ASSESSMENT OF THE OUTCOME OF PROXIMAL FEMORAL NAIL VERSUS DYNAMIC HIP SCREW IN THE TREATMENT OF UNSTABLE INTERTROCHANTERIC FRACTURE IN ELDERLY PATIENT

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ABSTRACT

Background

Intertrochanteric fractures are common problems in elderly and need surgical intervention to prevent bed ridden problems and decrease comorbidities among the elderly population. Globally there is an increase in the incidence of femoral neck fracture and the surgical management with better outcome is challenging for surgeons and for hospitals.

Objective

To assess the outcome of proximal femoral nail versus dynamic hip screw in the treatment of unstable Intertrochanteric fracture in elderly patient.

Patients and Methods

This prospective study was carried out at orthopedic departments in Shar Hospital, teaching hospital,tuymalik and Roonaki private hospitals between 26thJuly 2013 to 15th October 2014. The study included 88 patients with intertrachanteric fracture of the femur, 48 were male, and 40 were female they were divided in two groups; 44 patients were treated by proximal femoral nail (PFN) and the other 44 patients by dynamic hip screw (DHS). For both groups data regarding age, sex, side of fracture were recorded, then we compared both group intraoperatively and postoperatively with respect to operation time,hospital stay, varus deformity of the neck, misplacement of hip screw , mobilization after operation, implant failure, screw cut out, hip pain, bed sore, deep vein thrombosis, and union duration.

Results

The mean age was 64±19, 48% were above 70 year and 52% were below 70 years age, male 48 (54.5%) and female 40(45.5), fracture side was 40.9% right and 59.1% left, 50% fixed by PFN and 50% fixed by DHS, operation duration mean for PFN was 63.8±11.5 min and 88.5±13.3 min for DHS with significance P value (<0.001), mean hospitalization time was 4.3±1.2 day for PFN and 6.3±1.7 day for DHS with significance P value (<0.001), mean mobilization time was 1.6± 0.7 day for PFN and 2.5±1.2 day for DHS with significance P value (0.007), mean union duration was 3.3 ±0.9 months for PFN and 4.8±1.6 months for DHS with significance P value (0.001), Intra and postoperative complication was 6 (13%)screw of hip screw misplacement happen in 4 cases of DHS and 2 (3.7%) cases of PFN, implant failure 1 (2%) case of PFN ,screw cut out 2(3.7%) cases for PFN, bed sore 8(18%) cases for DHS, hip pain was 8(13%) cases for DHS, varus collapse 6 (13%) in which 2 cases (3.7%) for PFN and 4(8%) for DHS.

Conclusion

Proximal femoral nail which is an intramedulary devices for the fixation is more stable devices for the patients with fracture of Intertrochanteric (kyle 3 or Ao31-A2) than DHS which is extramedulary devices (plate and screws) in term of shorter time of surgery. Early mobilization of the patient, early callus formation and earlier union, with less complication regarding bed sore and hip pain.

Keywords: *Proximal Femoral Nail, Hip Screw, Intertrochenteric Fracture.*

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INTRODUCTION

Intertrochanteric fractures of the femur are, by definition, extra capsular; they extend between the two trochanters with variable degree of comminiution [1, 2] . There is increasing incidence of the Intertrochanteric fracture with an advancing age [3]. Intertrochanteric fractures are either stable or unstable; by unstable fracture we mean a fracture with an intrinsic tendency to displace after reduction, which could be due to poor contact between the fracture fragments, as in four-part fractures or in those with a reverse oblique pattern or with a subtrochanteric extension and when there is osteoporosis leading to poor quality grip by the fixation implants [1].

There had been different modalities for surgical fixation of intertrachanteric fracture of the femur with different types of nails and/or screws along with hip arthroplasty[4] . This study was carried out to compare the outcome of PFN and DHS among elderly patients with intertrochanteric fracture of the femur.

