International Journal of Orthopaedics Sciences

ISSN: 2395-1958
IJOS 2017; 3(3): 600-606
© 2017 IJOS
www.orthopaper.com
Received: 25-05-2017
Accepted: 26-06-2017

Dr. Arvind Kumar
Department of Orthopaedics,
SBKSMIRC, Sumandeep
Vidyapeeth University,
Vadodara, Gujarat, India

Dr. Anurag Jain
Department of Orthopaedics,
SBKSMIRC, Sumandeep
Vidyapeeth University,
Vadodara, Gujarat, India

Dr. Aditya Agrawal
Department of Orthopaedics,
SBKSMIRC, Sumandeep
Vidyapeeth University,
Vadodara, Gujarat, India

Dr. Malkesh Sah
Department of Orthopaedics,
SBKSMIRC, Sumandeep
Vidyapeeth University,
Vadodara, Gujarat, India

Dr. Anirudh Bansal
Department of Orthopaedics,
SBKSMIRC, Sumandeep
Vidyapeeth University,
Vadodara, Gujarat, India

Dr. Sarvang Desai
Department of Orthopaedics,
SBKSMIRC, Sumandeep
Vidyapeeth University,
Vadodara, Gujarat, India

Outcome of proximal femur fracture treated with long proximal femoral nail and dynamic hip screw

Dr. Arvind Kumar, Dr. Anurag Jain, Dr. Aditya Agrawal, Dr. Malkesh Sah, Dr. Anirudh Bansal and Dr. Sarvang Desai

DOI: <http://dx.doi.org/10.22271/ortho.2017.v3.i3i.95>

Abstract

Background: Proximal femur fractures [PFF] are most common among all fractures around hip. Operative treatment and early mobilization is ideal to decrease morbidity and mortality. Aim of this study is to evaluate and assess functional and radiological outcomes of Long Proximal Femoral Nail [PFN] and Dynamic Hip Screw [DHS] used for fixation of PFF.

Material and Method: This prospective analytic study was conducted in the department of orthopaedic, SBKSMIRC, during the year 2014 to 2016. Total 40 cases were selected by inclusion and exclusion criteria. Twenty cases were treated with Long PFN and other 20 with DHS. According to Evan's classification, 57.5% Fracture were stable type, 32.5% fracture was unstable type and 10% fracture was subtrochanteric or reverse oblique type. All patients were followed-up to 48th week postoperatively.

Observation and Result: In our series, overall clinical & radiological outcome among each treatment group was 85% satisfactory. Infection rate in DHS group was 15% while in PFN group was 5%. By 6th postoperative week, 90% patients could bear partial weight in PFN group while in DHS group only 70% patients were able to do same. Full weight bearing in PFN group was between 12th - 18th postoperative weeks while in DHS group it was between 12th - 24th postoperative weeks.

Conclusion: In this study, it was concluded that there is no major difference in functional and radiological outcome on long term follow up in both the treatment group.

Keywords: Proximal femur fracture (PFF), Long PFN, DHS

Introduction

Proximal femur fractures are most common among all fractures around hip. Proximal femur fracture comprise pertrochanteric and subtrochanteric fractures. Proximal femur fracture account for approximately 1/3rd of all hospitalised patients. Incidence of proximal femur fracture increased significantly with increased in average life expectancy of general population. Incidence of proximal femur fracture in elderly is higher than in young adult. Higher incidence of proximal femur fractures in elderly are due to several factors like-osteoporosis, poor vision, decrease muscle power. In elderly, 85-95% proximal femur fracture result from trivial fall while in younger adult it result from high velocity trauma like road traffic accident. Initially these fractures were treated conservatively which result in high morbidity and mortality rate but later on prime concern of orthopaedic surgeons is to mobilize the patients as early as possible to decrease the morbidity and mortality. Various modes of treatment of proximal femur fracture had advanced greatly in last 3-4 decades. Now a days, operative treatment and stable internal fixation with various types of fixation devices has become the treatment of choice in these types of fractures, allowing early rehabilitation yielding better functional recovery. Early mobilization of patients put great demands on both implant and osteoporotic bone. The study was aimed to evaluate and assess functional and radiological outcome of extra medullary (DHS) and intramedullary (long PFN) implants used for fixation of proximal femur fractures.

Material and method: This prospective study was conducted in the department of orthopaedic, SBKSMIRC, during the year 2014 to 2016. In our series, 40 cases of proximal femur fractures were selected by inclusion and exclusion criteria.

