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## RESEARCH ARTICLE

# EVALUATION OF INTERNAL FIXATION OF FRACTURE NECK OF FEMUR ABOVE 60 YEARS OF AGE BASED ON SELECTION USING PHYSIOLOGICAL STATUS SCORE

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### ABSTRACT

**Introduction:** Hip fractures are relatively common injuries in adults and are associated with substantial mortality and morbidity, especially in the elderly. While patients above 60 years are considered for arthroplasty, the study focuses on evaluating internal fixation in carefully selected patients of this age group. **Aim:** This study is aimed at evaluation of clinicoradiological and functional outcomes of fixing femoral neck fractures in a selected elderly population. **Material and methods:** The study included 36 cases of fracture neck of femur above 60 years of age treated by closed reduction and internal fixation. Dual-energy x-ray absorptiometry (DEXA) was done preoperatively and those with Physiologic Status Score (PSS) more than 20 were included in the study. **Results:** In our study 75% of the patients had an excellent Harris hip score while it was good in 11.11%, fair in 8.33% of the patients and poor in the remaining 5.55% of the patients. Non-union of femoral neck fracture occurred in 4 cases (11.11%) while osteonecrosis was observed in 3 patients (8.3%). The eldest patient operated was 85 years of age. **Conclusion:** Internal fixation maybe considered as mode of treatment in carefully selected patients over 60 years also with favourable outcomes. PSS is a useful tool in selecting such patients.

## INTRODUCTION

Most of the hip fractures occur in elderly patients and are the second most common cause of hospitalization in these individuals. 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 fracture to increase among the elderly population worldwide (Dennison, 2006). In elderly patients, the usual cause is a simple fall with force being transmitted to femoral neck through greater trochanter. Alternatively, excessive external rotation against the fixed head tightens the anterior capsule and causes fracture neck of the femur (Egund, 1988). The quotation "We come into the world under the brim of the pelvis and go out through the neck of the femur" reflects the defeatist attitude that has long been held by medical and lay personnel towards femoral neck fractures in the past (Garden, 1961). Treatment of femoral neck fracture is almost always surgical and entails either preservation of femoral head or replacement arthroplasty. In active young patients, closed or open reduction with internal fixation is the treatment of choice and arthroplasty is the optimum treatment for old patients with osteoporotic bones who have low activity level. But in active elderly patients above 60 years with good bone stock, there is

always a treatment dilemma whether to fix the fracture or replace the hip. Both approaches are acceptable, and the surgeon must choose which method is the best in their hands. Preservation of femoral head is a biological solution for these fractures in physiologically active patients of 60 years or above. The shorter length of anaesthesia, lower operative blood loss, less perioperative morbidity and lower early mortality favors the internal fixation of these fractures over arthroplasty (Lu-Yao, 1994). Fixation is also preferred in rural Indian patients who belong to lower socioeconomic class and are farmers, laborers or household workers who have to squat frequently for one or other reasons. Although after internal fixation of these fractures, the rate of revision ranges from approximately 10% in low-risk patients to 50% in high-risk patients. But prosthetic replacement of the hip for femoral neck fracture ignores the fact that at least 2/3<sup>rd</sup> of the patients treated by internal fixation have functional hips that last the remainder of their lifetime and do not require subsequent revision surgery (Roche, 2005). However second operation if required to treat the complication of internal fixation does not preclude the good result as most of the internal fixation are done by minimally invasive closed technique. Numerous studies have reported better outcome after arthroplasty when compared with internal fixation, but early mortality and perioperative complications are higher in the arthroplasty group. Also, the population of elderly patients with fractured neck of femur

comprises several subpopulations ranging from absolutely fit patients capable of living independently to unhealthy bedridden individuals. Hence it is not likely that one method would be optimum for all of the subpopulations.

## MATERIAL AND METHODS

The present study was conducted in the Department of Orthopaedic Surgery Indira Gandhi Medical College (IGMC), Shimla. The study included 36 cases of fracture neck of femur above 60 years of age treated by closed reduction and internal fixation. The inclusion criteria were: unilateral fracture neck of femur in patients above 60 years of age and displaced fracture of femoral neck with PSS > 20. Pathological fractures and fracture neck of femur with advanced osteoarthritis of ipsilateral were not included. Prospective cases included the patients operated from June 2015 to June 2017. After reporting to the hospital detailed history was obtained from the patient and the attendants. Assessment of patient was done for fracture neck of femur, other associated injuries and the general condition of the patients. DEXA of the normal hip was done in all patients above 60 years of age. PSS scoring was done and the patients who fulfilled the inclusion criteria were included in the study. Closed reduction of fracture neck of femur was done by one or other method after anaesthesia. If reduction was not achieved by one method; then the other method was tried to achieve the acceptable reduction namely Whitman's method, Leadbetter technique, Smith-Peterson method and Flynn's technique. Garden alignment index and Lowell's criteria were used to evaluate the acceptability of the reduction achieved failing which, the hip was remanipulated. We were able to achieve closed reduction in all 36 cases. After following standard technique for exposure of lateral wall of femoral shaft, fixation was done using either partially threaded cancellous screws (PTCS) or dynamic hip screws (DHS) with locking side plate. Post-operatively, patients were discharged after two dressings on 2<sup>nd</sup> and 5<sup>th</sup> day. Sutures removed on 14<sup>th</sup> day. Patients were switched on to toe touch weight bearing which was gradually increased depending on stability of fixation and patient compliance. Every patient was advised to come for follow up at 6 weeks interval till fracture union or some complication occurs. Functional scoring was done every time according to Modified Harris hip score and were categorized into excellent, good, fair or poor result.