PATIENTS AND METHODS

This prospective study was carried out in the departments of orthopedic at sulaimani teaching hospital, Shar teaching hospital, Runaki and Tuymalik private hospital PFN surgeries carried out by the auther while the DHS surgeries data taken from other surgeons after permission; during the period July 26th 2013 to October 15th 2014. The mean duration of follow up was 8 months for each patient. All patient were admitted to the emergency hospital, where primary examination and investigation was done, later they were scheduled for surgery, during this time general condition of the patient was assessed regarding the cardiovascular status, chronic disease and anesthesia fitness and medical consent for surgery. We used Kyle system for classification of the fracture, The type of Intertrochanteric fracture included in this study was type 3 Kyle in which the two greater and lesser Intertrochanteric fractured along with the varus collapse [4, 5].

Patients were included in the study when they fulfilled the following criteria:

1. Type 3 in Kyle classification. In AO 31-A2 peritrochanteric multifragmentary [4, 5].
2. Age between 60-90 years.
3. Type of trauma (fall from height, Road traffic accident, domestic fall on the ground).

Exclusion criteria

1. Type 1 and 2 in Kyle classification.
2. Multitrauma patient with multiple fractures.
3. Open wound fracture.
4. Young patients

Eighty eight patients underwent surgical operation for the fixation of Intertrochanteric fracture of the femur, they were divided into two groups; 44 of them were fixed bydynamic hip screw (DHS implant) Fig.1, the other 44 were fixed by proximal femoral nail (PFN implant) Fig .2 [6].

Postoperative care: admission to the surgical ward and follow up for the vital sign; in The next day assessment of blood profile done with pain control and antithrombotic medications for 21 days . In the 2nd postoperative day the patient is allowed to sit down and the physiotherapy started. Most of the patient remained for 2-3 (up to 10 days) in hospital.

The patients were seen weekly for the first month then twice weekly for the next month for assessment, regularly physical examination, and new x-ray made for the patient. They were followed regularly for eight months.

Partial and full weight bearing: DHS; the patients is mobilized the day after the surgery according to the condition of the patient, non weight bearing was applied, weight bearing is allowed after callus formation which took about 6 weeks. PFN; the patients mobilized on the next day, with partial weight bearingwith walking frame, full weight bearing allowed after 6 weeks because of the poor bone quality.

RESULTS

The mean age was 64±19, 48% were above 70 year and 52% were below 70 years age, male 48 (54.5%) and female 40(45.5), fracture side was 40.9% right and 59.1% left, 50% fixed by PFN and 50% fixed by DHS, table 1. Intra and postoperative complication was 6 (13%) screw of hip screw misplacement happen in 4 cases of DHS and 2 (3.7%) cases of PFN, implant failure 1 (2%) case of PFN, screw cut out 2 (3.7%) cases for PFN, bed sore 8 (18%) cases for DHS, hip pain was 8 (13%) cases for DHS, varus collapse 6 (13%) in which 2 cases (3.7%) for PFN and 4 (8%) for DHS, table

2.Mean operation duration for PFN was 63.8±11.5 min and 88.5±13.3 min for DHS with significance P value (<0.001), mean hospitalization time was 4.3±1.2 day for PFN and 6.3±1.7 day for DHS with significance P value (<0.001); mean mobilization time was 1.6± 0.7 day for PFN and 2.5±1.2 day for DHS with significance P value (0.007), mean union duration was 3.3 ±0.9 months for PFN and 4.8±1.6 months for DHS with significance P value (0.001), table 3 and 4.

