



Total Hip Arthroplasty for Displaced Femoral Neck Fractures in Elderly Patients

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Abstract

Background: The management of displaced femoral neck fracture in elderly patients is debated subject for many years. There is high chance of fracture nonunion with internal fixations, significantly increased bone wear both in hemi-arthroplasty (HA) and bipolar arthroplasty ultimately landing into the revision surgery. In recent years total hip arthroplasty (THA) for displaced fracture neck of femur in elderly patients has been considered as a primary treatment because of its excellent functional outcomes, low revision rates and even cost effective.

Materials and Methods: A total of 20 total hip arthroplasty was performed for displaced femoral neck fracture of patients more than 65 years. All the patients were operated through modified Harding's approach. Both cemented and un-cemented types of arthroplasty were performed. Functional outcomes of hip were evaluated at 3 months and 1 year after surgery.

Results: The Average age of patients was 71.5 year (range 66 to 81 years) with 8 (40%) male, 12 (60%) female. There were 7 (35%) fractures in right side and 13 (65%) in left side. Fifteen percentage of patients have diabetes mellitus, 20% have hypertension, 15% have old cerebro-vascular accident (CVA) and 25% have Ischemic heart disease (IHD). Even though post-operative mortality after 3 month was nil, one year mortality was 5%. Functional outcomes of hip according to Harris Hip Score (HHS) were 85% of excellent and good results and 15% of fair results.

Conclusion: Total hip arthroplasty is a good option for displaced femoral neck fracture for independently mobile, mentally competent, elderly patients of age more than 65 years with better rehabilitation potential, function of hip, and very low revision rate.

Keywords: Elderly patients; Fracture neck of femur; Total hip arthroplasty

Introduction

The optimal treatment for displaced sub-capital fracture neck of femur in elderly patients is matter of debate for many years [1,2]. In the past it was assumed that internal fixation was gold standard treatment for femoral neck fracture arguing that retaining the femoral head always gives the good results than the prosthetic replacement [3]. Treatment options for displaced femoral neck fracture include closed reduction and internal fixation, hemi-arthroplasty, bipolar arthroplasty and total hip arthroplasty [4,5]. Treatment by closed reduction and internal fixation is influenced by many factors like age of patient, displacement of fracture, quality of bone, delay in treatment, quality of fracture reduction, type of fixation devices and final position of the fracture [3]. This method of treatment however gives high rate of non-union and avascular necrosis so that patients are ultimately landed into the revision surgery [3,6]. Barnes et al. [7] reported 20 to 25% of nonunion in this age group while Skinner and Powles [8] reported 26% of nonunion and 33% of avascular necrosis either segmental or entire head resulting into late collapse and osteoarthritis of hip joint. The majority of patients treated with hemi-arthroplasty experiences the degeneration of acetabular cartilage or erosion of the prosthesis which may sooner require the revision surgery [9]. The incidence is even more higher in young patients and overall revision rate is 7 to 12% within a few years [6].

Total hip arthroplasty is established treatment for osteoarthritis and rheumatoid arthritis and in recent years it has been considered as a primary procedure for displaced femoral neck fractures in elderly patients with little or no comorbidities because it gives good functional outcomes in terms of pain relief and even cost effective [10-12]. Even though incidence of post-operative hip dislocation is slightly higher which is reported to occur 0 to 18 %, particularly the patients with cognitive dysfunction, it is treatment of choice because of low revision rate and better immediate function of hip [4,13]. The purpose of

this study was to evaluate the functional outcomes, revision rate and complications after the total hip arthroplasty for displaced fracture neck of femur in independently mobile elderly patients of age more than 65 years.

Material and Methods

This was a descriptive analytical study conducted in Civil Service Hospital, Nepal from 2011 to 2014. We reviewed 20 patients with femoral neck fractures managed by primary total hip replacement during four year period. We included previously independently mobile and mentally competent patients (mental test score >7), elderly patient of age more than 65 years, displaced sub-capital (Figure 1a and 1b) and trans-cervical femoral neck fractures (Figure 2) in our study. Patients with infection, neuromuscular disease, rheumatoid arthritis, pathological fracture, nonunion femoral neck fracture secondary to failed internal fixation were excluded from the study. Clinical features of patients including operative details, early complications, mortality, morbidity and social fitness were recorded thoroughly.

