



A Prospective comparative study of dynamic hip screw and proximal femoral nail for trochanteric fracture femur

Authors

Dr Vijendra Damor, Dr Sachin Upadhyay, Dr Sudheer Rawat*

Department of Orthopaedic, NSCB Medical College Jabalpur, Madhya Pradesh, India

*Corresponding Author

Dr Sudhir Rawat

58 Bapu Nagar, Near Ratlam Public School, Ratlam, M.P, India

Abstract

Aim and Objective: To compare the functional outcome of proximal femoral nailing and dynamic hip screw in inter-trochanteric fracture femur.

Material and Method: This prospective analytic study was conducted at the Department of Orthopedics and Traumatology NSCB MCH Jabalpur between 2011 to 2015. Total 64 Cases were selected by inclusion and exclusion criteria. Out of 64 cases, 30 cases were treated with PFN and 34 with DHS. All the operations were done under image intensifier control. Follow up of the patients were done up to 48th postoperative weeks for the assessment of functional and anatomical outcome.

Observation and Result: Present series is of 64 cases with average age of 50-70 years out of which 43.75% were male and 56.25% were female. Most common mode of injury was trivial injury/minor slip comprising 65.62% patients. Second commonest mode of injury was Road Traffic accident comprising 26.56%. The fracture was classified by EVAN'S classification, 65.62% cases were of stable fracture, 34.3% of unstable type. Fracture were reduced under image intensifier and fixed with D.H.S or P.F.N. By 3rd postoperative weeks, in PFN group 91.66% of cases were partial weight bearing with crutches, But in DHS group by 6th postoperative weeks 75% of cases partial weight bearing with help of crutches, full weight bearing in P.F.N group was 10.6 wk and in D.H.S group it was 14.8 wk. IN PFN group 6.66% and in DHS group 17.76% were having superficial infection, while 11.5% in D.H.S group had deep infection, no deep infection in P.F.N group.

Conclusion: In PFN group patients, blood loss and soft tissue dissection was less as compared to DHS group patients. Within first 3 months PFN allowed a faster postoperative restoration of walking ability as compared to DHS. It was found that there was no major difference between PFN and DHS treatment group long term follow-up in clinical and radiological features.

Keyword: Proximal Femoral Nail, Dynamic Hip screw, Inter trochanteric fracture femur.

Introduction

The intertrochanteric fracture are commonest fracture encountered in geriatric population. The incidence of this fracture increased a lot with

gradual increase in general life expectancy of the population. The fracture around hip accounts for about one third of all hospitalized patients. In elderly, 90% of extra capsular fracture results

from trivial injury while in young adult it results from high energy trauma like motor vehicle accident. The incidence of extracapsular fracture in elderly is more than fracture in young adult because of several factors like osteoporosis, decreased muscle power, poor vision. These fractures are associated with a substantial morbidity and mortality and account for a large amount of expenditure in the treatment. Elderly patients with extracapsular fracture and their hospital stay had prime concern of orthopaedic surgeon around the globe.

The treatment of extracapsular fracture had advanced greatly in the last three decades. In early nineteenth century patients were simply placed on skeletal traction in bed for prolonged period of time until healing occurred (usually 10-12 weeks). This was associated with many complication like malunion, shortening resulting in to functional impairment for patient. In the present scenario, with focus on anatomical and functional restoration without prolonged immobilization. Most of the Surgeons are preferring operative management. The Dynamic Hip Screw (DHS Richards) and Proximal Femoral Nailing (PFN) are most commonly used implant for this fracture. DHS is eccentric load sharing device work on principle of dynamic compression at fracture site. Dynamic action of DHS results in reduced incidence of cut-out and of penetration of the nail into the hip joint, as opposed to static devices. AO/ASIF in 1996 designed a new medullary implant Proximal femoral nail (PFN)¹. It has several advantage like being an axial, load bearing device, less soft tissue damage during surgery, comparatively less operating time, short lever arm, thereby decreasing the risk of failure of implant. Since 1970's, almost all the surgeons all over the world have opined that fractures around proximal end of femur should be operated routinely. Therefore internal fixation of trochanteric fracture has become established as the treatment of choice. The arguments favoring internal fixation has been based on such promises as the lower mortality rate, the need of less

