

TO COMPARE THE FUNCTIONAL OUTCOMES BETWEEN THE DIRECT LATERAL APPROACH AND THE POSTERIOR APPROACH IN HIP ARTHROPLASTY

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Abstract

Background: Osteoarthritis (OA) of the hip is a degenerative ailment that lacks a remedy and often necessitates a THA. The main techniques used for THA are the posterior and direct lateral approaches. The posterior method is regarded as straightforward to execute; yet, elevated rates of dislocation have been documented. The straight lateral technique enables precise placement of the cup, perhaps reducing the occurrence of hip dislocation and minimising the likelihood of sciatic nerve damage. Nevertheless, there is a heightened susceptibility to experiencing a limp. The dislocation of a hip prosthesis is a significant complication that may occur following THA, with considerable consequences for morbidity and expense. **Aim:** To compare the functional outcomes between the direct lateral approach and the posterior approach in hip arthroplasty. **Materials & Methods:** 96 patients who fulfilled the inclusion criteria and gave consent for the surgery were taken for the study. Convenience sampling was done and they were divided into two groups after explaining the patients about the type of approach before the surgery. Group A was operated using the direct lateral approach method and Group B was operated using the posterior approach method for hip arthroplasty. Socio-demographic data of patient like age, sex, religion mode of injury, side of involvement, clinical history, examination, investigations, operative note and immediate postoperative rehabilitation progress and Follow up clinical and functional assessment data using Harris hip score were observed. Clinical and the functional assessment was done during the follow up studies using Harris hip score for each group. **Results:** Harris Hip Score at 3 months postoperatively, among 48 patients in the direct lateral approach group, 1 patient had excellent score, 8 patients had good score, 25 patients had fair score and 14 patients had poor score. In posterior approach group among 48 patients, 2 patients had excellent score, 5 patients had good score, 33 had fair score and 8 had poor score. The difference was statistically not significant. Harris Hip Score at 6 months postoperatively, among 48 patients in the direct lateral approach group, 9 patients had excellent score, 26 patients had good score, 10 patients had fair score and 3 had poor score. In posterior approach group 7 patients had excellent score, 33 patients had good score 4 patients had fair score and 4 patients had poor scores. The difference was statistically not significant. **Conclusion:** We conclude that both the direct lateral approach and the posterior approach for hip arthroplasty gives satisfactory result and neither of them seems to offer clear advantage over the other.

INTRODUCTION

The normal hip functions as “ball-and-socket” joint. The femoral head(ball) articulates with the acetabulum(socket), allowing smooth range of motion in multiple planes. Any condition that affects either of these structures can lead to deterioration of joint. This in turn can lead to deformity, pain and loss of functions. The most common conditions affecting the hip joints is osteoarthritis. Other conditions that affect the hip joints are trauma, idiopathic osteonecrosis, inflammatory arthritis (rheumatoid arthritis), psoriatic arthritis, alcohol induced, developmental dysplasia, childhood hip disorders and secondary osteonecrosis.^[1] Osteoarthritis of a hip joints is a progressive condition that has no cure and often requires total hip arthroplasty.^[2] Hip fractures are common and comprise about 20% of the operative workload of an orthopaedic trauma unit. Intra-capsular femoral neck fracture accounts for about 50% of all hip fractures. The lifetime risk of sustaining hip fracture is high and lies within the range of 40% to 50% in women and 13% to 22% in men.^[3]

Total Hip Arthroplasty is a procedure whereby the diseased articular surfaces are replaced with synthetic materials, thus relieving pain and improving joint kinematics and function. Total Hip Arthroplasty has long been demonstrated to be a cost-effective treatment for osteoarthritis of hip joint with improvements in pain, improved function and quality of life. It is the most common operative intervention for treatment of severe osteoarthritis.^[4]

Hemiarthroplasty is a procedure in which femoral components is replaced by prosthesis. Hemiarthroplasty is a common treatment choice for displaced fragility hip fractures. It enables immediate full weight-bearing without the risk of typical complications of internal fixation including avascular necrosis and non-union.

