ORIGINAL RESEARCH

Assessment of role of proximal femoral nail in unstable trochanteric fractures of femur

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ABSTRACT

Background: Proximal femoral fractures are important cause of morbidity and mortality these days in aged population. This study evaluated the role of proximal femoral nail in unstable trochanteric fractures of femur. **Materials & Methods:** Fifty cases of trochanteric fracture of femur were examined clinico radiologically and were admitted to orthopaedic ward. Fractures were further classified with AO/OTA classification and unstable type (AO 31 A2, A3) were included in this study. Cases were treated with proximal femoral nail. Following parameters were noted intraoperatively- total time of the surgery and blood loss. Patients were followed up regularly at 1, 2 and 6 months postoperatively and assessment was done using Harris Hip score. **Results:** 23(46.0%)had right limb involved and 27 (54.0%)had left limb involved. 27 (54.0%) had fall from height, 21 (42.0%) had road traffic accident and 2 (4.0%) had slip and fall. 12(24.0%)had no co-morbidity,11(22.0%)had diabetes,17(34.0%) had hypertension,8(16.0%)had both diabetes and hypertension and 2(4.0%)had asthma. 18(36.0%) had 31–A2.1type of fracture, 17 (34.0%)had31–A2.2typeoffracture,6(12.0%)had31–A2.3typeof fracture,2(4.0%)had31–A3.1 type of fractureand 7(14.0%)had31–A3.2typeof fracture. 23(46.0%)had short PFN implant used and 27 (54.0%) had long PFN implant used. 10 (20.0%) had operative time between 60 – 70 mins, 11 (22.0%) had operative time between 70 – 80 mins, 15 (30.0%) had operative time between 80 – 90 mins and 14 (28.0%) had operative time between 90 – 10 mins. 12 (24.0%) had blood loss of 150 ml, 15 (30.0%) had blood loss of 200 ml, 10 (20.0%) had blood loss of 250 ml, 8 (16.0%) had blood loss of 300 ml and 5 (10.0%) had blood loss of 350 ml in the entire study group. 12 (24.0%) had radiological union between 12 – 13 weeks, 14 (28.0%) had radiological union between 14 – 15 weeks, 7 (14.0%) had radiological union between 16 – 17 weeks, 5 (10.0%) had radiological union between 18 – 19 weeks and 12 (24.0%) had the radiological union between 20 – 21 weeks in the entire study group. The difference was significant (P< 0.05). **Conclusion:** Proximal femoral nailing is a significant advancement in the treatment of unstable trochanteric fractures. By doing closed reduction, it offers a minimal soft tissue damage, preserves the fracture hematoma, decreased blood loss and reduces the operating time. The proximal femur nail offers a stable fixation, minimizes the stress and allows early mobilization. It offers a superior stabilization than other currently used implants for such fracture. It is mandatory that the fracture must be reduced anatomically with alignment of posteromedial buttress before nail insertion as the nail does not do any spell. Though complications were reported, still it holds good, with good surgical hands because the procedure is technically demanding and needs a steep learning curve.

Key words: Femoral fractures, operative time, Proximal femoral nailing

INTRODUCTION

There is a worldwide increase in the incidence of inter trochanteric fracture. Proximal femoral fractures are important cause of morbidity and mortality these days in aged population. These fractures are seen in old patients following low energy trauma or in the young individuals, the mechanism of injury is almost always high energy trauma, either from direct trauma (e.g. motor vehicle accident) or from axial loading (e.g. a fall from height).[1]

Treatment of unstable trochanteric fractures is always challenging. Historically, non-operative management has resulted in excess rates of medical morbidity and mortality, as well as malunion and non union. Non operative management is appropriate only in selected non ambulators who experience minimal discomfort from injury. Now the goal of the treatment of these

fractures is stable fixation, which allows early mobilisation of the patient.[2] To return to preinjury function and activity levels, early operative interventions have become the preferred solution for the treatment of senile femoral intertrochanteric fracture. The DHS and its variants had been considered the standard implant in the treatment of per trochanteric hip fractures with a high cost performance for stable intertrochanteric fracture but, for unstable intertrochanteric fractures, the failure rate is higher.[3] Intertrochanteric fracture1 is defined as the fracture extending from the extra-capsular basilar neck region to region along the lesser trochanter before medullary canal development. Dynamic hip screw and dynamic condylar screw have been used for a long time with great success. However, both DHS and DCS requires relatively larger skin incision, more tissue handling, all of which increases the probability of infection, blood loss, operating time.[4] Varus collapse of the fracture, non-union and implant failure are also commonly seen with DHS fixation. Since this device performed less well in unstable trochanteric fractures, with high rates of failure, intramedullary fixation devices have become increasingly popular.[5]This study evaluated the role of proximal femoral nail in unstable trochanteric fractures of femur.

MATERIALS & METHODS

The present study consisted of all confirmed cases of unstable trochanteric fractures of femur falling under inclusion criteria in department of orthopaedics at Rajarshee Chhatrapati Shahu Maharaj Govt. Medical College, Kolhapur.

