

Outcomes of Posterior versus Lateral Approach for Hemireplacement Arthroplasty

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Abstract:

Purpose: Many surgical approaches to hip have evolved over the period of time. The most commonly used surgical approach for Hemireplacement Arthroplasty is Moore's posterior approach. However, due to complications such as dislocation after the procedure, new approaches like Hardinge's lateral approach is gaining popularity and is becoming widely accepted. But, there are very few studies to compare the outcome and complications associated with both the approaches. The purpose of this study is to compare outcomes, as well as complications associated with Hemireplacement Arthroplasty in neck of femur fractures by posterior and lateral approach.

Methodology: 100 enrolled patients were evaluated from the emergency department/OPD and were distributed in two groups having 50 patients each undergoing hemireplacement arthroplasty with modular bipolar prosthesis by Moore's posterior approach and Hardinge's lateral approach and were followed up.

Results: Incidence of dislocation was found higher in patients operated by posterior approach. Intraoperative blood loss and length of incision was higher in posterior approach than lateral approach. There were some instances of surgical site infections in both the approaches but was statistically insignificant.

Conclusions: There are no notable differences in outcomes and complications between the two approaches. Neither lateral nor the posterior approach seems to offer a clear advantage over each other except intraoperative blood loss and length of incision. With methodological limitations as mentioned in this study, the interpretation of this study remained limited. Therefore, further multicentre, randomized controlled studies on a larger sample with long-term follow-up should be implemented to conclusively ascertain the outcomes.

Keywords: Hemireplacement Arthroplasty, Dislocation, Surgical site infection, Abductor weakness.

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Introduction

Incidence of hip fractures is found to increase with an increase in average life span. Even trivial trauma can cause hip fractures in the elderly population, and patients with associated comorbidities are known to have higher mortality rate after hip fracture. [1]

About half of all fractures of the femoral neck are displaced intra capsular fractures which interfere with the blood supply to the femoral head and therefore, jeopardize the chances of bone healing. [2] Its incidence is common owing to severe osteoporosis and increased brittleness of the bone with advancing age. Conservative management of Intra-capsular fractures (neck of femur fracture, femoral head fractures) is associated with increased rates of mortality in the first 30 days after trauma. The surgical options available in population aged below 50

years involve closed or open reduction and internal fixation. In the elderly population, options include hemireplacement arthroplasty (monopolar or bipolar) or total hip replacement based on patient profiles, patients economic condition, personal preferences and experience of the surgeon. [3] Therefore, the goal of hip fracture management in elderly patients is to restore their ability to perform daily activities as soon as possible after the fracture by minimizing complications.

Hemireplacement arthroplasty is a procedure done in cases of fracture neck of femur in which femoral component is replaced by a prosthesis. [4] In patients over the age of 60 years, HRA results in fewer reoperations as compared with internal fixation and allows immediate full weight bearing without the risk of typical complications related to internal

fixation, such as avascular necrosis and Non-union. [5] Numerous new approaches to the hip have been described since the 1990's. The majority of these approaches are based on older approaches that have been modified for a specific surgical procedure.

The most commonly used surgical approach for HRA is Moore's posterior approach. [6] However, due to complications such as dislocation after the procedure, new approaches like Hardinge's lateral approach [7] is gaining popularity and is becoming widely accepted. But, there are very few studies to compare the outcome and complications associated with both the approaches. In our study, we attempt to throw light on the risks and benefits associated with the approaches so as to plan our surgical approach.

Materials and Methods

This prospective observational study was done on 100 patients from June 2021- May 2022. Approval for this study was obtained from the Institutional Ethics Committee. The enrolled patients with displaced neck of femur fractures lesser than 3 weeks old in patients aged more than 65 years were evaluated from the emergency department/OPD and were distributed in two groups after taking an informed consent. Those excluded from the study were of age less than 65 years, those with pathological fractures of the neck of femur, accompanying fractures of the ipsilateral limb, fractures exceeding 3 weeks old, and patients diagnosed with neurological disorders, stroke, or dementia. Each group constituted of 50 patients each. One group was treated with Hemireplacement arthroplasty with modular bipolar prosthesis by posterior approach while the other group was treated with hemireplacement arthroplasty with modular bipolar prosthesis by lateral approach. Intra-operative variables – length of incision, the amount of blood loss and duration of surgery was evaluated. Functional results were evaluated on the basis of Harris Hip Scores [8], radiological finding and complications in the post-operative period. The patients were advised to follow-up in OPD at the day of stitch removal, on 4 weeks, 12 weeks and 6 months. The patients were

followed up for at least 6 months postoperatively and evaluation of the results was done.

