



INTRACAPSULAR FRACTURES OF THE FEMORAL NECK. RETROSPECTIVE ANALYSIS OF FACTORS INFLUENCING THE OPERATIVE RESULT AFTER OSTEOSYNTHESIS.

Orthopaedics

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ABSTRACT

Background:- The purpose of the study was to review the factor influencing the result associated with treatment of femoral neck fracture with internal fixation in 60 consecutive series of young patient

Method:- Between 2003 and 2007 sixty femoral neck fracture in 60 consecutive patient who were between the age 15 and 55 years old treated with closed reduction and internal fixation with three cannulated cancellous screws at our institute fifty of sixty were displaced fractures and ten were nondisplaced fractures. The results and complication were retrospectively reviewed and factor like displacement (Garden's classification), time of fixation since injury, quality of reduction were reviewed.

Results:- Twenty four (40%) were associated with the development of nonunion and thirty six (60%) of the sixty fractures healed after one operation. ten fractures (17%) were associated with the development of osteonecrosis, Fractures with a Garden classification of I and II have significantly better results than Garden III and IV ($P < 0.05$). Fracture that fixed earlier (< 48 hrs) has significantly better outcome than those fixed after 48 hrs, An unsuccessful reduction of the fracture had significant effect on the outcome.

Conclusion:- If internal fixation is considered, early fixation and perfect reduction should be aimed.

KEYWORDS

Hip fracture, closed reduction, Internal fixation factor affecting

INTRODUCTION

The fracture of femoral neck has always been called "the unsolved fracture" Quote "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 been long held by both medical and lay personal towards the fractures.

Although prosthetic replacement frequently is considered for the treatment of displaced fractures in elderly patients, efforts are focused on preserving the femoral head in physiologically younger patients¹⁻⁶. Complications such as osteonecrosis and nonunion have been reported to occur in 10% to 45% and 10% to 30% of patients who have a femoral neck fracture, respectively⁴⁻¹³. There is a surprising paucity of data regarding the factor affecting outcomes of treatment of femoral neck fractures in young patients.

The purpose of the present study was to retrospective evaluation of a consecutive series of young patients with femoral neck fractures that had been treated with contemporary methods of internal fixation at a level-1 trauma center in order to learn more about factor affecting the results and complications of treatment of these potentially devastating injuries.

Materials and Methods

This is retrospective analysis of result of 60 cases with a mean age of thirty-six years (range, fifteen to fifty years) of intracapsular femoral neck fracture that were closed reduced and stabilized with three cancellous screws placed parallel to each other between 2003 and 2007, we included patient who were treated within three week after injury, fractures were preoperatively classified using the Garden criteria¹⁷. Thirty eight patients were male, and twenty-two were female; Fifty fractures were displaced (Garden-III&IV), and ten were nondisplaced (Garden-I&II)

The mean duration of clinical follow-up for the group as a whole was 2.3 years (range, 6 month to 3.5 years). Detail Clinical history and radiographic data were retrospectively reviewed, and the results and complications were analyzed.

Fourteen fractures were treated within twenty-four hours after diagnosis, twenty two were treated between twenty four hour and forty eight hours, twenty patient treated between forty eight hours and seven days and four patient were treated after seven days (Table 1)

The quality of reduction judge by Garden's alignment index¹⁸, which States that for the reduction to be acceptable the Garden's angle i.e.

angle between the medial cortex of the femoral shaft and medial primary compression trabeculae should lie between 160° to 180° in both anteroposterior and lateral radiographs. McElevenny's concept of reduction of fracture i.e. to except either anatomic or over reduced position but not under reduced position was taken into consideration.

Fracture reduction was graded on the basis of the degree of residual angulations and the amount of displacement as excellent (< 2 mm of displacement and $< 5^\circ$ of angulation in any plane), good (2 to 5 mm of displacement and/or 5° to 10° of angulation), fair (> 5 to 10 mm of displacement and/or $> 10^\circ$ to 20° of angulation), or poor (> 10 mm of displacement and/or $> 20^\circ$ of angulation)^{5,15,16,19}.

Nonunion defined as failure of fixation with implant breakage, loss of reduction, or persistence of a visible fracture line at a minimum of six months after the index procedure.

Osteonecrosis was classified radio graphically with use of the method of Ficat and Arlet²⁰

Functional assessment at the time of follow-up was performed by evaluating pain, walking status, infection, range of motion, shortening, and ability to squat and sit cross legged.



(A)



(B)



(c)

A displaced femoral neck fracture was reduced and fixed with three cannulated screws in a reverse triangle configuration on anteroposterior and lateral radiographs (Figure A & B).

Illustration (Figure C) demonstrating the reverse triangle configuration.

