



OUTCOMES OF FIXATION VERSUS REPLACEMENT FOR EARLY SURGICAL TREATMENT OF FEMORAL NECK FRACTURES IN ELDERLY PATIENTS

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ABSTRACT

Background: In patients aged 60-80 years, the decision between internal fixation and arthroplasty remains controversial due to various factors like age, impaired mobility, poor balance and delayed reaction time. We conducted this study to see the outcomes of early surgical intervention in femoral neck fractures in the elderly patients and to compare the results of fixation and replacement.

Materials & Methods: Patients with fracture neck of femur over age of 60 who went under early surgical intervention were selected retrospectively. These surgically treated patients were divided into 2 groups: fixation and replacement. In Fixation group, 3 patients were treated with cannulated cancellous screws and 22 with mini dynamic hip screws, whereas in replacement group 54 were treated with partial hip replacement and 21 with total hip replacement. Post operatively patients were assessed with modified barthel's index (MBI), harris hip scores (HHS), SF-36 scoring & visual analouge scale (VAS) at discharge, 6 weeks, 3 months, 6 months and 1-year follow-up visits.

Results: The patients undergoing arthroplasty having had a 1.5 times better modified barthel's index score compared to fixation at 1 year. The harris hip scores had a 1.7 times better score compared to fixation at 1 year. All 9 sub-components of harris hip scores, all 8 sub-components of SF-36 questionnaire as well as range of motions sub-components at discharge v/s 6 months & discharge v/s 1 year when compared, showed a significantly higher score in both arthroplasty & fixation patients at 6 months & 1 year compared to scores at discharge.

Conclusion: Functional outcomes were better in the patients treated with arthroplasty compared to fixation of the neck femur fracture over a 1 year period in the elderly population in India.

Keywords: Femoral Neck Fractures, Internal Fixation, Hip Arthroplasty.

INTRODUCTION

Femoral neck fractures are more common in elderly population. With increasing world's population, hip fractures in elderly pose a significant health care problem due to co-morbidities and associated factors like osteoporosis, dementia and return to pre-injury function even after rehabilitation. Hip fractures are common in this age group due to impaired mobility, poor balance, delayed reaction time and poor vision [1-3].

Considering these factors, single treatment method would not be optimal for treatment of femoral neck fractures in the elderly population [4].



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Currently there are various surgical treatment options available for femoral neck fractures like cannulated cancellous screws, dynamic hip screws [5-9], hemiarthroplasty and total hip arthroplasty. Treatment of displaced femoral neck fractures has been controversial although certain studies suggest treatment using reduction with internal fixation in patients with good bone quality and good ambulatory status whereas arthroplasty in elderly with poor bone quality and poor ambulatory status [10-14].

We conducted this study to see the outcomes of early surgical intervention in femoral neck fractures in elderly patients and to compare the results of fixation and replacement.

MATERIALS & METHODS

Between august 2017 to august 2018, a total of 100 retrospective cases with prospective follow up of early fracture neck of femur in elderly (>60 years)

treated with fixation/replacement were reviewed. Elderly patients (> 60 years) with new onset fracture neck of femur were included in the study while we excluded patients less than 60 years with old (>48 hours) femoral neck fracture, with a history of any depressive disorder, insufficient data & having a pathological neck femur fracture. In this study, 48% of cases were male and 52% were female. 55% of study cases were maximum in age group of 71 - 80 years followed by 33% cases in age group of 61 - 70 years and the remaining minimum cases of 12% in age group of > 80 years. The total age range is from 61 to 84 years. The percentage of cases with right hip involved was 64% and with left hip involved was 36%. Cases were divided into 2 groups: 3 patients were treated with cannulated cancellous screws and 22 with mini dynamic hip screws, whereas in replacement group 54 were treated with partial hip replacement and 21 with total hip replacement. In garden type 1 fracture neck of femur, 3 patients operated with fixation and no arthroplasty; in garden type 2, 20 patients operated with fixation and 5 with arthroplasty; in garden type 3, 2 with fixation and 36 with arthroplasty; in garden type 4, 34 arthroplasty and no fixation were done. Post operatively patients were assessed with modified barthel's index (MBI), harris hip scores (HHS), sf-36 scoring & visual analogue scale (VAS).

Operative Technique: For fixation cases, all patients coming to casualty diagnosed with intracapsular femur neck fracture reduction was done using lead better method. In OT, patient is put on fracture table. Reduction was achieved and confirmed under image intensifier. Then using lateral incision fracture is exposed. Fixation is done using appropriate angle mini dynamic hip screw.