All the patients were operated through antero-lateral modified Harding approach. Both cemented and non-cemented prosthesis

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(Figure 3c and 3d) were used depending upon the intra-operative assessment of quality of bone and size of femoral canal (Figure 4). Each patient received preoperative and intra-operative antibiotics and a course of prophylactic low molecular weight heparin (Enoxaparin) for 5 days after operation. Those patients with previous history of thromboembolic phenomenon were given a six week course of Enoxaparin. Post-operatively abduction pillow was placed in between the knee to prevent adduction for three to four days. All patients followed the specific occupational therapy and physiotherapy protocol that included avoidance of >90 degree hip flexion and adduction. The patients were allowed to walk with the help of walker after the first dressing (Figure 5). The patients were evaluated at 3 month and 1 year after surgery. At the time of follow-up visit, a standard proforma was completed to assess the functional activity of patients including Harris Hip Score (HHS). In addition hip joint was examined and radiographs were obtained for each patient separately.

Results

The average age of patients was 71.5 with minimum age of 66 and maximum age of 81 years. Details of general data were listed in Table 1. The average delay of surgery was 5.85 days (4 to 9 days).

Discussion

Currently incidence of hip fractures is increasing through the world. It is estimated that annual number of hip fractures will rise from 1.7 million in 1990 to 6.3 million by the year 2050 [14]. So this gives huge burden to health care system. Internal fixation, unipolar hemi-arthroplasty, bipolar arthroplasty and total hip arthroplasty are

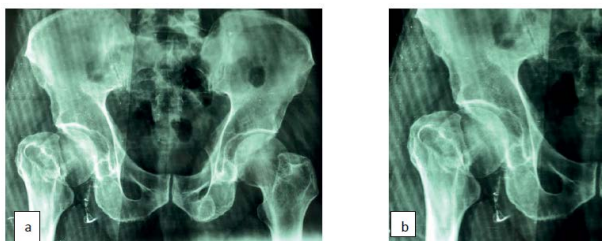


Figure 1a and 1b: Showing pre-operative displaced sub-capital fracture neck of femur.



Figure 2: Showing the trans-cervical fracture neck of femur left side.

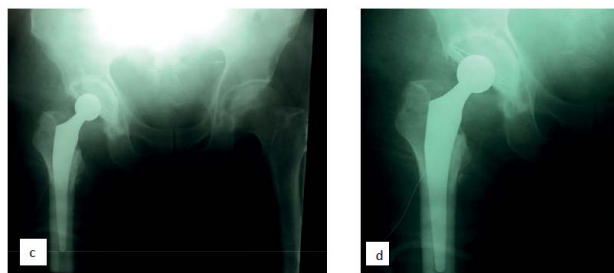


Figure 3c and 3d: Showing reverse hybrid type of total hip arthroplasty.



Figure 4: Showing the un-cemented type of arthroplasty after femoral neck fracture.



Figure 5: Showing walking of patient 7th day after replacement surgery.

Parameter	Number of cases
Gender	
Male	8 (40%)
Female	12 (60%)
Involved side	
Right	7 (35%)
Left	13 (65%)
Prosthesis	
Cemented	9 (45%)
Un-cemented	11 (55%)
Mortality	
Three month	0
One year	1 (5%)
Morbidity	
Urinary tract infection	2 (10%)
Cerebro-vascular accident	1 (5%)
Chest infection	2 (10%)
Deep Vein Thrombosis	1 (5%)
Wound problems	
Superficial	2 (10%)
Deep	0
Harris Hip Score	
Excellent	8 (40%)
Good	9 (45%)
Fair	3 (15%)
Poor	0
Medical Comorbidities	
Diabetes	3 (15%)
Hypertension	4 (20%)
Old CVA	3 (15%)
Ischemic Heart disease	5 (25%)

Table 1: Showing the demographic profiles, complications and Harris Hip Score after Total Hip Arthroplasty for displaced femoral neck fractures.

the currently available techniques for femoral neck fractures with different indications, outcomes and risk profiles [3]. For many years it was assumed that closed reduction and internal fixation was a standard treatment in spite of its high rate of complications [3]. Patients treated with internal fixation even though have the advantage of saving natural joint if healing completes, but develops poor postoperative rehabilitation until fracture union because of pain and high osteosynthesis failure [5]. On the other hand, arthroplasty provides the better stability and less pain after surgery so that patients are allowed to walk immediately after implantation with better mobilization and rehabilitation [5]. Although there is no statistically significant difference between the bipolar hemi-arthroplasty and total hip arthroplasty with regard to functional outcomes, if acetabulum is not affected by osteoarthritis, THR appears more cost effective and functional because it usually does not require revision surgery that would otherwise may require for bipolar or unipolar hemiarthroplasty [5]. Avery et al. [15] showed that Harris Hip Score (HHS) had been dominated by THR group as compared to HA group upto 9 years after surgery. Beyond that duration HHS seemed to be declined even in the THR group as a result of older age, prosthetic degeneration and other complications. Regarding the comparison of arthroplasty and internal fixation groups many studies showed the better outcomes after arthroplasty in terms of overall functional scores, function of abductor muscles, independent ambulation without walking aids, and quality of life [16-18]. Similarly Skinner et al. [19] performed the prospective randomized study comparing the internal fixation, hemi-arthroplasty and total hip arthroplasty with 13 years follow up. They showed that revision rate was 33%, 24% and 7%

