



E-ISSN: 2395-1958
P-ISSN: 2706-6630
IJOS 2021; 7(3): 298-302
© 2021 IJOS
www.orthopaper.com
Received: 01-05-2021
Accepted: 03-06-2021

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Evaluation of functional outcome of intracapsular fracture neck of femur with Austin Moore prosthesis at a tertiary care hospital in Srikakulam

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DOI: <https://doi.org/10.22271/ortho.2021.v7.i3e.2760>

Abstract

Introduction: Fractures of the femoral neck are common injuries occurring in the elderly population due to osteoporosis. They present a significant challenge to Orthopaedic surgeons because of the high rate of complications like nonunion, avascular necrosis, and associated comorbidities. Historically, Austin Moores prosthesis has served as an exemplary implant over the years in the management of intracapsular fracture neck of femur in older individuals. Our aim of the study is to assess postoperative function in these population and to validate the use of AMP in current Orthopaedic practice.

Methods & Materials: This is a hospital-based cohort study. We did this study in thirty patients who had the fractured neck of the femur using Austin Moore Prosthesis, who are admitted to the Department of Orthopaedics in Great Eastern Medical School & Hospital, Srikakulam from Dec 2017 to Dec 2019. All patients were followed for twelve months. It is a patient-reported outcome study based on a questionnaire using a Harris hip score.

Results: Harris hip score, which is the gold standard in the assessment of postoperative function in hip surgeries was used in this study. We graded the patients as excellent, good, fair, and poor depending on the functional outcome based on each criterion in this scoring system. The functional results were excellent in 50%, good in 23.3%, fair in 23.3%, and poor in 3.3% of cases. The poor results are due to moderate hip pain after surgery. The complication rate was low.

Conclusion: Hemiarthroplasty with Austin Moore Prosthesis proved to be a good choice for the management of fracture neck femur in the elderly population with limited physical demand and low economic background. The mortality and morbidity are low; the operative procedure is simple with satisfactory functional results and fewer complications.

Keywords: fracture neck of femur, Austin Moore prosthesis

Introduction

Fractures around the hip are common and comprise around 20% of operative cases in Orthopaedic unit ^[1]. Of those cases, intracapsular fractures of the femoral neck account for about 50% of cases. According to doruku *et al*, a recent surge in the incidence of hip fractures can be attributed to increased life expectancy worldwide, and it is estimated that there will be an increase in cases from 1.6 million in 1990 to about 6.2 million in 2050 ^[2].

The problem of fracture neck of femur is one of the oldest in orthopedics. In spite of numerous advances in osteosynthesis, the incidence of nonunion and avascular necrosis is very high. There is higher rate of non-union (5%) and osteonecrosis (10%) associated with fracture neck of femur in un-displaced fractures. In displaced fractures following internal fixation, the non-union rate is 10-30 per cent and osteonecrosis is 15-33 percent, Fractures of the femoral neck still remain an unsolved fracture to the orthopedic surgeon as far as treatment and results are concerned. Fractures of the femoral neck can occur at all ages and in both sexes. The most common mechanism of injury is simple fall with force along the femoral neck through greater trochanter, causing fracture ^[3]. The incidence of these cases is increased mainly due to an increase in trivial trauma, osteoporosis and other comorbidities in the elderly population. Management techniques for femoral neck fractures in elderly patients have been controversial due to the risk of complications like nonunion and osteonecrosis of the femoral head.

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Posture - related complications like bedsores, deep vein thrombosis resulting in secondary pulmonary embolism are associated with high mortality and morbidity. when compared to internal fixation, The advantages of uncemented Austin Moore Self-Locking Prosthesis (AMP) include less operative time, less blood loss and fewer postoperative complications. It is also cost-effective. when compared to cemented hemiarthroplasty, uncement AMP hemiarthroplasty Y has better bone to implant union, no risk of bone cement implantation syndrome, easy removal in case of infection. Austin Moore Hemiarthroplasty is commonly done in developing countries like India. It is most commonly reserved for non-ambulatory people^[4]

Daniel *et al.*^[6] in their study concluded that the patients treated with Austin Moore prosthesis returned to preinjury level of activity with satisfactory outcome Manzoor *et al.*^[7] in their study concluded that prosthetic replacement with AMP is an appropriate mode of treatment in elderly patients in whom early mobilization is essential to prevent complications of prolonged immobilization.