All the necessary clinical details were recorded and were prepared for this study. Routine X-Ray pelvis with bilateral hip AP, AP and lateral view of hip with thigh was taken to know the details of the fracture. The fracture was immobilized using skin traction with weight. The surgery was conducted as soon as the clinical and general condition of the patient permitted. Spinal anaesthesia was administered in majority of the case.

Surgical Approaches

I. Posterior approach to the hip.

Moore's Approach

Start the incision about 10 cm below the posterior superior iliac spine and extend it downward and sideways, parallel to the fibers of the gluteus maximus to the rear margin of the greater trochanter. Continue the incision downward for 10 to 13 cm parallel to the femoral shaft. Expose and separate the deep fascia in line with the skin incision. Use blunt dissection to separate the fibers of the gluteus maximus, ensuring not to go more than 7 cm from the tip of the trochanter to avoid injury to the branches of the inferior gluteal artery and nerve. Retract the proximal fibers of the gluteus maximus upwards and expose the greater trochanter. Retract the distal fibers downwards and partially divide their insertion into the linea aspera in line with the distal part of the incision. Expose and carefully retract the sciatic nerve, dividing a small branch of the sacral plexus to the quadratus femoris and inferior gemellus (which contains sensory fibers to the joint capsule). Expose and divide the gemelli and obturator internus, and optionally the tendon of the piriformis at their insertion on the femur. Retract the muscles medially and tag them for later reattachment to the trochanter if needed. Incise the posterior part of the joint capsule from distal to proximal along the line of the femoral neck to the rim of the acetabulum. Detach the distal part of the capsule from the femur. After the procedure is over, close the wounds in layers after placing a negative suction drainage. [6]

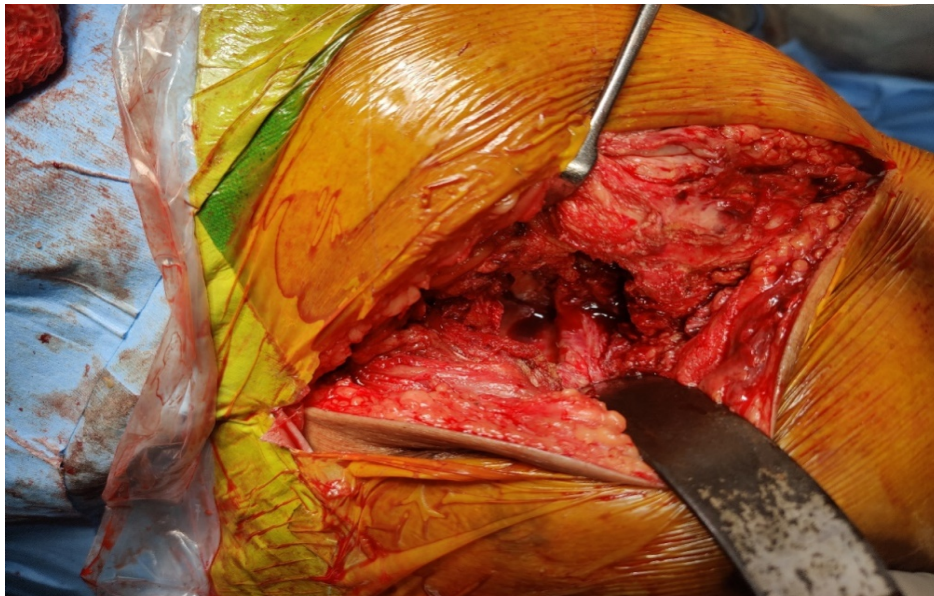


Figure 1: Moore's Posterior approach to the hip

II. Lateral approach to the hip.

Hardinge's Approach

Position the patient supine with the greater trochanter at the edge of the table and ensure that the muscles of the buttocks are freed from the edge. Make a posteriorly directed lazy-J incision centered over the greater trochanter. Divide the fascia lata in line with the skin incision and centered over the greater trochanter. Retract the tensor fasciae latae anteriorly and the gluteus maximus posteriorly to expose the origin of the vastus lateralis and the insertion of the gluteus medius. Incise the tendon of the gluteus medius obliquely across the greater trochanter, leaving the posterior half still attached to the trochanter. Carry the incision proximally in

line with the fibers of the gluteus medius at the junction of the middle and posterior thirds of the muscle. Ensure that the gluteus medius split is no farther than 4 to 5 cm from the tip of the greater trochanter to avoid damage to the superior gluteal nerve and artery.

