

A PROSPECTIVE STUDY OF COMPLICATIONS IN BIPOLAR HEMIARTHROPLASTY USING MODIFIED HARDINGE APPROACH IN THE MANAGEMENT OF FEMORAL NECK FRACTURES

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Abstract

Introduction: Fracture of femoral neck is on the rise in the recent years owing to the increase in the geriatric population, severe osteoporosis and increased brittleness of the bone with advancing age. Total hip replacement was mostly used in the initial days but owing to higher chances of dislocations, it is less preferred. Bipolar hemiarthroplasty has become one of the main methods of treatment. A variety of surgical approaches have been used. Posterior approach is the most preferred approach currently, followed by Hardinge approach. Complications like dislocation, infection and abductor lurch are still common with current approaches. This study was undertaken to show the functional outcomes of a Modified Hardinge approach which seems to have optimal results out of all the approaches.

Aim: To evaluate the functional outcomes and complications of modified hardinge approach.

Materials and Methods: A total of 20 patients with fracture neck of femur were taken into the study and treated with Bipolar Hemiarthroplasty using modified Hardinge approach between June 2018 and October 2019. Each patient was put through the same preoperative and postoperative protocols. They were screened for comorbidities and were taken up for surgery. Complications after this approach were evaluated post operatively for a period of 6 months.

Results: The mean hip score was 80. Complications like posterior hip dislocation and infection were nil. Abductor lurch was not noted in any of the patients. One patient had infection out of 20 which was managed accordingly.

Conclusion: Bipolar hemiarthroplasty through modified Hardinge approach can be used in the management of femoral neck fractures with lowest complication rate. Complications like posterior dislocation and abductor lurch were nil in the study. The only downside of the procedure being a longer learning curve makes it a less used approach compared to others.

Keywords: Hemiarthroplasty, modified Hardinge approach, femoral neck fracture

Introduction

Fracture neck of femur is one of the most common fractures treated by the orthopaedic surgeon owing to the increase in life expectancy in the world with advanced healthcare facilities¹. The older age group are commonly affected owing to reduced bone mineral density and increased propensity for fractures even with trivial trauma. Various treatment options are used to treat this elderly affected group². Internal fixation for fracture neck of femur has less success in the recent times including the increase in number of complications like prolonged bed rest, nonunion and ailments due to delayed mobilization³.

Total hip replacement through classic approaches is the choice of surgery in previously healthy and independent individuals besides the fact of having higher chances of dislocation⁴. Surgical goal is to have a stable, mobile, pain free hip joint⁵. To address all the drawbacks, newer methods and approaches are brought into practice. Bipolar hemiarthroplasty is a choice due to the economical

constraints and to bring back a near normal hip joint which allows immediate return to daily activities which avoids complications of prolonged recumbency.

Various approaches have been described in accessing the hip joint namely Kocher-Langenback (dorsal), Hardinge (lateral), Moore (posterior), Watson Jones (anterolateral) and Smith Peterson (anterior). Posterior approach is the most commonly used approach at present⁶. Though commonly used; posterior approach has a complication of posterior dislocation. Lateral approaches were also used as a treatment modality. Owing to the incision technique and its complications, Hardinge modified the lateral technique from detaching the whole gluteus medius to detaching only the anterior half of the muscle⁷. Abductor lurch remained to be a complication due to injury of superior gluteal nerve even with the modification made by Hardinge⁸. Since then many modifications have been made to reduce abductor lurch. Many studies have been done to understand the better functional outcome in these approaches mostly pertaining to total hip

replacements⁹. This study was done in the view to know the functional outcome with the modified hardinge approach for fracture neck of femur treated with bipolar hemiarthroplasty.

Materials & Methods:

A total of 20 patients with fracture neck of femur with age ranging from 58-60yrs were admitted in department of orthopaedics, Prathima Institute of Medical Sciences, Nagunur, Karimnagar, and were included in the study conducted from June 2017 to October 2018. Thorough history and workup was done to each patient. All the comorbidities were assessed and fitness obtained before taking up for surgery.

Positioning:

Lateral position under spinal anesthesia. The limb was draped under sterile conditions folded in a saddle bag fashion and allowing the leg to hang over the edge of the table. Drapes are tied underneath the operating table. A lazy J shaped incision was made centering over the greater trochanter. Fascia lata incised in line with the skin incision. Tensor fascia lata is split in line with femur and proximally the split should curve slightly towards the Anterior superior iliac spine. The gluteus maximus are also split or retracted anteriorly and posteriorly. The trochanteric bursa incised to view the complete fibres of the gluteus medius muscle. An oblique incision made in the gluteus medius in line with the muscle fibres. The incision was made between the anterior one third and posterior two third. Care was taken not to incise more than 3 cm of the anterior muscle bulk. The superior gluteal nerve almost runs 5 cm proximal to the greater trochanteric insertion of the gluteus medius muscle. Hence care is taken to keep the incision as distal as possible. The incision is then continued along the fibres of vastus lateralis distally.