## RESULTS

A total of 36 patients with fracture neck of femur were included in the study. The age ranged from 60-85 years. Most of the patients (88.88%) were between the ages of 60-69 years and the mean age in our study was  $66.7 \pm 4.7$  years. Males predominated and comprised 61.11% of the total number of patients. Right sided fractures of neck of femur were more common than the left (55.55% versus 44.44%). Maximum number 88.88% of patients had history of fall from low height while 11.11% presented with roadside accident. Garden type III and type IV fractures predominated in our study. 19 (52.77%) patients had type III and 14 (38.88%) patients had type IV fracture. 3 (8.33%) patients had Garden type II fractures. 21 (58.33%) patients were having a score between 20 to 25 and 15 (41.66%) patients had score > 25. Most (50%) of the patients were operated between 6 to 72 hours while 41.66% were operated between 72 hours to 7 days after injury. All those patients who were operated after one week were

either presented late to the hospital or were having associated injuries or co-morbid conditions affecting fitness for surgery and anaesthesia. In our study, maximum number (50%) of patients had duration of hospital stay of less than one week. The minimum number of days of hospital stay was 5 days and the maximum was 22 days with a mean duration of  $7.61 \pm 3$  days. In majority (88.88%) of our patients, fixation was done with partially threaded cancellous screws. We used three cannulated screws in all the patients with 2 washers in 14 (38.88%) patients and 3 in 18 (50%) patients. Sliding hip screw was used for fixation in 4 (11.11%) of the patients with Pauwel type III fracture pattern. PTCS were placed in triangular configuration in 62.50% of patients and inverted triangle in 37.50% of patients. In our study 75% of the patients had an excellent Harris hip score while it was good in 11.11%, fair in 8.33% of the patients and poor in the remaining 5.55% of the patients (Table 1). Early post operative superficial infection occurred in 11.11% of our patients which cleared with prolonged antibiotics. In long term follow up, non-union were seen in 11.11%, osteonecrosis in 8.33% and intraarticular protrusion of screw in 2.77% of patients. Minor screw back out was noted in 22 (73.33%) of patients out of 32 patients who were fixed with PTCS and did not affect the outcome (Table 2).

## DISCUSSION

Fracture neck of femur is frequent and severe injury with consequent high morbidity and mortality. Osteoporosis, co-morbidities, increased incidence of trivial trauma increases the incidence and complicates the treatment of these fractures. Management poses a challenge to the Orthopaedic surgeon especially in the elderly patient with medical co-morbidities. The optimum treatment of these fractures remains a matter of debate. In its true sense it is the "unsolved fracture". Non-union and early fixation failure is frequently observed in elderly as a result of osteoporosis and other factors which include age, degree of displacement, fracture line, degree of comminution and quality of reduction (Parker, 1994). Various authors demonstrated the rate of non-union and early fixation failure in 10% to 45% of elderly patients undergoing osteosynthesis (Blomfeldt, 2005). In our study, non-union of femoral neck fracture occurred in 4 cases (11.11%). Functional results were fair in 2 and poor in 2 patients as per Harris hip score. The incidence of non-union in our study was close to the lower side of the range reported in literature. It was markedly lower than 34.5% reported by Parker *et al* (Sciard, 2011) and 24.2% reported by Cao *et al* (Cao, 2014). This lower incidence may be due to the selection of healthier individuals with good bone stock in our study. Carpintero *et al* reported the incidence of avascular necrosis of the femoral head to be in 9%-18% of patients, between two and eight years post-fracture; risk factors include the degree of fracture displacement, patient age and delay in surgical treatment (Carpintero, 2014). Asnis and Wanek-Sgaglione retrospectively reviewed the results of stabilization of femoral neck fractures with cannulated screws in 141 elderly patients. Thirteen patients (9.2%) developed osteonecrosis within twenty-four months. Osteonecrosis developed in thirteen additional patients during 8 years of follow-up, out of which 8 patients had displaced fractures. Osteonecrosis occurred in 19.5% patients who had Garden type II fracture, in 20% of type III and in 30% of type IV fractures (Asnis, 1994). In our study, avascular necrosis was observed in 3 patients (8.3%) which resembles most of the

recent studies. Two of our patients were males and all were aged less than 70 years. Functional results as per Harris Hip score were fair in these 3 patients. Type of implant has an important influence on complications. During fixation of the femoral neck fracture, if screw insertion is not proper they will cut through the upper and lower cortex and sometimes the screw will penetrate the head. Incidence of 3 to 13% of intra-articular screw protrusion have reported in literature.<sup>12</sup> In the present study, intra-articular protrusion of superior screw was observed in a 74-year-old male patient (Garden type III) on 6 weeks follow-up. The patient had a good functional result and is on regular follow up. Although intra-articular cut out of lag screw have been reported more in fixation by Dynamic hip screw, none of our patients fixed with dynamic hip screw developed this complication.

