Journal of Advanced Medical and Dental Sciences Research

@Society of Scientific Research and Studies ***NLM ID:*** *101716117*

Journal home page: www.jamdsr.com doi: 10.21276/jamdsr Index Copernicus value = 85.10

(e) ISSN Online: 2321-9599; (p) ISSN Print: 2348-6805

Original Research

Comparative evaluation of efficacy two screw and single helical screw in Proximal femoral nailing in patients with intertrochanteric fractures of femur

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ABSTRACT:

Background: Intertrochanteric fractures are defined as fractures of proximal part of femur located between lesser and greater trochanter. Different versions of Proximal femoral nail (PFN) have in common a smaller diameter proximal nail portion (13 to 15 mm), two lag screws into the head and neck of various diameters, and long and short nail lengths Proximal femoral nail (PFN) was developed combining the features of an unreamed intramedullary femoral nail with a sliding load bearing, 2 femoral neck screws. Hence; under the light of above mentioned data, the present study was undertaken for assessing and comparing the efficacy of two screw PFN and single helical screw PFN in patients with intertrochanteric fractures of femur. **Materials & methods:** A total of 40 cases of intertrochanteric fractures of skeletally mature adults were enrolled. All the patients were broadly divided into two study groups as follows: Group A: Patients treated with two screw PFN, Group B: Patients treated with single helical screw PFN. Blood samples were obtained and complete hematological and biochemical examination of all the patients was carried out. Clinical examination along with radiographic assessment of all the patients was done. All the patients were treated according to their respective study groups. Functional outcome and Harris hip score was assessed by analyzing the palmer and parker score on follow-up. **Results:** Significant results were obtained while comparing the mean duration of procedure among subject of both the study groups. Significant results were obtained while comparing the mean time for partial weight bearing among subject of both the study groups. Mean time required for fracture to unite among subjects of group A and group B was found to be 89.5 days and 88.4 days respectively. Non-significant results were obtained while comparing the mean time for partial weight bearing among subject of both the study groups. Non-significant results were obtained while comparing the palmer and parker score and Harris hip score at final 6 months follow-up among subjects of the two study groups. **Conclusion:** After occurrence of fracture union, functional outcomes are similar irrespective of the type of implant used

Key words: Screw, Proximal femoral nail, Femur.

Received: 23/07/2020 **Modified:** 22/08/2020 **Accepted:** 25/08/2020

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This article may be cited as: Chaudhary S. Comparative evaluation of efficacy two screw and single helical screw in Proximal femoral nailing in patients with intertrochanteric fractures of femur J Adv Med Dent Scie Res 2020;8(9):189-192.

INTRODUCTION

Hip fractures or fractures of proximal femur are one of the most frequent and appalling fractures affecting the elderly population with 90% occurring in >60 years age group. Intertrochanteric fractures are defined as fractures of proximal part of femur located between lesser and greater trochanter. Population of senior citizens is increasing as longevity increases day by day. Hip fracture is second most common cause of hospitalization in elderly. Before the introduction of suitable fixation devices, treatment of intertrochanteric fractures was non operative, consist of prolonged bed rest in traction until fracture healing occurred followed by a lengthy programme of ambulation training.[1-3]

Modern era of internal fixation of hip fractures began with Smith-Petersen in 1925 and his invention of the triflange nail for hip fractures. Different versions of this device have in common a smaller diameter proximal nail portion (13 to 15 mm), two lag screws into the head and neck of various diameters, and long and short nail lengths Proximal femoral nail (PFN) was developed combining the features of an unreamed intramedullary femoral nail with a sliding load

bearing, 2 femoral neck screws.[4- 6] Hence; under the light of above mentioned data, the present study was undertaken for assessing and comparing the efficacy of two screw PFN and single helical screw PFN in patients with intertrochanteric fractures of femur.

