Total Hip Arthroplasty for Displaced Femoral Neck Fractures in Elderly Patients

Kapil Mani KC*, Dirgha Raj RC, Parimal Acharya and Bandhu Ram Pangeni
Civil Service Hospital, Kathmandu, Bagmati, Nepal, India

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

*Corresponding author: Dr. Kapil Mani KC, Assistant Professor, Civil Service Hospital, Orthopedics Minbhawan, Kathmandu, Bagmati, Nepal, India; Tel: 009779841244502; E-mail: drkapil2007@yahoo.com

Received November 24, 2015; Accepted December 11, 2015; Published December 18, 2015

Citation: Mani KKC, Raj DRC, Acharya P, Pangeni BR (2015) Total Hip Arthroplasty for Displaced Femoral Neck Fractures in Elderly Patients. Orthop Muscular Syst 5: 204. doi:10.4172/2161-0533.1000204

Copyright: © 2015 Mani KKC, et al. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.
(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 throught 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
follow up. They showed that revision rate was 33%, 24% and 7%
fixation, hemi-arthroplasty and total hip arthroplasty with 13 years
performed the prospective randomized study comparing the internal
walking aids, and quality of life [16-18]. Similarly Skinner et al. [19]
scores, function of abductor muscles, independent ambulation without
the better outcomes after arthroplasty in terms of overall functional
degeneration and other complications. Regarding the comparison
HA group upto 9 years after surgery. Beyond that duration HHS seemed
Hip Score (HHS) had been dominated by THR group as compared to
there is no statistically significant difference between the bipolar
implantation with better mobilization and rehabilitation [5]. Although
pain after surgery so that patients are allowed to walk immediately after
until fracture union because of pain and high osteosynthesis failure [5].
joint if healing completes, but develops poor postoperative rehabilitation
was assumed that closed reduction and internal fixation was a standard
place in selected patients with acute femoral neck fracture [33-35
significant number of studies have indicated that THA has definite
surgery usually does not require and function of hip is excellent. A
due course of time it will be more cost effective because revision
surgery including prosthesis seems expensive at the beginning, with
considering the complications, re-operation rate, mortality and
 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
techniques ensuring the posterior hip stability was maintained. The
kind of patients. Dislocation rate in our series is nil probably because
quality of capsular closure, and the experience of the surgeon [26,27].
reconstruction of hip biomechanics, the head size and offset, the
risk of dislocation depends on the surgical approach, the
Hip dislocation is more common in elderly patients with mental
Kenzora et al. [24] mentioned that post-operative mortality of patients
post-operative 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].
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].
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].

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

| 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 Comorbidites          |                 |
| Diabetes                      | 3 (15%)         |
| Hypertension                  | 4 (20%)         |
| Old CVA                       | 3 (15%)         |
| Ischemic Heart disease        | 5 (25%)         |

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].
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.

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 benefited 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 months. It has better rehabilitation potential, better functional outcomes and very low revision rate.

