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## Functional outcome in patients who have underwent Total Hip Replacement through modified lateral approach for various indications

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### Abstract

**Introduction:** Evaluation of long term outcomes of an operative procedure is important to determine the durability of the procedures like total hip replacement (THR). Patient derived outcome scales have become increasingly important to surgeons and clinical researchers for measuring improvement in function after surgery. It provides a means for comparison of the results of different clinical interventions which may lead to any changes in operative technique, implant design, type of joint that occurs over time

**Methodology:** On admission to the ward, a detailed history of the patients was taken. This included age, sex, occupation, complaints, associated medical illness. Following this, they were subjected to a thorough clinical examination and general condition was assessed and accordingly corrective measures were taken to correct the general being of the patients.

**Results:** In our study, out of 56 patients, there were 3(5.4%) cases of Heterotrophic ossification identified in the follow up X- Ray, two were Brooker grade 1 and one was Brooker grade 2 without limitation of movements.

**Conclusion:** In this modified approach, the posterior capsule was intact and the anterior capsule was repaired which provides a soft tissue envelope around the joint. This may give additional stability against dislocation.

**Keywords:** THR, Modified Lateral Approach, Brooker Grade

### Introduction

With the increased life expectancy these days and the resultant higher number of aged people living active and independent lives, joint replacement surgeries are procedures that have increasingly been performed intending to improve quality of life for the population living with orthopaedic conditions. Despite the advancements seen on total hip replacement surgery over the last decades, the selection of the best surgical approach is still controversial in literature, being so determined by individual preferences of the surgeon.

Many approaches have been described for total hip arthroplasties. However, the most frequently used and studied are:

- The trans trochanteric approach,
- The anterolateral approach,
- The direct lateral
- Postero lateral approaches <sup>[1]</sup>.

A direct lateral approach to the hip joint was first described by McFarland and Osborne (1954) based on the basic anatomical principle that the gluteus medius and vastus lateralis muscles act in functional continuity via their fascial connection over the greater trochanter. He detached the whole gluteus medius together with the vastus lateralis from the posterior border of the greater trochanter and swung them forward like a bucket handle. This lateral approach was popularized by Hardinge <sup>[2]</sup> (1982) by reflecting the anterior half of the gluteus medius and vastus lateralis. The lateral approach requires reflection of the anterior fibres of gluteus medius and minimus from the greater trochanter, and one of the complications of this procedure is postoperative weakness of hip abduction.

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This may occur either through denervation of the gluteal flap, following damage to the inferior branch of the superior gluteal nerve or by failure to establish reattachment of the flap to the greater trochanter. Hardinge was aware of these problems and cautioned against excessive retraction of the gluteal flap [3]. Dall (1986) described a modification of the technique, in which a sliver of trochanteric bone is taken with the gluteal flap so as to allow better fixation of the flap to the greater trochanter during closure. Unfortunately he does not report the postoperative abductor function of his patients. Since then many modifications have been reported.

Evaluation of long term outcomes of an operative procedure is important to determine the durability of the procedures like total hip replacement (THR). Patient derived outcome scales have become increasingly important to surgeons and clinical researchers for measuring improvement in function after surgery. It provides a means for comparison of the results of different clinical interventions which may lead to any changes in operative technique, implant design, type of joint that occurs over time.

Good results can be achieved in the majority of cases irrespective of the type of approach. However, post-operative dislocation is still a problem, more so when performed for fractured neck of femur. The incidence of dislocation is much less in the lateral approach compared to other approaches [4-6].

### Methodology

On admission to the ward, a detailed history of the patients was taken. This included age, sex, occupation, complaints, associated medical illness. Following this, they were subjected to a thorough clinical examination and general condition was assessed and accordingly corrective measures were taken to correct the general being of the patients.

Routine blood investigations were done for all the patients. Special attention was paid to CRP and ESR and if these were abnormal, surgery was deferred. Standard anteroposterior and lateral X-rays were taken including pelvis with both hips. Analgesics, antibiotics, tetanus toxoid and blood transfusions were given as needed before surgery.

### Preoperative Assessment

The patients were evaluated according to the modified Harris hip scoring system [13]. The scores taken into account were of pain, function, range of motion, and deformities. Also a mention of the limb length discrepancy and flexion contracture is made. The physical fitness of the patient undergoing a major surgery was assessed after taking Pre-operative informed consent. Physical examination included examination of spine and both lower extremities including opposite hip, both knees and foot. Trendelenburg test to assess the abductor musculature mechanism was done when possible. Neurovascular status of affected extremity was evaluated. Any occult infections like skin lesions, dental caries and urinary tract infections were identified and treated preoperatively.