Many surgical approaches to hip have evolved over the period of time, surgical procedure differs chiefly in position of patient in supine or lateral. The choice of surgical approaches is largely dependent on personal preference and training. The posterior approach and Hardinge’s lateral approach are the two most commonly used surgical approaches. There are advantages and disadvantages of each procedure. The Lateral Approach preserves the posterior capsules which may reduce the rate of hip dislocation and sciatic nerve damage but the main complication of this procedure is post-operative abductor muscle dysfunction. In Posterior Approach the main advantage is preservation of the abductor mechanism thereby causing low frequency incidence of post-operative limping. The complication associated with this procedure is the potential sciatic nerve injury and post-operative hip dislocation as posterior joint capsule and external rotator muscle group are compromised.^[3] However there is no clear evidence

and consensus as to say which approach is superior to the other.^[5-7]

MATERIALS AND METHODS

This is non randomized control trial hospital based study was conducted the department of orthopaedics RIMS, Imphal from December 2020 to November 2022. Patients with fracture neck of femur were included in this study. 96 patients who fulfilled the inclusion criteria and gave consent for the surgery were taken for the study. Convenience sampling was done and they were divided into two groups after explaining the patients about the type of approach before the surgery. Group A: Direct lateral approach group and Group B: Posterior approach group. Ethical approval was taken from Institutional Research Ethics Board, RIMS Imphal before starting the study and informed consent was taken from all the participants. Group A was operated using the direct lateral approach method and Group B was operated using the posterior approach method for hip arthroplasty. Socio-demographic data of patient like age, sex, religion mode of injury, side of involvement, clinical history, examination, investigations, operative note and immediate postoperative rehabilitation progress and Follow up clinical and functional assessment data using Harris hip score were observed. The patients were followed up at 3 months and 6 months postoperatively at the out-patient department of the RIMS Orthopaedic department. Clinical and the functional assessment was done during the follow up studies using Harris hip score for each group.

Inclusion Criteria

1. Age group, 50-90years
2. Garden’s type III and IV fracture

Exclusion Criteria

- Previous hip surgery
- Associated comorbidities such as any type of coagulopathy, uncontrolled diabetes mellitus or any disease where fitness for surgery cannot be obtained
- Pathological fracture of neck of femur

Methodology

All the patients were operated under spinal anaesthesia. Skin preparation was done with 10% povidone iodine solution followed by rectified spirit. The operative field was isolated with sterile drapes. Bipolar prosthesis implant was used for all surgery. Patient positioning: Patient was kept in the lateral position with the affected limb uppermost which was internally rotated and flexed in the posterior approach and supine with greater trochanter at the edge of the table and the gluteal muscles of the buttocks freed from the edge in the direct lateral approach.

Direct Lateral Approach: Posteriorly directed lazy-J shaped incision centered over the greater trochanter was made and fascia lata divided in line with the incision. The tensor fascia lata was retracted anteriorly and gluteus maximus posteriorly exposing

the origin of the vastus lateralis and the insertion of the gluteus medius and the tendon of the gluteus medius was incised obliquely across the greater trochanter leaving the posterior half still attached to the greater trochanter. The incision was carried proximally in line with the fibres of the gluteus medius at the junction of the middle and the posterior third upto 4 to 5 cm from tip of the greater trochanter and distally in the line of the fibers of the vastus laterally down to the bone along the anterolateral surface of the femur. The capsule was exposed by elevating the tendinous insertions of the anterior portion of the gluteus minimus and vastus lateralis and incision given over the capsule in line with tendinous fibers of the gluteal minimus. The femoral head was dislocated by flexing and externally rotation of the hip and femoral neck osteotomy done using oscillating saw. The femoral canal was reamed and the chosen bipolar prosthesis was inserted and the hip joint capsule, abductors fascia lata and the subcutaneous tissue was repaired with the absorbable suture and finally the skin was closed with the stapler or suture.

Posterior Approach: A 15cm or longer curved incision centred on the posterior aspect of the greater trochanter was made and the incision was extended across the buttock cutting over the posterior aspect of greater trochanter continuing down along the shaft of femur. The fascia lata was incised to uncover the vastus lateralis distally and the fascial incision was lengthened in line with skin incision to split the fibres of gluteus maximus by blunt dissection. Any bleeding vessels were cauterized to prevent any excessive blood loss.

The hip was then internally rotated to place the short external rotators of hip on stretch. A stay suture was placed in piriformis and obturator internus tendon just before they insert into the greater trochanter and the muscles was detached close to their femoral insertion to reflect them backward and laying them over the sciatic nerve to protect it during the rest of the procedure. The posterior aspect of the hip joint capsule was then fully exposed and a T-shaped or longitudinal incision was made over the posterior capsule and the hip was dislocated by internal rotation after performing capsulotomy. The femoral neck was delivered into the wound and the femoral neck cut and removed from the acetabulum. The femoral canal was reamed and the chosen bipolar prosthesis inserted. The hip joint capsule, abductors of the hip, fascia lata, and subcutaneous tissue was repaired with absorbable suture and finally the skin was closed with a stapler or suture.

