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Short term outcomes of total hip arthroplasty for neck femur fracture in patients above 50 years of age

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Abstract

Background: Fracture displacement disrupts the femoral head blood supply and increases risk of osteonecrosis of femoral head, delayed union, nonunion and osteoporosis which risks failure of fracture fixation procedures. Total hip arthroplasty improves functional outcome score and decreases pain. In the present study, we aim to measure the functional outcome, hospital stay and rate of complications such as hypotension, pulmonary embolism, infection associated with uncemented Total hip arthroplasty in neck of femur fracture in patients more than 50 years of age. This study aims to evaluate risks and complications and functional outcome associated with surgery.

Materials and Methods: This prospective observational study was carried out in 20 patients admitted in the Department of Orthopaedics of Government Medical College and Sir Sayajirao General Hospital, Vadodara between March 2017 and October 2018. Patients having fracture neck of femur with age more than 50 years regardless of the etiology and type of fracture were included in the study. All patients were operated using Moore's posterior approach under spinal anesthesia. Patients were followed up at post-operative period of 2 weeks, 1 month, 2 months, 6 months and 12 months for assessment and consultation. Harris hip score was calculated at 12 months.

Results: Mean age of the study was 72.6 years with a 1.5:1 female to male ratio. Average intra-operative blood loss was 350 ml. Only one of the patients had superficial surgical site infection. Average Harris hip score was 85.7 at final follow-up. None of the patients required support for walking. Majority of patients (16, 80.0%) could walk for long distance (>1.5 km) at final follow-up. No radiological abnormality was noted at final follow-up at 12 months.

Conclusion: Despite the poor quality of bone in elder patients, uncemented total hip arthroplasty did not seem to compromise the stability and osseointegration of these components. Therefore, uncemented total hip arthroplasty is a viable option for patients with neck femur fracture in patients of more than 50 years of age.

Keywords: Fracture neck of femur, Uncemented, Total Hip arthroplasty, Harris hip score

Introduction

Hip fracture is a devastating injury often resulting in long-term disability due to its high incidence and considerable consequences for rapidly expanding elderly population. Hip fractures are one of the most challenging and fastest growing public health concern [1]. The lifetime risk of sustaining a hip fracture is high and lies within the range of 40% to 50% in women and 13% to 22% in men. Life expectancy is increasing worldwide and these demographic changes can be expected to cause the number of hip fractures occurring worldwide to increase from 1.66 million in 1990 to 6.26 million in 2050 [2]. For persons over 50 years of age, hip fracture is among the ten most incapacitating conditions worldwide in term of disability adjusted life years [3]. One year mortality rate after a hip fracture is 20-27% [4, 5]. Of the 80% of hip fracture patients that walk independently before the fracture, only half of them are able to do so after the incident [6]. Furthermore half of the patients previously living independently remain in a long term care or need help with activity of daily living one year after the fracture [7]. At community level, hip fractures have a huge financial impact [8]. Recent studies have indicated that orthogeriatric care for these patients can improve mobility and ability to manage activity of daily living and is likely to be cost effective [9]. The term hip fractures include intra-capsular and extra-capsular fractures of proximal femur. Femoral neck fractures are intra-capsular in location and account for 50% of all hip fractures.

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In early 20th century, bed rest with traction for 6 months was the recommended way of treating neck femur fracture. However many patients died of medical complication of inactivity such as pneumonia or emboli. This led to evolution of surgical management of hip fractures ^[10]. Currently surgical modalities for fracture of neck femur in patients above 50 years of age includes ^[11].

- Internal fixation
- Hemiarthroplasty
- Total Hip Arthroplasty

Internal fixation is a relatively short, atraumatic treatment due to being a minimally invasive surgical procedure. Closed or rarely open reduction is used and stabilized with internal fixation, usually with cannulated screw system or sliding hip screw with short plate. When internal fixation is used in patients of more than 50 years of age as primary treatment, it leads to high rate of complications and reoperation. Failure rate of 35%-50% have been reported in the literature. The most frequent complications are avascular necrosis and non-union due to disturbed vascular supply of the femoral head and mechanical failure due to inadequate fixation. So, over a period of time, internal fixation has become obsolete as a modality of treatment for neck femur fractures in patients aged more than 50 years ^[12].

Hemiarthroplasty includes prosthetic replacement of femoral head only. Hemiarthroplasty is a quick and highly standardised procedure that allows for early weight bearing and recovery. However many patients with femoral neck fractures have osteoarthritis which may necessitate secondary conversion to total hip arthroplasty. Hemiarthroplasty also leads to wear of articulating acetabular cartilage which may require early revision for THA ^[13, 14]. Groin and thigh pains are often more common among patients undergoing hemiarthroplasty when compared with total hip arthroplasty ^[15].