### Roentgen graphic evaluation

The goal of preoperative radiographic assessment is to confirm the diagnosis, To determine anatomic relationship of the femur and pelvis to allow for accurate restoration of joint anatomy and biomechanics. Standard pelvic roentgenogram AP view with both hips along with upper end femur, AP X-ray of hip in 15 degrees of internal rotation and lateral X-ray of hip were taken. X-rays of spine and knees were also taken to know their status. Following features were noted;

Femur-Bone stock, medullary cavity, limb length discrepancy and neck.

Acetabulum-Bone stock, floor, migration, protrusion, osteophytes and approximate cupsize.

### Pre-operative planning

The general goals are;

- To restore anatomical and bio-mechanical centre of rotation of hip.
- To restore appropriate muscle relationships.
- To anticipate any problem likely to be met and planning for them too preoperatively.

A single surgeon performed all the surgeries, using the modified Lateral approach to all the hips in all cases.

### Surgical Technique

The patient was placed in the full lateral position on the operating table with support. A straight lateral skin incision was made midway between the anterior and posterior border of the greater trochanter cantering on the tip of the greater trochanter. The fat and fascia lata are incised in line with the skin incision and retracted with a self-retaining retractor. At the proximal part of the fascia lata, gluteus maximus insertion to the fascia lata is encountered, which is split in line with the fascia lata. The trochanteric bursa was incised to demonstrate the anterior and posterior borders of the gluteus medius and the vastus lateralis. Blunt dissection was used to split the anterior third of the gluteus medius. Usually a layer of fat is visible deep to gluteus medius. This split is in the direction of the muscle fibres, which makes anterior 45° angulation to the skin incision. The split was not extended more than 3 cm cephalad to the insertion of the trochanter to protect the inferior branch of the superior gluteal nerve. Next, a diathermy needle is used to make a curvilinear incision in the gluteus-vastus tendinous attachment to greater trochanter; this is continued distally in the shape of the Greek letter "omega" through the thickened crescentic attachments of vastus lateralis and gluteus medius to the greater trochanter. The condensation of aponeurotic tissue is carefully palpated to ensure that the incision is placed in an area which provides an optimum bulk of tissue.

There is a surgical plane between the glutei and capsule marked by areolar tissue, and dissection was carried out in this plane to the acetabular rim. The flap was retracted with a self-retaining retractor and the patient's leg is externally rotated to visualize the full length of the capsule with its overlying iliofemoral ligament. A 'T' shaped incision was made on the anterior capsule with the vertical limb of the 'T' along the intertrochanteric line and the horizontal limb across the anterior surface of the capsule to the acetabular rim. At this stage, the head of the femur was dislocated by flexion, adduction and external rotation to perform a femoral neck osteotomy and the head is removed with the cork screw.

For acetabular preparation, a Hohmann retractor was placed in the acetabular notch beneath the transverse acetabular ligament and a posterior rim retractor. The acetabulum was prepared in the usual fashion. Trial acetabular prosthesis was then seated in to the acetabular fossa to assess the orientation of the cup to be seated. The optimal position of placement was 40° of abduction or inclination and 15° of ante version or forward flexion.

For femoral preparation, the leg was held perpendicular to the floor. Care was taken while preparing the femoral shaft not to damage the posterior fibres of the gluteus medius with the

rasp which can be avoided by retracting this muscle with a blunt Hohmann retractor. Preparation of the femoral canal was done using the appropriate reamers and broaches. Final implantation done after trial prosthesis was found to be stable and satisfactory.

Careful attention was paid to the detail closure of the muscular layers. A 1 Vicryl was used to repair the capsule. The conjoint tendon flap (gluteus medius and minimus, vastus lateralis) was repaired to the greater trochanter condensation remnant, the split gluteus and vastus are approximated with 1 Vicryl stitches. The fascia lata, subcutaneous tissues and skin are closed in layers over drain.

### Results:

Functional outcome of the procedure was done by following the Harris Hip Score (Modified). The results showed excellent results in 22 (39.2%) diseased hips, good in 31(55.4%) hips, fair in 3 (5.4%) hips. No poor outcome was noted in the study.

**Table 1:** Harris Hip Score (Modified)

Results	No. Of Hips	Distribution
Excellent	22	29.2%
Good	31	55.4%
Fair	3	5.4%
Poor	0	0%

Out of 56 patients, 42 (75%) diseased hips were treated with cemented THR,

13 (23.2%) hips were treated with uncemented THR, whereas 1(1.8%) patient was treated with Hybrid type of THR.

