CLINICAL RESEARCH ON DYNAMIC HIP SCREW AND PROXIMAL FEMORAL NAIL IN THE TREATMENT OF INTERTROCHANTERIC FRACTURES

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ABSTRACT

BACKGROUND
Intertrochanteric fractures account for nearly 50% of all fractures of the proximal femur. These injuries commonly affect the elderly and they have a tremendous impact on the healthcare system. Intertrochanteric fractures comprise of fractures occurring in the region between greater and lesser trochanters. Despite marked improvement in implant design, surgical technique and patient care, intertrochanteric fractures remains to be a challenge.

MATERIALS AND METHODS
The present study consists of 60 patients with intertrochanteric fractures of femur who were treated with either DHS and PFN at Vijayanagara Institute of Medical Sciences, Bellary, during March 2014 to September 2015. Case were selected by simple random sampling, each individual is chosen randomly and entirely by chance. This study was carried out to compare the results of intertrochanteric fractures treated with DHS and PFN. All the 60 patients were asked to follow up at regular interval.

RESULTS
Full weight-bearing in PFN was 10.5 weeks and in DHS 14.50 weeks with P value >0.05. Duration of hospital stay 10.5 days in PFN 14.5 days in DHS. Delayed anatomical complications are external rotation in 1 case of PFN and none in DHS, shortening of >1 cm in 4 cases of PFN and in 10 cases of DHS, varus deformity in 5 cases of PFN and 4 cases of DHS.

CONCLUSION
PFN is better alternative to DHS in treatments of intertrochanteric fractures, but is technically difficult procedure and require more expertise compared to DHS.

KEYWORDS
Dynamic Hip Screw (DHS), Proximal Femoral Nail (PFN).


ORIGINAL RESEARCH ARTICLE

BACKGROUND
Intertrochanteric fractures account for nearly 50% of all fractures of the proximal femur. These injuries commonly affect the elderly and they have a tremendous impact on the healthcare system. Intertrochanteric fractures comprise of fractures occurring in the region between greater and lesser trochanters. Despite marked improvement in implant design, surgical technique and patient care, intertrochanteric fractures remains to be a challenge. Since this fracture is more common in elder patients, the aim of treatment should be prevention of malunion and early mobilisation. The new generation implant for management of trochanteric fracture is proximal femoral nail, which is also a collapsible device with added rotational stability. Previously, DHS was considered as gold standard for intertrochanteric fracture.

MATERIALS AND METHODS
The present study consists of 60 patients with intertrochanteric fractures of femur who were treated with either DHS and PFN at Vijayanagara Institute of Medical Sciences, Bellary, during March 2014 to September 2015. Cases were selected by simple random sampling, each individual is chosen randomly and entirely by chance. This study was carried out to compare the results of intertrochanteric fractures treated with DHS and PFN. All the 60 patients were asked to follow up at regular interval.

After the patient with intertrochanteric fracture was admitted to hospital, all clinical details were recorded. Inclusion criteria are type 1, 2, 3 (Boyd and Griffin’s classification), age >18 years, both sexes, fresh intertrochanteric fractures in adults. Exclusion criteria
includes patient with type 4 Boyd and Griffin’s classification, medically who are unfit for surgery, polytrauma patients, pathological fractures, old neglected fractures, age less than 18 years and patient with other associated fractures (multiple fractures).

Steps of operation of DHS- fracture reduced by first giving traction and 20 degrees abduction (to correct varus deformity) and then limb was externally rotated gently and finally internally rotated up to neutral position. The vastus lateralis splitting approach was used. Lateral skin incision was taken from distal edge of greater trochanter. Subcutaneous tissue and tensor fascia latae were cut in the same line and vastus lateralis was split from trochanteric crest to expose the greater trochanter and upper part of shaft up to two inches. The incision was extended distally for plate application. The lateral cortex was opened with 2 mm drill bit. The guidewire was inserted into the center of femoral head and advanced to subchondral bone. The triple reamer was set at 10 mm shorter than the reading of direct measuring device. Before inserting lag screw, a proper size of hip screw was measured by direct measuring gauge. To insert the screw into the head and neck, the coupling screw guide shaft and the hip screw were assembled. The coupling screw was inserted through the hallow guide shaft into the hip screw. The screw was driven into the femoral neck by turning the wrench until the zero mark on wrench reached the lateral cortex. This meant that with this selected length of screw, the tip of screw was 10 mm from joint. The T-handle of wrench was made perpendicular with femoral shaft at the end of insertion to allow proper keying of lag coupling screw. The length of the hip pin is indicated on measuring device and is calculated 5 mm before the tip of the guidewire. Drilling is done over the guidewire with 6.5 mm drill bit to a depth up to the length of hip pin previously measured. The same length 65 mm hip pin is inserted with the help of hexagonal cannulated screwdriver. Length and position to be confirmed with C-arm, guidewire then removed. Neck screw is inserted using cannulated screwdriver. Final position is confirmed with image intensifier. Distal locking is usually performed with two cortical screw. For standard PFN, distal locking jig was used. A drill hole is made with 4 mm drill bit through both cortices length is measured directly from the drill marking.

All patients were followed up at an interval of 6 weeks till fracture union is noted and then once in 3 months till one year. At every visit, patient was assesed 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-related complication.

