

Study of the Functional Outcome of the Fracture Neck of Femur in the Elderly Treated with Hemiarthroplasty through Hardinge's Approach

Ashokvardhan Reddy J¹, Omkarnath Gudapati², Tejaswi³

ABSTRACT

Introduction: Numerous new approaches to the hip have been described since the 1990s; most approaches are based on older approaches and are modified for a specific surgical procedure. Hardinge described a useful modification of the McFarland and Osborne direct lateral approach based on the observation that the gluteus medius inserts on the greater trochanter by a strong, mobile tendon that curves around the greater trochanter. This approach can be easily made with the patient in supine position. Study aimed to see the functional outcome of Fracture Neck of Femur in The Elderly Treated with Hemiarthroplasty through Hardinge's Approach and to Study the associated complications.

Material and methods: This is a prospective study of primary hemireplacement arthroplasty of the hip done in 25 patients with fracture neck of femur using Bipolar prosthesis/Austin Moore's prosthesis. Clinical assessment done at 2 weeks, 3 months and 6 months period by Trendelenburg's Test. Follow up was done for a minimum of 6 months. The results were evaluated using the Modified Harris Hip Scoring.

Results: 18 of the 25 cases were operated within a week following the fracture. In this study, 16 cases had Excellent results (52%), 5 cases had Good results (20%), and 4 cases had Poor results (16%). Good to Excellent results were seen in 72% of the cases at 3 months of follow-up. 21 cases Excellent (84%) and 4 cases Poor results (16%) at 6 months of follow-up.

Conclusion: Hemiarthroplasty with Austin Moore's prosthesis/bipolar prosthesis through Hardinge's approach in the elderly produces good functional outcome with minimal complications and has several advantages. The functional limitations after surgery were dependent more on the pre-existing medical conditions.

Keywords: Hardinge's approach, Hemiarthroplasty, Fracture neck of femur, Austin Moore's prosthesis, Bipolar prosthesis, Modified Harris Hip Scoring.

dislocation of the hip in a young child by division of Sartorius and rectus femoris tendon and iliac epiphysis.³

Mc Farland and Osborne described a lateral approach to the hip that preserves the integrity of the gluteus medius muscle. They noted that gluteus medius and vastus lateralis muscles can be regarded as being in direct functional continuity through the thick periosteum covering the greater trochanter.^{1,4,5} Hardinge described a useful modification of the McFarland and Osborne direct lateral approach based on the observation that the gluteus medius inserts on the greater trochanter by a strong, mobile tendon that curves around the greater trochanter. This approach can be easily made with the patient in supine position.¹

Frndak et al. modified the Hardinge's direct lateral approach by placing the abductor split more anterior, directly over femoral head and neck must not extend more than 2 cm above the lateral lip of the acetabulum to avoid damage to the gluteal neurovascular bundle. this offers exposer of the femoral head and neck requires less retraction.⁶ McLaughlin described a direct lateral approach to the hip through the gluteus medius used for many years by Hay at the Stracathro Hospital. It is also based on the anatomical observation made by McFarland and Osborne that the gluteus medius and vastus lateralis are in functional continuity through the thick periosteum covering over greater trochanter.⁷

Gibson is responsible for the rediscovery of the posterolateral approach to the hip first described and recommended by Kocher and Langenbeck. Because detaching the gluteal muscles from the ilium and interfering with the function of the iliotibial band are unnecessary, rehabilitation after surgery is rapid.⁸

A modification of the Gibson approach by Marcy and Fletcher in which the hip is dislocated by internal rotation and the anterior part of the joint capsule is preserved to keep the hip from dislocating after surgery.⁹

Posterior approach to the hip joint described by Osborne, gluteus maximus has been opened in line with the fibers of muscle and division of insertion of the gluteus maximus into the fascia lata. Relatively little bleeding occurs because the branches of the superior gluteal artery are contained in the proximal half of the muscle and the branches of the inferior gluteal are contained in the distal half. Moore's approach has been facetiously labeled

