

## The Unsolved Fracture Treatment Options, Radiological and Functional Outcome comparison in Fracture Neck of Femur in Elderly Population

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### Abstract

The fracture neck of femur has posed a great challenge to the orthopaedic surgeons since a long time. In spite of so many methods and procedures which have been tried to overcome this mishap, it still lives up to its disrepute of being the “unsolved fracture”, as far as treatment and results are concerned. This study has been done retrospectively in the Department of Orthopaedics and Trauma Centre in J. A. Group of Hospitals, Gwalior (M. P.) patients with intracapsular fracture neck of femur, in Age Group >60 years with no other significant medical or surgical comorbidities. Our study concluded that The present study showed that total hip arthroplasty compared to internal fixation and hemiarthroplasty for the treatment of femoral neck fractures significantly reduces the risk of reoperation at the cost of higher blood loss and increased surgical time. though the incidence of other complication were at par what was given in literature, hemiarthroplasty was not a good surgery for patients who have a longer life expectancy. Because With the increasing time after surgery, there was an increasing proportion of patients with painful hip. and prosthetic protrusion and subsequent revision to THA. Furthermore postoperative function as evaluated by the Harris hip score was significantly higher in the total hip arthroplasty compared to the internal fixation and hemiarthroplasty group, up to two year of evaluation. The findings suggest that in the THA group, good functional outcome like early rehabilitation, better function and clinical results and reduced incidence of complications and good patient compliance so total hip arthroplasty might be a better choice than internal fixation and hemiarthroplasty in treating elderly patients with a femoral neck fracture.

**Keywords:** Radiological, functional, fracture

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### Introduction

The fracture neck of femur has posed a great challenge to the orthopaedic surgeons since a long time. In spite of so many methods and procedures which have been tried to overcome this mishap, it still lives up to its disrepute of being the “unsolved fracture”, as far as treatment and results are concerned. The incidence of femoral neck fractures, in the elderly increasing continuously due to the ageing of population on the planet and urbanization. In terms of global economic instability, increasingly more funds would have to be paid by the health systems for treatment of those fractures. Probably it will be necessary to discuss, debate, optimize and revise some current therapeutic standards[1]. Fracture displacement, patient age, comorbid disorders, pre-fracture activity level are some of the critical factors in determining the clinical practice for treating femoral neck fractures[2].

Operative alternatives for femoral neck fractures differs greatly throughout the world, but mainly includes prosthetic replacement (arthroplasty) and internal fixation. Options for arthroplasty are unipolar hemi-arthroplasty, bipolar hemiarthroplasty and total hip arthroplasty. Options for internal fixation include multiple screws, a compression screw and slide plate or an intramedullary hip screw device.

However, whether arthroplasty or internal fixation is more appropriate for femoral neck fractures in elderly patients is still being debated[3]. Additionally, internal fixation has traditionally been the preferred method for treating incomplete stable fractures (Garden type 1) or undisplaced fractures (Garden type 2) regardless of age and satisfactory outcomes have been achieved including shorter operation time and joint preservation[7] but the prolonged immobilization which is required after osteosynthesis, and that too with the

uncertainty of having a patent vascular supply left to the head, and the vast incidence of non union and avascular necrosis specially in the elderly population, paved the way to the thought of primary head excision and prosthetic replacement in the elderly patients, and thus the concept of arthroplasty came in vogue. Proponents of prosthetic replacement argue that replacement of the femoral head eliminates the necessity for revision surgery due to avascular necrosis and nonunion, both of which are difficult situations to manage following osteosynthesis and authors have reported a high re-operation rate in older patients with undisplaced fractures, because of fixation failure, avascular necrosis of the femoral head and others[4]. Hemiarthroplasty (HA) has been the treatment of choice for intracapsular fractures of the neck of femur in elderly patients with low functional demands, because of its lower expertise demand, less surgical time, less blood loss and simpler rehabilitation in comparison to total hip arthroplasty (THA)[5,6]. Another reason is that Asian people are used to sit on the floor with their legs crossed, and most of the work for farmers and workers demand them to squat for most of their labor times. These habits demand larger range of motion to their hip joint, and their joint should not be dislocated. Therefore, despite many reports on long-term results that had demonstrated unacceptably high rates of pain and migration[7]. However, this surgical intervention is not without morbidity and mortality during peri-operative period[8]. Surgical intervention in elderly patient is aimed for achieving immediate post operative mobilization as prolonged bed rest and hospital stay in elderly population creates other cardio respiratory complications. therefore, in younger patients with higher functional demands, especially under the age of 70, many authors report better functional and clinical results with THA in comparison with cc screw fixation[9-10].