Distally, carry the incision anteriorly in line with the fibers of the vastus lateralis down to bone along the anterolateral surface of the femur. Elevate the tendinous insertions of the anterior portions of the gluteus minimus and vastus lateralis muscles.

Abduct the thigh to expose the anterior capsule of the hip joint. Incise the capsule as desired. After the procedure is over, close wounds in layers after placing a negative suction drainage. [7]

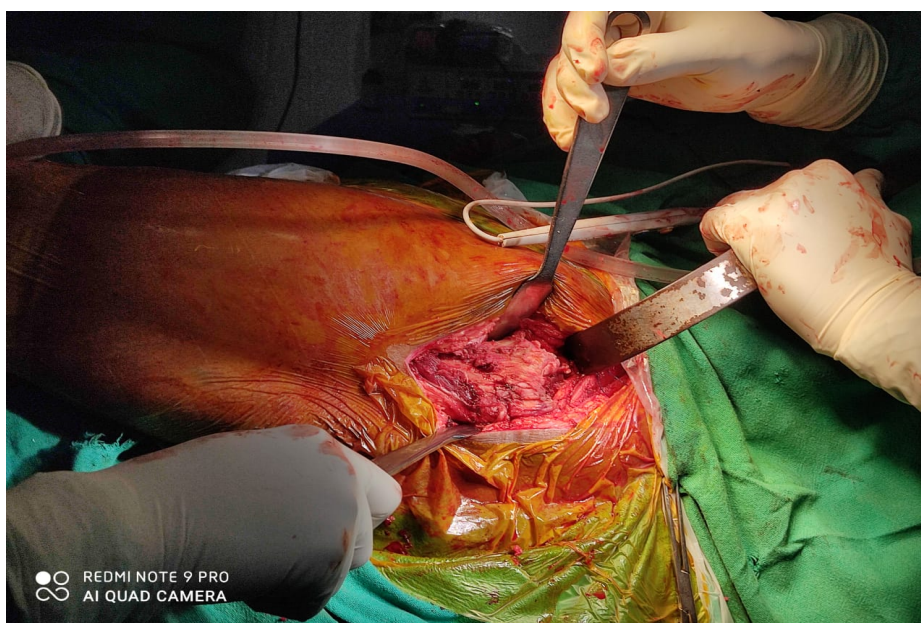


Figure 2: Hardinge's Lateral Approach

Results

The mean age for the group operated by the posterior approach was 72.7 years, while the mean age for the group operated by the lateral approach was 73.2 years.

Among the cases operated by the posterior approach, 40% were males and 60% were females.

For those operated by the lateral approach, 32% were males and 68% were females. In Group A, the mode of injury for 47 (94%) patients was a self-fall from standing height, and 3 (6%) cases followed a Road Traffic Accident (RTA). In Group B, the mode of injury for 49 (98%) patients was a self-fall from standing height, and 1 (2%) case followed a Road Traffic Accident (RTA).

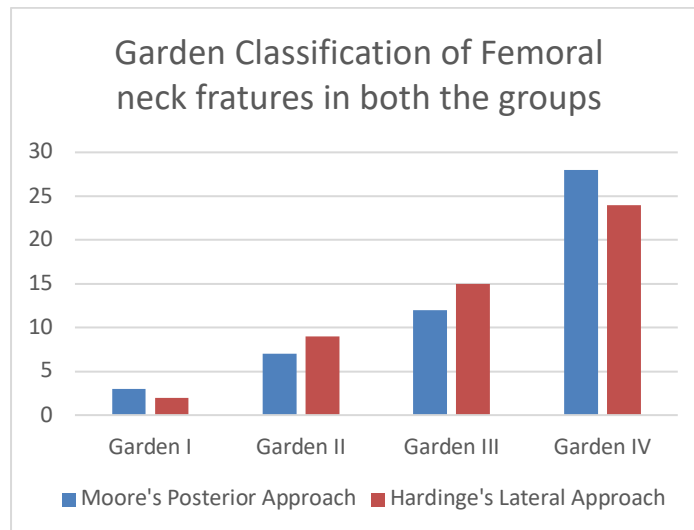


Figure 3: Garden classification of femoral neck fractures in between the two groups