References
1. Mossey M, Murtan E, Knott K, Graik R (1989) Determinants of recovery of 12 months after hip fracture: the importance of psychological factors. Am J Public Health 79: 279-286.
2. Su H, Alaharoff GB, Hiebert R, Zuckerman JD, Koval KJ (2003) In-hospital mortality after femoral neck fracture: do internal fixation and hemi-arthroplasty differ? Am J Orthop (Belle Mead NJ) 32: 151-155.
3. T Jirkovský, S Ponzer, O Svensson, A Söderqvist, H Törnkvist (2003) Internal fixation compared with total hip replacement for displaced femoral neck fractures in the elderly: a randomized controlled trial. J Bone Joint Surg [Br] 85: 380-388.
4. Lu-Yao GL, Keller RB, Litteberg B, Wennberg J (1994) Outcomes after displaced fractures of the femoral neck. A metaanalysis of one hundred and six published reports. J Bone Jt Surg Am 76: 15-25.
5. Moulopoulos G, Starnatakos M, Anabtaz H, Vasiliadis G, Bataris G, et al. (2008) The four-year functional result after a displaced subcapital hip fracture treated with three different surgical options. International Orthopaedics (SICOT) 32: 367-373.
6. Taline WH, Ammour PC (1985) Primary total hip replacement for displaced subcapital fractures of the femur. J Bone Joint Surg [Br] 67: 214-217.
7. Barnes R, Brown JT, Garden RS, Nicoll EA (1976) Subcapital fractures of the femur. A prospective review. J Bone Joint Surg [Br] 58: 2-24.
8. Skinner PW, Powles D (1986) Compression screw fixation for displaced subcapital fractures of the femur. Success or failure? J Bone Joint Surg [Br] 68: 78-82.
9. Hedbeck CJ, Enocson A, Lapidas G, Blomfeldt R, Törnkvist H, et al. (2011) Comparison of bipolar hemiarthroplasty with total hip arthroplasty for displaced femoral neck fractures: a concise four-year follow-up of a randomized trial. J Bone Joint Surg Am 93: 445-450.
10. Rogmark C, Carlsson A, Johnell O, Stenbo I (2002) A prospective randomized trial of internal fixation versus arthroplasty for displaced fractures of the neck of the femur: functional outcome for 450 patients at two years. J Bone Joint Surg [B] 84: 183-186.
11. Gallo J, Cechova I and Zapletalova J (2010) Early complications associated with total hip arthroplasty due to femoral neck fracture. Acta Chirurgiae Orthopaedicae et Traumatologiae Ceskoslovenska 77: 389-394.
12. Kyle RF (2010) Subcapital fractures: in the bucket or on top of the neck? Orthopedics 33: 644.
13. Johansson T, Jacobsson SA, Ivansson I, Knutsson A, Wahnlöfö A (2000) Internal fixation versus total hip arthroplasty in the treatment of displaced femoral neck fractures: a prospective randomized study of 100 hips. Acta Orthop Scand 71: 597-602.
14. Cooper 1, Campbell G, Melton LJ 3rd (1992) Hip fractures in the elderly: a world-wide projection. Osteoporos Int 2: 285-289.
15. Avery PP, Baker RP, Walton MJ, Rookey JC, Squires B, et al. (2011) Total hip replacement and hemiarthroplasty in mobile, independent patients with a displaced intracapsular fracture of the femoral neck: a seven- to ten-year follow-up report of a prospective randomised controlled trial. J Bone Joint Surg Br 93: 1045-1048.
16. Jain NB, Losina E, Ward DM, Harris MB, Katz JN (2008) Trends in surgical management of femoral neck fractures in the United States. Clin Orthop Relat Res 466: 3116-3122.
17. Iftekhar HW, Sharma S, Latio I, Qafatra A, Farnoz M, Jan M (2014) Primary total hip arthroplasty versus internal fixation in displaced fracture neck of femur in sexa- and septuagenarians. J Orthopaed Traumatol 15: 209-214.
18. Ravikumar KJ, Marsh G (2000) Internal fixation versus hemi-arthroplasty versus total hip arthroplasty for displaced subcapital fractures of femur: 13-year results of a prospective randomised study. Injury 31: 793-797.
19. Skinner P, Riley D, Ellery J, et al. (1989) Displaced subcapital fractures of the femur: a prospective randomised comparison of internal fixation, hemiarthroplasty and total hip replacement. Injury 20: 291-293.
20. http://www.nepalmountainnews.com/cms/55%www.nepalmountainnews, com\.../2014/.../life-expectancy-in-nepal-reach...%20www.infoplease.com/20%20 ...%20World%20Statistics%20%20Health%20%20Social%20Statistics.
21. Ions GK, Stevens J (1987) Prediction of survival in patients with femoral neck fractures. J Bone Joint Surg Br 69: 384-387.
22. Walker NJ, Norton R, Vander Hoom S, Rodgers A, Machalson S, et al. (1999) Mortality after hip fracture: regional variations in New Zealand. N Z Med J 112: 269-271.
23. Pai VS, Arden D, Wilson N (2003) Fractured neck of femur in the mobile independent elderly patient: should we treat with total hip replacement? Journal of Orthopaedic Surgery 11:123-128.
24. Kenzora JE, McCarthy RE, Lowell JD, Sledge CB (1984) Hip fracture mortality. Relation to age, treatment, preoperative illness, time of surgery, and complications. Clin Orthop Relat Res : 45-56.
25. Gregory RJ1, Wood DJ, Stevens J (1992) Treatment of displaced subcapital femoral fractures with total hip replacement. Injury 23: 168-170.
26. Ames JB, Lurie JD, Tomek M, Zhou W, Koval KJ (2010) Does surgery volume for total hip arthroplasty affect outcomes after hemiarthroplasty for femoral neck fracture? The American Journal of Orthopedics 39: 84-89.
27. Rutz E, Leumann A, Rutz D, Schäfer D, Valdernambolo V (2010) Total hip arthroplasty for fractures of the proximal femur in older patients. Hip Int 20: 215-220.
28. William M Ricci, Langer JS, Leduc S, Streubel PN, Borelli JR (2011) Total hip arthroplasty for acute displaced femoral neck fractures via the posterior approach: a protocol to minimise hip dislocation risk. Hip Int 21: 344-350.
29. Coates RL, Armour P (1979) Treatment of subcapital femoral fractures by primary total hip replacement. Injury 11: 132-135.
30. Coates RL, Armour P (1979) Displaced intracapsular neck of femur fractures in mobile independent patients: total hip replacement or hemi-arthroplasty? Injury 30: 345-348.
31. Gebhard JS, Amstutz HC, Zinar DM, Dorey FJ (1992) A comparison of total hip arthroplasty and hemiarthroplasty for treatment of acute fracture of the femoral neck. Clin Orthop 262: 123-131.
32. Iorio R, Healy WL, Lemos DW, Appleby D, Lucchesi CA, et al. (2001) Displaced femoral neck fractures in the elderly: outcomes and cost effectiveness. Clin Orthop Relat Res : 229-242.
33. Davison JH, Calder SJ, Anderson GH, Ward G, Jagger C, Harper WM, et al. (2001) Treatment for displaced intracapsular fracture of the proximal femur. A prospective, randomised trial in patients aged 65 to 79 years. J Bone Joint Surg Br 83: 206-212.
34. Ossendorf C, Schevenery MJ, Wanner GA, Hans-Peter Simmen, Werner CML (2010) Treatment of femoral neck fractures in elderly patients over 60 years of age - which is the ideal modality of primary joint replacement? Patient Safety in Surgery 4: 16-24.
35. He JH, Zhou CP, Shen B, Yang J, et al. (2012) Meta-analysis comparing total hip arthroplasty with hemiarthroplasty in the treatment of displaced femoral neck fractures in patients over 70 years old. Chin J Traumatol 15: 195-200.
36. Parker MJ, Pryor GA (2000) Internal fixation or arthroplasty for displaced cervical hip fractures in the elderly: a randomised controlled trial of 208 patients. Acta Orthop Scand 71: 440-446.