INTRODUCTION

Of the trauma cases presented at Gandhi General Hospital casualty, Secunderabad, 70% come under the preview of Orthopaedic surgeon, of which one in ten cases involve fracture neck of femur (Intracapsular). Nearly 16% of the fractures are the fractures involving neck femur (intracapsular). Majority of fracture neck of femur were dealt by surgical methods only. Numerous new approaches to the hip have been described since the 1990s; most approaches are based on older approaches and are modified for a specific surgical procedure.¹

Schaubel modified the Smith-Peterson anterior approach after finding reattachment of the fascia lata to the fascia on the iliac crest difficult. Instead of dividing the fascia lata at the iliac crest, an osteotomy of the overhang of the iliac crest is performed between the attachments of the external oblique muscle medially and fascia lata.² Somerville described an anterior approach using a transverse bikini incision for irreducible congenital

¹Associate Professor, ²Associate Professor, Department of Orthopaedics, Malla Reddy Institute of Medical Sciences, Hyderabad, ³Senior Resident, Gandhi Medical College, Secunderabad, India

Corresponding author: Dr. Omkarnath Gudapati, Associate Professor, Department of Orthopaedics, Malla Reddy Institute of Medical Sciences, Suraram, Hyderabad-500 055, India

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“The Southern Exposure”.^{10,11}

Hip Abduction Function After Hardinge’s Approach

In 1954 Mc Farland and Osborne described their lateral approach to the Hip, which they referred to as “A Suggested Improvement on Kocher’s Method”.

Hardinge recommended using a diathermy needle to cut a cuff of vastus lateralis and gluteus medius from the proximal femur and retract it forward. Only the anterior margin of gluteus minimus is divided; thus, half of the gluteus medius insertion and almost the entire gluteus minimus insertion to the femur are undisturbed. Since then many modifications have been reflected, in original Hardinge’s approach to restore good hip abduction function, we should be careful in closure of the muscular layers. This is the important step to the success of this approach. A -1-vicryl was used to repair the capsule. The conjoint tendon flap (gluteus medius, minimus and vastus lateralis) was repaired to the greater trochanter with bone stitches using 5 ethibond. The split gluteus and vastus are approximated with light 1 vicryl stitches.¹

M. Ramesh, J. M. O’Byrne, N. Mc Carthy, K. Mahaligham, studied prospectively 81 consecutive patients undergoing hip surgery using the Hardinge approach. The abduction muscles of the hip in these patients were assessed electro physiologically and clinically by the Modified Trendelenburg Test.¹²

Aim of the present research was to Study the functional outcome of Fracture Neck of Femur in The Elderly Treated with Hemiarthroplasty through Hardinge’s Approach and to Study the associated complications.

MATERIAL AND METHODS

The present study consists of 25 cases of Intracapsular fracture Neck of Femur that were treated with Hemiarthroplasty through Hardinge Approach in Gandhi Hospital. Among the 25 patients, 13 patients are female and 12 patients are male patients. We did 25 cases of Hemireplacement Arthroplasty, 16 cases of Austin Moore’s prosthesis Hemiarthroplasty, 9 cases of bipolar Hemiarthroplasty.

Age of patients range from 40-80 years. Follow-up done for

6 months on average, abduction muscle function, clinical assessment done with Modified Trendelenburg test at 2 weeks, 3 months and 6 months period and functional grading of Hip Joint done with Modified Harris Hip Score.¹³

Position of Patient: Hardinge described this approach with the patient in supine position.¹⁴

We did 25 cases in Hardinge’s lateral approach. 10 patients in supine position, 15 patients in lateral decubitus position. Lateral position provides better access for two surgeons standing on opposite sides of the table. It also allows for increased mobility of the operated extremity.