The Aim of this study was to evaluate clinical and radiographic results and quality of life and functional outcome at long term follow up in a population of patients treated age more than 60 years with bipolar HA and total hip arthroplasty and internal fixation for an intracapsular fracture of the proximal femur and to evaluate the

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functional outcome of Primary total hip arthroplasty vs bipolar hemiarthroplasty vs internal fixation in fracture neck of femur by using HHS, Also Acceptance and patient compliance of total hip arthroplasty and bipolar hemiarthroplasty in these age group.

**Material and Methods**

This study has been done retrospectively in the Department of Orthopaedics and Trauma Centre in J. A. Group of Hospitals, Gwalior (M. P.) patients with intracapsular fracture neck of femur, Age >60 years and who had no other significant Medical or surgical comorbidities. The patients who gave refusal to consent, Age<60 years, had suspected Pathological fracture or had any Preexisting hip pathology, Patients who are bedridden or barely mobile or had Significant cognitive impairment were excluded from the study.

Cases were operated in routine and emergency hours as per admission and availability of operation theater.

All the patients were counseled regarding the modes of treatment. Informed and valid written consent were recorded. The patients were taken for surgery after routine investigations. X ray of pelvis with both hips (in 15 degree internal rotation) AP view and lateral view of involved hip was taken and Medical and anesthesia fitness were taken, then patients were operated with appropriate and best suitable method for the patients as per their choice.



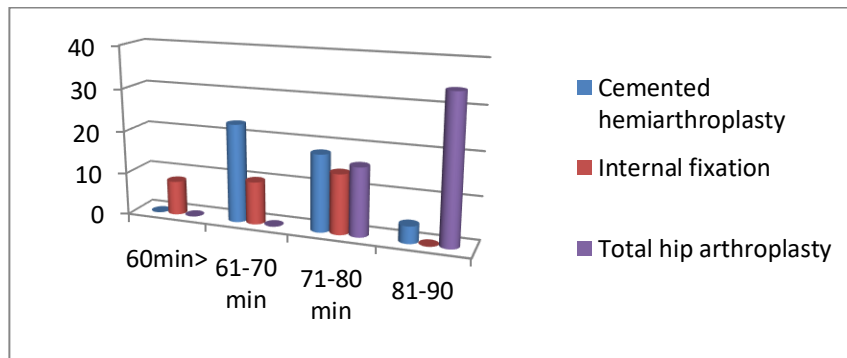
**Fig.1 Intraoperative Image of Total Hip Arthroplasty**

Cases were operated either with cemented bipolar hemiarthroplasty or CC screw or total hip arthroplasty depending which is more suitable for fracture.

