

Original Research Article

A comparative study between proximal femur locking compression plate and dynamic hip screw fixation in management of pertrochanteric fracture

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ABSTRACT

Background: Pertrochanteric fracture is common in elderly people. Dynamic hip screw is still considered the gold standard for treating intertrochanteric fracture. Proximal femoral locking compression plate is newer device. The purpose of the study was to compare the outcome of surgical treatment of trochanteric fracture by dynamic hip screw and proximal femoral locking compression plate.

Methods: We study 60 patient admitted and followed up at J.L.N. Medical College Ajmer from June 2016 to April 2018 for minimum 6 month or till the bony union. Every fracture classified according to AO classification and functional result will be assessed according to Harris hip score using unpaired t test.

Results: The mean operative time and average intraoperative blood loss was more in PFLCP group when compared with DHS group it was statically significant. DHS group has marginally better functional result then PFLCP group. There was no difference in the radiological outcome between two group.

Conclusions: DHS is best implant for stable intertrochanteric fracture but PFLCP can also be good alternative for unstable IT femur fracture.

Keywords: Pertrochanteric fracture, Dynamic hip screw, Proximal femur locking compression plate, Proximal femur nail

INTRODUCTION

Proximal femoral fractures are devastating injuries that most commonly affect the elderly and also in young. In young and healthy individuals, the injury results from high energy trauma, where as these fractures are common in the elderly persons due to osteoporosis and 90% of fractures result from a simple fall.¹ They are three to four times more common in women who are osteoporotic; trivial fall being the most common mechanism of injury.²

Conservative management of proximal femur fracture resulted in higher mortality rates ranging from 4.5 to 22%

so they are now indicated only for elderly person with high medical risk for anaesthesia and surgery. Thus, surgery by internal fixation is the ideal choice. Various treatment modalities are available for these fractures – plate constructs and cephalomedullary interlocking nails. Dynamic hip screw (DHS) is the gold standard treatment for stable intertrochanteric fractures.³

In case of unstable intertrochanteric fractures, the incidence of limb shortening, medialization of distal fragment and implant cut outs are high. In this case, proximal femur nail (PFN) is the implant of choice.⁴ In certain cases, like greater trochanter or lateral wall

fracture type in proximal femoral fractures, PFN difficult to performed.⁵ In those cases, newer methods like proximal femur locking compression plate (PF-LCP) is alternative implant for the treatment.⁶ The multiple locking screw holes of the PF-LCP provide various options to tackle complex fracture pattern.

However, there is scarcity of literature comparing DHS with PFLCP in the treatment of petrochanteric fractures. Hence, we conducted a randomized control study to evaluate the operative procedures, clinical outcomes and radiological outcomes in petrochanteric fractures treated with DHS and PFLCP.

METHODS

This study was conducted in Department of Orthopaedics, J.L.N. Medical College & Associated Group of Hospitals, Ajmer. 60 cases for the study were selected which operated for petrochantric fractures by proximal femur locking compression plate and dynamic hip screw from June 2016 to April 2018 and result were evaluated using unpaired t test.

Method of collection of data

- A case documentation form was used to obtain data, including age, sex, mechanism of injury, type of fracture according to AO/OTA classification.
- Radiological investigations - Hip with thigh (AP view) and knee with thigh X-ray (AP & lateral view)

Inclusion criteria

Inclusion criteria were age ≥18 years; patients with proximal femoral fracture.

Exclusion criteria

Exclusion criteria were pathologic fracture; open proximal femur fracture; patient unfit for surgery.

RESULTS

This was a prospective comparative study of the treatment of 60 cases of trochanteric and petrochanteric fractures of proximal femur. Two groups of 30 patients operated with DHS and PFLCP were taken.

In our study the youngest patient was of 21 yrs and the oldest was 90 yrs of age. The male to female ratio was found to be 3:1. Average age of patients 57.75 years in which treated by PFLCP was 54.10 years while in DHS was 61.40 years. P value is equal to 0.1130 which is statistically not significant. Out of 60 patient 38 (63.33%) has right side fracture and 22 (36.67%) has left side fracture.

The fractures were classified according to AO classification system (1979). Out of 60 patient 21 (35%) has AO classification type 31A1, 24 (40%) has 31A2 and 15 (25%) has 31A3 type fracture. The commonest mode of injury in our patient was fall on ground (48.33%). The other modes were – road traffic accident (RTA), fall from height.

Table 1: Age distribution (n=30).

		PF-LCP	DHS	Total	P value
		No. of patients	No. of patients		
		N (%)	N (%)	N (%)	
Age group (in years)	21-40	7 (23.33)	6 (20)	18 (30)	0.113
	41-60	8 (26.67)	9 (30)	17 (28.33)	
	61-80	13 (43.33)	11 (36.67)	19 (31.67)	
	>80	2 (6.67)	4 (13.33)	6 (10)	
Total		30 (100)	30 (100)	60 (100)	
Mean±S.D.		54.10±17.76	61.40±17.38		

Table 2: Average operative time (n=30).