Currently, THA is preferred over hemiarthroplasty in treatment for neck femur fractures in elderly due to higher success rate, lower risk of reoperation and comparable rate of postoperative infection when compared with hemiarthroplasty. THA is the most cost effective treatment as compared to other surgeries ^[16]. Initial costs of THA is higher compared to bipolar hemiarthroplasty. However, overall costs are regarded as lower, because of increased long-term survival, better outcome and less frequent revision surgery. In conclusion, THA is recommended as an evidence-based primary treatment for femoral neck fractures in patients with more than 50 years of age ^[16].

Following various randomized clinical trials, it was established that cemented total hip replacement was a reasonable treatment option for active, independently living

and cognitively intact patients with an acute, displaced fracture of the femoral neck. In this subset of patients, total hip arthroplasty provided predictable and durable pain relief, a high level of function and was associated with a lower need for reoperation. Medical and surgical complications associated with total hip replacement were higher in some earlier studies but with better operative technique and vigilant perioperative medical management, these short-term problems were reduced to an acceptable level.

During the initial studies, cemented implants were commonly used because of the concern about the potential for retarded osteo-integration with uncemented components in these patients with osteopenia and a wide femoral canal. The other concern for the use of press-fit femoral components was related to the possibility of femoral fractures.

This study aims to learn the short term outcomes of uncemented total hip replacement in neck femur fractures in patients more than 50 year old and to evaluate the osseointegration potential of the uncemented femoral component and scrutinize the early implant related complications. This study also aims to evaluate the methods to avoid the medical complications of total hip replacement in this population.

Materials and Methods

Twenty patients with neck femur fractures of age more than 50 years were included in this study regardless of etiology and anatomical or displacement variety. Patients with neck femur fractures with associated injuries were excluded from the study. Detailed history regarding the mode of trauma (high velocity or low velocity) and associated injuries was taken. Systemic diseases were identified through detailed examination and laboratory investigations. Patients were evaluated for comorbidities and proper correction of the illness was ensured after physician consultation. Major comorbidities in our study were associated cardiac disorders, diabetes mellitus and hypertension. Each patient was properly monitored for these disorders and medications were started. Preoperative investigations were carried and preoperative haemoglobin was corrected to above 10 gm/dl. Blood pressure and random blood sugar levels were monitored regularly. Patients with poor respiratory capacity were nebulized with oxygen and bronchodilators at 6 litres/min. All the patients were examined for urinary tract infection and absence of the same was mandatory for operative procedure. After adequate patient conditioning for 48-72 hours, patients were posted for surgery with strict adherence to anesthetic advise. Preoperative medications in the form of injection tecoplanin (400mg), injection cefoperazone-sulbactam (2000mg) and injection tranexamic acid 1000 mg (to reduce intraoperative blood loss) were given.

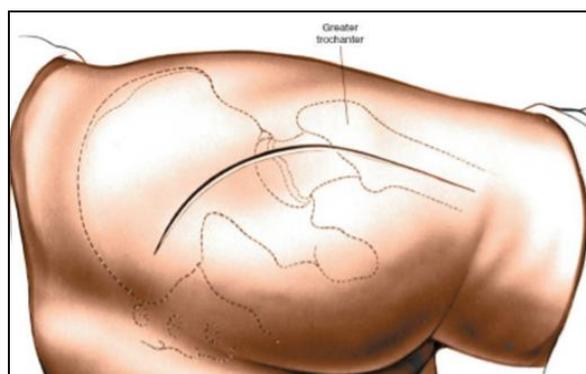


Fig 1: Moore's Incision

All patients were operated using Moore's posterior approach in lateral decubitus position. After deep dissection through gluteus maximus fibres, a myocapsular flap comprising of short external rotators and posterior part of capsule was

created flush along the posterior border of greater trochanter. Fractured femoral head was extracted using a cork-screw following which femoral neck osteotomy was carried out.