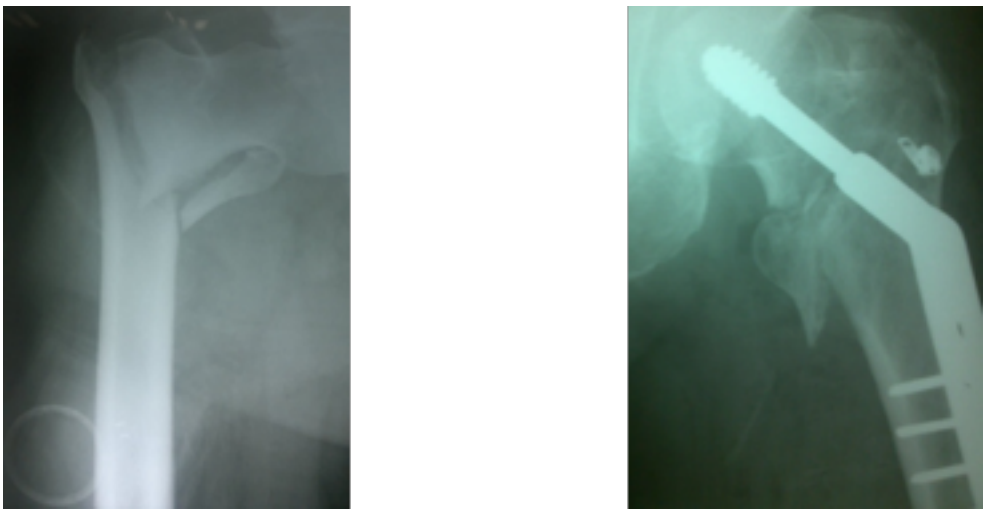

Figure 1. Intertrachanteric fracture of the femur: left photo preoperatively. Right photo showing fracture treated by DHS.

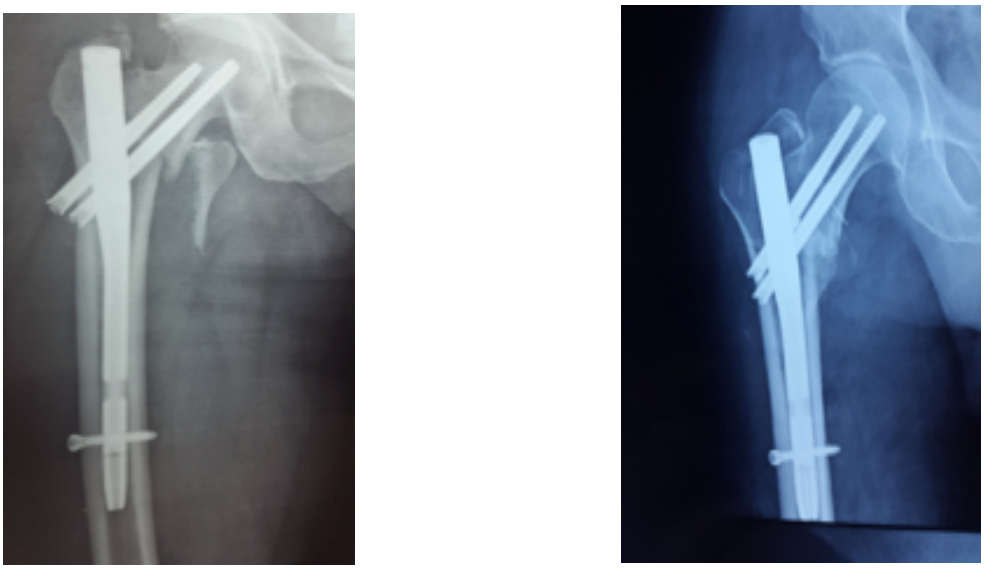

Figure 2. Show two comminuted fractures treated by PFN

Table 1. Shows the age, gender and side distribution of the fracture.

	PFN		DHS			
Variable	**No.**	**%**	**No.**	**%**	**χ^2**	**P**
		Age groups				
≤ 70 years	20	47.6	22	52.4		
> 70 years	24	52.2	22	47.8	0.1	0.6
		Gender				
Male	20	41.7	28	58.3		
Female	24	60.0	16	40.0	2.9	0.08
		Fracture side				
Right	20	55.6	16	44.4		
Left	24	46.2	28	53.8	0.7	0.3
		Complications				
Yes	6	21.4	15	78.6		
No	38	55.4	29	44.6	5.4	0.02

Table 2. Intraoperative and Post-operative complications.

Complication	No.	%
Misplacement of hip screw	6	13.0
Infection	0	-
Implant failure	1	2.0
Screw cut out	2	3.7
Varus	6	13.0
Hip pain	8	18.0
Bed sore	8	18.0
DVT	0	-
Total	31	

Table 3. Means durations of all studied patients.

Variable	Mean	SD
Operation time (minutes)	87	27
Mobilization (days)	2	1
Hospitalization (days)	5	2
Union duration (months)	4	2

Table 4. Distribution of duration means according to fixation type.

