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Comparative study of Hemireplacement Arthroplasty with bipolar prosthetic and proximal femoral nail (PFN) in unstable intertrochanteric fracture of Femure: interventional prospective randomized study

[1]Jitendra Singh Rathore, Junior Specialist, Department of orthopaedics, District hospital Rajsamand

[2]Lokpal Singh Bhati, Medical Officer, Department of orthopaedics, District hospital Jaisalmer

[3]Devendra Singh Rathore, Consultant orthopaedics, Department of orthopaedics, Rajasthan hospital, Jodhpur

Corresponding Author: Jitendra Singh Rathore, Junior Specialist, Department of orthopaedics, District hospital Rajsamand

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Abstract

Background: Hip fractures are among the most devastating injuries in the elderly patients. Hip fractures in young adults are often the result of high energy trauma while in contrast 90% of hip fractures in elderly result from trivial trauma – a simple fall, tripping over a rug, arising from chair, or some slight misstep. The proposed study is aimed to compare cemented bipolar prosthetic replacement and Proximal Femoral Nail (PFN) in the management of unstable Intertrochanteric fracture of femur.

Methods: The present study was prospectively carried out in 60 consecutive patients of Fracture Intertrochanter Femur and treated with Hemiarthroplasty with Cemented Bipolar Prosthesis and Proximal Femoral Nail.

Results: The average mobility score in PFN group is 8.11±0.82 and in Bipolar group is 7.16±0.76. Final mobility score is better in PFN group (P value 0.01) than by Bipolar group.

Conclusion- Hip arthroplasty is an effective procedure after failed internal fixation of an intertrochanteric fracture of an older patient. Most patients report good pain relief.

Keywords: PFN, Fracture, Orthopaedics

Introduction

Osteoporotic hip fractures have become a major cause of morbidity and mortality in the adult and elderly population around the world. Hip fractures are becoming a matter of concern in Asia particularly because of a 2e3 times increase in their incidence in almost every country in the continent. The incidence of hip fracture is estimated to rise from 1.66 million in 1990 to 6.26 million in 2050.[1]

The need for internal fixation and early mobilization of patients with intertrochanteric fracture femur is now thus widely accepted. However, most patients with intertrochanteric fractures have severe osteopenia and this along with comminution in elderly osteoporotic patients renders internal fixation difficult. In addition

comminution along calcar and posterior cortex leads to varus malpositioning of the fracture fragments.[2]

Rigid nail plate devices used initially for stabilization of these fractures caused mechanical complications like nail penetration and breakage of plate component, especially in unstable intertrochanteric fracture that collapsed into more stable position. This resulted in innovation of sliding fixation devices so as to allow controlled collapse during conversion of an unstable fracture into stable position.[3]

The DHS superceded earlier devices such as McLaughlin Plate, Angle Blade Plate and the Jewitt nail plate, but failure of fixation still occurs in up to 20 percent cases. Cutting out of implant from the femoral head continues to be an important cause of mechanical failure with these implants though its incidence is determined by factors like fracture subtype, quality of reduction, implant position and bone density.

An intramedullary device (Gamma nail) has some theoretical advantage over DHS and its predecessors. It is not dependent on screw fixation of a plate to the lateral cortex, which can be a problem in very osteoporotic bone. In addition, as the load is transmitted to the femur along a more medial axis, it has a shorter moment arm. However, these devices have also been associated with increased risk of intraoperative and postoperative femoral shaft fractures. Another long term complication has been the incidence of thigh pain possibly secondary to distal locking, lack of an anterior bow of the implant and nail length. To avoid this Long PFN is used now. Simple intertrochanteric fractures can easily be treated by Osteosynthesis with proximal femoral nail (PFN) with good result.[4,5]

Material and Methods

Type of study- Randomised Prospective Interventional Comparative Study

Inclusion Criteria

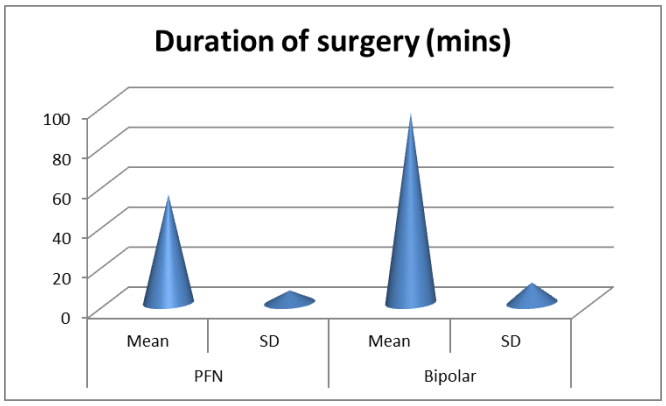
- Patients admitted in department of orthopedics with Unstable intertrochanteric fractures of femur (Evan's type third, fourth and fifth)
- Age 60-80 years
- Patients who have given informed and written consent

Exclusion Criteria

- Patient unfit for surgery as per A.S.A. (American Society of Anaesthesiologists) guidelines.
- Patient having previous hip surgery
- Patient having pathological fracture
- Patient having Associated fracture
- Patient having compound injury.

Observation

The age of the patients in present study was in range of 60 - 80 years. There was a preponderance of female in present study in both groups.



The mean duratioin of surgery in the Bipolar group (95.36±10.21 minutes) was much more that in PFN (53.10±6.25 minutes) group.

Table 1: Post-Operative Hospital Stay

	PFN		Bipolar	
	Mean	SD	Mean	SD
Post-operative stay	5.12	1.76	5.21	1.36
P value	>0.05 (NS)			

All patients of Bipolar group was discharged 5.21±1.36 days and in PFN was to 5.12±1.76 days after surgery.