**Observation and Result**

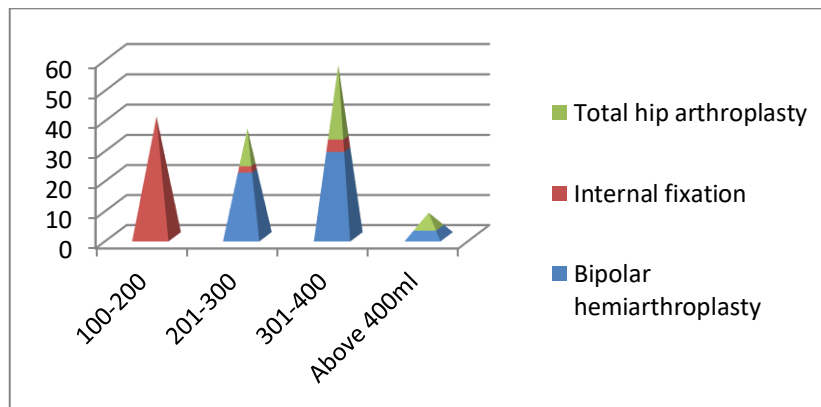
The fracture neck of femur being most common in age group of 50 years and above age with female preponderance. There were 56% patients with right sided fractures and 44% patients with left sided fractures showing right sided preponderance. In our study most of the injuries were caused by fall on ground / trivial trauma (91% ), remaining injuries were due to RTA. 50% patients were having Gardens Type IV fractures, 40% were having Gardens Type III and 10% were having Gardens type II fractures.

The average surgical time was 71.94 min and in internal fixation group patients it was 65.18 minutes and in THA group- 84.38(weighted mean difference, 5.76 minutes, p >0.05).



**Fig. 2 Bar Diagram Showing Comparison of Duration of Surgery**

Patients who underwent arthroplasty had greater blood loss than those who were treated with internal fixation, Intraoperative average blood loss was 390 ml in total hip arthroplasty, 320 ml in hemiarthroplasty and 140ml in internal fixation with weighted mean difference of 80 ml. (weighted mean difference, 80 mL, 128 to 210, p >0.05).



**Fig. 3 Cone Diagram Comparing Intraoperative Blood Loss**

In total hip arthroplasty, 99.4% patients had fair to excellent harris hip score while only 0% patients had poor, at last follow up. In hemiarthroplasty group, 91.4% patients had fair to excellent harris hip score while only 8.5% patients had poor, at last follow up. In internal fixation group 37.5% patients had poor harris hip score at last follow up. The results of this study shows the advantage of total hip arthroplasty in

the recovery of hip function early. 6 month after surgery, the Harris score of HA group was higher than that of Hemiarthroplasty and IF group, and the excellent and good score in HA group was also significantly higher than that in Hemiarthroplasty and IF group (P value<0.05). In internal fixation group , 2.08% patient developed superficial infection, 4.16% patients developed deep infection, ,2.08% patient had dislocation after surgery and 8.3% patients developed implant failure , 4.16% patients had intra-articular migration of screw. In total 11 had to go for revision surgery .03 patients were reoperated with bipolar hemiarthroplasty and 07 patients were reoperated with total hip arthroplasty , 01 patient reoperated with implant removal f/b valgus osteotomy and DHS.



Fig.4 Follow-Up Xray showing Avascular Necrosis in patients operated with BDSF at end of 11 month.

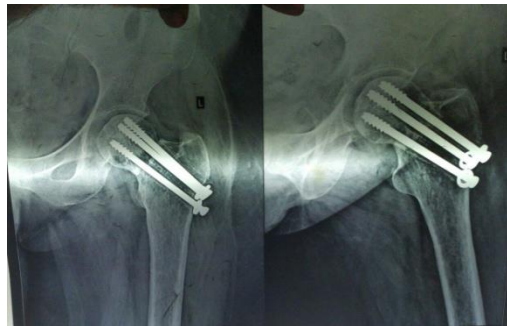


Fig.5. X ray of Patient Showing Nonunion.

In hemiarthroplasty group , 2.12% patient developed superficial infection, 4.25% patient developed deep infection, , 4.25% patients had prosthetic hip dislocation after surgery and 1 patient had cognitive dysfunction for which the exact cause was not known, 8.51% patient developed cotyldosis. Out of total 08 reoperation 02 patients, who had dislocation, open reduction was performed .and 02 patients with deep infection were operated with antibiotic impregnated cement spacer and 04 patients having cotyldosis were operated with total hip arthroplasty.