RESULTS

In our study, maximum age was 86 years and minimum age was 33 years. Most of the patients were between 61-80 years. Mean age was 72.18 years. In PFN group, 20 were females and 10 were males; in DHS group, 15 males and 15 females. According to type of fracture- type 1, 16 cases (27%); type 2, 31 cases (31%); and type 3, 13 cases (13%). Most of our patients were 50 years and above. In them, domestic fall (at home) and trivial trauma was main reason behind the fracture, while road traffic accident, young patients were affected. Fall from height 18%, RTA 12%, slip and fall 70%. All the cases included in study group were fresh fractures who underwent surgery at the earliest possible in our setup. The delay was due to medical comorbidities of patients. All the patients were operated at an average interval of 3 days from the day of trauma. Overall complications in DHS was 44% and 56% in PFN. Average time for surgery in PFN is 80 minutes and 100 minutes in DHS (P value = 0.0001). There is a statistically significant blood loss measured by mop count (each fully-soaked mop
containing 50 mL blood). Blood loss was measured by mop count and collection in suction. Blood loss was more for DHS compared to PFN. Average blood loss in PFN is 271 mL and 434 mL in DHS and results were statistically significant. Postoperative complications during hospital stay in PFN group- chest infection in 2 cases; in DHS group- chest infection 2 cases and superficial wound infection in 2 cases. Average hospital stay in PFN group was 10.5 days and 15.40 days in DHS group. There was statistical significance since p value is less than 0.05. Full weight-bearing in PFN was 10.5 weeks and in DHS 14.50 weeks with P value >0.05. Duration of hospital stay 10.5 days in PFN 14.5 days in DHS. Delayed anatomical complications are external rotation in 1 case of PFN and none in DHS, shortening of >1 cm in 4 cases of PFN and in 10 cases of DHS, varus deformity in 5 cases of PFN and 4 cases of DHS. Functional results as follows- excellent in 8 cases, fair in 1 cases and good in 11 cases; lost in follow up 3 cases, poor in 5 cases and 2 cases expired in PFN group and excellent in 10 cases, fair in 3 cases and good in 7 cases; lost in follow up 2 cases, poor in 6 cases and 2 cases expired in DHS group.

**DISCUSSION**
Fractures of intertrochanteric fracture have been recognised as a major challenge by orthopaedic community, not solely for achieving fracture union, but for restoration of optimal function in the shortest possible time that too with minimal complication. The aim of management accordingly has drifted to achieving early mobilisation, rapid rehabilitation and quick return of individuals to pre-morbid home and work environment as a functionally and psychologically independent unit. In this study, an attempt was made to survey, evaluate, document and quantify our results in the management of such individuals by using Proximal Femoral Nail (PFN) and Dynamic Hip Screw (DHS) implants and compare the results in these two groups.

Most of the patients in present study were age group 6th to 8th decade of life. Mean age in years both groups combined = 72.18. This signifies the fact that patients from these age groups are involved in low energy trauma like domestic fall (fall at home).\(^1,^2,^3,^4,^5\) H.B. Boyd and LL Griffin 166 in their study of 300 cases found a marked sex
The rate of union was same in two groups (PFN and DHS). However, PFN had earlier radiological union, better functional outcome, less complications and earlier weight-bearing. This study correlates to our study regarding early weight-bearing and less complications.

CONCLUSION

In the present study, which was carried out in VIMS, Bellary, from March 2014 to September 2015, 60 patients of intertrochanteric fracture were included. There were 30 patients operated by PFN, 30 by DHS.

In our series of 60 patients, there were 35 females and 25 males. Minimum age was 33 years, maximum 86 years with mean age of 72.18 years. Most of the people were between 60-80 years. Slip and fall accounted for 70% of cases. Right side was more common accounted for 53.3% of cases. Boyd and Griffin type 2 fracture account for 51.7% of cases. Average blood loss was 271 mL for PFN, 434 mL for DHS. Mean duration of hospital stay was 10.5 days in PFN and 15.4 days in DHS group. Mean time for full weight-bearing was 10.5 weeks for PFN and 14.5 weeks for DHS group. Out of 60 cases, 5 cases were lost in follow up and 4 cases died. Good excellent results were seen in 63% of cases in PFN and 56.7% in DHS group.

1. Advantage with PFN is that smaller exposure required than DHS, therefore be associated with lesser blood loss, shorter operating time and less morbidity.
2. PFN gives biomechanically sound fixation because the shaft fixation is nearer to the center of rotation of hip, giving shorter lever arm and lower bending movements on the device.
3. Rotational stability was higher when PFN is used.
4. The incidence of wound infection was found to be lower with intramedullary implants, which resulted in early ambulation of patients.
5. In PFN entry point, determination is crucial particularly in elderly with osteoporotic bones as wrong entry point may result in iatrogenic comminution of lateral cortex.
6. Early mobilisation can be begun postoperatively in case of PFN as it is a load sharing device and less surgical dissection.
7. The learning curve for treatment of fracture by DHS was smaller as compared to PFN.
8. The screening time with help of image intensifier was much lesser in cases operated by DHS as compared to PFN.
9. The implant-related complications were much lesser in DHS. However, the rate of union was same in two groups (PFN and DHS). Both the implants in their own right are equally effective in management of IT fracture of femur.
For the reasons mentioned above, we consider PFN as better alternative to DHS in treatments of intertrochanteric fractures, but is technically difficult procedure and require more expertise compared to DHS.

Limitations of Study
Lack of control group as no two fractures are the same to compare.

Relatively small patient population (sample size), so it may not be true representative of population under study.

Outcome of the surgical management, whether PFN or DHS had a great influence on the existing medical conditions of the patients, these were not taken into account.

The study done in a limited span of time, which also posed a limiting factor.

Complications and outcome of surgery also depends on the experience of the surgeon.

REFERENCES