

Comparison of Intramedullary and Extra Medllary Fixations In Unstable Intertrochanteric Fractures: A Study

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Abstract

Introduction: Dynamic hip screw was commonly recommended and practiced as a choice of treatment for Intertrochanteric fracture recently the trends have changed towards intramedullary nailing along with sliding screw. Internal fixation is appropriate choice for intertrochanteric fracture; optimal fixation is based on stability of fracture. A new method for intertrochanteric fractures treatment involves the use of an intramedullary nail that interlocks proximally into the femoral head was introduced in early 1990s. *Methods:* Study will be prospective, time bound, hospital based, randomized comparative study. Cases satisfying the inclusion criteria admitted in AMC during the study period of October 2016 to October 2018 will be included. *Results:* Total of 50 patients were treated for unstable intertrochanteric fracture among which 25 were treated with intramedullary nail (TFN, PFN) and 25 patients with extramedullary fixation (Dhs), among which intramedullary fixations showed better results in terms of functional outcome and clinical outcome compared to extramedullary group. In terms of duration of surgery, blood loss intramedullary group were better compared to extramedullary group. In terms of complete union of fracture and functional out come using Harris hip score at 1month and 6 month results were similar in both groups. But intramedullary group had 19 of excellent outcome, 6 of good, 0 fair and extramedullary 10 excellent 11 good and 4 fair results, and one case of Dhs had complication of screw cut out. *Conclusion:* Taking all parameter into consideration intramedullary nail is preferred choice of treatment for unstable intertrochanteric fracture because of bio mechanical advantage.

Keywords: Unstable intertrochanteric fracture; Extramedullary, Intramedullary; Harris hip score.

Introduction

Intertrochanteric fractures are the most frequently operated fracture type and has the highest postoperative fatality rate.¹ The incidence of fractures in proximal femoral area has risen with increasing numbers of elderly persons with osteoporosis and traffic accidents in young adults.² The screw-plate (extramedullary) and nailing systems (intramedullary) are the two basic osteosynthesis methods used in the management of trochanteric fractures.³

Biomechanical studies have shown that intramedullary devices are more stable under loading, although associated with more reoperation rates as shown in few studies. Furthermore, the tip of the nail was redesigned to decrease the risk of intra and postoperative fractures of the femoral shaft by a significant reduction in bone stress⁴

In our hospital the intertrochanteric fractures were treated with Dynamic Hip Screw (DHS) fixation or IMN (TFN, PFN) fixation after complete preoperative evaluation. This study was taken up to analyze the effectiveness of surgical treatment of intertrochanteric fracture of femur using extramedullary (TFN, PFN) and intramedullary fixation (DHS) and to compare the clinical and functional outcomes of intertrochanteric fractures managed by above mentioned fixations.

Results

Statistical analysis

All characteristics were summarized descriptively. For continuous variables, the summary statistics of mean±standard deviation (SD) were used. Chi-square (χ^2) test was used for association between two categorical variables.

If the *p* value was <0.05, then the results were considered to be statistically significant otherwise it was considered as not statistically significant. Data were analyzed using SPSS software v.23.0. and Microsoft office 2007

In intramedullary nail group mean duration of surgery in minutes was 82.4 ± 17.7, which was less compared to extramedullary procedure with time duration of 95.4 ± 11.6 and difference was statistically significant between 2 groups. Mean amount of blood loss in milli litre in intramedullary procedure was 101.2 ± 36, and in extramedullary procedure it was 204.4 ± 61.4 suggesting that intramedullary procedure had less blood loss compared to extramedullary procedure and difference was statistically significant. Time of complete fracture union in months was around 4.8 ± 1.5 m in intramedullary group, 4.9 ± 1.5 in extramedullary group and the difference was not statistically significant (Table 1).

Table 1: Mean parameters between implants

Parameters	Intramedullary		Extramedullary		p value
	Mean	SD	Mean	SD	
Duration of Surgery in minutes	82.4	14.7	95.4	11.6	0.001*
Blood Loss in ml	101.2	30.6	204.4	61.4	<0.001*
Time for complete union of fracture in months	4.8	1.5	4.9	1.5	0.776

Note: * significant at 5% level of significance (*p* < 0.05)

Number of C-arm exposures in intramedullary procedure was 28.20 ± 4.43 and extramedullary procedure was 23.4 ± 3.81. This shows intramedullary

fixation had slightly high exposure compared to extramedullary fixation. Difference was significant with *p* value <0.01 (Tables 2, 3).

Table 2: Association of number of C-arm exposures with implants

Number of C-arm exposures	Intramedullary		Extramedullary		p value
	N	%	N	%	
18-20	0	0.0	5	20.0	
21-25	10	40.0	15	60.0	
26-30	6	24.0	3	12.0	0.01*
>30	9	36.0	2	8.0	
Total	25	100.0	25	100.0	

Note: * significant at 5% level of significance (*p* < 0.05)

Table 3: Mean number of C-arm exposures between implants

Mean Number of C-arm exposures	Intramedullary		Extramedullary		p value
	Mean	SD	Mean	SD	
	28.20	4.43	23.24	3.81	<0.001*

Note: * significant at 5% level of significance ($p < 0.05$)

In Intramedullary Group 3 patients were transfused 1 unit of blood 1 patient was transfused 2 units of blood its was significantly higher when compared to extramedullary group where 3 units

was transfused to 1 pt ant and 2 units were transfused to 1 patient and 1 unit was transfused to 10 patients. diffence was statistically significant with p value 0.031 (Table 4).