AOT	PF-LCP		DHS		P value
	Frequency	Percentage (%)	Frequency	Percentage (%)	
31-40 min	0	0	6	20	0.0001
41-50 min	2	6.67	14	46.67	
51-60 min	6	20	5	16.67	
61-70 min	12	40	3	10	
71-80 min	7	23.33	2	6.67	
81-90 min	3	10	0	0	
Total	30	100	30	100	
Mean±S.D.	67.77±11.16		49.60±10.82		

Table 3: Average blood loss (n=30).

Blood loss	PF-LCP		DHS		P value
	Frequency	Percentage (%)	Frequency	Percentage (%)	
101-150 ml	0	0	0	0	<0.0001
151-200 ml	0	0	6	20	
201-250 ml	4	13.33	10	33.33	
251-300 ml	8	26.67	8	26.67	
301- 350 ml	12	40	4	13.33	
351-400 ml	4	13.33	2	6.67	
401-450 ml	2	6.67	0	0	
Total	30	100	30	100	
Mean±S.D.	314±54.05		242.50±55.19		

Table 4: Radiological union (n=30).

Union (Weeks)	PF-LCP		DHS		P value
	No. of patients	Percentage (%)	No. of patients	Percentage (%)	
≤ 12	3	10	4	13.33	0.0126
13-16	15	50	14	46.67	
17-20	10	33.33	12	40	
21-24	2	6.67	0	0	
Total	30	100	30	100	
Mean ± S.D.	18.60±4.04		16.33±2.63		

Table 5: Postoperative complications (n=30).

Complications	PF-LCP		DHS		Total (%)
	No. of patients	Percentage (%)	No. of patients	Percentage (%)	
Infection	4	13.33	2	6.67	6 (10)
Implant failure (Screw backout)	2	6.67	1	3.33	3 (5)
Varus collapse + Shortening>1 cm	2	6.67	3	10.0	5 (8.33)
Total	8	26.67	6	20	14 (23.33)

Table 6: Functional outcome (n=30).

Result (HHS)	PF-LCP		DHS		P value
	No. of patients	Percentage (%)	No. of patients	Percentage (%)	
Poor (<70)	4	13.33	2	6.67	0.0036
Fair (70-79.9)	6	20	2	6.67	
Good (80-89.9)	6	20	8	26.67	
Excellent (90-100)	14	46.67	18	60	
Total	30	100	30	100	
Mean ± S.D.	83.347±10.824		90.803±7.998		

Average operating time in PF-LCP was 67.77 and in DHS was 49.60. P value is equal to 0.0001 which is statistically significant. Average blood loss in PF-LCP was 314 and in DHS was 242.50. P value is less than 0.0001 which is statistically significant.

Harris hip scoring system was used to evaluate the functional result in our study. Comparing the outcome of PF-LCP and DHS with Harris Hip Score, PF-LCP had 13.33% Poor, 20.0% fair, 20.0% Good, 46.67% Excellent

results. DHS had 6.67% Poor, 6.67% fair, 26.67% Good and 60.0% Excellent results. P value is equal to 0.0036 which is statistically significant.

Radiological union was seen in all 60 (100%) cases. In PF-LCP, average union time was 18.60 weeks and in DHS, Average union time was 16.33 weeks.

In our study 14 (23.33%) cases having postoperative complication. PF-LCP, total 8 (26.67%) patients had

postoperative complication in which 4 (13.33%) had early deep infection, 2 (6.67%) associated with implant failure (proximal screw backout) 2 (6.67%) had varus collapse and shorting >1 cm. DHS, 6 (20.0%) had post operative complication in which, 2 (6.67%) had early deep infection, 1 (3.33%) had screw back out, 3 (10.0%) had varus collapse and shorting >1 cm.

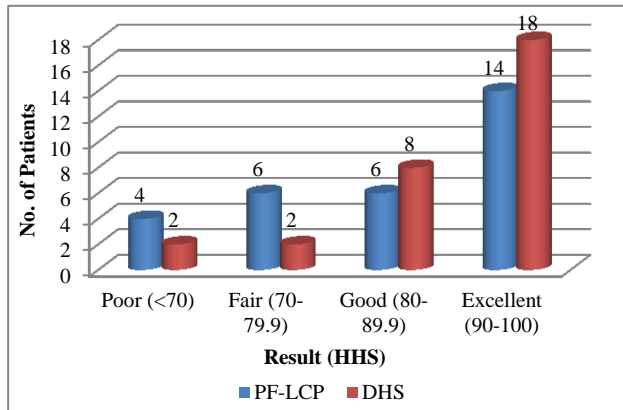


Figure 1: Final outcome measures (assessed with Harris hip score).