Table 1. Comparing Harris Hip Score of Patients at Various Intervals

Harris Hip Score	Bipolar	Hemiarthroplasty			Internal Fixation				Total hip arthroplasty	
	14 days	6 month	1 year	14 days	6 month	1 year	14 days	6 month	1 year	
<70(Poor)	20	04	04	45	30	18	15	02	00	
71-79(Fair)	25	14	00	05	19	09	30	20	11	
80-89(Good)	05	26	32	00	04	19	03	25	20	
90-100(Excellent)	00	05	11	00	00	02	02	03	18	
<b>Total</b>	<b>50</b>	<b>49</b>	<b>47</b>	<b>50</b>	<b>50</b>	<b>48</b>	<b>50</b>	<b>50</b>	<b>49</b>	



Fig. 6 X rays Showing Complication of Hemiarthroplasty ( Dislocation / Cotyldosis)

In total hip arthroplasty group , 2.04% patient developed superficial infection, 2.04% patient developed deep infection, , 2.04% patients had prosthetic hip dislocation after surgery and 2.04% patient developed peri prosthetic fracture. Out of total 02 reoperation 01patients, who had dislocation, open reduction was performed .and 01 patients with deep infection were operated with antibiotic impregnated cement spacer . Overall reoperation rate was 4.08% in total hip arthroplasty , 17% in hemiarthroplasty and 22.9% in internal fixation [RRR-3.8 WITH P VALUE =.002] thus, screw fixation and Hemiarthroplasty was a risk factor for a major reoperation.

**Table 2: Enumerating Complications of Each Type of Intervention**

S. No.	Complications in Bipolar group	Complications in CC Screws group	Complications in the THR group
1	Superficial Infection (2.12%)	Superficial Infection (2.08%)	Superficial Infection (2.04%)
2	Deep Infection (4.25%)	Deep Infection (4.16%)	Deep infection (2.04%)
3	Dislocation (4.25%)	NonUnion (31.9%)	Dislocation(2.04%)
4	Peri Prosthetic Fracture (0.00%)	Implant failure (8.3%)	Peri Prosthetic Fracture (2.04%)
5	Stem Loosening (0.00%)	AVN(8.3%)	Stem Loosening (0.00%)
6	Revision operation (17.0%)	Dislocation (2.08%)	Reoperation ( 4.08%)
7.	Cotyloidosis (8.51%)	Migration of Screw into joint (4.16%)	
		Reoperation (22.9%)	

### Discussion

Surgical treatment of femoral neck fractures is one of the most common procedures performed by orthopedic surgeons. However, the optimal treatment option of displaced femoral neck fractures remains a matter of debate[10-15]. Current treatment options include reduction and internal fixation, hemiarthroplasty, or total hip arthroplasty[14]. Numerous studies have provided evidence for better outcomes after arthroplasty when compared with internal fixation in terms of overall functional scores, abductor muscles function, independent ambulation without walking aids, and quality of life[16-20]. In the present study, we evaluated the treatment of femoral neck fractures in elderly patients using closed reduction and internal fixation with cannulated hip screws compared to hip arthroplasty. Although perioperative blood loss, length of hospitalization, and complications were statistically significantly lower in the internal fixation group of patients, the postoperative functional scores up to the 12-month evaluation and need for reoperation were in favor of the arthroplasty group of patients. Internal fixation preserves the femoral head; in addition, it has shorter operative time, less blood loss and operative trauma, while arthroplasty might increase operative mortality [21]. But High proportion of internal fixation related complications occurred after surgery. On the one hand, due to the blood supply of femoral neck and head had been damaged at the moment of injury , On the other hand, the osteoporotic bone of elderly patients could also have an impact on the treatment of internal fixation. The holding force of the screws on fracture broken end might be weak for osteoporotic bone, while the relative extension of fracture healing time caused by destruction of femoral neck blood supply required internal fixation more firmly. In The contradiction between the two could result in internal fixation loosening, displacement or even failure .In this study, 9% patients had the loosening and displacement of internal fixation implants, in Internal Fixation group .Non union rate in the study was 31.9% .Arthroplasty as a mode of treatment of displaced femoral neck fractures in comparison with internal fixation is associated with a significantly lower risk of revision surgery, at the cost of higher infection, blood loss, and surgical time rates[17,19,25].Unlike IF group, Although by choosing arthroplasty over internal fixationthe surgeon effectively eliminates the risks of non-union, malunion, and avascular necrosis of the femoral head, a new set of complications is introduced including prosthetic hip dislocation,prosthetic protrusion, prosthesis loosening , cotyloiditis and persistent thigh pain etc[16-18] , Meanwhile, As complications occurred after surgery, the subsequent question was how to deal with these complications, which was bound to involve reoperation. Moreover, the risk of cotyloiditis has been described for HA, defined as progressive acetabular cartilage and bony erosion caused by friction between the head of the prosthesis and the articular surface of the acetabulum. This condition has been described as a possible cause of pain, prosthetic protrusion and