MATERIALS & METHODS

A total of 40 cases of intertrochanteric fractures of skeletally mature adults were enrolled in the present study with the aim of comparing the efficacy of two screw PFN and single helical screw PFN in patients with intertrochanteric fractures of femur. All the patients were broadly divided into two study groups as follows:

- Group A: Patients treated with two screw PFN
- Group B: Patients treated with single helical screw PFN

Ethical approval was obtained from institutional ethical committee and written consent was obtained from all the patients after explaining in detail the entire research protocol/

Inclusion criteria

- Skeletally mature patients of all age groups having intertrochanteric femur fracture classified as per, AO/OTA classification

Exclusion Criteria

- Terminally ill patients.
- Presence of pathological fractures.
- Previous ipsilateral hip or femur surgery.
- Ipsilateral femur shaft fractures.
- Patients who didn't gave informed consent

Blood samples were obtained and complete hematological and biochemical examination of all the patients was carried out. Clinical examination along with radiographic assessment of all the patients was done. All the patients were treated according to their respective study groups. Functional outcome and Harris hip score was assessed by analyzing the palmer and parker score on follow-up. All the results were analyzed by SPSS software. Chi- square test and Mann Whitney U test were used for assessment of level of significance. P- value of less than 0.05 was taken as significant.

RESULTS

Mean age of the patients of group A and group B was found to be 63.5 years and 65.3 years respectively. 60 percent of the patients of group A and 55 percent of patients of group B were males. Mean duration of procedure among subjects of group A and group B was found to be 46.9 minutes and 36.9 minutes respectively. Significant results were obtained while comparing the mean duration of procedure among subject of both the study groups. Mean time for partial weight bearing among subjects of group A and group B was found to be 18.1 days and 14.9 days respectively. Significant results were obtained while comparing the mean time for partial weight bearing among subject of both the study groups. Mean time required for fracture to unite among subjects of group A and group B was found to be 89.5 days and 88.4 days respectively. Non-significant results were obtained while comparing the mean time for partial weight bearing among subject of both the study groups.

Non-significant results were obtained while comparing the palmer and parker score and Harris hip score at final 6 months follow-up among subjects of the two study groups.

Table 1: Mean age of the subjects of both the study groups

Parameter	Group A	Group B
Mean Age (years)	63.5	65.3
Standard deviation (SD)	3.5	4.5

Table 2: Gender-wise distribution of subjects of both the study groups

Gender	Group A		Group B	
	Number	Percentage	Number	Percentage
Male	12	60	11	55
Female	8	40	9	45
Total	20	100	20	100

Table 3: Comparison of mean duration of procedure among subjects of both the study groups

Parameter	Group A		Group B		P- value
	Mean	SD	Mean	SD	
Mean duration of procedure (minutes)	46.9	5.1	36.9	4.1	0.001 (S)

Table 4: Comparison of mean time when patients were allowed to partially bear weight among subjects of both the study groups

Parameter	Group A		Group B		P- value
	Mean	SD	Mean	SD	
Mean time for partial weight bearing (days)	18.1	2.4	14.9	1.9	0.010 (S)

Table 5: Comparison of mean time required for fracture to unite among subjects of both the study groups

Parameter	Group A		Group B		P- value
	Mean	SD	Mean	SD	
Time for fractures to unite (days)	89.5	5.6	88.4	4.8	0.552

Table 6: Comparison of mean Palmer And Parker Score among subjects of both the study groups

Mean Palmer And Parker Score	Group A	Group B	P- value
Preoperative	0	0	1.0
Postoperative 1 month	3.5	3.7	0.03 (s)
Postoperative 3 month	5.6	5.1	0.04 (s)
Postoperative 6 month	8.6	8.5	0.91

Table 7: Comparison of mean HHS among subjects of both the study groups

HHS Score	Group A	Group B	P- value
Preoperative	50.2	51.6	0.23
Postoperative 1 month	62.6	61.3	0.46
Postoperative 3 month	73.1	74.8	0.58
Postoperative 6 month	79.6	80.7	0.43