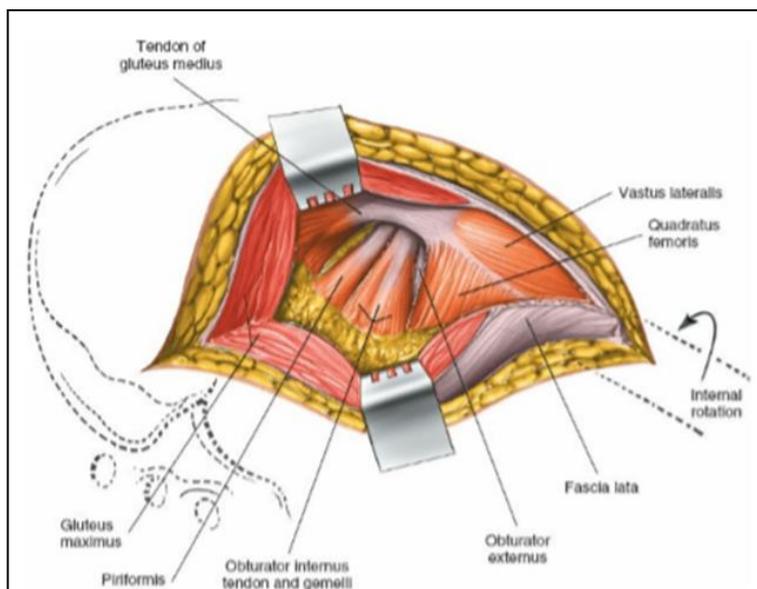


Fig 2: Deep dissection

Acetabular preparation and component implantation were performed first in all cases. Femoral canal was then prepared using graduated reamers. Once femoral canal was prepared sequential broaches were inserted in the canal till an appropriate fit was achieved. It was ensured that all the cancellous bone in the canal was removed and the final implant would have circumferential contact with the cortical bone. Periprosthetic fractures while using press fit technique in an osteoporotic senile femoral canal has always been a negative advocate for uncemented total hip arthroplasty but in our study, careful canal enlargement with reamers prior to broaching and use of proximal coated uncemented stems reduced the incidence of intraoperative fracture.

After femoral stem implantation, femoral head was implanted and reduced. Stability of hip system was checked using telescoping and shuck test. Meticulous closure of posterior soft tissue was done with myocapsular flap, repaired with non absorbable suture and was reattached to greater trochanter directly through holes made with a drill. Suction drains were placed in all patients.

Postoperatively, antibiotic protocol was injecting tecoplanin 400 mg once a day for three days with injection ceftioxone-sulbactam 2000 mg twice a day and injection amikacin 500

mg thrice a day for 5 days.

Injection enoxaparin was started from first post operative day for a dose of 0.6 mg/day subcutaneously for anticoagulation. This was continued till the day of discharge. Post discharge oral formulation of an anticoagulant drug was not continued. Early mobilization was deemed adequate for prophylaxis of deep vein thrombosis.

Static and active quadriceps exercises were started on the evening of the surgery within the limits of comfort followed by high sitting on the first post operative day. Weight bearing was individualized for each patient and determined by intraoperative fixation of implant to the bone. All patients were advised to be mobilized full weight bearing with the help of a walker from next day.

Criterion for discharge was two consecutive days with dry, healthy looking suture site on dressing, without any episode of fever post operatively. In case of any soakage, swab culture was taken, antibiotics were started according to the sensitivity and surgical debridement of the wound was done. Patients were not discharged until two consecutive dressings were dry. Every patient was followed clinically and radiologically at 2 weeks, 1 month, 3 months and 12 months. Postoperative modified Harris hip score was evaluated at 12 months.

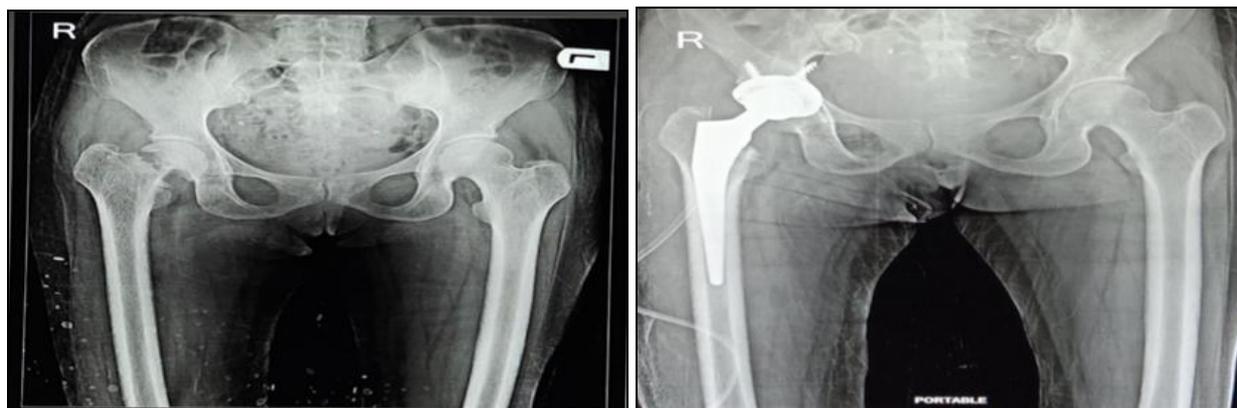


Fig 3: Uncommented total hip arthroplasty for a case of fracture neck of femur



Fig 4: clinical photo of patient operated with total hip arthroplasty at 12 month follow up

