Modified Hardinge Approach for Lesser Complications

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ABSTRACT

BACKGROUND

Fracture Neck of Femur is on the rise in the recent years owing to the increase in the geriatric population. It has a high incidence owing to severe osteoporosis and increased brittleness of the bone with age. It constitutes 20% of osteoporotic fractures. Total hip replacement was mostly used in the initial days but owing to higher chances of dislocations, it became less preferred. Now, bipolar hemiarthroplasty has become one of the main methods of treatment in such patients. Many surgical approaches have been used for a very long time in the field of Orthopaedics and various modifications were tried to obtain optimal results. Posterior approach is the go-to approach used nowadays followed by Hardinge approach. In spite of the different approaches introduced, complications like dislocation, infection and abductor lurch are still common. 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.

METHODS

A total of 20 patients fulfilling the inclusion and exclusion criteria with fracture neck of femur were taken into consideration and treated with Bipolar Hemiarthroplasty by modified Hardinge approach between April 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 only when the coexisting conditions were under control. The patients were evaluated up to 6 months postoperatively.

RESULTS

The age of the patients in the study ranged between 58 and 60 yrs. All the patients underwent bipolar hemiarthroplasty through modified Hardinge approach. 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.

CONCLUSIONS

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. The only downside of the procedure is a longer learning curve which makes it a less used approach in the field of Orthopaedics when compared to other approaches.

KEY WORDS

Hemiarthroplasty, Modified Hardinge Approach

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BACKGROUND

Fracture neck of femur is one of the most common fractures dealt by the orthopaedic surgeon owing to the increase in life expectancy in the world with advanced healthcare facilities[1] The older age group are commonly affected owing to decreased bone mineral density with increased age and increased propensity to break their bone even with trivial trauma. Various modalities of treatment are put forward to this elderly affected group.[2] Internal fixation for fracture neck of femur has reported with less success in the recent times including the increase in number of complications like prolonged bed rest, non-union and ailments due to delayed mobilization.[3]

Total hip replacement is the choice of intervention in previously healthy and independent individuals besides the fact of having higher chances of dislocation.[4] Considering all these factors the goal of the surgery is to have a stable, mobile, pain free hip joint.[5] In order to address all the drawbacks, newer methods and approaches were brought into practice. Bipolar hemiarthroplasty is a choice made owing to the economical constraints and to bring back a near normal hip joint. It allows immediate return to daily activities and avoids bed rest complications. Various approaches have been explained in accessing the hip joint namely Kocher-Langenback (dorsal), Hardinge (lateral), Moore (posterior), Watson jones (anterolateral) and Smith Peterson (anterior). Posterior approach is the go-to surgery at present mostly.[6]

Though mostly used, the posterior approach has an evident complication as posterior dislocation. Lateral approach was 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 muscle.[7] Besides the modification made by Hardinge, Abductor lurch remained to be a complication due to injury of superior gluteal nerve.[8] Since then many modifications have come to play to reduce adductor lurch. Many studies have been done to understand the better functional outcome in these approaches mostly pertaining to total hip replacements.[9] This study is done to know the functional outcome when modified hardinge approach was used to treat fracture neck of femur with bipolar hemiarthroplasty.

METHODS

A total of 20 patients were included in the study conducted from April 2018 to October 2018. Patients with fracture neck of femur were admitted to our hospital. Thorough history and clinico-radiological workup was done for each patient. General condition of the patient was assessed and measures pertaining to them were taken accordingly. All the comorbidities were assessed and brought in control before taking up for surgery. Patients were explained about the need for study and the way it was going to be done. Patients after a proper preoperative protocol with analgesics and antibiotics were taken up for surgery.

Patient was put on lateral position under spinal anaesthesia. 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. It must be ensured that the drapes are tied underneath the operating table. A lazy J shaped incision was made centering over the greater trochanter. Fascia lata is also 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 was incised to view the complete fibres of the gluteus medius muscle. An oblique incision is 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