Correspondence

Dr. Arvind Kumar
Department of Orthopaedics,
SBKSMIRC, Sumandeep
Vidyapeeth University,
Vadodara, Gujarat, India

Out of 40 cases, 20 cases were treated with DHS and 20 cases with Long PFN. All 40 cases were operated on fracture table and under C-arm control. In this series EVAN'S CLASSIFICATION was used to classify these fractures.

Dynamic hip screw (DHS) is a lag screw which is biomechanically superior to various compression hip screw system developed during recent years (Regazzoni 1985). Dynamic hip screw is a unique implant, it facilitate compression across the fracture line at time of operation, also act as a rail on which axial movement is feasible to achieve impaction of the fracture fragments with passage of time. It is strong enough to withstand large bending loads and also protect the fixation against disruptive torque transmitted by the shaft during internal/external rotation

Proximal femoral nail (PFN) has recently been introduced by AO/ASIF in 1996 for fixation of proximal femur fractures. It is an intramedullary load sharing device, theoretically provides more efficient load transfer than sliding hip screw. It has a high rotational stability. Low mechanical stress concentration on the implant bone interface. Long PFN has advantage that it prevent femoral shaft fracture and can also be used in associated shaft femur fractures. Insertion of PFN require less operative time, less blood loss, less soft tissue dissection, less chance of infection both theoretically and practically, other advantage of long PFN is it can be used in fracture shaft femur along with trochanteric fracture.

Operative method

For DHS - after proper anaesthesia patients was placed supine on fracture table. Fracture was reduced under C arm guide. Approximately 8 to 10 cm longitudinal incision was made starting from trochanter and extending distally. A guide pin passed in central or inferior portion of neck in anteroposterior view and central in lateral view. Depth of guide pin was measured and required length to be reamed with triple reamer. Lag screw was then inserted keeping a tip apex distance below 25 mm and appropriate size plate was fixed.

For PFN – after proper anaesthesia patient was placed supine on fracture table. Fracture was reduced under C arm control. Approximately 3 to 5 cm proximal longitudinal incision was made starting from trochanter. Entry portal (On tip of G.T) was made with help of bone awl and a guide wire was passed under c arm guide. Medullary canal was reamed up to desired diameter. Appropriate length nail was passed. During Proximal locking position of lag screw in neck should be inferior in AP view and central in LAT view. Appropriate size Antirotational screw was then inserted. Fracture impaction was done if needed. Distal locking was done and wound was closed.

Postoperative protocol: From the first postoperative day patients was encouraged to do static quadriceps and ankle pump exercise. From 3rd postoperative day dynamic quadriceps exercise, hip and knee movement started. Stitches were removed on 13th postoperative day.

Follow up of the patients for functional and radiological evaluation were done at regular interval of 6th, 12th, 18th, 24th and 48th postoperative week.

Observation and result

In our series of total 40 cases, 42.5% (17 pts) patients were male and 57.5% (23 pts) patients were female. 60% (24) of the patients were between 51 to 70 years of age. Most common mode of injury was trivial fall comprising 47.5% (19 pts) in which 17.5% (7 pts) were male and 30% (12 pts) were female. 2nd common mode of injury was road traffic accident comprising 25% (12 pts) in which 15% (7 pts) were male and 10% (5 pts) were female. In 62.5% (25pts) cases Right limb was affected while in 37.5% (15 pts) cases Left limb. All fractures were classify according to EVAN'S classification. 57.5% (23 pts) fracture was STABLE (type 1st and 2nd), 32.5% (13 pts) fracture was UNSTABLE (type 3rd, 4th and 5th) and 10% (4 pts) fracture was Reverse oblique or sub trochanteric type. Average duration of hospital stay were 18 days in DHS group and 14 days in PFN group. In DHS group, 4 hole and long barrel plate were used in 65% patient. In PFN group, 10mm, 360mm nail were used in 65% patients. Infection rate in DHS group was 15% while in PFN group it was 5%. Implant failure in DHS group was 15% (in one patient plate was broken, in two patients cut-out of lag screw) while in PFN it was 10% (cut-out of lag screw). Delayed union in DHS group was 5% while in PFN it was 10%. Coxa vara deformity in DHS group was 10% while in PFN group was 5%. By 6th postoperative week 70% patients in DHS group bear partial weight while 90% patients in PFN group. Full weight bearing in DHS group was between 12th to 24th postoperative weeks while in PFN group was between 12th to 18th postoperative weeks.