The advantage of the supine position is that it makes orientation of the component easier and facilitates comparison of leg length for correction of limb length discrepancy.

Surgical Procedure Adopted (figure-1):

In lateral / Decubitus position the patient placed on the unaffected side.

1. On placing supine position with the greater trochanter at the edge of the table and the muscles of the buttocks freed from the edge. 7-10 cm skin incision was taken distal to the prominence of the greater trochanter in the mid position of the lateral aspect of the thigh, directly on the femur. Extended it in line with femur over the prominence of the trochanter, inclining about 20 degrees posteriorly in the proximal 1/3rd of the wound. Surgical procedure was same for the both positions in Hardinge’s Lateral Approach.
2. A posteriorly directed lazy 'J' shaped incision centered over the greater trochanter was made and divided the fascia lata in line with the skin incision and centered over the greater trochanter.
3. Tensor fascia lata anteriorly and gluteus maximus posteriorly were retracted by exposing the origin of the vastus lateralis and insertion of the gluteus medius.
4. The tendon of the gluteus medius incised obliquely across the greater trochanter leaving the posterior half still attached to the trochanter.
5. The incision carried proximally in line with the fibers of

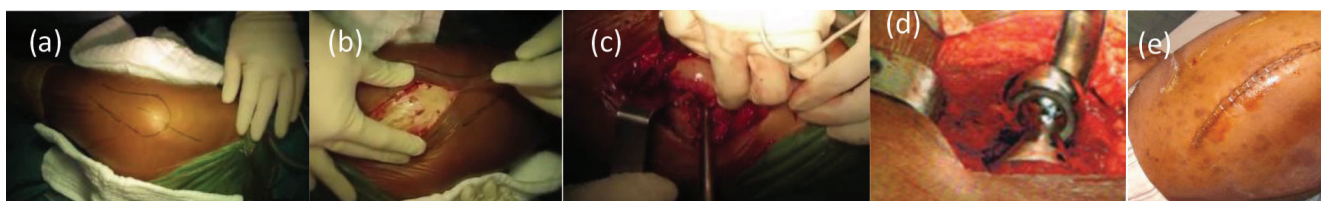


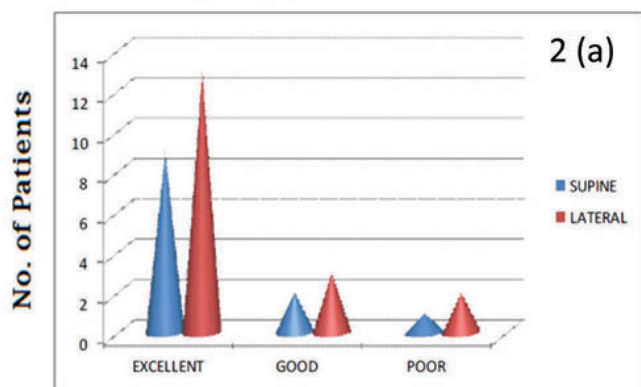
Figure-1: Hardinge’s Approach for Hemiarthroplasty by using Bipolar Prosthesis: (a) Skin Marking in Lateral Position; (b) Skin Incision in Hardinge’s approach; (c) Delivery of the Femoral Head; (d) Fixation of Bipolar Prosthesis; (e) Closure of Incision.

Comparable Group	Type of Character	Excellent	Poor	(Ch) ²	P Value	Significance
Sex	Male	10	2	0.21	> 0.05	Nil
	Female	11	2			
Age Groups	40-60 years	14	2	0.08	> 0.05	Nil
	61-80 years	7	2			
Prosthesis used in Hemiarthroplasty	Austin More	13	2	0.01	0.05	Nil
	Bipolar	8	2			
Position of Patient in Hardinge’s Approach	Supine	9	2	0.08	0.05	Nil
	Lateral	12	2			

For Sex (Chi)² = 0.21, p>0.05, Significance = NIL.; For Age group (Chi)² = 0.08, p > 0.05; Significance = NIL.