Mortality rate after hip fracture in elderly patients at 1 year varies between 14% - 36% and it increase with passage of time (Swionkowski, 1987). Patients with serious comorbidities like chronic obstructive pulmonary disease, acute chest infection, heart failure, and malignancies etc have higher mortality rate (Carpintero, 2014). Mortality is also influenced by pre-operative cognitive state, medical comorbidities, ambulatory state of the patient. In our study, no mortality was observed among 36 patients. Harris hip score is one of the most widely used rating system for disabled hips, have high reliability, validity and used by many authors to analyze the final results after fracture neck of femur. In our study, 75% of the patients had excellent score, 11.1% had good outcome while it was fair in 8.33% and poor in 5.55% of the patients respectively. Neeraj Aggarwal *et al* did a prospective study that included 62 patients over 60 years of age treated by cancellous screw fixation or arthroplasty. They reported mean Harris hip score of 91.8 in internal fixation group at one year follow up. In this study, excellent to good/fair scores were observed in 82% patients and poor in 17.94% patients treated by internal fixation (Agarwal, 2017). Cao *et al* 2014 compared the outcome of closed reduction internal fixation and total hip arthroplasty for displaced fracture neck of femur in patients above 65 years age and reported the excellent score in 72.6% of the patients of internal fixation group.<sup>9</sup> Various authors have observed satisfactory Harris hip score in majority of patients after fixation of fracture neck of femur they also observed that Harris hip score improved considerably from 3 month to 1 year follow-up.<sup>13</sup> Excellent to good/fair score was observed in 94.4% of patients which was better than above mentioned studies and many other studies.

Many studies have shown there is a positive interrelationship between the stability of fixation and the bone density of the bone being operated, although, all these were cadaveric studies (Sjostedt, 1994; Levi, 1996; Jenny, 1999 and Clark, 1990). In the past it has been suggested that bone density measurement maybe used to select patients who are more suitable for internal fixation (Swionkowski, 1987). After retrospective cohort analysis by Weinrobe M *et al* in 1998 and by Spangler L *et al* in 2001, this hypothesis was reaffirmed (Weinrobe, 1998 and Spangler, 2001). Nonetheless, in clinical practice bone densitometry alone cannot be used for decision making but other factors like, age, gender, fracture displacement, implant used, the time to surgery, pre-existing morbidity, and the angle of the fracture all call for attention (Parker, 2002; Raaymakers, 2002; Baitner, 1999 and Hammer, 2005). Physiological status score is one such tool which has been used in all cases of our study and the results are pointing that it has

served the purpose of the study well. Nevertheless, in the past, there have been studies negating this correlation as well (Heetveld, 2005). Life expectancy has been on the rise in most of the countries forasmuch as the last century and till today it is not appearing to decrease (Parker, 2002). Longevity is on the rise, ergo, there can be an expected increase in the incidence and burden associated with the morbidity and mortality associated with fracture neck of femur. All our patients were relatively healthy individuals having good bone quality and activity level. Better score of our study may be because of strict inclusion criteria which take into consideration, the physiologic status score in addition to fracture characteristics. The hypothesis of this study to find out the results of internal fixation in elderly neck of femur fractures with patient selection using PSS has shown considerably acceptable results with low incidence of complication. Hence surgical decision making should be personalized to each patient according to accurate mortality and morbidity assessment. Accordingly, it will not be wrong to comment that a category of patients above the age of 60 years maybe good candidates for internal fixation rather than replacement with expectedly good outcomes. Be that as it may, the study does lack a few shortcomings like small number of patients, shorter follow up period and strict inclusion criteria as we selected relatively healthy patients having good pre-injury activity level. On that account, it may not be wrong to suggest that some patients who have a higher life expectancy and are leading an active life prior to injury, may be good candidates for internal fixation since any complication may be effectively dealt with arthroplasty later on (Parker, 2002).

## Conclusion

Fracture neck of femur in elderly patients is difficult to manage and requires skillful surgical expertise and close follow up. The present study has shown that the complications of displaced femoral neck fracture were not as high as previously described in literature in selected elderly patients (above 60 years). PSS is a useful tool to guide the treatment modality with favourable outcomes. Considering the increasing frequency of occurrence of these fractures, its associated complications and controversies regarding treatment, and low socioeconomic status of our patients the results of this study especially has implications in developing countries like India. However, a large scale multicentric study done over a long period may be required to conclusively comment on the same.

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