Variable	PFN Mean±SD	DHS Mean±SD	t-test	P
Operation time (minutes)	63.8±11.5	88.5±13.3	9.3	<0.001
Mobilization (days)	1.6±0.7	2.5±1.2	2.8	0.007
Hospitalization (days)	4.3±1.2	6.3±1.7	4.3	<0.001
Union duration (months)	3.3±0.9	4.8±1.6	3.6	0.001

DISCUSSION

The mean age group of our study was (64±19) years, 48% was above 70 years and 52% was below the age of 70 years, this result was lower than age series of Saudan et al. [1] and Pan et al. [6], which explains the better life expectancy in the developed countries. The gender distribution was 54.5% for male and 45.5% for female, and this result was incompatible to the studies of Saudan et al. [1], Papasimos et al. and [7] Liu et al. [8], we relate this difference in the to the social and cultural habits of Kurdish community since males are more active than female.

Regarding the Duration of surgery (calculated from the time of induction) our study showed statistically significant difference between DHS and PFN groups (p value <0.001) in which the mean surgery duration was 63.8±11.5 min for PFN and 88.5±13.3 min for DHS.

Kumar et al. [9], Pan et al. [6] reported shorter operation time in favour of PFN. while Papasimos et al [7] and Parker et al. [10] reported shorter operation time for the DHS, we relate this difference in our study that some cases operated on for DHS on traditional operative table in addition to the of soft tissue closure.

Duration of immobilization showed a better mobilization time for the PFN than for DHS, this could be related to smaller incision and less muscle and soft tissue dissection.

There was significant difference (p=0.007) in duration of hospitalization between PFN and DHS patients, Mean hospitalization duration was significantly longer (2 days) among patients treated with DHS than those treated with PFN (p<0.001), which was comparable to the study of Kumar et al. [9] and Saudan et al. [1]. In general the mean hospital stay among our patients was 5 days with SD of 2.

We relate this difference to the fact that large number of our cases were operated on in private hospitals, where the hospitalization took shorter time because of financial issue and those patients with longer hospitalization who randomly felt in the DHS group were operated on in public hospitals and most of them were complaining of comorbidities .

The union confirmed by callus formation on plane x-ray and no more pain and tenderness on palpation at the fracture site, our study shows significantly shorter duration of union for PFN cases 3.3±0.9 months and 4.8±1.6 for DHS with (p=0.001). We didn't have any case of nonunion in our study.

Misplacement of hip screw position; misplacement of hip screw in both PFN and DHS was basically due to technical difficulty assosciated with quality of the implant and not related to the surgeon or surgical team

The varus collapse was one of postoperative complication and 6 (13%) cases were recorded, 4 (8%) for PFN and 2 (4%) for DHS which was higher than the study of Kumar et al. [9], the average varus collapse was 6 degree, and the higher rate of varus deformity in PFN group in our study could be related to the technical failures related to traction table.

There was no case of infection in our study and this was compatible with the study of Giraud et al. [11] but incompatible with study of Herman et al. [12], Saudan et al. [1] and Papasimos et al. [7] who reported variable percentage of infection .

There were two cases of cut out in PFN group (3.7%) without acetabular penetration which was treated by removal of the proximal screw and this result was compatible with the Herman et al. [12] but was not compatible with T Morihara et al. [13] who didn't report any case .

The recorded cases of bed sore in our study was 8 (18.0%) cases, which is comparable to the study of In Liu et al [8] and E. Soucanye de Landevoisin et al [14], and this is due to the co morbid diseases.

There were 8 (18%) cases of hip pain after union in our study all of them were from the DHS group , which is comparable to A. Herman et al. [12] study who recorded 4 (10%) cases after union. We couldn't find explanation for this phenomenon

In conclusion, PFN (proximal femoral nail) which is an intramedulary devices for the fixation is more stable device for patients with Intertrochanteric (kyle 3 or Ao 31-A2) fractures than DHS which is extramedulary devices (plate and screws) because of of the shorter lever arm of the PFN, better contact with the medullary canal, shorter time of surgery, early mobilization of the patient, early callus formation and earlier union, with less complication regarding bed sore, hip pain, on the other hand economically it is more demanding and has a higher learning curve especially for the medical staff and junior doctors, there is higher exposure rate for radiation so special care should be given to the availability of protection equipments. Finally we recommend providing longer period of study, collecting larger sample, selecting high quality implant type, suggesting thicker guide wire o avoid bending during insertion, selection of shorter antirotation screw .

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