Post-operatively abduction pillow was given to patients. Drain removal was done on 2nd post op day. Dressing was done on 5th and 8th day. Patient were allowed non weight bearing walking form 2nd post op day and discharged on 5th post op day. Patients were kept non weight bearing walking for 6 weeks. After 6 weeks X ray was taken and patients were allowed 25% weight bearing walking. Weight bearing was increased by 25% every 2 weeks and patients were full weight bearing on affected limb by 12 weeks post operatively.

For replacement cases, patient was placed lateral on the operating table. A modified Smith-Peterson approach (posteriorlateral approach) was used. Once the head was exposed, fractured head part removed. The exposed acetabulum is then reamed with serial

power reamers of increasing sizes. Femoral stem of proper size is then inserted into canal maintaining the ante version and hammered into the canal till satisfactory fit is determined. Ceramic head of proper diameter is then inserted and fixed with a punch.

Post-operative abduction pillow was given to minimize risk of hip dislocation. Drain was kept for <48 hours before the surgery, dressing was done on post-op day 2 and day 5 with sterile materials. Suture removal was usually done on 21st postoperative days. However, mobilisation protocols were given to the patients on individualized basis as per the extent of surgery and soft tissue dissection

Statistical Analysis: Modified barthel Index (MBI) scores, pain assessment by harris hip scores (HHS), sf-36 Scores & visual analogue scale Scores were recorded for postoperative intervals including at discharge, at 6 weeks, at 3 months, at 6 months and at 1-year follow-up visits.

RESULTS

Total 100 patients with early fracture neck of femur in elderly (>60 years) were taken in study and there was no follow up loss. Relative risk = 1.539 [95% Confidence Interval: 1.139 to 2.079] i.e. The patients undergoing arthroplasty having had a 1.5 times better score compared to fixation at 1 year (table 1).

Relative risk = 1.7 [95% Confidence Interval: 1.24 to 3.65] i.e. The patients undergoing arthroplasty having had a 1.7 times better score compared to fixation at 1 year (table 2). A comparison of all the 9 components of sf-36 questionnaire was done. Chi-square test was applied to the data at a level of significance of < 0.01. The sf-36 data comparison of fixation versus arthroplasty at 1 year was found to be significant for all the 8 components of sf-36 Score ($p < 0.01$) (table 3). In arthroplasty group, 5.3% patients developed superficial wound infection, 2.6% have post op dislocation and there were 6.75% deaths while in fixation group, 8% patients developed superficial wound infection and there was no mortality. Superficial wound infection was treated with antibiotics based on culture sensitivity report and local dressings. Dislocation was managed by closed reduction under anaesthesia. There were 5 mortality in the post operative period in arthroplasty group due to terminal cardio-respiratory failure in 3 patients and pulmonary embolism in 2 patients (table 5).

Table 1: Modified Barthel Index at Discharge & Follow-Up Visits Up to 1 Year Post-Operative Period:

Groups:	Mean Score at Discharge:	Mean Score at 1 Year:	P value: (paired t-test)
Fixation (A)	65.3 ± 5.1	85.2 ± 6.1	> 0.05
Arthroplasty (B)	69.4 ± 6.2	87.1 ± 6.3	< 0.001

Table 2: Harris Hip Score At Discharge & Follow-Up Visits Up To 1 Year Post-Operative Period

Groups:	Mean Score at Discharge:	Mean Score at 1 year:	P value: (paired t-test)
Fixation (A)	69.3 ± 5.3	90.2 ± 6.2	> 0.05
Arthroplasty (B)	72.2 ± 5.4	91.3 ± 6.1	< 0.001

Table 3: SF- 36 score components at discharge & follow-up visits up to 1 year post-operative period

SF - 36 Components:	Groups:	Median Score at Discharge	Median Score at 1 year	P value: (paired t-test)
Physical Functioning	Fixation	78 [70, 89]	92 [91, 96]	> 0.01
	Arthroplasty	80 [76, 90]	94 [90, 98]	< 0.01
Role Limitations due to Physical Health	Fixation	80 [71, 87]	93 [92, 97]	> 0.01
	Arthroplasty	81 [74, 86]	95 [91, 97]	< 0.01
Role limitations due to Emotional Health	Fixation	77 [70, 89]	95 [91, 97]	> 0.01
	Arthroplasty	78 [76, 90]	96 [90, 98]	< 0.01
Energy/Fatigue	Fixation	75 [71, 78]	92 [91, 95]	> 0.01
	Arthroplasty	79 [76, 84]	94 [90, 97]	< 0.01
Emotional Well being	Fixation	78 [70, 88]	92 [91, 96]	> 0.01
	Arthroplasty	80 [75, 91]	94 [90, 97]	< 0.01
Social Functioning	Fixation	75 [70, 89]	93 [91, 96]	> 0.01
	Arthroplasty	81 [76, 90]	95 [90, 98]	< 0.01
Pain	Fixation	78 [70, 89]	92 [91, 97]	> 0.01
	Arthroplasty	80 [76, 90]	94 [90, 97]	< 0.01