nursing care, early release from hospital, prevention of bed sores and other medical complications, early ambulation and better end results. The goal of operative treatment is to restore anatomy (anatomical reduction), strong and stable fixation of the fracture fragments and resultant union afterwards within reasonable period of time. Common internal fixation devices: (1) Fixed angle devices;-Jewett fixed angle nail plate (1941), Fixed angle nail plate of Holt (1963),95 degree DCS plate (2) Sliding nail plate;-DHS (Richards), AO type plate and Medoff's Sliding plate (MSP) (3) Intramedullary devices;- Ender nail, Gamma locking nail, Proximal femoral nailing (PFN) In present day surgical practice, it is important to know whether a fracture is stable or unstable: The answer to this question will guide the reduction technique, the type of fixation to be used, and the postoperative management. A good classification must provide information on the fractures potential of being anatomically reduced with good apposition of the fragments. Also, it should be possible to tell, in the light of the classification, whether a particular fracture is likely to become secondarily displaced after fixation; this information must be available before the patient is allowed to weight-bear. Over the past 50 years, much has been written on the different methods of the fixation of extra capsular fracture. In order to appreciate the results, one needs to Study the fracture management modalities involved. The result will help to treat the patients of extra capsular fractures by best surgical modality in current phase of time.

Material and Method

Patients with extracapsular fracture upper end of femur attending orthopaedics emergency and OPD of NSCB medical college hospital Jabalpur were included in the present study. fracture. Total 64 Cases were selected by inclusion and exclusion criteria. Out of 64 cases, 30 cases were treated with PFN and 34 with DHS.

Inclusion criteria include patient with all type of trochanteric fracture with no specific duration of

illness. Exclusion criteria were patient with previous surgery of proximal femur, fracture with subtrochanteric extension, pathological fracture other than osteoporosis, polytrauma and patient going on any chemotherapy and radiotherapy for malignancy or those who are not will to participate in study. All patient were explained about surgical procedure and informed consent were taken from patient. After taking complete clinical examination and history taking it is recorded. An Antero-posterior view of pelvis with both hip in 15° internal rotation and involved hip lateral radiograph were taken. All patient shifted toward after all routine investigation, splintage and skeletal traction. patient had similar antibiotic coverage, operated after pre anesthetic check under spinal anesthesia or epidural anesthesia. Standard surgical techniques were selected for both DHS and PFN where closed reduction was done under C- arm guidance. All surgeries were performed by same set of surgeon. All surgeries were done by Indian made DHS and PFN. Postoperative AP and Lateral X ray were used to assess for adequacy of reduction and position of screw in head.

Table showing base line character

		PFN	DHS	TOTAL
no of patient		30	34	64
male		15	13	28
female		20	16	36
FRACTURE	STABLE	20	22	42
	UNSTABLE	12	10	22
Mode OF trauma	trivial	24	18	42
	RTA	10	7	17
	Other	4	1	5

Out of 64 cases, 34 were treated with DHS while 30 cases with PFN. 28 (43.75%) were male and 36(56.25%) were female patients. Average age of patients was 51 to 70 years (60% patients). Most common mode of injury was trivial injury/minor slip comprising 65.62% patients in which 31.25% female and 15.62% male, second commonest mode of injury was Road Traffic accident comprising 26.56%, in which 15.62% were male and 9.37% were female. On Evan's classification

Postoperative follow up- From the first postoperative day patient was encouraged to do exercise for hip and knee joint. Stitches were removed on 14th /15th postoperative day. Patients were allowed for partial weight bearing with the help of crutches after 3rd week in simple stable fracture and after 6 weeks in comminuted posteromedial cortex of trochanter in both group, all patient were followed up at 6th, 12th,18th,24th and 46 weeks. With each visit patient were examined clinically for any infection, swelling, deformity like (shortening, rotational deformity, gait), range of movement at hip and knee. X Ray were taken (view of pelvis showing both hip AP and Lateral view of operated hip including thigh) to assess status of union and position of implant.

Observation

The present study is done on 64 cases of extracapsular fracture of proximal of femur, admitted and treated in Department of Orthopaedics and Traumatology NSCB MCH Jabalpur during the period from August 2011 to July 2015.

42 (65.62%) were of stable type, 22 cases (34.37%) of unstable type.

The average hospital stay of PFN was for period of 16 days while in DHS treated patients average duration of stay were 17 days.