Results

For the group as a whole, thirty six (60%) of the sixty fractures healed after one operation. ten fractures (17%) were associated with the development of osteonecrosis, which was classified as stage I in one hip, stage II in four, stage III in three, and stage IV in two. Twenty four (40%) were associated with the development of nonunion. Twenty two (44%) of the fifty displaced (Garden III&IV) fractures were associated with the development of nonunion, and ten (20%) were associated with the development of osteonecrosis. Two (20%) of the ten nondisplaced (Garden I&II) fractures were associated with the development of nonunion. No undisplaced fracture were associated with the development of osteonecrosis. There was a significant difference ($p < 0.05$) between nonunion and osteonecrosis in displaced fracture compare to undisplaced group. (Table 1)

Of the fourteen fractures that were treated within twenty-four hours after injury, four (28%) were associated with the development of nonunion, two (14%) were associated with the development of osteonecrosis. Of the twenty two fractures that were treated between twenty four to forty eight hours after injury, eight (36%) were associated with the development of nonunion and four (18%) were associated with the development of osteonecrosis; Of the twenty fractures that were treated between forty eight hours to seven days of injury, eleven (55%) were associated with the development of nonunion and four (20%) were associated with the development of osteonecrosis; Of the four that were treated after seven days of injury, three (75%) were associated with the development of nonunion (Table 1) All nondisplaced patient had excellence to good reduction. In nondisplaced fracture two (20%) were associated with the development of nonunion. Of the fifty displaced fractures forty two with a good to excellent reduction, seventeen (40%) were associated with the development of nonunion and eight (19%) were associated with the development of osteonecrosis. eight displaced fractures had a fair or poor reduction. Five (62%) fractures were associated with the development of nonunion and two (25%) were associated with the development of osteonecrosis. Thus, only two of eight fractures that had a fair or poor reduction healed without complication.

Table 1: Data on the patients

Number of patients/number of fractures	60
Mean age (range) (yr)	36(15-55)
Mean duration of follow-up (range)	2yrs(6 mnth to 3.5 yrs)
Fracture type (no. of fractures)	
Displaced	50
Nondisplaced	10
Rate of fracture union after a single operation	60%
Rate of osteonecrosis (overall)	17% (10 out of 60)
Rate of complications according to fracture type	
Displaced	nonunion- 44%, Osteonecrosis- 20%
Nondisplaced	nonunion- 20%, Osteonecrosis-0%
Rate of complications according to Time of fixation since injury	
<24 hrs	nonunion- 28%, Osteonecrosis-14%
24-48hrs	nonunion- 36 %, Osteonecrosis-18%
48hrs-7days	nonunion- 55%, Osteonecrosis-20%
1-3weeks	nonunion- 75%

Rate of complications (nonunion) according to quality of reduction	
Displaced -good to excellent reduction	nonunion-40%,
Osteonecrosis -19%	
Fair to poor reduction	nonunion-62%, Osteonecrosis -25%

Discussion: -

The most important drawback of internal fixation is the relative high failure rate and need for secondary operation. This study also shows overall failure rate for internal fixation (Nonunion,40%; AVN,17%) as previously shown in the literature, this study showed an increase of failure rate for fracture types garden 3 and 4²¹.

Other factors influencing the results of osteosynthesis are quality of reduction and time of fixation since injury.

The present study demonstrated that the use of contemporary internal fixation methods for the primary treatment of femoral neck fractures in young patients was associated with a rate of fracture union (60%; thirty six of sixty). However, even with the use of contemporary treatment methods, seventeen (17%) of seventy-three fractures were associated with the development of osteonecrosis.

The rate of fracture healing in these patients probably was due to the healing potential and good bone quality of the femoral head and neck of most

Young patients^{22,23} in contrast, older patients with femoral neck fractures have poorer bone quality, which probably leads to higher rates of nonunion¹².

The 17% rate of osteonecrosis among patients with displaced fractures is similar to that reported in previous, smaller studies of younger patients with displaced fractures, even studies in which excellent reduction was achieved in a high percentage of patients^{5,7,9-11,13,16}.

Fortunately, a substantial number of the patients (33%) who had osteonecrosis in the present series (three of ten) did not have marked symptoms and had not required additional surgery at the time of the latest follow-up. In a recent series by Jain et al.¹⁰, the occurrence of osteonecrosis did not significantly affect functional outcome; however, the mean duration of follow-up for the entire group was only 2.5 years.

The findings of the current study support the premise that the quality of reduction has an impact on the outcome of treatment. The outcome for patients with a fair or poor reduction was poor, although it is important to recognize that problems that make it difficult to obtain a good reduction, such as comminution and marked displacement may reflect more severe injury patterns. It is also important to note that although most patients had a good to excellent reduction, approximately one in six still had development of osteonecrosis. It has been speculated that the fate of the femoral head is partly determined at the time of injury. On the basis of current data we recommend continued efforts to obtain as accurate a reduction as possible.

The finding in current study also support the good union rate in patient who was operated within twenty four hours and within forty eight hours as compare to patients operated after forty eight hours and after seven days. Fracture of the neck of the femur is traditionally treated by an emergency operation. Swiontkowski et al²⁴ achieved union of 100% when surgery was performed within eight hours of the injury. However, 20% of the patients developed AVN. Zetterberg et al²⁵ and Bray²⁶ also suggested that the timing of surgery after injury was an important factor in influencing the outcome.

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