Overall clinical and radiological assessment- overall 85% satisfactory and 15%unsatisfactory result was seen in each treatment group. In Stable fracture, 92.30% satisfactory and 7.69% unsatisfactory result in DHS group while 90% satisfactory and 10% unsatisfactory result in PFN group. In unstable fracture, 82.33% satisfactory and 16.66% unsatisfactory result seen in DHS group, while 85.71% satisfactory and 14.28% unsatisfactory result seen in PFN group. In subtrochanteric and reverse oblique fracture, 66.66% satisfactory and 33.33% unsatisfactory result seen in PFN group while one pt treated with DHS had unsatisfactory result.

Post-op x rays of DHS

Pre & post-op x rays of long PFN

Table 1: age and sex incidence

Age	Male	Female	Total
31 to 40	2	3	5
41 to 50	3	4	7
51 to 60	4	8	12
61 to 70	6	6	12
71 to 80	2	2	4
	17	23	40

Table 2: mode of injury

Mode of Injury	Total no	male	Female
RTA	12	7	5
Major trauma	5	2	3
Fall from height	4	2	2
Trivial fall	19	7	12

Table 3: EVAN'S classification

Type	Fracture	No. Of cases	%
Stable	Type 1-- Undisplaced two fragment fracture	6	15%
	Type 2--Displaced two fragment fracture	17	42%
Unstable	Type 3— 3 fragment fracture without posterolateral support.	5	12.5%
	Type 4— 3 fragment fracture without posteromedial support.	6	15%
	Type 5— 4 fragment fracture without posterolateral and posteromedial support	2	5%
R	Reverse oblique (subtrochanteric)	4	10%
		40	

Table 4: size of implant use

Implant	size	No. Of pts	%
DHS	4 hole, short B	3	15%
	4hole, long B	13	65%
	6 hole, short B	2	10%
	8hole, long B	2	10%
PFN	10 mm, 360 mm	13	65%
	11 mm, 380 mm	5	25%
	12 mm, 360 mm	2	10%

Table 5: Duration of hospital stay)

Fracture type	No. Of case	Duration of stay (in days)	
		DHS	PFN
Stable	23	15 days	9 days
Unstable	13	18 days	15 days
RO/ST	4	21 days	18 days

Table 6: amt. Of callus at 6th, 12th, 18th, 24th, & 48th week

Amt of callus	DHS					PFN				
	6 th	12 th	18 th	24 th	48 th	6 th	12 th	18 th	24 th	48 th
Not visible	4	1	1	0	0	4	1	0	0	0
Little (+)	10	4	0	0	0	10	3	0	0	0
Fair (++)	2	12	16	20	20	3	12	18	20	20
Good (+++)	0	8	12	16	20	0	9	14	18	20

Note: S – Satisfactory outcome, US – Unsatisfactory outcome

Table 7: Radiological evaluation

Radiological Sign		DHS					PFN				
		6 th	12 th	18 th	24 th	48 th	6 th	12 th	18 th	24 th	48 th
Fracture gap	+ nt	16	3	1	N	N	18	2	1	N	N
	- nt	6	16	18	20	20	4	17	19	20	20
Bridging of Fracture gap	+ nt	15	17	19	20	20	16	18	20	20	20
	--nt	5	3	1	0	0	4	2	0	0	0
Visible callus	+ nt	16	18	20	20	20	14	18	20	20	20
	--nt	4	2	0	0	0	6	2	0	0	0
Trabecular pattern	+ nt	0	4	14	18	20	0	4	12	16	20
	--nt	20	16	6	4	0	20	16	8	4	0

Table 8: Range of movement at 12th, 18th, 24th and 48th week

Range of Hip movement	DHS				PFN			
	12 th	18 th	24 th	48 th	12 th	18 th	24 th	48 th
Full Range	14	18	20	20	16	19	20	20
5-10 degree short of full range	16	18	20	20	18	20	20	20
>50 degree of full range	18	19	20	20	20	20	20	20
<50 degree of full range	20	20	20	20	20	20	20	20

Table 9: Overall complications

Complications	DHS	PFN
Nil	11 (55%)	14 (65%)
infection	3 (15%)	1 (5%)
Broken implant	1 (5%)	0
Cut out of lag screw	2 (10%)	2 (10%)
Delayed union	1 (5%)	2 (10%)
Non union	0	0
Malunion (coxa vara)	2 (10%)	1 (5%)

