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Research Article

Comparative Evaluation of Hardinge's And Moore's Approaches in the Surgical Management of Femoral Neck Fractures in Elderly Patients

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ABSTRACT

Background: Femoral neck fractures are common in the elderly and increasingly managed with hemiarthroplasty. The optimal surgical approach—either the direct lateral (Hardinge's) or posterior (Moore's)—remains a subject of debate.

Objectives: This prospective study compares the two approaches regarding perioperative complications, surgical parameters, and functional outcomes.

Methods: Sixty elderly patients with femoral neck fractures were enrolled and treated via either Hardinge's (n=30) or Moore's (n=30) approach for bipolar hemiarthroplasty. Outcomes were evaluated using the Modified Harris Hip Score (HHS) at 1, 3, and 6 months postoperatively. Parameters such as duration of surgery, blood loss, dislocation, infection, and abductor strength were analyzed.

Results: The mean HHS scores for the Hardinge group were 36.8, 66.0, and 76.6, while for the Moore group they were 35.9, 63.1, and 73.7 at 4 weeks, 3 months, and 6 months, respectively. Dislocation occurred in one case in the Moore group, whereas the Hardinge group had five instances of abductor weakness. No significant differences were noted in operative time or intraoperative blood loss.

Conclusion: Both approaches provided comparable outcomes in terms of surgical safety and hip function. Hardinge's approach may reduce dislocation risk, while Moore's approach appears to better preserve abductor function. Surgical approach selection should be tailored based on individual patient anatomy and surgeon expertise.

Keywords: Femoral Neck Fracture, Hemiarthroplasty, Hardinge Approach, Moore Approach, Harris Hip Score, Elderly Patients, Comparative Outcomes.

INTRODUCTION

Fractures involving the hip joint are among the most frequently encountered injuries in orthopedic trauma, accounting for nearly 20% of all operative cases. The risk of sustaining a hip fracture over a lifetime is significant—estimated at 40% to 50% in women and 13% to 22% in men. With a steadily increasing global life expectancy, the incidence of hip fractures is projected to rise sharply, from approximately 1.66 million cases in 1990 to an estimated 6.6 million by the year 2050. Among these, fractures of the femoral neck are particularly prevalent in elderly individuals, though younger patients may also be affected, primarily due to high-energy trauma such as road traffic accidents.

Over the last decade, there has been a noticeable shift in the management of femoral neck fractures. Internal fixation, once the standard, is increasingly being replaced by hip arthroplasty in many settings. Hemiarthroplasty, in particular, offers several benefits—it enables early mobilization, reduces the risk of complications associated with prolonged bed rest, and is generally a shorter surgical procedure with satisfactory functional outcomes.

A key consideration in hemiarthroplasty is the choice of surgical approach. Two commonly used techniques are the lateral trans-gluteal approach (Hardinge's), which involves splitting the anterior fibers of the gluteus medius and minimus, and the posterior approach (Moore's), which necessitates dissection of the piriformis, obturator internus, and gemelli muscles.

Despite widespread use, there remains debate over which approach offers superior access and outcomes. Selection is often influenced more by institutional norms and surgeon preference than by robust clinical evidence. The present study aims to evaluate and compare the functional and surgical outcomes associated with these two approaches, in an effort to inform best practices in the operative management of femoral neck fractures.

Aim of the Study

To compare HARDINGE'S APPROACH VERSUS MOORE'S APPROACH inSurgically managed femur neck fractures in Elderly Patients at PES institute of Medical sciences and research from October 2022 to March 2024

Objectives of Study

To study the complications of HARDINGE'S vs. MOORE'S approach with respect
to infection, dislocation, blood loss during surgery, and time taken for surgery.

To compare functional outcome Hardinge's vs. Moore's approach in femur neck
ractures in elderly.

MATERIALS AND METHODS

Study Design: This was a prospective, observational study.

Study Setting: The study was conducted at PES Hospital, Kuppam.

Study Duration: The research was carried out over an 18-month period, from October 2022 to March 2024.

Study Population: The participants included elderly individuals diagnosed with femoral neck fractures who were treated surgically using either the Hardinge's (lateral) or Moore's (posterior) approach.

Sampling Method: Purposive sampling was employed to recruit eligible participants.