prosthetic loosening and subsequent revision to THA. In the THA group, many authors have seen good outcome like early rehabilitation, better function and clinical results and reduced incidence of complication. Keating et al[17] recently compared reduction and internal fixation to hemiarthroplasty and total hip arthroplasty in patients older than 60 years of age with displaced femoral neck fractures. In their study, at the 2-year follow-up, the rate of reoperation in the internal fixation group was 39% compared to 5% and 9% in the hemiarthroplasty and total hip arthroplasty groups, respectively. Additionally, the internal fixation group had worse functional and quality of life outcome scores compared with the arthroplasty groups[17].The results of this study shows the advantage of total hip arthroplasty in the recovery of hip function early and in 1 year. After the index surgery, the Harris score of THA group was significantly higher than that of Internal Fixation group and HA group, and the excellent and good scores in total hip arthroplasty group was also significantly higher than that in IF and HA group (P value <0.05). Hence, the high incidence of internal fixation and hemiarthroplasty related complications later on lead to significant number of reoperation with total hip arthroplasty which increases the morbidity and overall financial burden to patient .Overall reoperation rate was 4.08% in total hip arthroplasty , 17% in hemiarthroplasty and 22.9% in internal fixation [RRR-3.8 WITH P VALUE =.002] thus, screw fixation and Hemiarthroplasty was a risk factor for a major reoperation.The results of mortality and survival time analysis were also significantly different between the THA and HA and screw fixation groups ,but none of the procedure seems to increase he incidence of mortality since all the mortality were because of other medical comorbidities.

### Conclusion

The following conclusion could be drawn from the study Most of the patients who were operated for fracture neck femur in our series were between 60-70 years of age.Most of the cases of fracture neck of femur in elderly was due to fall on ground indicating them to be a fragility fracture. Thus improving bone health can decrease the incidence of fracture neck femur in elderly. Internal fixation with cannulated screws and for femoral neck fractures in the elderly has substantial complications and reoperation (20%) rates. In line with the literature, and The present study showed that total hip arthroplasty compared to internal fixation and hemiarthroplasty for the treatment of femoral neck fractures significantly reduces the risk of reoperation at the cost of higher blood loss and increased surgical time . though the incidence of other complication were at par what was given in literature , hemiarthroplasty was not a good surgery for patients who have a longer life expectancy. Because With the increasing time after surgery, there was an increasing proportion of patients with painful hip. and prosthetic protrusion and subsequent revision to THA.Furthermore

postoperative function as evaluated by the Harris hip score was significantly higher in the total hip arthroplasty compared to the internal fixation and hemiarthroplasty group up to two year of evaluation. The findings suggest that in the THA group, good functional outcome like early rehabilitation, better function and clinical results and reduced incidence of complications and good patient compliance so total hip arthroplasty might be a better choice than internal fixation and hemiarthroplasty in treating elderly patients with a femoral neck fracture.

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