fracture treated with PFN or DHS were allowed partial weight bearing at 4 weeks and full weight bearing at 15 weeks. No significant statistical difference was seen in the outcomes between the PFN and DHS groups (95% CI:0.83P1.30,P=0.72).

Discussion

In this study an attempt was made to survey, evaluate, document and compare the results of management of peritrochanteric fractures by using Proximal femoral nail^[2, 3, 4] (PFN) developed by AO/ASIF and Dynamic Hip Screw^[1]

(DHS) and its modifications^[5]. AO/ASIF classification as proposed by Muler *et al.*^[6] and Boyd - Griffen classification^[7] were used in classifying these fractures.

It was found that the mean age in years of both groups combined was 43.36 as against 63.7 years seen in Reska M. Series^[8]. Study by Keneth J. Koval and Joseph D. Zuckerman (1996)^[9] as well as In this study majority of the fractures in the young were caused by road traffic accidents (53%) and in elderly by fall at home or due to trivial trauma (47%).

Mean duration of surgery for PFN^[2, 3, 4] was 62.6 minute and for DHS^[1] was 66 min. Radiation exposure in DHS^[1] was definitely lesser as compared to cases operated by PFN^[2, 3, 4]. The mean blood loss was relatively lesser in PFN^[2, 3, 4] as compared to those treated by Dynamic Hip Screw^[1] (DHS).

There was one case (6.66%) of greater trochanter fracture in a case of

PFN^[2, 3, 4] which happened during opening of canal with manual reamer. In one case (6.66%) there was difficulty in proximal locking of PFN^[2, 3, 4] due to sliding of caudal guide wire in cranial direction. However the other series like Singh B.N^[10] study overall complication rate was 15%.

Tip to apex distance (TAD) was used as a measure for adequate size and placement of screws. Ideally it should be less than 25mm^[11]. Risk Increases rapidly as screw is placed more peripherally and shallow^[12]. For correct placement of PFN^[2, 3, 4] in the medullary canal it is important to make the correct entry at the tip of greater trochanter as was originally described by Ebrahim *et al.*^[13] In our protocol we gave IV antibiotics for 3 days but in presence of wound infection we continued use of IV antibiotics for 10 days. Dressing of wounds was done as per necessity^[14].

As proposed by A. Bodoky, U. Neff, M. Heberer & F. Harder

¹⁵ two doses of cephalosporin antibiotics were administered preoperatively as prophylaxis which significantly reduced the incidence of wound infection.

In one case of PFN (6.66%) and in 3 cases of DHS (15%) we noted shortening of 1 cm. Shortening might have resulted due to comminution of variable degree at fracture site & concentric collapse at fracture site as reported by Babhulkar Sudhir ^[16] Average time of radiological union in all our 30 patients was about 15 weeks as also reported by Windoff J *et al* ^[17].

In management with PFN ^[2, 3, 4] Werner *et al.* ^[18] showed Z-effect in 7.1% cases and compression screw cut-out in 8.6%. Al-Yassari *et al.* ^[19] reported an 8% incidence of cut-out. In this study as well as T. Morihara *et al.* ^[20] study there was no case with these complications; probable reason can be delay in starting of weight bearing.

Implant failure in DHS¹ in the form of cut-out in the Richard screw from the femoral head was not observed in this study as against 20 % of fixation failure seen in study by Baumgartner M.R Chvostoski (1995).

The range of movement calculated by the Harris Hip Scoring system treated by both the implants i.e PFN ^[2, 3, 4] and DHS ^[1] was good and almost the same. Though PFN ^[2, 3, 4] has been found to be more successful as compared to DHS ^[1] in treating unstable trochanteric fracture as proposed by Bhatti A. *et al.* ^[21]

In this study excellent outcome in DHS¹ Group was 86.6% and in PFN ^[2, 3, 4] Group was 53.3% because of mechanical complications of PFN ^[2, 3, 4]. Similar results were reported in Yassari GAL ^[22] series which has 90% and Fogagnola F ^[23] series which has 92% good to excellent outcome.

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