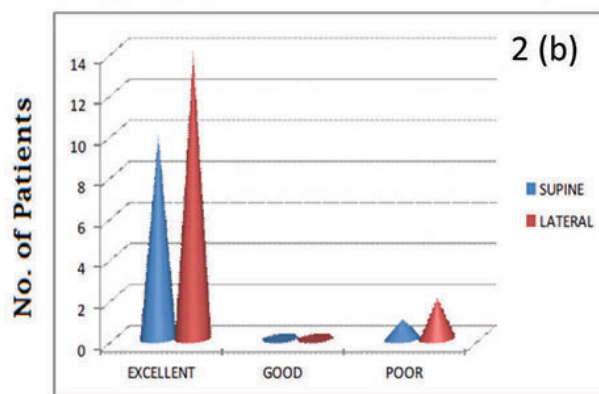
Table-1: Significance of comparables with abductive muscle function

Fig. 2 (a) at 3 Months.



Abductor Muscle Power by Trendelenburg Test

Fig. 2 (b) at 6 Months Follow-up



Abductor Muscle Power by Trendelenburg Test

Figure-2: Abductor Muscle Power by Trendelenburg Test

the gluteus medius of the junction of the anterior 1/3rd and posterior 2/3rd of the muscle.

- Tendinous insertions of the anterior portions of the gluteus minimus and vastus lateralis muscles were elevated.

In supine position abduction of the thigh then exposes the anterior capsule of the Hip Joint. But in lateral/ Decubitus position flexion, external rotation and adduction of the hip joint exposes the anterior surfaces of the capsule.

- The capsule was incised in a 'T' shape for further repair.
- After implant fixation, a drain was kept in muscle layers and another one was kept subcutaneously.
- During closure, the tendon of the gluteus medius repaired with non-absorbable braided sutures.
- The longitudinal split in the gluteus medius and vastus lateralis were repaired.
- The split in the deep fascia and Iliotibial band was closed.

STATISTICAL ANALYSIS

SPSS version 21 was used to tables and graphs. Descriptive statistics like mean and percentages along with chi square test were used to infer results.

RESULTS

Out of 25 cases included in our study, there were 13 females and 12 males with a mean age of 68 years. 83% of the cases sustained the hip fracture following a road traffic accident. 64% of the hips were of the right side, 36% were left side. Among the associated medical conditions hypertension, diabetes mellitus and anemia were common.

18 of the 25 cases were operated within a week following the fracture. The complications seen were, One case of superficial infection and One case of deep infection. 21 out of 25 cases in this study had no complications following the surgical procedure. There were no cases of dislocation of the prosthesis, no cases of peri-prosthetic fracture nor any case of implant loosening or subsidence.

In this study, 16 cases had Excellent results (52%), 5 cases had Good results (20%), and 4 cases had Poor results (16%). Good to Excellent results were seen in 72% of the cases at 3 months of follow-up. 21 cases Excellent (84%) and 4 cases Poor results (16%) at 6 months of follow-up.

Evaluation of Results: We performed the modified

Trendelenburg test as described by Handastle and the operated side and lift the opposite leg by flexing the hip to between neutral and 30 degrees and flexing the knee enough to lift the foot from the ground. The examiner observed the patient from the back and studied the line of the iliac crests. This clinical assessment done at 2 weeks, 3 months and 6 months' period. The appearance was classified as follows.

Abductor muscle power grading with Modified Trendelenburg Test:

Excellent: The pelvis on the non-weight bearing side can be elevated high and maintained for 30 seconds.

Good: Elevation of the pelvis is present but not to the maximum.

Fair: The pelvis is elevated but cannot be maintained in this position for 30 seconds.

Poor: There is dropping of the pelvis on the non-weight bearing side.