DISCUSSION

In this study of 60 cases of proximal femoral fractures were evaluate. Trivial trauma of domestic simple fall on ground was the commonest cause of fracture attributed to 48.34%. The most common mode of trauma is simple fall on ground in the older age group and road traffic accidents in younger patients.

David reported that these fractures are more common in females due to postmenopausal osteoporosis, but in our study greater number of male patients 45 (75%) were affected and female patients were 15 (25%) probably due to outdoor activities in our rural set up.⁷

Out of 60 patient 38 (63.33%) has right side fracture and 22 (36.67%) has left side fracture. In studies conducted by Gupta right sided fractures were more common, whereas in studies made by Kenzor et al left side fracture were common.^{10,11}

Average age of patients 57.75 years in which treated by PFLCP was 54.10 years while in DHS was 61.40 years. P-value is equal to 0.1130 which is statistically not significant.

In our study, the average surgery time was considerably higher in the PFLCP group that is 67.77 min as compare to DHS that is 49.60 min, primarily because comparatively more dissection was required as compared to DHS fixation and the increased operative time with PFLCP is may be because the surgeon is handling a new technique with new implant. Saini, et al based on their

study in 2013 mean operating time for PF-LCP was 79.5 min and total blood loss averaged 233.13 ml.⁸

Union was achieved in all cases. No significant difference was found between union time of the two group of our study, but the DHS group united slightly earlier (mean 16.33 weeks) than the PF-LCP group (mean 18.60 weeks). This might be because dynamic hip screw provide control collapse at fracture site which improved microcirculation at the fracture site.

In this study the average blood loss in PF-LCP was 314ml and in DHS was 242.50 ml. Taeger et al showed a 43% increased blood loss in a reduction of complex unstable fractures compared to stable ones.⁹

CONCLUSION

We conclude that DHS is the best implant for stable proximal femoral fractures with lesser operative time and lesser blood loss. While PFLCP can be a good alternative for unstable proximal femoral fractures with better results with slightly longer operative time and more blood loss.

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Ethical approval: The study was approved by the institutional ethics committee

REFERENCES

1. Nieves JW, Bilezikian JP, Lane JM, Einhorn TA, Wang Y, Steinbuch M, et al. Fragility fractures of the hip and femur: incidence and patient characteristics. *Osteoporos Int.* 2010;21(3):399-408.
2. Dimon JH, Hughston JC. Unstable intertrochanteric fractures of the hip. *J Bone Joint Surg Am.* 1967;49(3):440-50.
3. Wolfgang GL, Bryant MH, Oneill JP. Treatment of intertrochanteric fracture of the femur using sliding screw plate fixation. *Clin Orthop Relat Res.* 1982;163:148-58.
4. Kokoroghiannis C, Aktselis I, Deligeorgis A, Fragkomichalos E, Papadimas D, Pappadas I. Evolving concepts of stability and inter-medullary fixation of intertrochanteric fractures-a review. *Injury.* 2012;43(6):686-93.
5. Palm H, Jacobsen S, Sonne HS, Gebuhr P. Hip fracture study group integrity of the lateral femoral wall in intertrochanteric hip fractures: an important predictor of a reoperation. *J Bone Joint Surg Am.* 2007;89(3):470-5.
6. Ozkan K, Türkmen I, Sahin A, Yildiz Y, Erturk S, Soyomez MS. A biomechanical comparison of proximal femoral nails and locking proximal anatomic femoral plates in femoral fracture fixation A study on synthetic bones. *Indian J Orthop.* 2015;49:347-51.
7. David GL. Fractures and dislocation of hip. *Campbells operative orthopaedics.* Chapter 52.

- Volume 3. 11th ed. Philadelphia, Pennsylvania, USA: Mosby Elsevier; 2010: 3237-3308.
8. Saini P, Kumar R, Shekhawat V. Biological fixation of comminuted pertrochanteric fractures with proximal femur locking compression plate; *Injury.* 2013;44(2):226-31.
 9. Taeger G, Schmid C, Zettl R, Schweiberer L, Nastkolb D. Stable and unstable pertrochanteric femoral fractures. Differentiated indications for the dynamic hip screw. *Unfallchirurg.* 2000;103:741-8.
 10. Gupta RC. Conservative Treatment of Intertrochanteric Fractures of the Femur. *Indian J Orthop.* 1974;36(6):229.
 11. Kenzora JE, McCarthy RE, Lowell JD, Sledge CB. Hip Fracture Mortality: Relation to Age, Treatment, Pre-operative illness Time of Surgery and Complications. *Clin Orthopaed Relat Res.* 1984;186:46-56.

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