

Comparison between Bipolar Hemiarthroplasty and Total Hip Arthroplasty for Unstable Intertrochanteric Fractures

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Abstract: The treatment of unstable intertrochanteric fractures is quite challenging especially in the elderly people. This study has been conducted to compare the outcomes of bipolar hemiarthroplasty and total hip replacement in the treatment of unstable trochanteric fractures in the adult and elderly age group. A considerable difference was observed in the two groups, in terms of the blood loss, operating time and cost of hospitalization. However the period of inpatient hospitalization, postoperative problems like pain, need for revision surgery were quite same between the two groups.

Keywords: Unstable Intertrochanteric fractures, Bipolar hemiarthroplasty, THR, Total hip arthroplasty.

INTRODUCTION

Intertrochanteric fractures are having an increasing incidence especially in the elderly population owing to osteoporosis [1]. These fractures lead to increased morbidity and mortality among the patients, making them to lead a more dependent life [2]. The commonly fractured sites in the proximal femur include the intertrochanteric region, the neck of femur and the subtrochanteric areas. Unstable and especially displaced fractures of the intertrochanteric region and also of the femoral neck pose an indication for early surgical intervention. The various treatment modalities include internal fixation with either cannulated or sliding hip screws, bipolar hemiarthroplasty and total hip arthroplasty.

Various trials exist which state a higher revision rate and more complications with internal fixation of these hip fractures [3, 4]. Hence, recently clinical guidelines recommend arthroplasty for the treatment of these fractures, particularly in the older population [5]. After a hip arthroplasty, the patients are allowed for early weight bearing as soon as possible and also encouraged to do exercise in the affected limb. This in turn reduces the bed rest period and hence, the complications. Bipolar hemiarthroplasty when compared to THR, is more expensive but associated with lesser complications [6]. However, globally there exists a variation in the usage of interventions because of the uncertainty in the ideal choice of endoprosthesis [7]. In our study, we compare the results of bipolar hemiarthroplasty and total hip arthroplasty with respect to the blood loss, operating duration, hospitalization cost and duration, postoperative complications - including

nosocomial pneumonia, urinary tract infection, wound infection and thromboembolism, pain, restoration of joint function and need for revision surgery.

METHODS

The study period extended from November 2016 to November 2017 and included patients who had sustained intertrochanteric fractures of the unstable type (three part or more fractures along with loss of posteromedial cortical buttress and also of the reverse obliquity type), in both adult age group and elderly and those patients who had lead an independent life prior to the injury. Patients having osteoarthritis or rheumatoid arthritis of the hip joint were excluded from the study. It comprises a total of 20 patients who were admitted in our department at Sree Balaji Medical College & Hospital, Chromepet, Chennai. Ten patients underwent Bipolar hemiarthroplasty-7 males and 3 females and the rest were operated by Total hip replacement - 6 males

and 4 females. Postoperative followup was done at 2 weeks, 6 weeks, 3, 6 and if possible, upto 9 months.

The patients were taken up for surgery within 48 -60 hrs and were operated under spinal or general anaesthesia, depending on the individual status. Patients were positioned laterally and the approach was posterolateral. Fibers of gluteus maximus were split and the gluteus medius fibers were retracted. The external rotators of the hip joint were exposed and were divided close to their insertion. The joint capsule entered with an inverted T shaped incision. After fixing the greater trochanter fragments, the head of the femur was removed along with osteotomy of the neck. Femoral canal reaming was done after internally rotating and adducting the femur. The lesser trochanter was reduced temporarily and used as a guide for determining the version of the prosthesis. The prosthesis height was decided upon after temporary fixation of the greater trochanter. The length of the extramedullary component was determined using a trial stem, which was assembled along with a trial cup. The femoral part of the component was inserted and fixed inside the canal of femur (at 15 degree anteversion) by manual cementing. The greater trochanter was fixed to the prosthesis using wires. Isolated lesser trochanter fragments were not reduced. In the THR group, a cemented acetabular cup was implanted after preparing the acetabulum. The femoral head component of the prosthesis was then attached to the stem. In the bipolar hemiarthroplasty group, no replacement of the acetabulum was done. Instead, implantation of a bipolar cup was done. The diameter of the outer head component of the prosthesis was determined by measuring the femoral head of the patient. After checking the stability, the hip joint capsule was repaired and the external rotators were reattached to the femur. Wound closure done with closed suction drain. Postoperatively, using an abduction wedge, the lower limb was held in abducted position. Check X-ray was taken postoperatively and the drain was removed by 48 hours post-surgery. LMW heparin was started 12 hrs pre-op and upto 30 to 35 days post-op for the patients in order to prevent deep vein thrombosis. Static limb exercises were taught from the first day onwards. Mobilisation with support was begun from second or third postoperative day. Patients were discharged after proper rehabilitation. Average duration of stay in the hospital was around 9 to 10 days. The follow up visits of the patients were timed at 2 weeks, 6 weeks, 3 months and 6 months. Some were followed upto 9 months. Both clinical and radiological evaluation was done in the postoperative visits. Functional outcome of the patients was assessed by Harris hip score and pain using the visual analogue scale.

