

Functional Outcome of Austin Moore Prosthesis (AMP) versus Bipolar Prosthesis in Fracture Neck of Femur

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ABSTRACT

Objective: To determine the functional outcome of Austin Moore Prosthesis (AMP) Versus Bipolar hemiarthroplasty prosthesis in fracture neck of femur

Methods: This Prospective randomized controlled trial was conducted at the Department of Orthopedics, Ward-17, Jinnah postgraduate Medical Centre, Karachi, from January 2016 to December 2016. The patients included 60 years or older, having displaced intra capsular neck of femur fractures. Patients with co-morbid, arthritis and pathological fractures were excluded. Patients were randomly divided equally in 2 groups, each group operated upon using standard techniques for Austin Moore and Bipolar hemiarthroplasties respectively. Functional outcome was measured as very good, good, fair and poor using Harris Hip Score at monthly interval and at 6th months follow up visit.

Results: The total numbers patients were 148(74 in each group). Final functional outcome showed that, in Bipolar prosthesis 72 (97.3%) patients had satisfactory status while 2 (2.7%) patients had unsatisfactory status. In Austin Moore group 64 (86.5%) patients had satisfactory status while 10 (13.5%) had unsatisfactory status

Conclusion: Bipolar prosthesis had better functional outcome than Austin Moore hemiarthroplasty. We recommend this as a treatment of first choice in elderly patients with fracture neck of femur.

Key words: Austin Moore Prosthesis, Bipolar Prosthesis, Harris Hip Score, hemiarthroplasty.

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INTRODUCTION

The most common fracture in elderly people is the fracture neck of femur.¹ Treatment of displaced neck of femur fracture till date remains one of the big ongoing controversies despite C-arm imaging support and MRI investigation to know early outcome. The treatment options range from closed reduction and fixation with screws², dynamic hip screw, partial³ or total prosthetic replacement⁴. The prosthetic replacement include unipolar (Austin Moore/ Thompson prosthesis) hemiarthroplasty^{5,6}, bipolar hemiarthroplasty⁷, modular with hemiarthroplasty components⁸ and total hip arthroplasty⁹ depending on expertise, pre injury status of patient and bony architectural changes.

Hemiarthroplasty has been the operation of choice in elderly patients because fixation of these fractures are often unsuccessful.

Various prosthesis like Austin Moore, Thompson and Bipolar prosthesis are used depending on bone stock on medial buttress, neck and mobility status of patient¹⁰. All these implants give different functional results post operatively. The aim of our study therefore was to assess and compare the functional outcome of AMP versus Bipolar.

METHODS

In our study we included patients of either gender, 60 years and above with fracture neck of femur which was displaced and classified according to the Garden classification¹¹ as Garden Type III and Garden Type IV. The fracture must be sustained within a week of presentation to the hospital. All others with co-morbid,

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arthritis and pathological fractures were excluded. All the participants were allotted either group A (AMP) or group B (Bipolar) in a random fashion. Counselling regarding the merits and demerits of each prosthesis were explained to all the participants and the inclusion to either group was totally voluntary without any coercion. Permission from Ethical Review Board (ERB) of the hospital was taken. All the surgeries were performed by experienced orthopaedic surgeon. The same standard protocol of surgery was adopted for all the patients.¹² Postero lateral Moore's approach was used for both hemiarthroplasties. Bipolar prosthesis was fixed with bone cement, while Austin Moore prosthesis was press fit. Wounds were closed over suction drain. Active and passive exercises of the limb under the supervision of physiotherapist was started on the first post op day and patients were sent home on fourth or fifth post op day.

They were advised to do assisted partial weight bearing with walker for 2 weeks. At 2 weeks stitches were removed, and then patient was allowed weight bearing as tolerated with walker for one month. Patients were followed up fortnightly for 3 months and then alternate month for 6 months post operatively, with gradually increasing weight bearing till 3 months and independent walking onwards. On each post operative visit Harris Hip Score¹³ was used for functional outcome. The Score interpretation was No disability (100 points)

Very good function was labeled if Harris hip score was 91-100. Good functional outcome was labeled if Harris hip score was 81-90. Fair functional outcome was labeled if Harris hip score was 61-80. Poor functional outcome was labeled if Harris hip score was less than 60. Very good, good and fair results were considered as satisfactory while poor functional results were labeled as unsatisfactory.

SPSS version 16 was used to analyze our data. Mean and standard deviation was calculated for age and other continuous variables while frequency and percentages were used for categorical variables like gender.

Statistical comparison (Bipolar and Austin Moore) was performed by using student chi-square test for functional outcome. Effect modifier like age, gender and type of fracture was controlled by stratification to see impact on this outcome variable.