Patients were informed about the study in all respects and written informed consent was obtained. As patient coming to emergency department with suspected trochanteric fracture were examined clinicoradiologically and were admitted to orthopaedic ward for further management. Fracture further classified with AO/OTA classification and unstable type (AO 31 A2, A3) were included in this study.

Cases were treated with proximal femoral nail. Following parameters were noted intraoperatively-total time of the surgery, blood loss. Post-operative management was intravenous antibiotics continued for first three days, check X-ray, immediately after surgery or 1st post-operative day whichever possible, dressing done on 2nd, 5th and 8th post-operative day and sutures removed on 12th post-operative day or after satisfactory healing of wound. Data thus obtained were subjected to statistical analysis. P value < 0.05 was considered significant.

RESULTS

Table I Age distribution of case Studied(n=50).

Age Group(years)	No. of cases	% of cases
31 – 40	6	12.0
41 – 50	7	14.0
51 – 60	6	12.0
61 – 70	15	30.0
71 – 80	9	18.0
81 – 90	7	14.0

Out of 50 cases studied; 6 (12.0%) had their age between 31 – 40 years, 7 (14.0%) had their age between 41 – 50 years, 6(12.0%) had their age between 51 – 60 years, 15 (30.0%) had their age between61 – 70 years, 9 (18.0%) had age between 71 – 80 years and 7 (14.0%) had their age between 81 – 90 years.

Table II Assessment of parameters

Parameters	Variables	Number	P value
Side	Right	23	0.92
	Left	27	
Mode of injury	Fall From Height	27	0.84
	Road Traffic Accident	21	
	Slip and Fall	2	
Co- morbidity	Nil	12	0.12
	Diabetes	11	
	Hypertension	17	
	Diabetes + Hypertension	8	
	Asthma	2	
Type of fracture	31–A2.1	18	0.05
	31–A2.2	17	
	31–A2.3	6	
	31–A3.1	2	
	31–A3.2	7	
Size of implant	Short PFN	23	0.95
	Long PFN	27	

Operative time (mins)	60 – 70	10	0.68
	70 – 80	11	
	80 – 90	15	
	90 – 100	14	
Intraoperative blood loss (ml)	150	12	
	200	15	
	250	10	
	300	8	
	350	5	
Time to radiological union (weeks)	12– 13 weeks	12	0.01
	14– 15 weeks	14	
	16– 17 weeks	7	
	18– 19 weeks	5	
	20– 21 weeks	12	

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Table III Distribution of post-op Harris hip score

	Harris Hip Score	
Follow-up	**Mean**	**SD**
Post-op(1 Month)	43.36	2.91
Post-op(2 Months)	71.92	2.32
Post-op(6 Months)	91.06	3.86
Mean% Change (from1Month to 2 Months)	66.37%	
Mean% Change(from 1Month to 6 Months)	110.49%	
Mean% Change (from 2 Month to 6 Months)	26.59%	
P-value(Intra-Group)		
Post-op(6 Weeks) vs Post-op(3Months)Post-op(6 Weeks) vs Post-op(6Months)	0.001^{***}	
Post-op(3Months) vs Post-op(6Months)	0.001^{***}	
	0.001^{***}	
P-valuesbyRepeatedMeasuresanalysisofvariance(RMANOVA).P-value<0.05isconsideredtobestatisticallysignificant.***P-value<0.001 (Highly Significant).		

Distribution of mean ± SD of Harris hip score at 1 Month, 2 Months and 6 Months post-op follow-up was 43.36 ± 2.91, 71.92 ± 2.32 and 91.06 ± 3.86. The minimum – maximum range of Harris hip score at 1 Month, 2 Months and 6 Months follow-up was 38 – 48, 65 – 76 and 78 – 97 respectively. The mean post-op (2 Months and 6 Months) Harris Hip score is significantly higher compared to the mean post-op (1 Month) Harris Hip Score (P-value<0.001 for all).The mean post-op (6 Months) Harris Hip score is significantly higher compared to the mean post-op (3 Months) Harris Hip Score (P-value<0.001).

DISCUSSION

In the mid-to-late 1970's, flexible intramedullary devices for the fixation of intertrochanteric fractures were introduced in the form of Ender's nail and the condylocephalic nail. The advantage of these devices was due to their intramedullary position, which places them closer to the resultant force across the fracture and reduces the bending moment on the device.[6] In addition, the use of distal sites of insertion to decrease operative time and loss of blood, compared with the use of proximal sites, was reported. This operative technique was made possible by the use of image intensification and was promoted as a closed method

for the fixation of intertrochanteric fractures.[7] However, a high prevalence of varus deformity, as well as pain in the knee caused by distal migration of the pins, were reported in association with this procedure. These problems led to a high rate of re-operation for extraction of the pins and correction of deformity. A high rate of failure due to loss of reduction, shortening, and external rotation resulted both from Ender's nails and from condylocephalic nails. Accordingly, most authors have recommended that these devices not to be used for the fixation of unstable trochanteric fractures.[8]This study evaluated the role of proximal femoral nail in unstable trochanteric fractures of femur.