Table 4: Visual Analogue Scale at Discharge & Follow-Up Visits Up To 1 Year Post-Operative Period

Groups:	Median Score at Discharge:	+Median Score at 1 year:	P value: (paired t-test)
Fixation	5 [2, 5]	0 [0, 1]	< 0.01
Arthroplasty	5 [2, 5]	0 [0, 1]	< 0.01

Table 5: Post-Op Complications in both Fixation and Replacement Group

Complication	Internal fixation group (A)		Arthroplasty group (B)	
	No. of cases	% of cases	No. of cases	% of cases
Superficial wound infection	2	8	4	5.3
Death	0	0	5	6.6
Dislocation	0	0	2	2.6

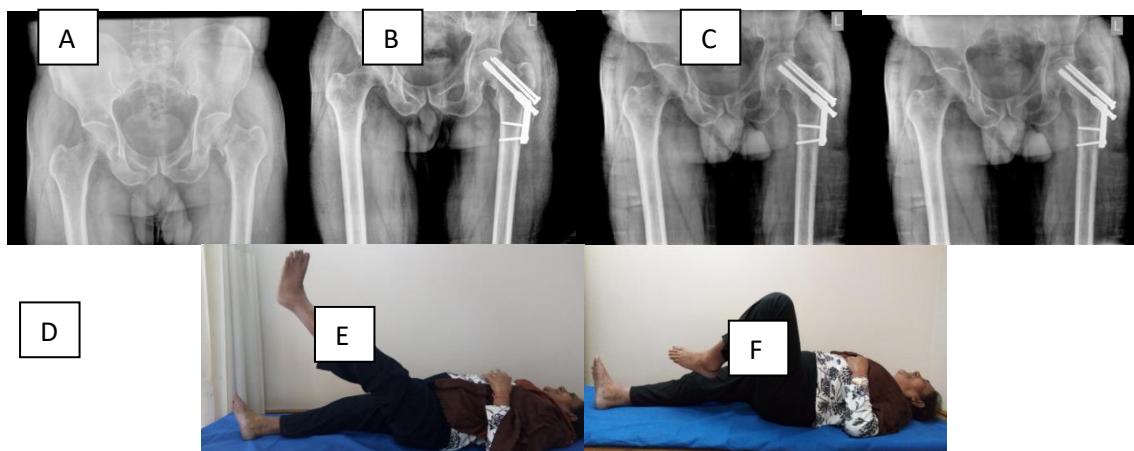


Fig. 1; (A) 64 Years Old Female with Garden Type 2 Femoral Neck Fracture (B) She Was Operated With Open Reduction And Dynamic Hip Screw (C, D) Follow-Up Radiographs At 6 Months And 1 Year (E) Active SLR At 1 Year Follow-Up. (F) Range Of Motion at 1 Year.

