

## Fixation of Undisplaced Fractures of the Neck of Femur with Multiple Cannulated Screws.

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### ABSTRACT:

**Background and aim of the work:** Treatment of fracture neck of the femur varies according to patient's age and the pattern of the fracture. Multiple cannulated screws (MCS) have been commonly used to treat femoral neck fractures. In this retrospective study we evaluated the outcome of the use of this technique in the treatment of undisplaced fracture neck of femur.

**Material and method:** In this retrospective chart review study, we revised the files and medical records of the cases of stable fracture neck of femur which had been treated by MCS in patients who were admitted to King Abdul Aziz Specialist Hospital and King Faisal Hospital, Al Taif, Saudi Arabia from January 2007 to December 2011.

**Results:** Sixteen patients with impacted and undisplaced fracture of the neck of femur were treated with multiple cannulated screws. The mean follow up was 26 months; mean age was 38 years (range 14-58 years). Thirteen/16 patients (81.25%) were satisfied with the excellent results of the treatment. Two patients (12.5%) showed non-union and valgus osteotomy, compression of the fracture and rigid internal fixation were used to promote union. One case developed avascular necrosis and treated by total hip Arthroplasty.

**Conclusion:** Fixation with cannulated screws usually is adequate for most femoral neck fractures specially the undisplaced type with acceptably low incidence of complications.

**INTRODUCTION:** In elderly, the femoral neck fractures are caused by mild or moderate trauma, however; high energy trauma is the usual cause of femoral neck fractures in young patients and often are associated with high rates of avascular necrosis and nonunion(1). The treatment of choice for femoral neck fractures is the placement of multiple screws across the fractured femoral neck and may be performed following either closed or open reduction using a standard lateral approach or a more limited percutaneous technique (2). Garden classification is the most commonly used classification system for femoral neck fractures where the fractures are divided into 4 groups according to the degree of displacement and fracture fragments and it can be used as guidance for treatment options and surgical implants (3). In Garden type I, the fracture is incomplete with valgus impaction and in Garden type II fracture it is complete but undisplaced. In type I fracture the impaction allows a significant amount of stability at the fracture site and the union following the fixation with MCS is nearly

100% (2 & 4). The stability In Garden type II fracture is minimal as there is no impaction and almost all subsequently displace if not internally fixed (4). Rates of nonunion and avascular necrosis for undisplaced fractures are low if these fractures are stabilized internally using multiple (two to four) cannulated screws (5). Swiontkowski, (6) determined that the best results were obtained with anatomical reduction and fixation with multiple screws. In this retrospective study we evaluated the outcome of the use of MCS in the treatment of undisplaced fracture neck of femur.

**Materials and Methods:** In this retrospective chart review study, we reviewed the hospital records of all patients with femoral neck fracture admitted to King Abdul Aziz Specialist Hospital and King Faisal Hospital, Al Taif, Saudi Arabia from January 2007 to December 2011. Sixteen patients with final diagnosis of undisplaced fracture neck of femur (Garden type I & II) were included in this study. We excluded cases of displaced fractures. We

reviewed age, gender, pattern of presentation, radiological and Intraoperative findings in addition to results of treatment and follow up data if available in the 16 patients included in the study.

**RESULTS:** Sixteen patients (10 females and one male) with impacted and undisplaced fracture of the neck of femur were treated with multiple cannulated screws (figure 1 and 2). The mean follow up was 26 months; mean age was 38 years (range 14-58 years). Thirteen/16 cases

(81.25%) were satisfied with the excellent results of the treatment. Two cases (12.5%) showed non-union and valgus osteotomy with compression of the fracture and rigid internal fixation were used to promote union. One patient (6.25%) developed avascular necrosis and treated with total hip arthroplasty. The mean union time was 119 days (range, 73-266 days). Preoperative, operative and postoperative data are shown in table 1, 2 and 3 respectively.