The results between the 2 groups were compared and analysed for significance using the Students T- test. Statistical significance was taken as the previous value less than 0.05.

RESULTS

During our study period of 12 months, a total of 23 patients were admitted in our department with intertrochanteric fracture of the femur. Of these, 3 were excluded from the study due to severe arthritis of the hip. Among the selected 20 patients, 10 had undergone treatment by bipolar hemiarthroplasty and 10 by total hip replacement. The average followup of the both the group was for 7.5 months (range 6 to 9 months). The bipolar group had 7 males and 3 females with an average age of 57 years (range 32 to 82 years (Fig-1(a)). The THR group consisted of 6 males and 4 females with an average age of 49 years (range 33 to 65 years). Two of the patients in THR group were treated for non-union of intertrochanteric fracture of unstable type. One of them was previously treated by Dynamic hip screw (Fig-4a). Screw cut-out has lead to non-union. The other patient was managed previously by Dynamic condylar screw, showing non-union. The patient has also had a fracture of femur shaft, which has been successfully treated 90 degree angled blade plate (Fig-5a). He has sustained another fall, leading to implant breakage, which was removed and total hip arthroplasty was done (Fig-5b). The mean duration of surgery in the THR group was around 75 minutes, while in the bipolar hemiarthroplasty group it was around 50 mins. Thus surgical time for bipolar hemiarthroplasty was comparatively half an hour shorter. The estimated average blood loss in THR was around 450 ml as against 250 ml in bipolar hemiarthroplasty. With regards to the duration of hospitalization, it was much similar in both the groups. However, the expenditure was more among the THR group. In the THR group, the average Harris Hip Score was around 77 while in the bipolar hemiarthroplasty group, it was about 74. Postoperative pain assessed by the visual analogue scale was almost similar (1.6 & 1.4 respectively) in both the groups. 3 patients in each of the groups had general complications. On follow-up, it was found that 1 out of 10 patients in both the groups needed revision surgery. The reason was development of arthritis in the patient who had undergone THR and due to loosening of the femoral component in the bipolar group. Thus, in terms of Harris hip score (functional outcome), visual analogue scale and the general complications & the need for revision surgery, the results do not differ much between total hip arthroplasty and bipolar hemiarthroplasty.



Fig-1(a): Anteroposterior X-ray of a 82 years male showing intertrochanteric fracture of right hip of unstable type



Fig-1(b): Postoperative AP view X-ray of the same patient treated by bipolar hemiarthroplasty



Fig-1(c): Closer view of the right hip joint showing the bipolar prosthesis



Fig-2(a): Anteroposterior radiograph of both the hips showing an intertrochanteric fracture of the left hip



Fig-2(b): Postoperative radiograph of the patient treated by bipolar hemiarthroplasty



Fig-3(a): Anteroposterior X-ray of the hips showing an unstable trochanteric fracture on the right side



Fig-3(b): Anteroposterior plain radiograph taken postoperatively showing bipolar prosthesis