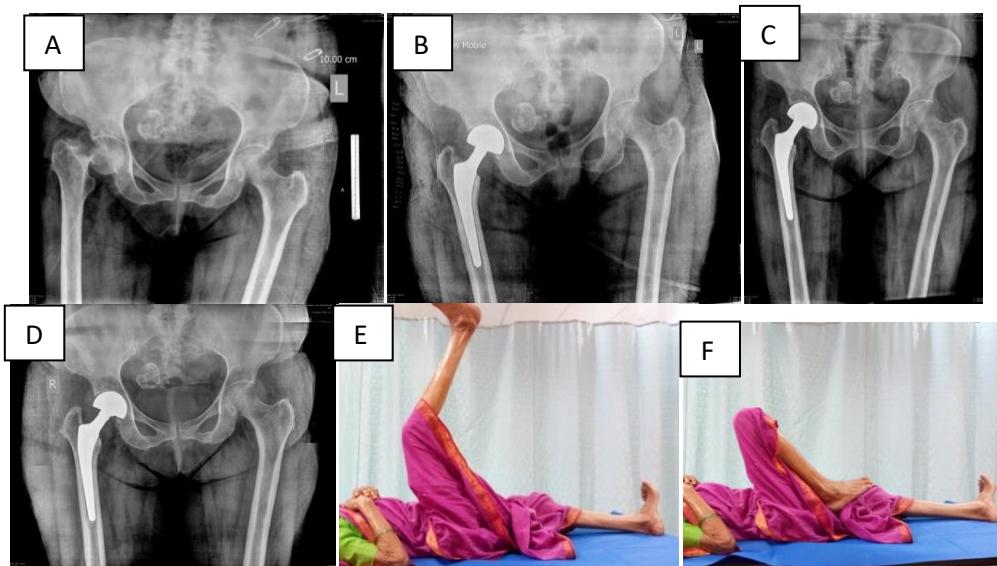


Fig. 2: (A) 78 Year's Old Female with Garden Type 4 Right Neck Femur Fracture (B) She Was Treated with Right Total Hip Replacement. (C, D) Follow-Up Radiograph at 6 Months and 1 Year (E) Active SLR at 1 Year Follow-Up. (F) Range Of Motion at 1 Year.

DISCUSSION

The femoral neck fracture is still considered as unsolved fracture as there are different opinions regarding management in elderly population. Available treatment options for femoral neck fractures include internal fixation, partial hip replacement and total hip replacement. Ideal surgical treatment of choice for femoral neck fracture in elderly is individualised based on various factors such as age, pre-fall ambulatory status, fracture pattern and medical co-morbidities [15-18]. Many authors are of the opinion that outcome of the surgery would be improved by a more patient-related approach which includes patient age, ambulatory status and co-morbidities than strict diagnosis-related approach [19, 20].

Advantages of internal fixation are that it retains the femoral head and normal hip joint biology and patient regains normal hip function following uneventful healing of femoral neck fractures. However, non-union and avascular necrosis of femoral head are of the major complications of this fracture which would ultimately require the partial or total hip replacement [21].

At the same time other studies have shown better outcomes of arthroplasty in comparison to internal fixation in terms of various functional scores, abductor muscle strength, independent walking without walking aids and quality of life [22-26]. In our study, we evaluated the surgical treatment of femoral neck fractures in elderly patients using cannulated cancellous screws/mini dynamic hip screws compare with partial/total hip replacement. In our study population, we found that modified Barthel index scores for both group at discharge (A 65.3 and B 69.4) and 1 year (A 85.2 and B 87.1) are significantly better in the arthroplasty group. Similar results were seen in other studies too [27-28].

In our study population, we found that Harris hip scores for both group at discharge (A 69.3 and B 72.2) and 1 year (A 90.2 and B 91.3) are significantly better in the arthroplasty group. Similar results were seen in other studies too [29-30]. In another study, done between Feb 2012 to Feb 2015, Harris hip score in fixation group was 74 and arthroplasty group was 76 [31].

The functional scores (modified Barthel index and Harris hip scores) in arthroplasty group were better due to early full weight bearing mobilisation and return to activities of daily living [31-33].

Percentage of mortality for the patients who were treated with internal fixation for unstable femoral neck femur fractures was 25%-36% while in arthroplasty group was 20-25% [31-35]. In our study mortality rate is 6.75% in arthroplasty group while there is no mortality in fixation group because fixation was preferably done in relatively younger age group than arthroplasty group with less or no co-morbidity and in pre-op ambulatory patients. In 6.75% patients in whom arthroplasty was done; 2 had h/o stroke, 2 had ischaemic heart disease and 1 patient had post op myocardial infarction.

Patients who underwent internal fixation for displaced femoral neck fractures, with 2 years of follow up, percentage of non union was 8-15 % and percentage of avascular necrosis was 6-12% [31-35]. In our study, all cases of internal fixation healed uneventfully without any complication of avascular necrosis and non-union. However, longer follow up needs to be carried to observe for avascular necrosis in fixation group.

In our study, in arthroplasty group, 5.3% patients developed superficial wound infection, 2.6% have post op dislocation and there were 6.75% deaths while in fixation group, 8% patients developed superficial wound infection and there was no

mortality. In a similar study, 1-4% patients in fixation group and 1-8% patients in arthroplasty group developed superficial infection and percentage of post op dislocation was 0-1% [28, 35]. In our study, the functional outcome is significantly higher in the arthroplasty group as compared to fixation group at 12-month evaluation; however, there are certain limitations to this study. First, it was a not a randomized control study. Second, longer follow ups are required.

CONCLUSION

We concluded that arthroplasty gives better functional outcomes as compare to internal fixation in elderly age group. However all fractures treated with internal fixation healed uneventfully whereas arthroplasty in elderly is associated with higher rates of mortality and complications like infections and dislocation.

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