This study evaluates functional outcome of hemiarthroplasty with AMP in elderly patients at our tertiary care center.

Patients and Methods

Our study has been carried out in 30 patients with a fracture neck of the femur using Austin Moore prosthesis, admitted in the department of Orthopaedics in great eastern medical school & hospital, Ragolu, Srikakulam from December 2017 to December 2019. All patients were followed up for one year.

Inclusion Criteria

- Patients aged 60 and above.
- Nonunion femoral neck fracture without hip joint arthritis < 3 months old
- Pauwells type 2, 3
- Garden 3,4

Exclusion Criteria

- Patients below age of the 60 years
- Pathological fractures, open fractures and fractures with neurovascular injuries
- Patients who were unfit for procedure due to medical comorbidities.
- Pauwells type 1, garden type 1,2
- Neglected Nonunion femur neck fracture with hip joint arthritis grade 4

We took permission from the institutional ethical committee in our hospital, and well-written and informed consent was taken from all the patients and their relatives who were participating in the study. We did a thorough clinical examination and detailed history about their pre-fracture ambulatory status and other medical comorbidities. Skin traction was applied in all fresh fractures preoperatively to reduce pain and muscle spasm. Proper preoperative anaesthetic assessment was done after lab investigations and radiographs.

Surgical Procedure

All the surgeries were performed on an elective basis within first 5 days of trauma with aseptic precautions under spinal or epidural anesthesia. All surgeries were done with patient in

lateral decubitus position. Modified posterolateral approach was used in all cases. short external rotators divided t shaped capsulotomy done and head was extracted and head size was measured using gauge. lateral entry point made and serial broaching was done and canal was irrigated with normal saline and gentamicin. Hemiarthroplasty was done using Austin Moore prosthesis of appropriate size and took proper precautions like lateral entry and centralized stem and bone plugs in amp stem to avoid surgical complications. Hip was tested for a full range of movements and stability was checked intraoperatively using chuck test and telescoping. We repaired short external rotators using the anchoring technique.

Postoperatively all patients were allowed weight bearing as tolerated, usually 24 to 72 hours after surgery, depending on the patient compliance using a walker. Antibiotics were administered postoperatively for three days to prevent infection. We discharged all the patients after a minimum of ten days.

We advised the patients to avoid squatting and to use the western toilet.

Regular follow up of the patients was done at two weeks, six weeks, three months, six months and 12 months. At each follow-up, the patients were assessed clinically using the Harris Hip Score and radiologically to detect any loosening, heterotrophic ossification, subsidence of the Prosthesis and protrusioacetabuli.

In this study harris hip scoring system used where total of 100 points were used with 70 poor 70 -79 fair 80-89 good 90-100 excellent

Statistical analysis: Our Studydesign is prospective observational study and Sample size is 30 Analysis was done by using MS excel. Qualitative data represented as percentages and quantitative data was represented as means and standard deviation. Statistical analysis was done using chi square test and significance was assessed by p value

Results

The mean age of patients was about 69.43 years, ranging from 60-89 years, and about 50% of the patients belonged to the 60-69 age group.

In our study, 17 patients were female, and 13 were male. The laterality of the fracture was slightly more with the left side, with 53% (16patients). The injury mode was mainly with trivial fall, i.e., fall during walking or slipping in the bathroom, which constitutes about 90% and only 10% were due to road traffic accidents. 39-55 mm sizes of Prosthesis were used as per requirement and 40% of cases have been done with 47 size implant, followed by 45 sizes with 30%. 43 size 20% 39, 51, 55 size 3.3% each

Harris Hip scores of our 30 operated patients averaged 86 (range, 69-98) at final follow-up after 12 months. We achieved excellent results in 50% (15 patients), good in 23.3% (7 patients), and fair in 23.3% (7 patients). Only 3.3% (1 patient) had poor results (coexistent osteoporosis) In our study group, one patient developed a superficial infection, which was managed conservatively, another patient suffered deep vein thrombosis. One patient had superficial bed sore managed with airbed and daily dressing. No loosening, osteolysis, dislocations, periprosthetic fractures, deep infection, and residual anterior thigh pain were reported. 60% were able to ambulate after three days, and 20% took one week, remaining 20% took two weeks.