DISCUSSION

The Intertrochanteric (IT) region comprises the proximal femur distal to the neck extending to the lesser trochanter. The majority of the bone in the region is cancellous, extracapsular, and highly vascularized (contrast with subcapital femoral neck) leading to a robust healing environment. Several anatomic features influence treatment. The greater and lesser trochanters are the points of attachment of the primary hip abductor (gluteus medius) and primary hip flexor (iliopsoas), respectively. The calcar femorale is a dense strut of posteromedial bone that supports force transfer from the neck to the shaft.[7- 9] Hence; under the light of above mentioned data, the present study was undertaken for assessing and comparing the efficacy of two screw PFN and single helical screw PFN in patients with intertrochanteric fractures of femur.

In the present study, mean age of the patients of group A and group B was found to be 63.5 years and 65.3 years respectively. Significant results were obtained while comparing the mean duration of procedure among subject of both the study groups. Significant results were obtained while comparing the mean time for partial weight bearing among subject of both the study groups. Non-significant results were obtained while comparing the mean time for partial weight bearing among subject of both the study groups. Gardenbroek at al study shows that osteosynthesis with the PFNA does not improve the position of the implant in the femoral head compared with the PFN. However, the risk of a secondary complication and the necessity of a late reoperation are significantly higher in patients treated with a PFN compared with patients treated with a PFNA Because of implant-related complications, three patients in the PFN group and four patients in the PFNA group needed an early reoperation. Macheras at al. emphasizes that regardless of the implant choice and its specific technical characteristics, in the end, it is the technique of inserting it properly that is the key to succeed with stable fixation and prevent major complications.[10, 11] Naja AS et al evaluated the rate and predictors of mechanical failure and its relationship with quality of reduction through assessing certain radiological parameters. Intertrochanteric femur fracture that was treated with proximal femoral nail with helical blades (PFNA) was reviewed. There was no statistical significant relation between any of the radiological outcomes and patient characteristics except between neck shaft angle and osteoporosis. The radiological outcomes are independent of the patient's characteristics except for Neck Shaft Angle and Osteoporosis.[12]

In the present study, non-significant results were obtained while comparing the palmer and parker score and Harris hip score at final 6 months follow-up among subjects of the two study groups. Our results were in concordance with the results obtained by previous authors, who also reported similar findings in their study. However; the final follow-up time was different in different studies, the difference in the mean Palmer and parker score at final follow-up in these studies are non-significant. Similar results are reported by previous authors, who also didn't observe any significant difference in the HHS of the patients of the helical screw group and double screw group at the final follow-up time.[13] Radaideh AM et al evaluated radiographic and functional outcomes of patients with unstable pertrochanteric fractures treated with the proximal femur nail antirotation (PFNA). Forty one patients were treated with short PFNA and nine with long PFNA. At final follow-up, solid union of all fractures had been achieved without any implant-related complications, the mean Harris Hip Score (HHS) was 79.34 ± 9.10 points and the mean neck-shaft angle was 127.2° ± 5.07°. No significant differences were encountered between the functional and radiographic outcomes of the PFNA with regards to the AO fracture classification and the implant

version.[14] In PFN fixations, proper alignment between the two main fragments and proper placement of the lag screws in the femoral head should be ensured. It is imperative to reduce fractures with minimal dissection to achieve a stable fixation, with an emphasis on good closed reduction. Restoration of the axis and rotation between the head-neck fragment and the shaft is mandatory. A long nail is needed for fractures that extend distally. Multiple factors have been implicated as relevant to good outcomes; these include implant design, fracture stability, operative technique, surgeon skills and learning curve. Optimal reduction of the fracture, conformation of reduction in both anteroposterior and lateral views and accurate positioning of the nail and screws remain of crucial importance and should be obtained at all times to prevent the important complication of screw cut-out.[15]

CONCLUSION

From the above results, the authors concluded that after occurrence of fracture union, functional outcomes are similar irrespective of the type of implant used. However; single helical screw PFN was associated with shorter duration of procedure and lesser time for starting of partial weight bearing.

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