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A PROSPECTIVE COMPARATIVE STUDY OF EXTRAMEDULLARY IMPLANT (DHS) VS INTRAMEDULLARY IMPLANT (PFN) IN SUBTROCHANTERIC FRACTURES OF FEMUR

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KEYWORDS :

INTRODUCTION

Subtrochanteric fractures account for 2-5% of all the proximal femur fractures and 10-30 % of all the Hip fractures (1). Though less common than intertrochanteric and femoral neck fractures, these are important because of their challenging management for biomechanical and anatomical reasons. These fractures are encountered both in young and old age. Fractures in young patients are usually associated with high energy trauma and those in old age are associated with low energy trauma (2-5). The lever arm of the femoral neck produces large compressive stresses in the medial and large tensile stresses in the lateral subtrochanteric cortex. If fracture in this region is unstable, these stresses are transmitted to any fixation device, leading to a high failure rate. This biomechanical problem is compounded by powerful muscle vectors and by a predominance of cortical bone which takes longer to heal.

During the last 50 years, the treatment of subtrochanteric femur fractures has evolved with improved understanding of both fracture biology and biomechanics. Early techniques of surgical repair demonstrated unacceptably high rates of complications; however, the benefits of restoring the anatomy and encouraging early mobilization are recognized and have led to significant research and improvement in implants. Currently, the subtrochanteric fracture remains technically challenging, even to experienced fracture surgeons.

Many surgeons have introduced number of new devices but there is not a single one which can be used with confidence and full reliance. Ongoing efforts to find an acceptable implant has resulted in a wide variety of implants having some advantages and disadvantages. Here is a study of 26 cases of subtrochanteric fractures. The goal was to find the better implant between dynamic hip screw (extramedullary fixation) and proximal femoral nail (intramedullary fixation) while treating these fractures.

MATERIALS AND METHODS

This is a study of 26 cases conducted in our hospital between oct 2020 to sept 2022. 13 of these cases were operated by DHS and another 13 cases were operated with PFN.

The fractures were classified on the basis of Seinsheimer classification.

Seinsheimer Classification[25] - This system incorporates factors affecting stability and offers management guidelines. It was based on fracture location, amount of displacement and degree of comminution.
Type I – fractures less than 2 mm displacement
Type II - displaced two-part fractures with:
IIA-transverse fracture pattern
IIB-Oblique fracture pattern, with lesser trochanter attached to the proximal fragment.
IIC Oblique fracture pattern, with lesser trochanter attached to the distal fragment.
Type III - displaced three-part fracture where:
IIIA-Lesser trochanter is a separate fragment
IIIB- Lesser trochanter is attached to either the proximal fragment or the distal fragment.
Type IV – displaced four-part fracture
Type V - fracture with extension through greater trochanter.

Out of the 13 cases treated by DHS eight cases were of type II(out of which four were of type IIb and another four of type IIc),three cases were type III (one type III a & two IIIb),rest two were of type V. Out of the 13 cases treated by PFN six cases were of type II(four of type IIb & two of IIc), five of type III(four of type IIIa &one of IIIb),one of type IV and rest one of type V. None of type I were there in our series.

Three patients treated with DHS and four treated with PFN were more than 50 years.21 were males (ten by DHS and 11 by PFN) and 5 were females (three by DHS and 2 by PFN). Operations were performed as soon as the anaesthetic fitness permitted. All of the cases were performed within three weeks. All the patients were operated in the fracture table under image intensifier. Care was taken not to devascularise the comminuted fragments.

The purpose of the procedure was to achieve internal fixation of the fracture with either intramedullary fixation (PFN) or by extramedullary fixation (DHS) leading to union and hastening mobilization. Post operative mobilization(partial weight bearing) were delayed for six weeks in all of our cases as most of our cases were comminuted and lack of medial cortical support. The criteria for full weight bearing was radiographic evidence of healing and absence of pain.

Radiographs were taken in the immediate post operative period, then at six weeks, six months and 1 year. Fracture union was taken as the period between injury and full weight bearing with roentgenographically healed fracture characterised by cortical bridging of the fracture in two views. Average time of union were 16 weeks in PFN and 18 weeks in DHS.

Results were evaluated on the basis of Modified Schantzkar –Lambert score which is based on clinical and radiological scores.

RESULTS

As per the Modified Schantzkar-Lambert scoring system, group with DHS (13 cases), shows excellent outcomes in five cases(38.4%), five(38.4%) good cases ,two(15.38%) fair and one(7.69%) poor cases. In the second group with PFN(13 cases),there were 6 (46.15%) excellent, 4 (30.77%)good ,2(15.38%) fair and one (7.69%)poor case.

Average period of hospitalization was 5-14 days in PFN fixation where as 11-18 days in DHS fixation. Most of the cases in both DHS and PFN united satisfactorily within 16 weeks. Three cases of PFN had delayed union were those where open reduction had to be done with intervention. Two cases of DHS showed delayed union but that too united without any active intervention.