Postoperative care: Parenteral antibiotic (3rd generation cephalosporin) was administered 12 hourly for five days and changed to oral antibiotic thereafter. Analgesics were administered at regular intervals for the first 48 hours of surgery. Check x-ray was taken on the 2nd post-operative day. Postoperative rehabilitation progress was assessed postoperatively. All patients were instructed to use a walker or two crutches and advance weight bearing

and exercises as tolerated until 1 month after surgery. The skin sutures were removed on postoperative day 10. No specific protocol was used to encourage early discharge from the hospital, each patient's response to the surgery and rehabilitation progress determined the discharge. Assessment was done at 3 months and 6 months postoperatively using the Harris hip scoring system.

Statistical Analysis

Data were checked for completeness and consistency. Data were entered and analysed using SPSS V.26 for Windows (IBM Inc.). Descriptive data were presented in terms of percentage, mean and standard deviation. Data were compared between the two groups under study by using independent sample t-test. A p-value of less than 0.05 was considered significant.



Figure 1: Instruments for hemiarthroplasty (1. Rasp Thompson type with tommy bar, 2. Charnley's self-retaining retractor, 3. Rasp Moore type, 4. Tommy bar, 5. Bone skid, 6. Head impactor, 7. Osteotome, 8. Right angled retractors, 9. Bipolar prosthesis, 10. Head gauge, 11. Oscillating saw blades, 12. Wrench, 13. Oscillating saw)



Figure 2:



Figure 3:



Figure 4: Detaching the short external rotators at their origin



Figure: 7



Figure 5: Extraction of femur head from the acetabulum



Figure 8: Capsule and short external rotators repair



Figure :6 ?



Figure 9: Final skin closure



Figure 10: Postoperative AP X-ray of bilateral hip showing bipolar prosthesis in right hip

RESULTS

A total of 96 patients meeting inclusion criteria underwent hip arthroplasty in the period under study. Out of these 48 underwent hip arthroplasty by the direct lateral approach and 48 by the posterior approach. All the patient were followed up for a period of 6 months after surgery. The following were the observations and the results at the end of the last assessment.

The mean age of the patients in the direct lateral group was 70.44(SD±7.57) and for the posterior group was 70.06(SD±7.2) and the mean age group of the total patient was 70.25(SD±7.35). The difference was statistically not significant (p value > 0.05). Among 96 patients who underwent hip arthroplasty 60 were female and 36 were male. Among 48 patients in the direct lateral group 21 were male and 27 were female. In the posterior approach group among 48 patients 15 were male and 33 were female. The difference was statistically not significant (P Value > 0.05). Among 48 patients who underwent hip arthroplasty by the direct lateral approach, 19 were Garden's type 3 fracture and 29 were Garden's type 4 fracture. Among 48 patients who underwent hip arthroplasty by posterior approach, 18 were Garden's type 3 fracture and 30 were Garden's type 4 fracture. Among 48 patients in the lateral approach group 7 patients had suffered high energy trauma and 41 had suffered low energy trauma. In posterior approach group, among 48 patients 7 had suffered high energy trauma and 41 had suffered low energy trauma. Among 48 patients in direct lateral approach, 26 patients had right side involvement and 22 had left side involvement. Among 48 patients in posterior

approach 28 patients had right side involvement and 20 had left side involvement. [This is shown in table 1]

Harris Hip Score at 3 months postoperatively, among 48 patients in the direct lateral approach group, 1 patient had excellent score, 8 patients had good score, 25 patients had fair score and 14 patients had poor score. In posterior approach group among 48 patients, 2 patients had excellent score, 5 patients had good score, 33 had fair score and 8 had poor score. The difference was statistically not significant (P Value > 0.05). [This is given in table 2]

Harris Hip Score at 6 months postoperatively, among 48 patients in the direct lateral approach group, 9 patients had excellent score, 26 patients had good score, 10 patients had fair score and 3 had poor score. In posterior approach group 7 patients had excellent score, 33 patients had good score 4 patients had fair score and 4 patients had poor scores. The difference was statistically not significant (P Value>0.05). [This is shown in the Table 3]