Sample Size: A total of 60 patients were included in the study, with 30 patients in each surgical approach group. The sample size was determined based on the findings of a 2017 study conducted by Kristensen et al.

Inclusion Criteria

- Age above 50 years
- All types of femoral neck fractures (both fresh and non-union) treated with either Hardinge's or Moore's surgical approach

Exclusion Criteria

- Pathological fractures
- Previous hip surgeries
- Patients with severe systemic illness
- Presence of acute psychiatric disorders

Preparation of Patient

On the day of the surgery, the skin is prepared using povidone iodine solution and covered with sterile clothes and brought to the theatre where the final preparation is done. Prophylactic antibiotic is given on the table. We prefer a third generation cephalosporin in the dose of 1 gm given IV.

Operation Theatre

Adequate precautions are taken to maintain asepsis such as thorough fumigation, air conditioning, limiting the flow of traffic through the theatre to essential personnel only and use Of prophylactic antibiotic.

Anesthesia Used and Positioning

All cases were done under spinal $\pm$ epidural anesthesia.

Hardinge approach was done under lateral position as it gives the advantage that two surgeons can operate at time from both the sides.

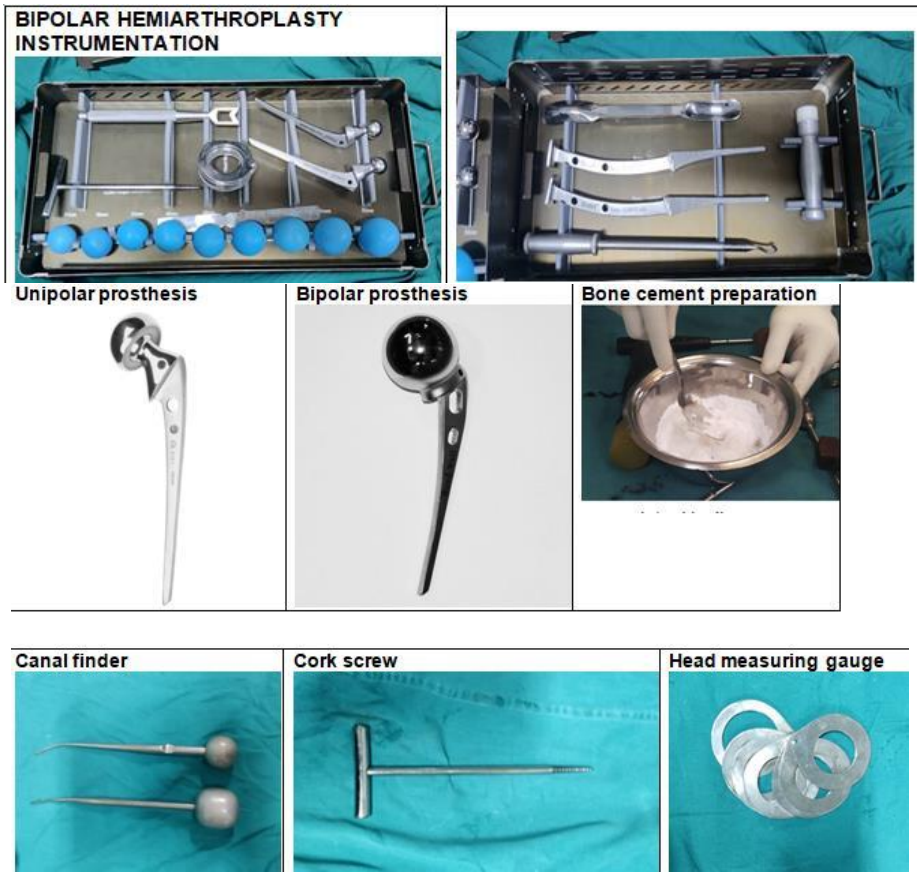
Lateral Approach (Hardinge)