Table 10: weight bearing ability

week	DHS		PFN	
	Partial	Full	partial	full
6 th	14	Nil	18	Nil
12 th	16	5	20	10
18 th	18	16	20	20
24 th	20	20	20	20
48 th	20	20	20	20

Table 11: overall clinical & radiological assessment

Fracture type	DHS			PFN			Total
	No.	S	US	No.	S	US	
Stable	13	12	1	10	9	1	23
Unstable	6	5	4	7	6	1	13
RO & ST	1	0	1	3	2	1	4
Total	20	17	3	20	17	3	40

Conclusion

In this study, there was no major difference in functional and radiological outcome between DHS and Long PFN. Though Blood loss, operative time, and soft tissue dissection was less in PFN as compared to DHS. Also, within first 3 month PFN allowed a faster restoration of postoperative walking ability as compared to DHS. Thus, from our observation we conclude that, results of DHS& PFN in stable fractures were found to be almost same, but in unstable fractures & subtrochanteric fractures long PFN gives better results as compared to DHS.

References

- Hunter GA. The result of operative treatment of trochanteric fracture of femur. Injury 1975; 6:202-205.
- Zickel Robert E. An intramedullary fixation device for the proximal part of femur. J.B.J.S. 1976; 58A:866-72.
- Hall G *et al.* comparison of nail plate fixation and Enders nailing for intertrochanteric fractures. J.B.J.S, 1981; 63-B:24-28.
- Wolfgang GL *et al.* Treatment of intertrochanteric fracture of femur using sliding screw plate. Clin. Orthop. 1982; 163:148-58.
- Heyse-Moore GH *et al.* Treatment of intertrochanteric fracture. A comparison of the Richards screw plate with Jewett nail plate. JBJS, 1983; 65B:262-67.
- Rueger Wu, Chi-Chaun *et al.* Journal of trauma infection and critical care. 1996; 41(4):699-702.
- Baumgaertner MR., Curtin SL, Lindskog DM. intramedullary versus extra medullary fixation for the treatment of intertrochanteric fracture. Clin. Orthop. Relat. Res. 1998; 348:84-94.
- Thomgren KG, Skytting B, Tidermark J, Burntson PO. Extra medullary fixation of 569 unstable intertrochanteric fracture. Acta ortho, 2001; 72:133-40.

9. Harrington P *et al.* Intramedullary hip screw versus sliding hip screw for unstable intertrochanteric femoral fracture in elderly. *Injury*, 2002; 33(1):23-28.
10. Saudan M *et al.* Pertrochanteric fracture: is there an advantage to an I.M nail? A randomized prospective study of 206 pts comparing the DHS and PFN. *JOT*, 2002; 16(16):386-393.
11. Nuber S *et al.* Stabilization of unstable trochanteric femoral fracture. DHS with trochanteric stabilization plate versus PFN. *Unfallchirurg*, 2003; 106(1):39-47.
12. Tyllianakis M *et al.* Treatment of extracapsular hip fracture with PFN: long term result in 45 patients. *Acta. Orthop. Belg.* 2004; 70(5):444-454.
13. Dean GL, David S, Jason HN. Osteoporotic pertrochanteric fracture; management and concurrent controversies. *JBJS*, 2004; 72B:737-752.
14. Ansari Moein CM, Verhofstad MHJ, Bley RLAW, Werken van der C. Soft tissue injury related to the choice of entry point in PFN, Piriformis fossa, GT tip. *Injury*. 2005; 36:1337-1342.
15. Daniel FA, Noesberger B. Is the PFN a suitable implant for treatment of all trochanteric fracture? *Clin. Orthop. Related Res*, 2005; 439:221-227.
16. Reska M, Veverkova L, Konecny J. PFN – a new stage in the therapy of extracapsular femoral fracture. *Scripta Medica (BRNO)*. 2006; 79(2):115-122.
17. Babhulkar Sudhir S. Management of trochanteric fracture, *IJO*, 2006; v-40(n-4):210-218.
18. Millind Porecha M, Deepak Parmar S. Long PFN versus DHS for treatment of intertrochanteric fracture: a randomized prospective study in 100 elderly patient. *The internet Journal of ortho. Surgery TM*, ISSN: 1531-2968.