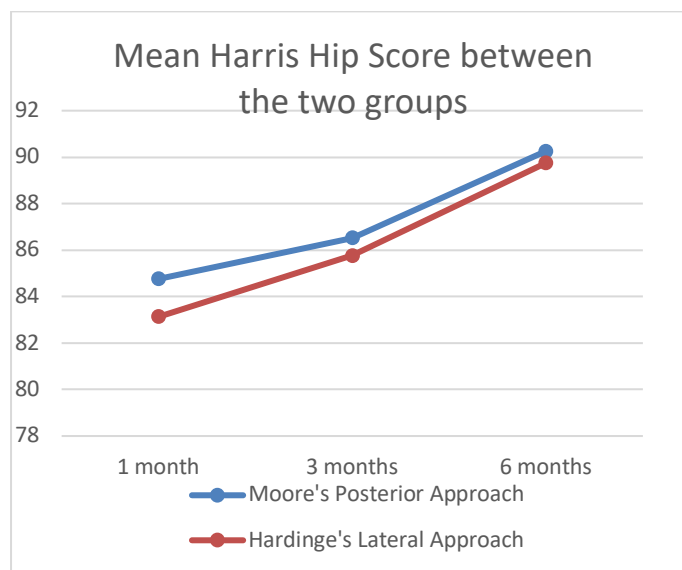


Figure 4: Mean hip score between the two groups

Table 1: Comparing outcomes between two groups

Variables	Group A Posterior Approach	Group B Lateral Approach	T-Statistic	Degree of Freedom (dF)	p-Value	Statistical Significance
Duration of Surgery (mins.)	67.24 + 8.26	64.44 + 10.24	1.505	98	0.136	No
Length of Incision (cms)	16.64 + 2.85	14.46 + 3.15	3.606	98	<0.001	Yes
Blood Loss (ml)	160.60 + 15.28	145.40 + 12.16	5.851	98	<0.001	Yes
Mean Harris Hip (1)	84.76 + 5.21	83.13 + 4.19	1.697	98	0.093	No

month)						
Mean Harris Hip (3 months)	86.52 + 4.18	85.77 + 3.21	1.003	98	0.318	No
Mean Harris Hip (6 months)	90.26 + 3.12	89.75 + 2.14	0.980	98	0.329	No
Mean Limb Length Discrepancy(cms)	0.60 + 0.30	0.50 + 0.20	1.874	98	0.064	No
Femoral Positioning	100 %	100%	No Variability			

Table 2: Complications in both the groups

Complications	Group A (Moore’s Posterior Approach)	Group B (Hardinge’s Lateral Approach)	Fisher’s Exact Test (p-Value)
Surgical Site Infection	8 %	2 %	0.362
Dislocation	4 %	0 %	0.495
Abductor Weakness	0 %	6 %	0.242
Myositis Ossificans	0 %	2 %	1

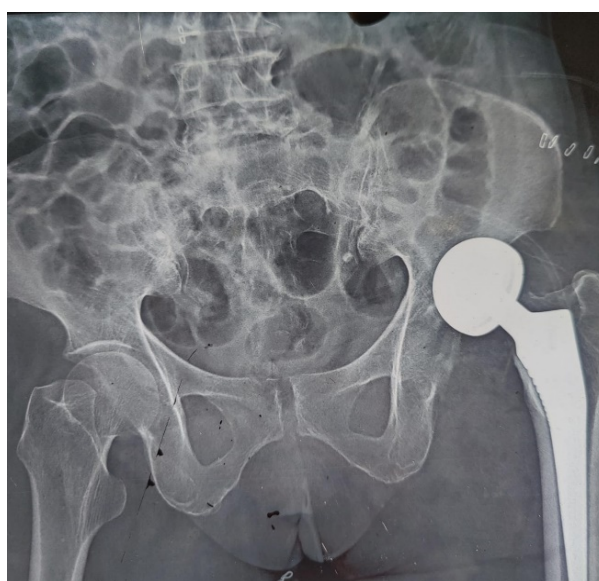


Figure 5: Posterior dislocation following hemireplacement arthroplasty using Moore’s posterior approach



Figure 6: Myositis ossificans developed in a case following intermuscular infection in a post-operative case of HRA by lateral approach

Discussion

Hemireplacement arthroplasty is a procedure done in cases of fracture neck of femur in which femoral

component is replaced by a prosthesis. [4] In patients over the age of 60 years, HRA results in fewer reoperations as compared with internal fixation

and allows immediate full weight bearing without the risk of typical complications related to IF, such as Avascular necrosis and Non-union. [5] Numerous new approaches to the hip have been described since the 1990's. The majority of these approaches are based on older approaches that have been modified for a specific surgical procedure.