We found that 6 (12.0%) had their age between 31 – 40 years, 7 (14.0%) had their age between 41 – 50 years, 6 (12.0%) had their age between 51 – 60 years, 15 (30.0%) had their age between 61 – 70 years, 9 (18.0%) had age between 71 – 80 years and 7 (14.0%) had their age between 81 – 90 years. Pajarinen J. et al[9] performed a randomised clinical trial comparing the Dynamic hip screw and proximal femoral nail in patients with pertrochanteric fractures emphasizing functional outcomes and rehabilitation. At four months review patients treated with proximal femoral nail regained their pre-injury walking ability, shortening of the both femoral neck and shaft was seen in patients treated with Dynamic hip screw, this difference was statistically significant.

We found that 23 (46.0%) had right limb involved and 27 (54.0%) had left limb involved. 27 (54.0%) had fall from height, 21 (42.0%) had road traffic accident and 2 (4.0%) had slip and fall. 12 (24.0%) had no co-morbidity, 11 (22.0%) had diabetes, 17 (34.0%) had hypertension, 8 (16.0%) had both diabetes and hypertension and 2 (4.0%) had asthma. 18 (36.0%) had 31 – A2.1 type of fracture, 17 (34.0%) had 31 – A2.2 type of fracture, 6 (12.0%) had 31 – A2.3 type of fracture, 2 (4.0%) had 31 – A3.1 type of fracture and 7 (14.0%) had 31 – A3.2 type of fracture. 23 (46.0%) had short PFN implant used and 27 (54.0%) had long PFN implant used. Kilinger H. M et al[10] have done a comparative study of 173 unstable intertrochanteric femoral fractures treated with Dynamic hip screw and trochanteric buttress plate versus proximal femoral nail. In case of proximal femoral nail, 2% revisions were necessary and in the case of dynamic hip screw with trochanteric buttress plate 21.6%. A shorter operation time and a considerable shorter in patient stay were common with proximal femoral nail. They concluded that Dynamic hip screw with trochanteric buttress plate had a higher incidence of complications in unstable trochanteric fractures than proximal femoral nail.

We found that 10 (20.0%) had operative time between 60 – 70 mins, 11 (22.0%) had operative time between 70 – 80 mins, 15 (30.0%) had operative time between 80 – 90 mins and 14 (28.0%) had operative time between 90 – 10 mins. 12 (24.0%) had blood loss of 150 ml, 15 (30.0%) had blood loss of 200 ml, 10 (20.0%) had blood loss of 250 ml, 8 (16.0%) had blood loss of 300 ml and 5 (10.0%) had blood loss of 350 ml in the entire study group. 12 (24.0%) had radiological union between 12 – 13 weeks, 14 (28.0%) had radiological union between 14 – 15 weeks, 7 (14.0%) had radiological union between 16 – 17 weeks, 5 (10.0%) had radiological union between 18 – 19 weeks and 12 (24.0%) had the radiological union between 20 – 21 weeks in the entire study group. ReskaMet al[11] reviewed 83 patients with proximal femoral fractures treated with femoral nail. In their study except for 2 cases post- operative course was favourable in rest of the patients. They concluded a careful surgical approach and technique with a stable osteosynthesis have markedly contributed to a more rapid mobilization of a patient with the use of proximal femoral nail.

We found that distribution of mean ± SD of Harris hip score at 1 Month, 2 Months and 6 Months post-op follow-up was 43.36 ± 2.91, 71.92 ± 2.32 and 91.06 ± 3.86. The minimum – maximum range of Harris hip score at 1 Month, 2 Months and 6 Months follow-up was 38 – 48, 65 – 76 and 78 – 97 respectively. The mean post-op (2 months and 6 months) Harris Hip score is significantly higher compared to the mean post-op (1 month) Harris Hip Score (P-value<0.001 for all). The mean post-op (6 months) Harris Hip score is significantly higher compared to the mean post-op (3 months) Harris Hip Score. Pavelka T. et al[12]reviewed 79 patients with ipsilateral fractures of the hip and femoral shaft treated with a long proximal femoral nail. In follow up for at least 12 months bone union was achieved in all patients. The outcomes were excellent in 64%,good in 28% and satisfactory in 8%. They concluded that the long proximal femoral nail is a high quality implant that increases our options for treatment of all the reconstruction nails.

CONCLUSION

Authors found that proximal femoral nailing is a significant advancement in the treatment of unstable trochanteric fractures. By doing closed reduction, it offers a minimal soft tissue damage, preserves the fracture hematoma, decreased blood loss and reduces the operating time. The proximal femur nail offers a stable fixation, minimizes the stress and allows early mobilization. It offers a superior stabilization than other currently used implants for such fracture. It is mandatory that the fracture must be reduced anatomically with alignment of posteromedial buttress before nail insertion as the nail does not do any spell. Though complications were reported, still it holds good, with good surgical hands because the procedure is technically demanding and needs a steep learning curve.

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