Fig.-4(a): Plain radiograph of the pelvis with hips showing non-union of intertrochanteric fracture of the right hip which has been treated previously by dynamic hip screw. Cut-out of the screw is seen



Fig-4(b): Postoperative radiograph of the patient. Dynamic hip screw was removed and total hip arthroplasty has been done



Fig-5(a): Preoperative radiograph of the right hip and femur along with the knee joint showing non-union of intertrochanteric fracture of the right hip joint, which has been treated by dynamic condylar screw. The patient has also sustained a fracture of shaft of femur which has united on treatment by 90 degree angled blade plate. The patient had a fall again which has lead to implant breakage



Fig-5(b): Postoperative radiograph of the patient. Previous implant was removed and Total hip arthroplasty was done

DISCUSSION

Hip fractures in toto have an incidence of about 80/ 100000 and this might double in the upcoming next 50 years as the aged population increases [8]. Among the hip fractures, 45% of the cases are of the trochanteric type [9]. Of these, 30 to 45% of the fractures are of the unstable type- 3 or 4 part fractures, accounting for higher morbidity and mortality [9]. The rest are simple 2 part fractures, which are of the stable type as per modified Evans Jensen classification which can be treated easily. A uniform agreement regarding the method of unstable trochanteric fractures does not exist [10]. Internal fixation with DHS (dynamic hip screw) and PFN (proximal femoral nail) are some of the treatments

available [11,12]. But these methods are associated with a higher failure rate in fixing unstable type of fractures - DHS 14% (Fig-4(a) [13] and PFN 7.1 to 12.5% [14]. Also the incidence of general complications like postoperative pneumonia, deep vein thrombosis was found to be around 25 to 50% with these internal fixation methods [15]. Early mobilisation following surgery has been shown to have a good prognosis.

Studies have been conducted comparing the outcome of patients treated with internal fixation against bipolar hemiarthroplasty, showing a success rate of 75% and much lesser postoperative complications in patients of bipolar hemiarthroplasty group [16, 17]. Delay in surgery has been shown to have a significant

effect on mortality. Studies by Falding *et al.* have reported hip replacement [18] with THA and bipolar hemiarthroplasty allow for earlier weight bearing and thus better rapid recovery. Treatment with THA has also been validated for use in elderly unstable trochanteric fractures by Sidhu *et al.*, [19]. Both THA and bipolar hemiarthroplasty have the merit of quicker recovery and lesser failure rates. Also they don't lead to non-union or malunion and also don't lead to avascular necrosis and related complications.

In order to compare the outcomes of bipolar hemiarthroplasty and THA, the factors of concern include the operating time and cost, post surgery outcome, procedural complications like acetabular erosion and dislocation. In our present study, no remarkable difference has been observed among these two procedures with respect to the surgical outcome, need for revision surgery and general complications. However, there was an observed significant difference in the duration of the procedure and per-operative blood loss, which was more in the THA group. Also due to an extra acetabular component, the THA was found to be more expensive.

The major problem of concern in THA post surgery is dislocation and this leads to complications like bed sores and pneumonia [20]. Although the large size of the head provides more stability, this cannot protect against dislocation.

Coming to the bipolar hemiarthroplasty, the major issue of concern is pain in the groin due to erosion of the acetabulum and occurrence of protrusion acetabuli [21]. Erosion of the acetabulum has shown to have a direct correlation with groin pain [22]. Elderly patients are at a higher risk for these problems.

In our current study, no statistically significant difference was observed between bipolar hemiarthroplasty and Total hip arthroplasty. The limitations of our study are a smaller study sample and a short study period relatively. A more prospective and more randomised study and longer followup is needed for comparing these procedures.

The current study shows that in both the groups, the functional outcome and relief of pain are quite similar, including duration of inpatient hospitalisation, need for revision surgery and general complications. Thus both THR and bipolar hemiarthroplasty prove good treatment options for unstable trochanteric fractures in the adult and elderly. However, Bipolar hemiarthroplasty may be taken as the treatment of choice if the operating time, cost of components and blood loss pose a major concern.

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