Table 2: Wound Infection

	PFN		Bipolar	
	No.	%	No.	%
Nil	27	90.00	30	100.00
Staphylococcus aureus Infection	3	10.00	0	0
Total	30	100.00	30	100.00
P value	0.472(NS)			

Out of the 30 patients, 3 patients infected with staphylococcus aureus in PFN group. No patient infected in Bipolar group

Table 3: Limb Length Discrepancy

	Bipolar		PFN	
	No.	%	No.	%
Shortening	20	66.67	0	0
Lengthening	10	33.33	0	0
Total	30	100.00	0	0

There is no LLD in PFN group in Bipolar group 20 patients have shortening and 10 patients have lengthening.

Table 4: weight bearing

	PFN		Bipolar	
	Mean	SD	Mean	SD
Full weight bearing	12.11	1.61	5.15	3.16
P value	P<0.001			

Most of the patients were allowed to bear weight with support of walker beginning from 3rd Post operative day in Bipolar group and 10th post operative day in PFN group.

Table 5: Final Harris Hip Score

	PFN		Bipolar	
	Mean	SD	Mean	SD
Final Hip Score	88.36	4.34	85.34	8.11
P value	<0.05 (S)			

The average harris hip score in PFN group is 88.36±4.34 and in Bipolar group is 85.34±8.11

Table 6: Final Mobility Score of Parker and Palmer

	PFN		Bipolar	
	Mean	SD	Mean	SD
Final Mobility score of parker and palmer	8.11	0.82	7.16	0.78
P value	<0.01 (S)			

The average mobility score in PFN group is 8.11±0.82 and in Bipolar group is 7.16±0.76. Final mobility score is better in PFN group (P value 0.01) than by Bipolar group.

Discussion

Intertrochanteric fractures in elderly osteopenic patients especially those who cannot follow limited weight bearing instructions, continue to vex orthopaedic surgeons. The best treatment for intertrochanteric fractures in such patients remains controversial. The discussion about ideal implant still continues and the variety of methods available attest to the difficulty encountered in the treatment of this fracture.

In an attempt to improve results and decrease the complications inherent in the postoperative period, Massey and then Holt developed more effective internal fixation. Holt reported walking his patients in 7 days with good results. Other orthopaedic surgeons though did not obtain results as good as these authors and other answers to the treatment of this fracture were sought. Dimon and Hughston and then Sarmiento developed osteotomies to obtain valgus position and good bone apposition and reported good results. Ecker et al reported good results using compression screw. However, Laros reported that in his series of 244 patients neither medial displacement nor anatomic reduction improved his results. He further stated that treatment should be chosen, first as a means of

stabilizing the fracture at minimum risk to patient, so as to allow early mobilization . Many surgeons have recommended that the hip be protected throughout the healing period in patients who have intertrochanteric or subtrochanteric fractures that have major comminution, osteoporosis, or poor fixation of screws. The poor mechanical properties of weak and porotic bones in these elderly patients do not usually provide a firm purchase for the screws. Though fracture healing and functional restoration are important but are secondary to the overall welfare of the patient. This summarises our philosophy in the treatment of intertrochanteric fractures in elderly patients with arthroplasty and proximal femoral nail (PFN).

The mean duratioin of surgery in the Bipolar group (95.36±10.21 minutes) was much more that in PFN (53.10±6.25 minutes) group. The operative time was much more in Bipolar than the PFN group and result are significant. This is comparatively same as previous studies:

Authors	Operative time	Prosthesis
Chan, Gurdev [6]	69 mins	Modular endoprosthesis
Stern, Goldstein[7]	80.5 mins	Leinbach prosthesis
Present study Bipolar	93.83mins	Cemented Bipolar prosthesis

Early mobilization is well known with Bipolar hemiarthroplasty.

Patients were trained to begin walking with walker earlier in bipolar group to reduce postoperative complications of prolonged recumbeney like pneumonia, bed sore, DVT etc.

In Bipolar group patients were discharged after being trained to walk with Walker with full weight bearing. In PFN group patient were told exercises to strengthen muscle and increase range of motion and walk started after 10 to 15 days.

This is comparatively same as previous studies as Kayali c et al,[8] in their study showed that time to full weight bearing was significantly earlier in the hemiarthroplasty group as compare to the PFN group.

The patients who were ambulatory at discharge gradually improved over follow up period and were able to transition from walker to cane and few patients without support. Age, gender, prefracture health status and social dependency before fracture are important factors determining functional recovery after surgery. Other patient never followed any physiotherapy advices and showed up after one year with an attack of stroke and continue to remain bedridden. This indicates the importance of following of strict physiotherapy regime for good outcome of surgery in patients. Majority of patients gained good range of motion with physiotherapy.

Limb length discrepancy was absent in PFN group and in Bipolar group 66.67% of cases in present study had limb shortening >10 mm and 33.33% had limb lengthening >10 mm. Some may say that one set of problems associated with internal fixation (loss of fixation, hardware cut out) are being traded with another set of problems in arthroplasty (limb length discrepancy), but if center of prosthesis is taken at level of greater trochanter tip then appropriate limb length can be maintained. In cases when greater trochanter is fractured, a surgeon can still make the length determination by repositioning the fractured greater trochanter anatomically and observing the tension of fascia over the gluteus medias. Anteversion and retroversion of the prosthesis can be determined with

the use of posterior aspect of lateral femoral condyle as a guide.

Conclusions

Hip arthroplasty is an effective procedure after failed internal fixation of an intertrochanteric fracture of an older patient. Most patients report good pain relief.

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