Results

The follow up period was 1 year. The average operating time was 40 min (range 35–80 min). The average blood loss in patients was 350 ml (range 300–1000 ml). The average intraoperative blood transfused were 2 units (range 2-4) for each surgery. Average duration of hospital stay was 8 days. One patient developed intraoperative hypotension which was managed successfully with blood transfusion and vasopressor support. Only one of the patients had superficial surgical site infection which was managed conservatively with culture specific intravenous antibiotics. Surgical debridement was not required and patient was discharged uneventfully. All patients were followed up for 1 year and evaluated using Harris hip score (HHS). Average HHS was 85.7 at final follow-up. Three patients (15.0%) had no pain while remaining 17 patients (85.0%) had slight pain without restriction of daily activities at final follow-up at 6 months. Eighteen patients (90.0%) had no limp at final follow-up; only two patients (10.0%) had slight limp. None of the patients required support for walking. Majority of patients (16, 80.0%)

could walk for long distance (>1.5 km) at final follow-up.

Table 1: Amount of pain

Pain	Final follow-up	Percentage (%)
I (No pain)	3	15
II (Slight, occasional, no compromises in activities)	17	85
III (Mild pain, no effect on average activities, rarely moderate pain with unusual activity, may take aspirin)	0	0
IV (Moderate pain, tolerable but makes concession to pain)	0	0
V (Marked pain, serious limitation of activities)	0	0
VI (Totally disabled, crippled, bedridden)	0	0

At the final follow up, 17 patients (85%) had slight pain without restriction of routine activities and 3 patients (15%) had no pain.

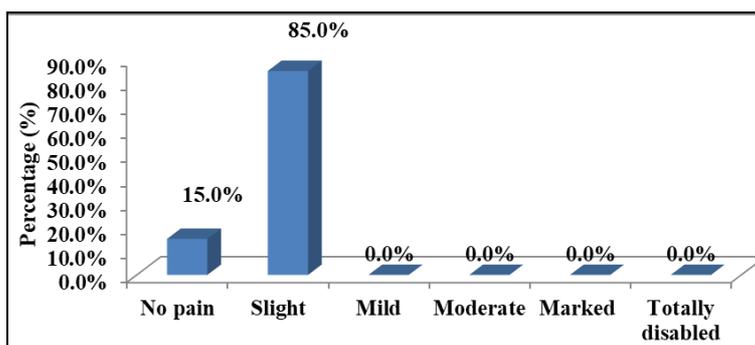


Fig 5: Pain at final follow up

No patient had an intraoperative periprosthetic femoral fracture. No patient developed postoperative wound hematoma. No patient developed deep vein thrombosis. None of the cases had aseptic loosening as assessed on serial radiographs. Subsidence was not noticed in any of the cases till the last follow up. There were no early or late dislocations. No heterotopic ossification was seen in any of the cases. There were no cases of sciatic nerve palsy.

Discussion

One of the main concerns for the use of uncemented femoral stem was related to the potential for poor fit of the femoral

component in the capacious canal [17], which may result in subsidence and lack of osteointegration. However, our study does not report any such complications. Objective of the study conducted by Klein *et al.* [18] was to evaluate the osseointegration potential of the uncemented femoral component and scrutinize early implant related complications. In our study, based on the radiographic evidence, there were no hips with clinically significant subsidence of femoral component or aseptic loosening. Furthermore, Harris hip score in our study was 85.7 comparable to that of Klein GR *et al.*, which was 82.4 at final follow-up. In conclusion, our study agrees with the findings

of Klein *et al.* that despite poor bone quality seen in this age group, osseointegration of the uncemented total hip arthroplasty components was not a problem.

No major intraoperative complication occurred in hip fracture patients undergoing uncemented total hip arthroplasty. Cardiopulmonary disturbances are known to occur during cementing of the femoral component to a larger extent than press-fit insertion of the implants. The pressurization of the cement in these capacious canals is believed to force fat, marrow and cement particles into the venous canals with subsequent migration to the lung and other vital organs [19]. Cement particles have been detected in the lungs, kidney, heart and brain of patients dying during cemented total hip arthroplasty. Although fatal and near fatal complications can and do occur with uncemented total hip arthroplasty, according to this study, the relative risk of perioperative mortality for cemented total hip arthroplasty in the acute hip fracture population is greater than uncemented arthroplasty. This is in accordance to the findings of our study where no significant cardiopulmonary complications or evidences of pulmonary embolism were seen. This clearly concludes that uncemented total hip arthroplasty in the elderly age group is a safe option as compared to its cemented counterpart.

Conclusion

Features of newly designed femoral stems conferred initial stability to the femoral component and allowed optimal bone ingrowth and long term biological fixation. The tapered femoral stems can be implanted with minimal reaming and broaching. It has less operative time and minimizes the harmful effects of marrow and fat embolization. Despite of the poor quality of bone in elder patients, uncemented THA did not seem to compromise the stability and osseointegration of these components. Therefore, uncemented THA is a viable option for patients of more than 50 years age group with neck femur fracture.

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