The mean preoperative hemoglobin level in the direct lateral approach group was 11.32(SD±1.01) gm% and in the posterior approach group was 11.32(SD±0.8) gm%. The difference was statistically not significant (P Value>.05). The mean postoperative hemoglobin in the direct lateral approach group was 10.84 (SD±1.01) and in the posterior approach group was 10.84 (SD±0.82). The difference was statistically not significant (P Value>.05). [This is depicted in the table 4]

The mean postoperative hospital stays in the direct lateral approach group was 13.94(SD±2.24) days and in the posterior approach group was 13.67(SD±2.44) days. The difference was statistically not significant (P Value>.05). [This is depicted in table 5].

Among 48 patients under direct lateral approach group 6 patients developed wound infection and was managed with regular dressing and injectable antibiotics, 1 patient had peri-prosthetic fracture and needed surgery. In posterior approach group among 48 patients 5 patients developed wound infection and was managed with regular dressing and injectable antibiotics, 1 patient had postoperative dislocation which was managed with closed reduction under short general anesthesia. [This is depicted in the table 6].

Table 1: Basic profile of two groups

Age in years	Treatment Arm		Total	P Value
	Direct Lateral Approach	Posterior Approach		
	70.44±7.57	70.06±7.2	70.25±7.35	0.804
Gender				0.292
Male	21(43.8%)	15(31.3%)	36(37.5%)	
Female	27(56.3%)	33(68.8%)	60(62.5%)	
Type of fracture (Garden's)				1.000
Type 3	19(39.6%)	18(37.5%)	37(38.5%)	
Type 4	29(60.4%)	30(62.5%)	59(61.5%)	
Mode of Injury				0.777
High Energy Trauma	7(14.6%)	7(14.6%)	14(14.6%)	

Low Energy Trauma	41(85.4%)	41(85.4%)	82(85.4%)	
Side of involvement				0.841
Right side	26(54.2%)	28(58.3%)	54(56.3%)	
Left side	22(45.8%)	20(41.7%)	42(43.8%)	

Table 2: Harris Hip Score at 3 months postoperatively

Harris Hip Score at 3 months post operatively	Treatment Arm		Total	P Value
	Direct Lateral Approach	Posterior Approach		
Excellent	1(2.1%)	2(4.2%)	3(3.1%)	0.289
Good	8(16.7%)	5(10.4%)	13(13.5%)	
Fair	25(52.1%)	33(68.8%)	58(60.4%)	
Poor	14(29.2%)	8(16.7%)	22(22.9%)	
Total	48(100%)	48(100%)	96(100%)	

Table 3: Harris Hip Score at 6 months postoperatively

Harris Hip Score at 6 months postoperatively	Treatment Arm		Total	P Value
	Direct Lateral Approach	Posterior Approach		
Excellent	9(18.8%)	7(14.6%)	16(16.7%)	0.290
Good	26(54.2%)	33(68.8%)	59(61.5%)	
Fair	10(20.8%)	4(8.3%)	14(14.6%)	
Poor	3(6.3%)	4(8.3%)	7(7.3%)	
Total	48(100%)	48(100%)	96(100%)	

Table 4: Mean preoperative and postoperative hemoglobin level in two groups

Pre-Operative haemoglobin level (g%)	Treatment Arm		Total	P Value
	Direct Lateral Approach	Posterior Approach		
	11.32±1.01	11.32±0.86	11.32±0.93	0.974
Post-Operative haemoglobin level (g%)	10.84±1.01	10.84±0.82	10.84±0.91	0.982

Table 5: Mean postoperative hospital stay in the two groups

Postoperative Hospital stay (in days)	Treatment Arm		Total	P Value
	Direct Lateral Approach	Posterior Approach		
	13.94±2.24	13.67±2.44	13.8±2.33	0.572

Table 6: Distribution of postoperative complications in the two groups

Postoperative Complications	Treatment Arm		Total	P value
	Direct Lateral Approach	Posterior Approach		
Infection	6(12.5%)	5(10.4%)	11(11.5%)	1.00
Peri- prosthetic fracture	1(2.1%)	0(0%)	1(1%)	
Dislocation	0(0%)	1(2.1%)	1(1%)	
None	41(85.4%)	42(87.5%)	83(86.5%)	
Total	48(100%)	48(100%)	96(100%)	

DISCUSSION

The present study was conducted in the department of orthopedics, Regional Institute of Medical Sciences, Imphal for the period of two years from December 2020 to November 2022. Patients with displaced Garden's type III-IV fracture neck of femur were divided in two groups. Group A patients underwent hip arthroplasty by direct lateral approach and the Group B patients underwent hip arthroplasty by posterior approach.