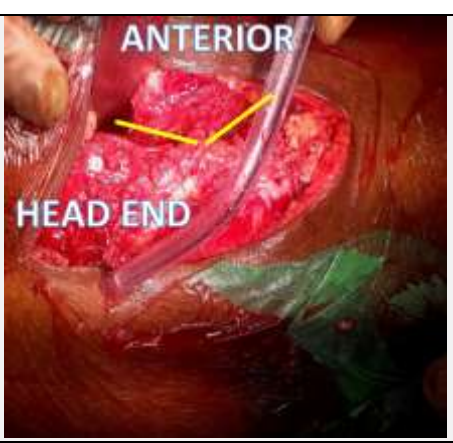

Figure 2

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

Figure 4

Femoral head is extracted using cork screw. Using the femoral head the size of the prosthesis can be estimated. If the size isn't appropriate for the system, a size smaller can be used. Acetabulum is examined for any loose bodies or bony fragments, removed if any present. Acetabular exposure is optimised by leg extension and external rotation which allows the proximal femur to be retracted posteriorly. A box cut is started 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 angle.[10] 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 of the particular patient. In our study, cementless procedure was done mostly. 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 confirmed with anatomical restoration of the anteversion and length of limb. Care was taken so that congruity of the joint and anteversion go hand in hand to prevent dislocation of the newly formed joint between the prosthesis and acetabulum. The capsule was sutured carefully to prevent any extrusion of the prosthesis through the capsule. The 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. Drain was placed. Layer by layer closure of the incision was done. The proper approximation of skin was checked to avoid postoperative dehiscence or any surgical site infections.

Postoperatively, the limb was kept in abduction with a pillow in between the legs. Antibiotics were given as per the postoperative protocol for 3 days. Drain removed on the second postoperative day. Patient was made to stand at the end of first postoperative day depending on the patient cooperation. Mobilization was started with a walker. Patients were discharged on postoperative day 10 and advised to visit us for suture removal 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. Regular follow-up of the patient was advised. Based on the radiological and clinical findings in the patient full weight bearing was advised at the end of 3-5 months. Regular clinicoradiological examination along with assessment of joint movement, gait, incision site pain and deformity were 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 bearing and return to usual activities i.e. walking without walker, walking without aid of others, climbing stairs without support etc.

RESULTS

A total of 20 patients with age ranging from 58 – 60 yrs. were followed up for 6 months with a fracture neck of femur treated with bipolar hemiarthroplasty. 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 quantification of type of fracture was almost 50% of Garden's type 3 fracture and 20% had Garden's type 4 fracture. The mean Harris hip score was 80.

Figure 5. Pre-Op X-Ray of Case 1

Figure 6. Post-Op X-Ray of Case 1

Mode of Injury	Number of Cases (n=20)	Percentage of Cases (%)
Trivial fall	15	75%
Road traffic accident	4	20%
Fall from height	1	5%

Table 1. Mode of Injury

Garden's Type of Fracture	Number of Cases (n=20)	Percentage of Cases (%)
Type I	3	15%
Type II	3	15%
Type III	10	50%
Type IV	4	20%

Table 2. Type of Fracture

Harris Hip Score	Number of Cases (n=20)	Percentage of Cases (%)
<80	5	25%
80-90	14	70%
>90	1	5%

Table 3. Harris Hip Score

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

Table 4. Postoperative Complications

Complications such as postoperative infection was seen in one patient of the group. Posterior dislocation and abductor lurch were not seen in any patients.

DISCUSSION

Bipolar hemiarthroplasty is a common treatment for fracture neck of femur. Bipolar hemiarthroplasty avails immediate weight bearing and low complications when compared to internal fixation[11]. Besides being the most availed option in treating fracture neck of femur, complications also exists due to the surgical technique. Many approaches have been availed 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 was 65.8 yrs. and there was a majority of female patients. The female preponderance can be attributed to the low oestrogen 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 bathroom 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 patients.

Garden's type 3 was the most common type seen in our study with 20 patients.[12] 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 approach[13]. Mukka et al also showed that there was a significant increase in posterior dislocation postoperatively in comparison to lateral approach while treating hemiarthroplasty.[14] 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 anal orifice.

Lateral Hardinge approach was found to have a common complication of total hip arthroplasty which was abductor lurch.[16] Certain authors saw a fourfold increase of abductor lurch in lateral approach to arthroplasty.[13] 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. 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 complications.[17] The results of Modified lateral approach were due to the working area being more distal to the superior gluteal nerve.[18]

- The incision was made between the anterior one third and posterior two third, rendering the Gluteus medius undisturbed at the greater trochanter.
- Superiorly the incision is extended only up to 3 cms, which maintains a safe distance from the nerve in our study. We found no abductor lurch in this group of patients.
- Extra care was taken in resuturing the gluteus medius with thicker suture.

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 approach.[19] Mc Lauchan et al proposed to use modified Hardinge approach over posterior approach as it has lesser complications.[20] 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 proper.[23]

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 longer learning curve.[18]

CONCLUSIONS

Modified Hardinge approach has fewer complications in comparison to the posterior and conventional lateral Hardinge approach. With the advantages comes a longer learning curve to operate without complications. Hence with proper surgical technique, and proper tight closure, we prefer the Modified Hardinge approach over other approaches as it had nil dislocations and abductor lurch.

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