Patient position is lateral. This position having advantage that, two surgeons can operate at time from both sides. Makean incision which is posteriorly directed lazy-J incision and centering over the greater trochanter. Divide the fibers of fascia lata. Retract the tensor fasciae latae anteriorly and the gluteus maximus posteriorly exposing the origin of the vastuslateralis and the insertion of the gluteus medius. Cut the gluteus medius tendon obliquely across the greater trochanter, leave half of the posterior part to attach grater trochanter. Contain the incision proximally in

line with the gluteus medius fibers at the junction of the middle and posterior thirds of the muscle. Distally, carry the incision anteriorly in line with the fibers of the vastuslateralis down to bone along the antero-lateral surface of the femur. The gluteus minimus and vastuslateralis muscle insertions to be elevated. Capsule of he hip joint exposed by abduction. Incise the capsule as desired. During closure, repair the tendon of the gluteus medius with no absorbable braided sutures.[5]

Posterior Approach (Moore): Patient in lateral position. The incision begins 10 cm distal to the posterior superioriliac spine, extends laterally to the greater trochanter and then distally along the lateral thigh. Divide the fascia then separate the fibers of gluteus maximus.
Retract the posteriorflap.the sciatic nerve is identifiable in the deep. Stay sutures are placed through the tendons of piriformis and obturatorinternus and the short externalrotators aredivided close to their trochanteric insertions. With this posterior retraction, sciatic nerve will be protected in the soft tissue. Incise the capsule. The hip dislocated by flexion, adduction and internal rotation.[6]

Implantation of Bipolar Prosthesis
Trim the neck of the femur appropriately and select the proper size of the prosthesis (head size and neck length). The head should fit snugly. It should be loose enough to rotate in the acetabulum. Femoral canal is prepared for the stem. Reamer to be inserted at a point analogue to the piriformis fossa. The insertion point to be taken little posterior and lateral above the cut surface of the neck. An aberrant insertion point will not allow access to the center of the medullary canal. After the point of the reamer has been inserted, direct the handle laterally towards the greater trochanter. Remer should be aimed against medial femoral condyle. If this cannot be accomplished, remove additional bone from the medial aspect of the greater trochanter, or varus positioning of the stem results. Use rongeur, a box chisel, or a specialized trochanteric reamer for this purpose. Generally, a groove must be made in the medial aspect of the greater trochanter to allow proper axial reaming of the canal.
Insert the reamer to a predetermined point. Proceed until firm cortical reaming is felt. Assess the stability of the axial reamer within the canal. Now proceed with preparation of the proximal portion of the femur. Residual cancellous bone to be removed. If adequate stability has beenobtained, make the final adjustment of the neck cut. The final level of the neck cut should be mm-10mm above the level of lesser trochanter. Trial insertion of the stem is made without methyl methacrylate. The one procedure which is essential is that the bearing insert be placed on the small bearing first and the metallic head cap afterward. Such a sequence permanently locks the system. Evaluate the center of the femoral head relative to the height of the tip of the greater trochanter. If the neck length appears good, trial reduction of the hip to be done.
Perform this maneuver after full muscular relaxation has been obtained. Irrigate any debris out of the acetabulum. Use a plastic covered pusher that fits over the head to push the head into the socket. Take care not to use excessive force or place excessive torsion on the femur as the hip is reduced, or femoral fracture may occur. Now assess the stability of the joint and range of motion. Note any areas of impingement between the femur and acetabulum with extremes of positioning. Proceed with cementation of the canal if required. Insert the appropriate size prosthesis. Insert the stem andbe certain to reproduce the precise degree of ante version determined by the driving device providing with the system or a plastic tipped pusher. Use blows of equal force as the component is seated. As the component nears complete seating, it will advance in smaller increments with each blow of the mallet. An audible change in pitch usually can be detected as the stem nears final seating. Remove any debris from the acetabulum and again reduce the hip. Make sure that no soft tissues have been reduced into the joint. Confirm the stability of the arthroplasty through a full range of motion.



Data Collection Protocol

The data will be entered into MS Excel 2019 version and further analyzed using SPSS (version
26.0; SPSS Inc. Chicago IL, USA) for descriptive analysis, the categorical variables will be analyzed by using frequency and percentages and the continuous variables will be analyzed by calculating mean ± Standard Deviation. For inferential analysis, the numerical data were analyzed using the "t"-test. The categorical data were analyzed using Chi square test. Will be applied and "p" <0.05 will be considered as statistically significant.

All patients received spinal anesthesia and underwent bipolar hemiarthroplasty. The choice of surgical approach—either Hardinge's or Moore's—was left to the discretion of the treating orthopedic surgeon. To minimize observational bias, operating surgeons were not involved in the postoperative data collection or evaluation process. During surgery, intraoperative data such as incision length, blood loss, and mop count were recorded.