Table 1: Showing complications

Complications	No of Patients	Percentage
None	27	90
Superficial Infection	1	3.3
Bed Sores	1	3.3
DVT	1	3.3

Table 2: Showing Final Harris Hip Score and clinical result

Grade	Harris Hip Score	No. of Patients	%
Excellent	90-100	15	50
Good	80-89	7	23.3
Fair	70-79	7	23.3
Poor	<70	1	3.3

The final harris hip score was excellent in 50 percent of patients and good in 7 patients fair in 7 patients poor in 1 patient with a chi square value of 13.2 and it is statistically significant with a P value of 0.0042 (< 0.05)

Discussion

Femoral neck fractures is still a controversial topic regarding the treatment as results have been variable with various treatment modalities, including internal fixation, Hemi replacement, and total hip replacement.

Our study's mean age is 69.43, and the average age was 66 years in Saxena and Saraf group [8], 67 years in Anil B Dhule [9] and 69 years in Shan SA group [10] and 65 years by Esoh *et al.*, [11] mean age in our study is similar to other studies in the literature

In our study, the incidence was more in the female group, with 57% compared to 83% in Esoh J.B group [11], 62.5% in the Freeman [12] group, 57% in study by Syed SN [13]. The left-sided hip involvement was about 53%, and it is similar when compared to Boyd and Salvatore group [14]. A similar finding was noted by Kishore Roy [15] with 68%. About 90% of our study population have been involved in an injury due to fall, and it is identical to Gyepes [16] and Ingalhalikar [17].

Among all study subjects, 50% of the patients had at least one or more systemic comorbidity, the most common being hypertension, seen in six patients. In contrast, other studies reported 33%, and 28.6% patients with hypertension by Karen Amit [18] and Mue Daniel [6] respectively.

The mean average duration of hospital stay was two weeks, similar to the study by Mue Daniel [6] (2015) with a mean duration of 16 days. In this study, 10% of patients developed minor complications. There were no significant complications. Posterior dislocation is reported in many series. Salvatti *et al.* [19] in their study explained that limb kept in flexion and adduction is the most common cause for dislocation of Prosthesis and reported 2.8% posterior hip dislocations in their study. Karen Amit [18] in 2014 reported 1.25% had a dislocation in his studies. No postoperative dislocations were reported in our study

They have been compared with other groups, and our results were satisfactory and are within the range of other studies. We had about 50% excellent results and 3.3% with poor outcomes.

In 2002, Parker [20] *et al.* in a review of 243 Austin Moore prostheses found at 1year post-surgery, 61 patients (25.1%) had residual pain, and 17 patients (7%) required revision surgery for aseptic loosening. Both residual pain and revision for aseptic loosening were strongly associated with features of the operative technique, based on the resection level of the femoral neck, seating of the prosthesis, prosthetic head size. They stated that most important predictor of a poor outcome

was the failure to seat the collar of the prosthesis on the calcar.

In 2004, W.P.Yau *et al.* [21] concluded in their study that AMP is a useful operation in the management of intracapsular fracture neck of femur in geriatric age group and alternate methods should be chosen for relatively younger patients. (internal fixation, total hip replacement)

In 2006, Alan R.Norrish *et al.* [22] reported acceptable long-term results for an uncemented Austin Moore Hemiarthroplasty in their study. They stated that prosthesis is inexpensive and does not suffer from the disadvantages of using bone cement for implantation in elderly people. In 2006, Masson *et al.*, [23] in their prospective randomized comparative study compared the various treatment modalities in displaced intracapsular fracture neck of femur in the elderly. They concluded that the osteosynthesis produced a high rate of revision surgery and an inferior functional outcome compared with that of Hemiarthroplasty.

In 2010, Abraham O. Odumala *et al.* [24] stated in their study that closed reduction after dislocation of the unipolar prosthesis has a higher failure rate significantly in dementia patients. They noted that the girdle stone procedure was considered after the first dislocation in these patients.