During each visit patient were examined clinically and radiologically to check status of union or for any uninvited complication.(table 3,4).

Table showing observed parameter.

			PFN	DHS	TOTAL
Hospital stay		average	16 day	17 day	
Union		average	10.6 week(avg)	14.8 week (average)	
infection			2	10	
Weight bearing					
	1	Partial	3wk	6wk	
	2	full	10.6wk	14.8wk	
Deformitry		coxavara	4	10	14
	2	coxavulga			
	3	ER		4	4
	45	IR	2	6	8
		Shortning	5	10	15
hardware failure			2	2	4

In PFN treatment group, Position of implant was found to be satisfactory in majority of cases (Approx. 100%) of stable type fracture. One case with unstable type had unsatisfactory result (cut out of lag screw from lat. Cortex)

In DHS treatment group, position of implant was found to be satisfactory in majority of cases of stable type fracture .In one case with unstable type fracture had unsatisfactory result (lag screw was not positioned centrally in the neck).

At 6th postoperative weeks, in PFN treatment group patients 90% (27 cases) out of 30 cases were taking partial weight with help of crutch. By 12th weeks all patients were walking comfortably. In DHS group, at 6th postoperative weeks 76.47% (26 cases out of 34 cases) bear partial weight, by 12th weeks 79.41% (27 cases out of 34 cases) and by 18th weeks all patients bear partial weight. In PFN group patients, full weight bearing start from 6th postoperative weeks (in 5 patients), by 12th week in 19 patients and by 18th postoperative weeks all 30 patients bear full weight ,while in DHS group full weight bearing start from 12th postoperative weeks and by 24th postoperative weeks all 34 patients bear full weight.

There was 4 coxavara deformity of 0° - 10° at 24th postoperative weeks in PFN treatment group. In DHS treatment group, 7 (20.58%) patients had coxavara 0° - 10° at 24th weeks. 2 patients 10° - 20° coxavara deformity at 24th weeks and 1 patient at 48th weeks. Coxavalga deformity was not found in any patient. 4 patients (11.76%) in DHS treatment group had external rotational

deformity and 6 patients (17.64%) had internal rotation deformity while only 2 patients in PFN group had internal rotational deformity.

Two cases (6.66%) in PFN group had superficial infection while 6 patients (17.64%) in DHS group had superficial infection. Average incidence of infection was 11.5%, there was no deep infection in PFN group while 4 cases (11.7%) of DHS group had deep infection. In 2 case (5.88%) of DHS group, DHS plate was broken. Two patients (6.66%) had pain around nail insertion site in PFN group. Two elderly patients had cutout of anti rotational lag screw in PFN group.

Discussion

The treatment of trochanteric fracture requires great skill. If not treated properly it can lead to various deformity like varus and shortening. Key for stable fixation depends on restoring biomechanics of hip joint and respecting soft tissue. Many research are going on to find out ideal implant for trochanteric fracture fixation. But in our country due to lack of recent facilities, limited number of hospital beds, limited number of operation theater working days, overcrowding of patients, limited experienced and qualified personnel, lack of patient awareness, operative fixation is obviously delayed. In the present series, 64 cases of extra capsular fractures had been treated. Out of 64, 30 (46.87%) cases were treated with PFN and 34(53.12%) were treated with DHS; the results were tabulated and compared.

Age Incidence

In this study the average age of patients were between 18 to 80 years. The maximum patients were in the age group of 61 to 80 in male patients and in females between 51 to 70 years respectively. In this series the youngest patient was 21 year old and oldest one was 79 years. Harrington and Johnston (1973)⁽²⁾ reported average age of 70 years, Hunter (1975)⁽³⁾ – 71 years, Kuderna et al. (1976)⁽⁴⁾ reported average age of 68 years, Zickel⁽⁵⁾ (1976) reported 63 years, Cuthbert and Howat⁽⁶⁾ (1976) 73.5 years, Poigenfurst and Schnable⁽⁷⁾ (1977)- 77 years, Laskin et al.⁽⁸⁾ (1979) reported average age of 86 years, Wilson et al.⁽⁹⁾ (1980) 78.2 years, Max. P. et al.⁽¹⁰⁾ (1986) 81.7 years, Domingo L.T. et al.⁽¹¹⁾ (2001) 80 years, Doub P .et al⁽¹²⁾(2002) 68 years Saudan M. et al⁽¹³⁾ (2003) reported average age 55 years, Tyllionksi M. et al⁽¹⁴⁾ (2004) reported average age 71.3 years. In western countries life expectancy was higher than Indians. The average life expectancy was 78 years in western countries while in India it was 64 years. Indians reached their senility earlier than western people, so these fractures were seen at an earlier age in India.