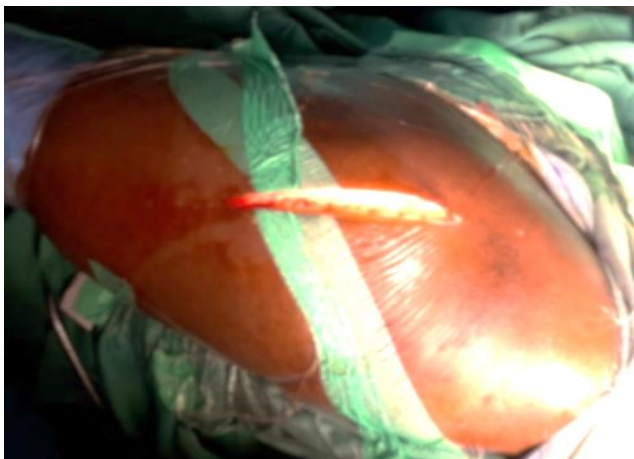


Figure 1: showing skin incision

ANTERIOR

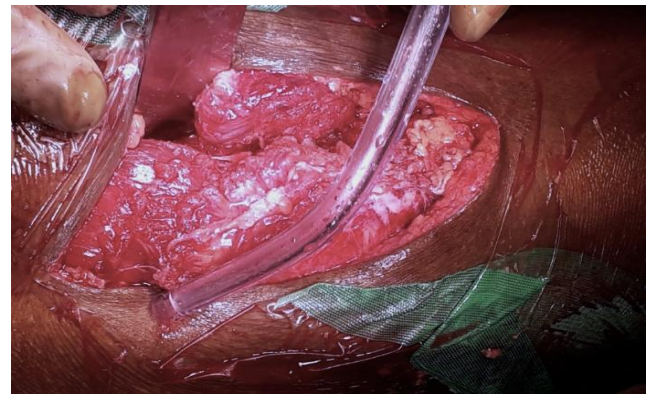


Figure 2: showing soft tissue dissection

This flap comprising anterior one third of gluteus medius and anterior fibres of vastus lateralis is reflected anteriorly to make the capsule visible. A T shaped incision is made over the capsule with the vertical limb in line with the intertrochanteric line. At the intertrochanteric line the tendinous insertion of gluteus minimus may be encountered which can be lifted off with cautery. The horizontal limb is made across the anterior capsule till the acetabular rim, the limb flexed at the hip and knee joint, adducted and externally rotated to dislocate the hip anteriorly. The capsule is safely retained.



Figure 3: showing gluteus medius and vastus lateralis reflected anteriorly



Figure 4: showing prosthesis insertion

Femoral head is extracted using cork screw. Using the femoral head, the size of the prosthesis can be estimated. If the size isn't relevant to the system; a smaller size can be used. Acetabulum is examined for any loose bodies or bony fragments and removed. Acetabular exposure is optimised by leg extension and external rotation which allows the proximal femur to be retracted posteriorly. A box cut is used to prepare the proximal femur. Using the rasp the proximal femur is prepared for the stem of the prosthesis. The anteversion can be confirmed by palpating the angle of the lesser trochanter which is different from the posterior approach where the lesser trochanter is visible making this approach require more experience and skill. The lesser trochanter makes an angle of almost 38.4 ± 9.6 degree to the normal neck shaft angle¹⁰. Keeping this in mind the anteversion of the proximal femur is maintained almost to normal. Hence the prosthesis is fitted to make an angle with lesser trochanter with the limb placed perpendicular to the floor on the operating table. By this manoeuvre, anteversion is attained mostly near normal. Certain studies state that the prosthesis can be placed almost in line with lesser trochanter also but in this approach we prefer forming an angle with lesser trochanter. The prosthesis is snugly fit with or without the cement depending on the bone density.

In our study, cementless procedure was done. Once the prosthesis is fit, passive movements about the joint were made such that flexion, extension, abduction, adduction, slight internal rotation and external rotation were possible without dislocation or impingement. Reduction was confirmed with anatomical restoration of the anteversion and length of limb. Care was taken so that congruity of the joint and anteversion were present to prevent dislocation of the newly formed joint between the prosthesis and acetabulum. The capsule was sutured to prevent extrusion of the prosthesis. Gluteus medius was sutured back with main bulk of the muscle with non absorbable sutures. Care was taken to confirm that the gluteus medius attachment to the greater trochanter was intact i.e the abductor mechanism was undisturbed. The remaining flap of vastus lateralis was sutured back to the bulk muscle with non absorbable sutures. Wound closed in layers.