**Table 1**

<b>Preoperative data</b>	
Mean age	38 years
Females	10
Males	6
Garden type I	5
Garden type II	11

**Table 2**

<b>Operative data</b>	
Mean operative time	41 minutes
Mean Intraoperative blood loss	30 ml
Number of patients requiring 2 screws	7
Number of patients requiring 3 screws	9

**Table 3**

<b>Postoperative data</b>	
Mean hospital stay	5.3 days
Mean follow up	26 months
Mean union time	119 days
Patient satisfaction	81.25%
Non union	12.5%
Avascular necrosis	6.25%

Figure 1: Two cannulated screws



Figure 2: Three cannulated screws



**DISCUSSION:** The increase in life expectancy produced a significant number of elderly patients suffering from femoral neck fractures, as a result of only moderate or minimal trauma, however; in younger patients these fractures usually result from high-energy trauma and they are more difficult to treat in addition to association with more complications than low-velocity injuries (1 & 7). In this study, the 2 cases of non union were below 30 years, the patient who developed avascular necrosis was 38 years old and the 3 patients have been exposed to major road traffic accidents.

The sequelae of femoral neck fractures depend on the amount of displacement, the amount of comminution, whether the circulation has been disturbed or not and the efficacy of management as the adequacy of the reduction, and the adequacy of fixation (8). The high rate of malunion may be related to the defective periosteal layer of the femoral neck, so the healing must be endosteal in addition to the inhibitory effect of the synovial fluid (9). Swiontkowski and Hansen (10), observed

that, good results would be expected following screw fixation of nondisplaced femoral neck fractures and the outcome after pinning displaced fractures is less predictable and they reported that technical complications only occurred in the patients with displaced fractures, none of whom regained functional ambulation. In contrast, 92% of the patients with nondisplaced or impacted fractures were ambulatory at 2-year follow-up. However; Swiontkowski et al.(11), Crawford et al., (12) and Strömqvist et al.(13), demonstrated that intracapsular pressures after femoral neck fractures are higher in nondisplaced fractures than in displaced fractures.

Care should be taken to avoid any loss of reduction during the surgical procedure with decompression of the hematoma by capsulotomy or needle aspiration to reduce intracapsular pressures and improve blood flow in the femoral head, a procedure which may promote union but the surgeon probably has less control over avascular necrosis because the blood supply to the femoral head after femoral neck fracture is

quite precarious (7 & 10). In this study all patients had Undisplaced fractures (Garden I & II) and routine decompression of the intracapsular pressure was done where capsulotomy was performed only in 3 patients and needle aspiration was used in the other 13 patients. However Ly and Swiontkowski (15), determined that capsulotomy in femoral neck fractures remains a controversial issue and the practice varies by trauma program, region and country. They recommended performing capsulotomy until there is conclusive data.

Madsen et al. (16), and Christie et al. (17), found that the use of a single large compression hip screw for fixation of femoral neck fractures might result in lower rates of union for intracapsular fractures. Parker et al (8), determined that the best results were obtained with anatomical reduction and fixation with multiple cannulated screw fixations and to minimize complications, the screws should be placed within the central two thirds of the femoral head and should be placed as far apart as possible, with the inferior and posterior screws adjacent to the cortex of the femoral neck. Even undisplaced fractures, between 10% and 15% of these patients develop complications over which the surgeon has little or no control (7).

In the present study excellent results were obtained in 81.25% of patients and complications were recorded in 18.75% of patients, these results are comparable with that reported in the literature (7 & 8).

Han et al (18), reported avascular necrosis in 52% and nonunion in 33% of patients after fixation with large compression screw and they found that Bipolar hemiarthroplasty would be the treatment of choice if this complication developed in those patients. In cases complicated by non union, Ballmer et al. (19), recommended valgus osteotomy in young active patients. In this study we reported nonunion in 12.5% of patients and they were treated by valgus osteotomy with rigid fixation and avascular necrosis was recorded in one patient (6.25%) and its treatment required total hip arthroplasty. Other complications as unrecognized screw penetration of the hip and infection were not recorded in the patients of this study.

Many authors reported that definitive fixation of undisplaced femoral neck fractures can be accomplished with two or three cannulated or noncannulated cancellous screws and he concluded that the key factors in treating femoral neck fractures should include early diagnosis, early surgery, anatomical reduction with capsular decompression and stable internal fixation (5, 6, 7, 8, 15, 17 and 20).

**Conclusion:** Fixation with cannulated screws usually is adequate for most femoral neck fractures specially the undisplaced type with acceptably low incidence of complications.

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