DISCUSSION

The hip joint is a major weight bearing joint playing a vital role in supporting body weight and in forward propulsion of body by its versatile anatomic and sound biochemical construction by nature. We did total 25 cases of Hemiarthroplasty through Hardinge's lateral approach all patients were treated in Fracture Neck of Femur with variable etiology. Age of the patients is between 40 - 80 years in them, females are 13 patients and males are 12 patients. 9 patients had Intracapsular Fracture Neck of Femur in left hip joint and 16 patients in right hip joint among them.

In total 25 cases we did 15 cases of Austin Moore's Hemiarthroplasty and 10 cases of Bipolar Hemiarthroplasty. We did Hardinge's Lateral approach in Supine position in 11 patients and Lateral / Decubitus position in 14 patients. We did follow up of 6 Months for each case an average. We checked Abductor muscle function with Modified Trendelenburg's test at 2 Weeks, 3 Months and 6 Months period. We gave 3 grading on the basis of Abductor muscle function through Modified Trendelenburg test.¹⁵

We also assessed function of the hip joint through Modified Harris Hip Scoring System and given functional grading at 6 months follow up period.

We found postoperative infection in only one case. That also subsided after good intravenous antibiotic therapy. We found

no postoperative dislocations of Hip joint in cases done in Hardinge's Lateral approach.

M.Ramesh, et al., studied prospectively 81 consecutive patients undergoing surgery using the Hardinge's Approach. The abduction muscles of the hip in these patients were assessed electrophysiologically and clinically by the modified Trendelenburg test. They have been able to demonstrate persisting damage to the superior gluteal nerve in 11% of the patients after this approach.¹²

We did total 25 cases of hemiarthroplasty in Hardinge's approach, at 3 months follow up we found excellent abductor muscle function in 16 patients, good in 5 patients and poor in 4 patients. After good physiotherapy, at 6 months' postoperative period we found excellent abductor muscle function in 21 patients and poor in 4 patients. In total 25 cases after 6 months follow up we found 4 cases of poor abductor muscle function.

The Significance of com-parables available in this study with Abductor muscle function at 6 months' follow-up is calculated by (Chi)² test and 'p' value. That means 16% cases suffered with abductor muscle weakness. In that 8% cases had hemiarthroplasty in Hardinge's lateral approach in lateral position and 8% cases had hemiarthroplasty in Hardinge's lateral approach in supine position.¹⁶

A persistently positive Trendelenburg test in the absence of EMG evidence of denervation may be explained by avulsion of the gluteal flap after operation. Failure of reattachment of the aponeurosis has been studied using metal markers and Radiographs. Elongation of the sutured aponeurosis by more than 2.5 cm is associated with a Trendelenburg gait. They have been able to demonstrate persisting damage to the superior gluteal nerve in 11% of patients after this approach. According to various studies superior gluteal nerve injury occurs more in Total Hip Arthroplasty than Hemiarthroplasty.¹²

CONCLUSION

Observations made by us found to be significant even though our series was too small but consisting of a cross section of our socio-economic groups. After doing 25 cases of hemiarthroplasty in Hardinge's lateral approach we found abductor muscle weakness in 16% cases. Lateral position provides better access for two surgeons standing on opposite sides of the table. It also allows for increased mobility of the operated extremity.

The advantage of the supine position is that it makes orientation of the component easier and facilitates comparison of leg length for correction of limb length discrepancy. In that 56% cases had hemiarthroplasty through Hardinge's lateral approach in lateral position and 44% cases had hemiarthroplasty through Hardinge's lateral approach in supine position. In Hardinge's approach we did not find any post-operative dislocation of hip joint.

Postoperative infections and dislocations of hip joint are very less as compare to posterior approach of hip joint. We found postoperative infections in only Two cases that were also subsided after good intravenous antibiotic therapy.

The Significance of comparable available in this study with Abductor muscle function at 6 months' follow-up is calculated by (Chi)² test and 'p' value. Internal comparison done, and results were found Insignificant.

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