Sex incidence: In the present study of 64 cases, 29 cases (45.31%) were males and 37 cases (57.81%) were females. Sex incidence reported by different authors were as follows : Harrington and Johnston⁽²⁾ (1973) reported 42% male and 58% female, Poigenfirst and Schnable⁽⁷⁾ (1977) 17% male and 83% female, Laskin et al⁽⁸⁾ (1979) reported 18% male and 82% female cases, Heyse-Moore et al⁽¹⁵⁾ (1983) 26% male and 74% female cases, Rueger J. M. et al⁽¹⁶⁾ (1996) reported 26% male patients and 74% female patients. Reska M. et al⁽¹⁷⁾ (2006) reported 30% male and 70% female. In maximum number of literature there was female predominance in extracapsular fracture upper end of femur. The reason for the female predominance might be due to physiological (postmenopausal osteoporosis) and less outdoor activity leading to weakened and early fragility of bone.

Mode of injury: In the present study most common mode of injury is trivial trauma 42 cases (65.62%), second most common is road side accident 17 patients (26.56%) and fall from height is 5 case (7.81%). Patient with slip and fall were of older age group while RTA patient were younger age. similar result were reported by jonnes et al⁽¹⁸⁾.

Hospital Stay: In the present study average hospital stay for PFN treatment group patient was 16 days while in DHS treatment group patients from 17.. Factors affecting the average hospital stay in the present study include delayed in consent of patients to the surgical treatment and limited number of operation theatre working days in a week as compared to input of patients. Similar result was found by bhatti et al⁽¹⁹⁾ and Haal and Ainscow⁽²⁰⁾ (1981)

Union of Fracture: The average time of union clinical(no local tenderness, painless ROM) AND Radiological(callus formation full weight bearing in PFN was 10.6 week and for DHS it was 14.8 weeks, similar result were found by pajarein et al²¹, kumar et al²² and Shankar et al²³.

Post Operative Weight Bearing: In the present study, the patients were mobilized in bed to a sitting posture in the first postoperative day to decrease the incidence of pulmonary thromboembolic and urinary tract complication. Walking with partial weight bearing with the help of crutch/walker was allowed in PFN group from 3rd postoperative weeks and in DHS group from 6th postoperative weeks. The average period of full weight bearing in PFN group was 10.6 postoperative weeks while in DHS group 14.8 postoperative weeks.

Functional Results: In the present study we treated patients of extracapsular fractures with Dynamic hip screw and proximal femoral nailing. Early range of movement of hip and knee joint, Weight bearing in PFN group compare to DHS group.

Deformity: There was 4 coxavara deformity of 0° - 10° at 24th postoperative weeks in PFN treatment group. In DHS treatment group, 7

(20.58%) patients had coxavara 0° - 10° at 24th weeks. 2 patients 10° - 20° coxavara deformity at 24th weeks and 1 patient at 48th weeks in DHS group. Coxavalga deformity was not found in any patient. 4 patients (11.76%) in DHS treatment group had external rotational deformity and 6 patients (17.64%) had internal rotation deformity while only 2 patient in PFN group had internal rotational deformity (table 6). 2 patient (6.66%) in PFN group had shortening of affected limb between 0-2 cm while 6 patients (17.64%) in DHS group had shortening of limb between 0-3 cm.

Infection: In this study Two patient (6.66%) in PFN group while 6 patients (17.64%) in DHS group had superficial infection. -In DHS group there were 4 patients (11.76%) who developed deep infection while there was no incidence of deep infection in PFN group - The average incidence of infection in this study was 11.5% According to available literature, incidence of wound infection in operative treatment of extracapsular fracture upper end of femur varies from 1.7%-16.9%.