In 2010, Nader N.T. Rehmatullah *et al.* [25] showed an inverse correlation between prosthesis head size and metaphyseal fit in their study. They stated that AMP with head sizes greater than 49mm are likely to be loose, and in such cases, the use of an uncemented bipolar or cemented Hemiarthroplasty is recommended.

In 2012, M.Hossain *et al.* [26] stated in their study that the risk of perioperative death was significantly higher following cemented implant insertion. They reported that mortality risk was exacerbated in patients with pre-existing cardiovascular morbidity.

In 2014, Anil B.Dhule *et al.* [9] concluded in their study that minimal incision surgery reduces the duration of surgery, blood loss, and postoperative pain. They used a modification of the posterolateral approach to preserve short external rotators that provide increased hip joint stability and better results. Karen Amit *et al.* [18] concluded that Hemiarthroplasty with uncemented AMP is a safe procedure with a low incidence of complications but should be reserved for elderly patients.

In 2015, daniel m *et al.* [6] in their study, concluded that Austin Moore Hemiarthroplasty in elderly patients gave satisfactory results with minimal morbidity. They stated that careful patient selection is essential and may decrease complications rate and improve the results.

In 2017, Matthew J *et al.* [27] concluded that there is no advantage of the bipolar prosthesis over unipolar in reoperation rate. In 2017, G.Mamarelis *et al.* [28] reported that return to theatre within 30 days of Hemiarthroplasty for femoral neck fractures is associated with a longer hospital stay, higher re-admission rate, and higher revision rates. It may be a useful short term quality indicator for long term outcome measure.

In 2018, Goyal *et al.* [5] declared in their study that Austin Moore Hemiarthroplasty showed better functional results. He stated that patients need to modify their daily routine activities and preferably avoid squatting and sitting cross-legged on the floor for more than ten years of AMP prosthetic life.

In 2018, balaji *et al.* [37] concluded that compared to uncemented Austin Moore prosthesis, cemented bipolar prosthesis has more total blood loss and duration of surgery.

HA is still a very good option for treating fracture neck of femur in elderly patients especially in developing countries like India. AMP is the choice of implant in less active patients.

In 2019, Pulkit Jain *et al.* [29] concluded in their study that though unipolar AMP faces criticism for acetabular wear, most patients showed excellent to good results and is a good choice in geriatric patients.

In 2020, Cui *et al.* [30] in their meta-analysis of 7 randomized

controlled trials and five cohort studies, concluded that in the treatment of elderly femoral neck fractures, the internal fixation group has lesser operative time and less bleeding, and the perioperative advantage is more pronounced. However, the Hemi-replacement group had more advantages in postoperative functional scoring and reoperation.

In 2020, Farey *et al.* [31] concluded that unipolar Hemiarthroplasty works better for patients with shorter life expectancy than bipolar Hemiarthroplasty.

Table 3: Showing Functional Results in Various Studies

Investigator	No. of Patients	Excellent	Good	Fair	Poor
SALVATI <i>et al.</i> (1964) [19]	251	31	26	25	8
SAXENA AND SARAF (1978) [8]	82	46.1	44.8	6.5	2.6
R Kumar01 (1980) [36]	25	28	36	20	16
Bavadekar and Manelkar (1987) [35]	328	60	30	10	0
BG Dubani (2004) [33]	123	38.2	34.1	17.8	9
PS Maini (2006) [32]	271	54.2	21	10.7	3.7
Laghari <i>et al.</i> (2014) [34]	50	44	27	20	9
Daniel <i>et al.</i> (2015) [6]	35	23	46	25	6
Pulkit Jain (2019) [29]	95	12	61	19	3
Present Study	30	50	23.3	23.3	3.3

Limitations of the study

1. Single centre, non-randomized, non-controlled, prospective, study
2. Small sample size with short duration of follow up

Conclusion

We conclude that Hemiarthroplasty with Austin moores prosthesis for the fracture neck of femur is a good option in elderly patients, especially in the economically backward group, as it is cost-effective. The complications are less disabling. Weight-bearing is early and The final harris hip score was excellent in 50 percent of patients and good in 7 patients fair in 7 patients poor in 1 patient with a chi square value of 13.2 and it is statistically significant with a P value of 0.0042 (<0.05)

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