Postoperative protocol:

Limb was kept in abduction with a pillow in between the legs. Antibiotics were given for 3 days. Patient was made to stand on first postoperative day. Protected mobilization started with a walker from 2nd postoperative day. Patients were discharged on postoperative day 10, suture removal done on day 15. Patients were advised not to flex or adduct the hip for the next 3 weeks as adduction may cause a dislocation due inadequate healing of the sutures. After 4 weeks partial weight bearing as tolerated by the patient was advised. Based on the radiological and clinical

findings, full weight bearing was advised at the end of 3-5 months. Regular clinico-radiological examination along with assessment of joint movement, gait, incision site pain and deformity was done at 2 weeks, 1 month, 3 months and 6 months. Patients were evaluated for postoperative infection, active range of motion, Harris hip score, abductor lurch and dislocation. Depending on the results, normal weight is bearing and returns to usual activities i.e. walking without walker, walking without aid of others, climbing stairs without support etc.



Figure 1: Preoperative radiograph



Figure 2: Postoperative radiograph showing bipolar prosthesis in situ

Results

In our study we wanted to assess the mode of injury in the geriatric age group and found that 75% patients were due to trivial fall at home, 20% of them were due to Road traffic accidents. The type of fracture was 50% of Garden's type 3 fracture and 20% had Garden's type 4 fracture.

The mean Harris hip score was 80.

Table 1: HARRIS HIP SCORE

SCORE	NUMBER OF CASES(n=20)	PERCENTAGE OF CASES(%)
<80	5	25%
80-90	14	70%
>90	1	5%

Table 2: COMPLICATIONS

Complications	Number of cases (n=20)	Percentage of cases (%)
Abductor lurch	0	0%
Posterior dislocation	0	0%
Postoperative infection	1	5%

Discussion:

Bipolar hemiarthroplasty is a common treatment for fractures of neck of femur. Bipolar arthroplasty avails immediate weight bearing and low complications when compared to internal fixation¹¹. Besides being the most availed option in treating fracture neck of femur, complications also exists due to the surgical technique. Many approaches have been used in treating the patient using hemiarthroplasty. But in our study we wanted to help decide the optimal procedure for orthogeriatric patients and found that the Modified Hardinge proved to be better.

The mean age of the patients were 65.8yrs and there was a majority of female patients¹⁴. The female preponderance can be attributed to the low estrogen levels after menopause which predisposes to osteoporosis.

The cause of fractures was mostly due to trivial fall such as fall at home, from the bed, slipping in the bathrooms which were low energy injuries. It very clearly supports the fact that trivial trauma like fall is the most common mode of injury of intracapsular neck of femur fracture in elderly patients¹⁶.

Garden's type 3 was the most common type seen in our study with 20 patients¹². Posterior approach was found to have an increased chance of posterior dislocation of hip due to the violation of the posterior capsule. *Bieber et al* in their study found that there was an eight fold increase in the posterior dislocation while using posterior approach¹³. *Mukka et al* also showed that there was a significant increase in posterior dislocation postoperatively in comparison to lateral approach while treating hemiarthroplasty¹⁴. Many studies have also concluded that the posterior approach has a potential risk in infection in addition to the posterior dislocation^{14, 15}. The source of infection was hypothesized to be due to the close relation to the perineum.

Lateral hardinge approach was found to have a common complication of total hip arthroplasty which was abductor lurch¹⁶. Certain authors saw a fourfold increase of abductor lurch in lateral approach to arthroplasty¹³. The reason behind the lurch was postulated to be the injury to the inferior branch of superior gluteal nerve. The injury could be due to direct injury or due to stretch during surgery. Dependingly the lurch may or may not improve with physiotherapy postoperatively. Modified Hardinge

approach significantly reduced this complication when done with care. More than 60% of the patients who underwent hemiarthroplasty through modified hardinge approach had excellent results with no complications¹⁷. The results of Modified lateral approach was due to the working area being more distal to the superior gluteal nerve¹⁸.

In our study we found no abductor lurch in this group of patients. Posterior dislocation was also found out to be zero. Downing et al found that the lateral modified hardinge approach was a significantly safer approach¹⁹. *Mc Lauchan et al* proposed to use modified hardinge approach over posterior approach as it has lesser complications²⁰. Certain other studies found no technical advantage of this modified hardinge approach over posterior approach^{21,22}. *Svenson* in his study using metal markers found out that the abductor lurch was more due to dehiscence of the flap in comparison to nerve injury proper²³.

The technical difficulty in this hardinge approach was anteversion. It was different from the posterior approach where lesser trochanter was visualised but in this modified approach the palpation of lesser trochanter was done. Owing to technical difficulties such as incision distal to gluteus medius, T shaped capsule incision and palpation of lesser trochanter as an anteversion landmark makes it a big learning curve¹⁸.

Conclusion:

Modified Hardinge approach has very few complications compared to posterior and conventional lateral Hardinge approaches. With the advantages comes a longer learning curve to bring about a surgery without complications. Hence with proper surgical technique and proper tight closure, we prefer the Modified Hardinge approach over other standard approaches as it has no dislocation and abductor lurch complications.

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