**Table 2:** Type of Thr

Type	No. Of Patients	Distribution
Cemented	42	75%
Uncemented	13	23.2%
Hybrid	1	1.8%

In our study, the prosthesis used was of 5 companies. Zimmer was used in 21 hips (37.5%), C2 Kalyx was used in 20 hips (35.6%), De Puy was used in 12 hips (21.5%), Stryker was used in 2 hips (3.6%) and Smith & Nephew was used in 1 hip (1.8%).

**Table 3:** Implant System Used

Prosthesis	No. Of Patients	Distribution
Zimmer	21	37.5%
C2 Kalyx	20	35.6%
De Puy	12	21.5%
Stryker	2	3.6%
Smith & Nephew	1	1.8%

In our study, out of 56 patients, there were 3(5.4%) cases of Heterotrophic ossification identified in the follow up X- Ray, two were Brooker grade 1 and one was Brooker grade 2 without limitation of movements.

Two (3.6%) patients developed superficial wound infection managed with antibiotics and regular dressing, wound healed well subsequently without deep infection. There was no incidence of deep infection.

One (1.8%) patient developed Foot drop post operatively, EMG & NCV study done at the end of five months showed involvement of Right Sciatic nerve with peroneal nerve component maximally affected with significant axonal loss and signs of recovery of Tibial nerve component who is on

regular follow up.

One (1.8%) patient had subsidence of femoral stem following slip and fall, which was managed with Revision of femoral stem.

One (1.8%) patient sustained Vancouver type C periprosthetic fracture following fall managed with Open reduction and internal fixation with LCP.

One (1.8%) patient had asymptomatic aseptic loosening at cement bone interface in Gruen Zone 3, 4 & 5 of femoral component.

No incidence of prosthetic dislocation in any of the patient due to better placement of implants and modified lateral approach in our study.

**Table 4:** Complications

Complication	No. Of Patients	Distribution
Heterotrophic Ossification	3	5.4%
Loosening	1	1.8%
Limb Length Descrrepancy	-	-
Superficial Infection	2	3.6%
Deep Infection	-	-
Thromboembolism	-	-
Nerve Injury	1	1.8%
Dislocation	-	-
Vascular Injury	-	-
Subsidence	1	1.8%
Periprosthetic #	1	1.8%

### Discussion

A S Basker, V C Bitounis<sup>7</sup> performed Electromyographic and clinical studies on patients undergoing total hip replacement by the modified direct lateral (29 hips), the direct lateral (29 hips) and the posterior approaches (21 hips). Assessments were made three months after operation. The Trendelenburg test was positive in eight cases operated upon by the direct lateral route, but in only one of each of the other two groups. Denervation occurred in only five of the 28 hips with abductor weakness without statistical difference between the groups. In our study, out of 56 patients, 29 patients who underwent EMG study on Gluteus medius, no evidence of denervation seen in any of the patients.

Marcel Dudda, A Gueleryuez, E Gautier, A Busato, C Roeder (2010) [8] evaluated risk factors for early dislocation after primary total hip arthroplasty (THA) in matched case control study of 175 cases with dislocation and 651 controls, showed posterior approach was 6 fold more prone to dislocation than the anterolateral or straight lateral approach. There was no incidence of prosthetic dislocation in our study due to modified lateral approach and better placement of prosthesis.

The reported modified lateral approach in our study differs from Hardinge approach in following ways:

1. By splitting gluteus medius in 1/3 of its anterior, a large portion of the posterior 2/3 of the gluteus medius remains undisturbed and soft tissue sleeve left at the greater trochanter made repair of gluteus-vastus flap easy.
2. The superior extension of the abductor split is only 3 cm, so that a safe distance is maintained from the inferior branch of superior gluteal nerve 1.
3. A 'T' shaped incision was made on the anterior capsule with the vertical limb of the T along the intertrochanteric line and the horizontal limb across the anterior surface of the capsule to the acetabular rim.
4. With the posterior capsule intact and the anterior capsule repaired, this modification gives soft tissue protection against dislocation.

5. Patient is placed in the lateral decubitus position which allows direct visualization of the relevant anatomy.

The modified direct lateral as described in this study offers predictable and easy access to the hip joint and provides excellent exposure of both acetabular and proximal femoral regions. There was no incidence of dislocation and postoperative limp is not a major problem. In this modified approach, the posterior capsule intact and the anterior capsule repaired, provides a soft tissue envelope around the joint. This may give additional stability against dislocation.

The limitation of this study is that not all the patients underwent Electrophysiological study of abductors, even though we wanted to do EMG study in all the patients, we could only do in patients who were willing to participate in the study.

### **Conclusion**

The modified direct lateral approach as described in this study offers predictable and easy access to the hip joint and provides excellent exposure of both acetabular and proximal femur. There was no incidence of prosthesis dislocation and postoperative limp is not a major problem.

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