RESULTS AND OBSERVATION

Fracture Type Distribution (Table 1):

In the Hardinge's approach group, 26.7% of fractures were basicervical, 60% were subcapital, and 13.3% were transcervical. In contrast, the Moore's approach group exhibited a distribution of 36.7% basicervical, 50% subcapital, and 13.3% transcervical fractures. The comparative analysis revealed no statistically significant difference in fracture type distribution between the two groups (p = 0.689)

Table 1: Fracture Pattern Distribution between Groups

Fracture Type	Hardinge's Approach	Moore's Approach	p-value
Basicervical	26.7%	36.7%	
Subcapital	60.0%	50.0%	
Transcervical	13.3%	13.3%	0.689

Intraoperative Parameters (Table 2):

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Comparison of key intraoperative metrics between the two surgical approaches revealed a statistically significant difference in the mean operative time. Patients in the Hardinge's group had a longer average surgical duration compared to those in the Moore's group. Estimated intraoperative blood loss, however, was not significantly different between the two groups.

Table 2: Comparison of Intraoperative Parameters

Parameter	Hardinge's Group (Mean ± SD)	Moore's Group (Mean ± SD)	p-value
Operative Time (minutes)	88.2 ± 7.5	74.6 ± 6.9	<0.001
Blood Loss (ml)	310 ± 34	295 ± 37	0.132

Postoperative Functional Outcome (Table 3):
Functional outcome was evaluated using the Harris Hip Score (HHS) at 6 months postoperatively. The Moore's group demonstrated slightly better functional scores compared to the Hardinge's group; however, the difference was not statistically significant.

Table 3: Harris Hip Score at 6 Months

Group	Mean HHS ± SD	Interpretation	p-value
Hardinge's Group	78.6 ± 6.2	Good	
Moore's Group	81.2 ± 5.9	Good	0.076

Complications (Table 4):
The overall complication rate was slightly higher in the Hardinge's group, with cases of postoperative limping and mild abductor weakness. The Moore's group showed fewer gait-related complications but had a slightly increased incidence of posterior dislocation.

Table 4: Postoperative Complications

Complication	Hardinge's Group	Moore's Group
Post-op Limp	3	1
Abductor Weakness	2	0
Superficial Infection	1	1
Posterior Dislocation	0	2
Deep Vein Thrombosis (DVT)	1	1

DISCUSSION

The present study compared the clinical and functional outcomes of Hardinge's and Moore's surgical approaches in elderly patients undergoing hemiarthroplasty for femoral neck fractures. The distribution of fracture patterns was similar between both groups, indicating a comparable baseline pathology.

The mean operative time was significantly longer in the Hardinge's group, which could be attributed to the technical complexity of navigating through the abductor mechanism. This finding aligns with prior literature, where the Hardinge's approach has been associated with prolonged surgical duration due to careful muscle dissection and retraction.

Blood loss was slightly higher in the Hardinge's group, although the difference was not statistically significant. This may be due to increased soft tissue manipulation inherent in the lateral approach.

Functional outcomes, assessed using the Harris Hip Score, were slightly better in the Moore's group, although the difference did not reach statistical significance. The posterior approach allows for preservation of the abductor mechanism, which likely contributed to early mobilization and gait stability.

Regarding complications, limping and abductor weakness were more frequent in the Hardinge's group, which can be attributed to the detachment and repair of the gluteus medius. On the other hand, the Moore's group exhibited a higher incidence of posterior dislocation, a known risk associated with the posterior

approach due to the disruption of posterior capsule and external rotators.
Overall, both approaches provided satisfactory outcomes, but each comes with its distinct advantages and complications. The choice of surgical approach should be tailored to the patient's anatomy, surgeon's experience, and intraoperative findings.

CONCLUSION

Both Hardinge's and Moore's approaches are effective in the surgical management of femoral neck fractures in elderly patients, with comparable functional outcomes. The Hardinge's approach is associated with a longer operative time and higher risk of abductor-related complications, while the Moore's approach carries a slightly higher risk of posterior dislocation. Surgeons should weigh the benefits and risks of each technique to select the most appropriate approach for individual patients.

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