Hardware Failure: In present study, -Two patient in DHS group had implant failure (broken of DHS plate of 8 holes after 18th postoperative weeks). – Two elderly patient in PFN group had cutout of antirotational lag screw at 12th postoperative weeks; it might be due to osteoporosis or poor quality of implant. In majority of cases there was no implant failure in this study

Conclusion

DHS fixation in proximal extracapsular trochanteric fracture require less time, less radiation exposure but has more blood loss and soft tissue damage. PFN has less blood loss, early weight bearing. But in long term follow up there was no significant difference in clinical and radiological union.

References

1. Godegone Wasudeo M, Salphale Yogesh S, short proximal nail, J Orthopaed surg. 2010;18(1):39-44.
2. Harrington, K.D. and Johnston, J.O. (1973): The management of comminuted Unstable Intertrochanteric Fractures. J. Bone Joint Surg., 55A: 1367-1376.
3. Hunter, G.A. (1975): The Results of operative Treatment of trochanteric fractures of the Femur. Injury 6: 202-205
4. Kuderna, H. et al (1976): Treatment of Intertrochanteric and Subtrochanteric Fractures of the Hip by Ender method. J.Bone Joint surg., 58A: 604-611.
5. Zickel, Robert E. (1976): An Intramedullary Fixation Device for the proximal part of the Femur J. Bone Joint Surg. 58 A: 866-72.
6. Cuthbert, H. et al (1976): The use of Kuntscher Y-nail in the treatment of intertrochanteric and subtrochanteric fractures of Femur. Injury 8: 135-42.
7. Poigenfurst, J. et.al (1977): Multiple Intramedullary Nailing of Pertrochanteric Fractures with Elastic Nails. Operative procedure and Results. Injury 9: 102-13.
8. Laskin RS et al (1979): I.T. fracture of hip in the elderly. Clin. Ortho. 101: 110-119.
9. wilson, G.E. et al (1980): The Significance and a Comparative analysis of Epidemiology of Hip Fractures. Clin. Orthop. 152: 35-43.
10. Esser, M.P., et.al (1986): Trochanteric Fractures of the Femur. J. Bone Joint Surg., 68B: 557-560.
11. Kim, W.Y et. al (2001): Failure of intertrochanteric fracture fixation with a dynamic hip screw in relation to pre-operative fracture stability and osteoporosis. Int. Orthop. 2001; 25(6): 360 – 2.
12. Harrington P. et al (2002): Intramedullary hip screw versus sliding hip screw for unstable intertrochanteric femoral fractures

- in the elderly. Injury, 2002 Jan.; 33(1): 23 – 8. 12).
13. Saudan, M. et al (2002): Pertrochanteric fracture: is there an advantage to an I.M. nail? : A randomized, prospective study of 206 patients comparing the DHS and PFN. J. Ortho. Trauma 2002 July, 16(16): 386-93.
 14. Tyllianakis M. et al (2004 Oct.): Treatment of extracapsular hip fractures with the proximal femoral nail; long term results in 45 patients. Acta. Orthop. Belg. 2004 Oct; 70(5): 444-54.
 15. Heyse-Moore, G.H. et al (1983): Treatment of Intertrochanteric Fractures. A comparison of the Richards screw plate with Jewett nail plate. JBJS, 65B: 262-267.
 16. Rueger, Wu, Chi-Chaun et al (1996): Journal of trauma infection and critical care. 41(4): 699-702.
 17. Reska M, Veverkova L, Konecny J. Proximal femoral nail (PFN) – A new stage in the therapy of extracapsular femoral fractures. Scripta Medica (BRNO). 2006; 79(2):115-22
 18. jonnes C Sm S, gutman G et al Arch Bone jt Surg.2016;4(1)23-8.
 19. Bhatti A, Power D et al A Prospective trial PFN vs DHS for unstable intertrochanteric fracture JBJS Br 2004;86:377
 20. Hall, G, et al. (1981): Comparison of Nail plate fixation and Enders nailing for intertrochanteric fractures. J.B.J.S. 63-B: 24-28.
 21. Pajarinen J, Lindahl J et al Peritrochanteric femoral fractures treated with a DHS or PFN. Bone Joint. 2005;87(1):76-81.
 22. Kumar R, Singh RN et al comparative study between PFN and DHS in treatment of intertrochanteric femur fracture. J Clin Ortho Trauma 2012;3 (1)28-36.
 23. Ravi Shankar P, Anil V et al comparative study between PFN and DHS in management of intertrochanteric fracture of femur JEBMH,2015;2(5):541-50.