The most commonly used surgical approach for HRA is Moore's posterior approach. [6] However, due to complications such as dislocation after the procedure, new approaches like Hardinge's lateral approach are gaining popularity and are widely accepted. [7] Subawa et al in their study found that the mean duration of surgery among patients operated by the posterior approach was around 128.52 minutes whereas the mean duration of the patients operated by the lateral approach was around 106.79 minutes. [9] Aparajit et al conducted a study that involved 80 patients. Out of these, 40 patients underwent surgery using the posterior approach (Group A), while the other 40 underwent surgery using the lateral approach (Group B). The functional outcome was evaluated based on the Modified Harris Hip Score. In Group A, the Modified Harris Hip Score at 3 months, 6 months, and 1 year was 67.22 ± 7.61 , 76.45 ± 6.31 , and 85.62 ± 6.04 , respectively. In Group B, the Modified Harris Hip Score at 3 months, 6 months, and 1 year was 65.01 ± 7.35 , 74.06 ± 6.81 , and 83.40 ± 5.09 , respectively. [10]

In our study, the mean length of the incision for patients operated using the posterior approach was approximately 16.64 cm with a standard deviation of 2.85, while it was around 14.46 cm with a standard deviation of 3.15 for patients treated using the lateral approach. In Group A, where hemiarthroplasty was performed using the posterior approach, the mean blood loss was about 160.6 ml with a standard deviation of 15.28, whereas in Group B, where hemiarthroplasty was done using the lateral approach, the mean blood loss was approximately 145.4 ml with a standard deviation of 12.16. The difference in mean length of incision and mean intra-operative blood loss was statistically significant. There was no statistically significant difference found between Harris Hip Score at different follow ups between the two groups.

Kalyanasundaram S et al in their study concluded that there were no significant complications in any of the 20 patients who underwent bipolar hemiarthroplasty through modified Hardinge approach. Complications like posterior dislocation and abductor lurch were nil in the study. [11] Patel et al in their study found that among 30 patients operated by the posterior approach, femoral stem was found in the center in 73.3% cases and eccentric in 26.6% cases (6 cases of varus and 2 cases of valgus stem positioning). Among the 24

cases operated by the lateral approach, femoral stem was found in the center in 75% cases and eccentric in 25% cases (5 cases of varus and 1 case of valgus stem positioning). Out of 54 patients selected in their study, 16 cases had limb length discrepancy. The mean LLD among cases operated by the posterior approach was 0.36cm whereas it was 0.6cm in the cases operated by the lateral approach. [4] Suratwala et al in their study checked for femoral stem positioning, loosening of femoral components, myositis ossificans as radiological parameters. There were no cases of femoral stem loosening, myositis ossificans in their study. Stem position was checked at 1 year follow up among the 25 patients who were operated by bipolar hemiarthroplasty by the posterior approach. Among the 25 cases, 20 cases (80 %) had stem in the center, 1 case (4%) had stem in the varus position and 4 cases (16%) with valgus stem positioning. There were no cases of femoral stem loosening or myositis ossificans in their study. [12]

In our study, the average limb length discrepancy (LLD) among the 14 cases in Group A, operated on via the posterior approach, was 0.6 cm. Meanwhile, it was 0.5 cm in the cases operated on by the lateral approach (Group B). We found no statistically significant difference in the average LLD between the two groups. The femoral stem was centrally positioned in all patients in both groups. In Group A, 4 (8%) cases experienced infections, leading to the need for Surgical Debridement. Only 1 (2%) case in Group B had an infection. One case treated with the lateral approach developed Myositis Ossificans due to intermuscular infection postoperatively. Group A had 2 (4%) cases of postoperative dislocation, requiring revision. On the other hand, 3 (6%) cases in Group B experienced postoperative lurch, which improved with subsequent physiotherapy. Our study did not encounter any cases of periprosthetic fracture, nerve injury, aseptic loosening, deep vein thrombosis (DVT), or pulmonary embolism.

Our study results were consistent with previous studies, showing no major differences in outcomes between the posterior and lateral approaches to the hip.

Conclusion

From the present study, we conclude that there are no notable differences in outcomes and complications between the two approaches except mean length of incision and intraoperative blood loss. Neither lateral nor the posterior approach seems to offer a clear advantage over each other. With Moore's Posterior Approach, we got 2 cases of posterior dislocation which needed revision and 4 cases of deep infections which needed debridement. With Hardinge's lateral approach we got no cases of posterior dislocation and only 1

case of intermuscular infection which subsequently subsided with debridement. The complications when compared between both the groups were not statistically significant. Still, we recommend using Hardinge's Lateral approach to hip during hemireplacement arthroplasty with modular bipolar prosthesis based on observations in our study with a small study sample.

But with methodological limitations as mentioned in this study, the interpretation of this study remained limited. Therefore, further multicentred, randomized controlled studies on a larger sample with long-term follow-up should be implemented to conclusively ascertain the outcomes.

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