In 4 out of 13 cases (30.77%) of PFN group needed open reduction. In DHS group difficulties were seen in 4 cases out of 13 cases. (30.77%)

The mean duration of surgery was 100 min in case of DHS group and 90 min in cases of PFN group.

Location of entry point was difficult in one obese patient treated with PFN. This is common occurrence in obese pts. Inappropriate reduction was seen in type IIC(two cases) and type V(one case) fracture treated with PFN, which lead to malposition of implant in varus malalignment and shortening. These three cases were. managed by reduction and holding by SS wiring. Two of these cases(15.39%) were done in the same setting and one case was done after 2 weeks interval. In two cases of DHS(15.39%) gap was present between plate and lateral cortex because of inappropriate implant ,which was managed with bone grafting.

There were one case (7.69%) of deep infection both in case of DHS and PFN group which subsided with IV antibiotics and one case of superficial infection in DHS group. There were two cases(15.38%) of joint stiffness in case of DHS. One case (7.69%)of device failure was there in DHS group which was managed later by long recon nail. Overall post operative complications were more in DHS group than in PFN group.

Results Obtained In Individual Types.

DHS

Results	I	II			III		IV	V	Total
		IIa	IIb	IIc	IIIa	IIIB			
Excellent			2	1	1			1	5
Good			2	2		1		1	6
Fair				1		1			2
Poor									
Total			4	4	1	2		2	13

Excellent Results(38.46%) In Case Of Dhs Fixation Are Mainly Achieved In Seinshemier Type Ii(23% Cases) & Of These Mainly In Type IIb(15.38%) Against IIc (7.69 Cases).

PFN

Results	I	II			III		IV	V	Total
		IIa	IIb	IIc	IIIa	IIIB			
Excellent			1	1	2	2			6
Good			1		2		1		4
Fair			1					1	2
Poor				1					1
Total			3	2	4	2	1	1	13

Excellent Results Were Seen In (46.15% Cases) In PFN Out Of These Mainly In Type III(30.77%).

Comparative Percentage Of Results

Results	DHS %	PFN %
Excellent	53.84	46.15
Good	46.15	30.76
Fair	15.38	15.38
Poor	0	7.69

Delayed union was more common in the most comminuted fracture pattern i.e. one each in type III and type V when treated with extramedullary fixation. Fortunately there was no case of non union. No significant difference between intramedullary fixation and extramedullary fixation were seen overall in our studies. But extramedullary fixation were better in type IIb fractures and intramedullary fixation in IIIa fractures.

DISCUSSION AND CONCLUSION

Subtrochanteric fracture is the fairly common fracture occurring in general population accounting for 10-30 % of all hip fractures. It commonly occurs in younger age group due to high energy trauma and elderly age group due to low energy fall. It has been proved from time to time that there is no one common solution to the problem and no panacea. Thus, it presents formidable problem to its treatment.

We have treated 26 subtrochanteric fractures, treatment is analysed, compiled and data is presented.

Before the introduction of suitable fixation devices in the 1960s treatment of proximal femoral fractures was mainly non operative but with increasing evidence of the morbidity of prolonged bed rest in traction, non operative treatment methods are seldom used. A number of complications associated with prolonged bed rest such as decubitus ulcer and thromboembolic phenomenon and others such as malalignment and joint stiffness occurred by conservative methods.

To avoid these complications and for rapid mobilization and restoration of function, majority of fractures should be treated operatively. Restoration of mobility in-patients with unstable fractures ultimately depends on the strength of surgical construct. There are multiple factors and variables, which affects the biomechanical strength of repair. Surgeon independent variables are bone quality, fracture pattern and stability. Whereas surgeon dependant variables are quality of fracture reduction and choice and placement of implant. Varieties of implants have been used to fix these fractures. Cost of the implant remains one of the important factor in the management in poor patients who cannot afford for the relatively expensive intramedullary fixation implants. With better understanding of biomechanics of subtrochanteric fractures there has been development of better implants.

Its an old saying that when you have multiple options none of them is “the option”. This holds true for the present study too. Although intramedullary fixation seems to be a better fixation in terms of less hospital stay, duration of surgery, less blood transfusion and post operative complications than if performed by closed reduction but intraoperative difficulties were more encountered in intramedullary fixation and is a technically demanding operation.

Intraoperative technical difficulties associated with PFN can be reduced by thorough knowledge and understanding of both the anatomy and implant. By using some technical tips difficult closed reduction can be done and internal fixation with PFN can be attempted. Methods of fixation depends on the fracture pattern and the duration of injury. Despite peri-operative problems PFN gives better results with fracture with medial comminution(such as Seinsheimer typeIII). Expences of the surgery (in implants) had been kept in mind as per the patients affordability.

To conclude, any modality of treatment done with proper expertise, maintaining ideal surgical steps and principles carry same results.

PFN carry better results in comminuted subtrochanteric fracture with lack of medial cortical support as compared to the DHS where excessive soft tissue dissection have to be carried out, but is a technically demanding procedure.

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