Table 4: Association of no. of blood units transfused with implants

No. of blood units transfused	Intramedullary		Extramedullary		p value
	N	%	N	%	
0	21	84.0	11	44.0	0.031*
1	3	12.0	10	40.0	
2	1	4.0	3	12.0	
3	0	0.0	1	4.0	
Total	25	100.0	25	100.0	

Note: * significant at 5% level of significance ($p < 0.05$)

At 1st month intramedullary nail group, means harris hip score was 46.9 ± 8.1 and extramedullary group was 36.4 ± 5.6 . this difference in mean harris hip score at 1st month between 2 groups was statistically significant. Intramedullary group had higher harris hip score than dynamic hip screw group. At 3 months in intramedullary group, mean harris hip score was 67.2 ± 6.5 , and in extramedullary group was 63.7 ± 9.5 . This difference in mean

harris hip score at 3rd month between two groups were statistically not significant. At 6 months in intramedullary 92.3 ± 3.9 and extramedullary was 87.6 ± 7.6 . this difference in mean harris hip score at 6th month between 2 groups was statistically significant. Intramedullary had higher harris hip score than extramedullary group (Tables 5,6).

Among intramedullary 19 patients had excellent result, 6 good and 0 fair results. In extramedullary

Table 5: Association of overall functional outcome with implants

Overall functional outcome	Intramedullary		Extramedullary		p value
	N	%	N	%	
Excellent	15	60.0	10	40.0	0.080
Fair	0	0.0	4	16.0	
Good	10	40.0	11	44.0	
Total	25	100.0	25	100.0	

Table 6: Mean Harris Hip Score Between Implants

Harris hip score	Intramedullary		Extramedullary		p value
	Mean	SD	Mean	SD	
1 st month	46.7	7.7	36.9	5.3	<0.001*
3 rd month	67.2	6.0	63.7	9.5	0.129
6 th month	92.3	3.9	87.6	7.6	0.008*

Note: * significant at 5% level of significance ($p < 0.05$)

Group 10 had excellent 11 had good, 4 fair results the difference between 2 groups were significant statistically with p value 0.016 (Table 7).

Among 25 patients of intramedullary and 25 patients of extramedullary one case of screw back out has been noted (Table 8).

Table 7: Overall functional outcome with implants

Overall functional outcome	Intramedullary		Extramedullary		p value
	N	%	N	%	
Excellent	19	76.0	10	40.0	0.016*
Fair	0	0.0	4	16.0	
Good	6	24.0	11	44.0	
Total	25	100.0	25	100.0	

Note: * significant at 5% level of significance ($p < 0.05$)

Table 8: Association of complications with implants

Implant Related Complications	Intramedullary		Extramedullary		p value
	N	%	N	%	
Nil	25	100.0	24	96.0	0.312
Screw back out	0	0.0	1	4.0	
Total	25	100.0	25	100.0	

Discussion

The present study aimed at comparing extramedullary and intramedullary fixations for unstable intertrochanteric fractures in terms of functional outcome, clinical outcomes. Fracture of intertrochanteric femur have been recognized as a major challenge by the orthopedic community, not solidly for achieving fracture, but for restoration of optimal functional in the shortest possible time that too with minimal complication.⁵

Our study shows that average duration of surgery for intramedullary was 82.4 min which was shorter than average time required for extramedullary procedure which was 95.4 min which correlates with other studies conducted by the author Author Pan X-h et al.,⁶ Saudan et al.,⁷ Kumar et al.,⁸ Umesh et al.,⁹ Baumgartner et al.¹⁰

On comparing the blood loss in our study, we found higher blood loss in extramedullary group, i.e. 204.4 ml, when compared to intramedullary group, i.e. 101.2 ml. Which was statistically significant. Our Study correlates with other literature conducted by author Keshav Goel,¹¹ Saudan et al.⁷ Pajarinen et al.¹² since They have also shown significantly higher blood loss in dhs surgery compared to pfn group.

Our study showed the number of C-arm exposure were more in intramedullary group compared to extramedullary group and was statistically significant with p value < 0.01 the result correlated with the study conducted by author Keshav Goel et al.⁵⁹ and Sahu B et al.¹³ Kumar et al.⁸

Time of complete union was 4.8 weeks in intramedullary and 4.9 in extramedullary and was not statistically significant.

The functional out come between 2 groups were accessed using Harris Hip Score. Harris Hip Score for extramedullary was (87.6) and intramedullary group was (92.3) thus study showed intramedullary had better functional outcome than the extramedullary and results were statistically significant at 1st month and 6th month. 3rd month follow up showed HHS results of both intramedullary and extramedullary were almost similar. At 6 month follow up most cases of intramedullary fixations were excellent when compared to dhs. This also correlates with the study conducted by author keshav et al, dhakad rks⁵ et al, and amardeep et al.¹⁴

One case of DHS had complication which had screw cut out and was treated with hemiarthroplasty.

Conclusion

In the more unstable types of fracture Boyd And Griffin Type 2,3,4 the intramedullary nails has distinct advantages over extramedullary and should be the preferred implant for fixation since it had better overall functional outcome, less operative time and less blood loss.

The weight bearing time in intramedullary fixation was significantly less compared to DHS.

Intramedullary nailing should be preferred in cases of severe osteoporosis as it has got inherent stability and intramedullary being load sharing device. By observing our outcomes we prefer intramedullary nails as the best choice implant for unstable Intertrochanteric fractures, as it is superior in terms of stability, blood loss, duration of surgery, postoperative functional recovery.

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