The results were compared by studying the two groups of patients with the direct lateral approach and the posterior approach in hip arthroplasty. The following variables of each patient were analysed: age, sex, mode of injury, type of fracture, side of injury, Harris hip score at 3months and 6 months, preoperative and postoperative haemoglobin level,

number of postoperative hospital stays and complications.

The mean age of the patients in the direct lateral group was 70.44(SD±7.57) and for the posterior group was 70.06(SD±7.2). This is comparable to the mean age of 75.30(±9.3) in direct lateral approach and 73(SD±9.0) in the posterior approach in the study conducted by Mohammed AM et al.^[8]

Among 96 patients who underwent hip arthroplasty 60 were female and 36 were male. 21 male and 27 female underwent hip arthroplasty by the direct lateral approach and 15 males and 33 females underwent hip arthroplasty by the posterior approach. The female patients accounted 56.3% in the direct lateral group and 68.8% in the posterior. This is comparable to 72% in the direct lateral approach and 73% in the posterior approach in Kristensen TB et al.^[9]

Among 48 patients who underwent hip arthroplasty by the direct lateral approach, 19 were Garden's type 3 fracture and 29 were Garden's type 4 fracture. Among 48 patients who underwent hip arthroplasty by posterior approach, 18 were Garden's type 3 fracture and 30 were Garden's type 4 fracture. Garden's type 4 fracture accounted for the majority of the cases in both the group which is comparable to the study conducted by Hongito MT et al.^[7]

In our study high energy trauma accounted for 14.6% and the low energy trauma accounted for 85.4% of the total cases which was comparable to the study by Aparajit P et al.^[3]

Among 48 patients in direct lateral approach, 26 patients had right side involvement and 22 had left side involvement. Among 48 patients in posterior approach 28 patients had right side involvement and 20 had left side involvement. Right side involvement accounted for 56.3% of the total patients which was comparable to 55.6% of the right-side involvement in a study conducted by Wang T et al.^[10]

Harris Hip Score at 3 months postoperatively, among 48 patients in the direct lateral approach group, 2.1% patient had excellent score, 16.7% patients had good score, 52.1% patients had fair score and 29.2% patients had poor score. In posterior approach group among 48 patients, 4.2% patients had excellent score, 10.4% patients had good score, 68.8% had fair score and 16.7% had poor score. This is comparable with the study conducted by Aparajit P et al.^[3]

Harris Hip Score at 6 months postoperatively, among 48 patients in the direct lateral approach group, 18.8% patients had excellent score, 54.2% patients had good score, 20.8% patients had fair score and 6.3% had poor score. In posterior approach group 14.6% patients had excellent score, 68.8% patients had good score 8.3% patients had fair score and 8.3% patients had poor scores. The mean Harris hip score was more at 6 months postoperatively in both groups. This finding was comparable with the study conducted by Aparajit P et al.^[3]

The mean preoperative hemoglobin level in the direct lateral approach group was 11.32(SD±1.01) gm% and in the posterior approach group was 11.32(SD±0.8) gm%.

The mean postoperative hemoglobin in the direct lateral approach group was 10.84 (SD±1.01) and in the posterior approach group was 10.84 (SD±0.82) which was comparable to study by Roselund S et al^[11]. The mean postoperative hospital stays in the direct lateral approach group was 13.94 (SD±2.24) days and in the posterior approach group was 13.67(SD±2.44) days. Our study finding was comparable with the study of Jeyaraman M et al.^[12]

Among 48 patients under direct lateral approach group 6 patients developed wound infection and was managed with regular dressing and injectable antibiotics, 1 patient had peri-prosthetic fracture and

needed surgery. In posterior approach group among 48 patients 5 patients developed wound infection and was managed with regular dressing and injectable antibiotics, 1 patient had postoperative dislocation which was managed with closed reduction under short general anesthesia. The occurrence of the wound infection was similar in both the study groups and was the most common complication. The finding of our study was similar to the finding in the study conducted by Patel M et al.^[1]

CONCLUSION

We conclude that both the direct lateral approach and the posterior approach for hip arthroplasty gives satisfactory result and neither of them seems to offer clear advantage over the other.

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