RESULTS

One hundred and forty patients were enrolled. A total of 74 patients were assigned in each group i.e. Austin Moore group and Bipolar Prosthesis group (age range 61

to 75 years). Our participants had a mean age of 65.06 years with the standard deviation of ±3.34. Majority of patients were between 61-65 years i.e. 95 (64.2%), 45 (30.4%) patients were in between 66-70 years and 8 (5.4%) patients between 71-75 years of age. Males were 88 (59.5%) while 60 (40.5%) were females. Mean duration of fracture was 3.72 days with the standard deviation of ±1.88 days. The functional outcome in Bipolar Prosthesis 58 (78.4%) patients had satisfactory status while 16 (21.6%) patients had unsatisfactory status. In Austin Moore group 45 (60.8%) patients had satisfactory while 29 (39.2%) had unsatisfactory status. Functional outcome at 3 months shows, in Bipolar Prosthesis 61 (82.4%) patients had satisfactory status while 13 (17.6%) patients had unsatisfactory status. In Austin Moore group 58 (78.4%) patients had satisfactory while 16 (21.6%) had unsatisfactory status. Functional outcome at 6 months shows, in Bipolar Prosthesis 72 (97.3%) patients had satisfactory status while 2 (2.7%) patients had unsatisfactory status. In Austin Moore Group 64 (86.5%) patients had satisfactory while 10 (13.5%) had unsatisfactory status. As per age groups functional outcomes shows, in between 61-65 years of age group, 47 (54.6%) patients have satisfactory outcome in Bipolar Prosthesis while only 39 (45.3%) patients have satisfactory outcome in Austin Moore. In between ages 66-70 years both Bipolar Prosthesis and Austin Moore have same frequency of functional outcome i.e. 21 (50%). On stratification of gender, 49 (57%) male have satisfactory outcome in Bipolar Prosthesis while 37 (43%) have satisfactory functional outcome in Austin Moore hemiarthroplasty. In female 23 (46%) have satisfactory outcome in Bipolar Prosthesis while, 27 (54%) have satisfactory functional outcome in Austin Moore hemiarthroplasty. On stratification of Type of Fracture 49 (58.3%) patients have satisfactory functional outcome with type III Fracture in Bipolar Prosthesis hemiarthroplasty while, 35 (41.7%) patients were satisfactory in Austin Moore hemiarthroplasty. In patients with Type IV Fracture 23 (44.2%) had satisfactory functional outcome in Bipolar Prosthesis while, 29 (55.8%) had satisfactory outcome in Austin Moore hemiarthroplasty.

Table 1. Mean Harris Hip Score at various intervals

Harris Hip Score		Bipolar Group	Austin Moore Group		
		Mean	Standard Deviation	Mean	Standard Deviation

	Base line	50.8	±12	41.3	±14
	6 wks	63.5	± 11	53.8	± 15
	3 mths	72.4	±14	62.4	±11
	6 mths	81.6	± 13	79.7	± 14

DISCUSSION

The femoral neck fractures in elderly when displaced (Grade II & IV) often need replacement. The bipolar hemiarthroplasty is preferred because of its better outcome compared to unipolar, and less complication rates¹⁴. Despite the fact bipolar prosthesis with cement fixation is costlier than Austin Moore prosthesis, it has better long term benefits to the patient, that outweighs the cost¹⁵.

Movement in bipolar is over two surfaces i.e. metal and cartilage, and metal and polyethylene interface, contrary to Austin Moore where movement is between metal and cartilage i.e. implant bone interface, that causes more wear in cartilage. Additional use of bone cement with bipolar gives secure placement in femur, whereas Austin Moore prosthesis gets loosened in femur mostly resulting in pain and early loss of function and mobility, hence patients with bipolar have better rehabilitation. Our study comparing bipolar with unipolar Austin Moore prosthesis did support that, in terms of pain, function, mobility and deformity. We found better outcome with bipolar than unipolar prosthesis.

Similar were the observation made by Lestrage¹⁶. He is of the opinion that bipolar is a two piece prosthesis and had more satisfactory functional outcome than single-piece AMP. Lin CC¹⁷ and colleagues also found better survival in bipolar hemiarthroplasty group as compared to Austin Moore hemiarthroplasty. AbdelKhalek¹⁸, Sabnis¹⁹ and Jeffcote²⁰ observed Harris Hip Score to be 92 in bipolar and 84 in AMP group and had superior functional outcome. This is comparable with our study which also shows better Harris hip score, range of motion and less pain. Hedbeck²¹ preferred bipolar hemiarthroplasty over unipolar because of less acetabular erosion in long term and hence better functional outcome, similar to our study.

We would recommend longer follow up studies to document any complications in either group. Also a comparison of internal fixation versus replacement in this age group would generate valid evidence based conclusion.

CONCLUSION

Bipolar prosthesis had better functional outcome than Austin Moore hemiarthroplasty. We recommend this as a treatment of first choice in elderly patients with fracture neck of femur. It gives patients better post operative outcome and quality of life compared to unipolar prosthesis.

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Authorship and contribution Declaration

Kashif Mahmood Khan, Conception and design, Collected the data, interpreted the data, Drafted the manuscript
Muhammad Azfar Khanzada, Revised the manuscript critically for important intellectual content, Final approval of the version for publication
Iftikhar Ahmed Memon, Collected the data