respectively in three different groups. Harris Hip Score was excellent in THA group and worst in hemi-arthroplasty group. The results of our study are also comparable to the above studies. The revision rate in our study is nil and functions of hip according to the Harris hip Score are 85% of excellent and good results.

The mean age of patients in our study was 71.5 years while average life expectancy at birth of our general people in 2014 was 67.19 years. This was the 165th position in world ranking while Monaco got the top ranking with average life expectancy at birth of 89.57 years and Macau had 84.48 years [20]. So average life expectancy of developed countries is significantly higher as compared to Nepal and patients of age more than 65 years in our context seem reasonably elderly. The overall mortality one year after hip fractures in elderly patients ranges from 14 to 36% [21]. Walker et al quoted that old age is an important risk factor for mortality of patients [22]. A large meta-analysis study showed that complication rates are as high as 49% [4]. The one year mortality in our study was 5% only. There were only 2 patients of octogenarian age in our series. However preoperative medical comorbidities and mental competence of patients are more important determinants rather than age per se for the post-operative mortality of patients [23]. The Kenzora et al. [24] mentioned that post-operative mortality of patients increases significantly when associated with 4 or more preoperative medical comorbidities. In our study 15% of patients have diabetes mellitus, 20% have hypertension, 15% have old CVA, 25% have IHD. Fifteen percentage of them have all the four disease mentioned above. So low incidence of medical comorbidities in our patients is one of the important factor for decreased post-operative mortality.

Gregory et al. [25] mentioned the relatively high postoperative hip dislocation in fracture neck of femur treated with total hip arthroplasty [25]. The risk of dislocation depends on the surgical approach, the reconstruction of hip biomechanics, the head size and offset, the quality of capsular closure, and the experience of the surgeon [26,27]. Hip dislocation is more common in elderly patients with mental dysfunction [4] and hence THA should be avoided if possible for this kind of patients. Dislocation rate in our series is nil probably because of ideal selection of patients, good repair of capsule with No.5 non-absorbable ethibond suture by drilling into the bone, placement of acetabular cup in anatomic ante-verted position. The study of Ricci et al. [28] showed the very low dislocation rate while doing the THA even through the posterior approach in acute displaced femoral neck fracture as long as the protocol for patient selection criteria and surgical techniques ensuring the posterior hip stability was maintained. The revision rate in our study was also nil, however duration of study was only 4 years and long term results regarding the revision surgery are still to be awaited. Many studies mentioned that long term prosthesis survival in acute fracture neck of femur in elderly patients was fairly good [29,30]. Revision rate in these studies was below 5% within 10 years period. However Gebhard JS et al. [31] showed that there was 49% of revision rate in 37 patients in followed for mean of 56 months.

The study of Iorio et al. [32] has showed that total hip arthroplasty for displaced fracture neck of femur is the most cost effective while considering the complications, re-operation rate, mortality and functional outcomes of hip over 2 years period. Even though cost of surgery including prosthesis seems expensive at the beginning, with due course of time it will be more cost effective because revision surgery usually does not require and function of hip is excellent. A significant number of studies have indicated that THA has definite place in selected patients with acute femoral neck fracture [33-35]. They concluded that this procedure is best reserved for independently

mobile active patients with fracture neck of femur with high potential of osteosynthesis failure like subcapital fracture, whose remaining life is expected to be at least more than 5 years or more and those with high functional demands. Moreover THA is absolutely reserved for patients with pre-existing arthritis of hip joint, paget's disease, renal osteodystrophy, severe osteoporosis, and after failed internal fixation [5,36]. The major limitation of this study is lack of adequate sample size because we included the selective patients with sub-capital and trans-cervical femoral neck fractures only. In the developing countries like Nepal many patients with this type of fractures do not agree to perform the total hip arthroplasty even though they are benefitted by this procedure. So it was difficult to get adequate patients in our study however results were compatible with those in literature.

Conclusion

Total hip arthroplasty is a good option for displaced fracture neck of femur for independently mobile, mentally competent active elderly patients whose remaining life is expected to be at least more than five years. It has better rehabilitation potential, better functional outcomes and very low revision rate.

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