



Dhs plus anti-rotational screw vs cannulated screws for femoral neck fractures: an analysis of clinical outcome and incidence regarding avn

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The aim of this study was to compare the union time, functional outcome and complications in patients with femoral neck fractures treated with percutaneous cannulated screws or dynamic hip screw (DHS) plus antirotational screw.

We selected 117 consecutive patients having a hip fracture at any level within the Garden classification, treated at the Orthopedics and Traumatology Clinic in Perugia from 2010 to 2011. Average patient age was 67.8 years. Patients received either a treatment including cannulated screws (group I) or a DHS plate with anti-rotational screw (group II). All patients were followed up for a minimum of 1 year. The Harris Hip Score at 12 months was used to evaluate functional outcome.

Between the two treatment groups, the differences in union time and functional outcome were not statistically significant. Moreover blood loss was significantly lower in group I.

The results of our study did not suggest a superiority of one surgical technique over the other, when considering the union time and functional outcome. Regarding complications, the incidence of avascular necrosis was found to be significantly related to the Garden classification but not to synthesis type.

Level of evidence: IV, Retrospective case series

Keywords : Intertrochanteric fractures ; DHS ; Screws ; Elderly.

INTRODUCTION

Femoral neck fractures belong to a wide group of hip fractures (1). This kind of fracture generally has a strong association with low energy traumas in older patients affected by osteoporosis. A few percentages of these fractures can affect younger patients in high energy traumas and represent an important challenge for the orthopaedic surgeon due to the high incidence of femoral head avascular necrosis (AVN) ; independently from both the correct reduction and the therapeutic strategy chosen (2,10,24).

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The early anatomical reduction and the stable fixation may reduce complications such as AVN of the femoral head and non-union, particularly in younger patients (1,9,18-20).

The purpose of this study was to compare the time of union, functional outcome and complications in patients affected by femoral neck fractures treated with either percutaneous cannulated screws or dynamic hip screw (DHS) plus antirotational screw.

MATERIALS AND METHODS

This study prospectively included 117 patients with femoral neck fractures between January 1st 2010 and March 31st 2011, hospitalized at the "Santa Maria della Misericordia" Hospital in Perugia (Italy).

Of these, 40 patients (35%) were male and 77 patients (65%) female. Mean age at a time of surgery was 67.8 years (45-80). All patients underwent surgery and were followed-up for a minimum of 1 year. The mean follow-up was 14.5 months (range 12-18).

The Garden classification was used. Exclusion criteria were: fractures classified as Garden III and IV in patients over 75 years old, rheumatoid or metabolic diseases, multiple fractures, metastatic fractures, fractures treated more than 48 hours from the trauma, as well as abdominal, head or renal injuries.

The patients were randomized into two groups: group I included 75 patients (64.1%) treated with cannulated screws and group II had 42 patients (35.9%) and were treated with DHS plus a antirotational screw.

According to the Garden classification, group I had 52/75 patients (69.3%) were type I and 23/75 (30.6%) type II.

In group II, 29/42 patients (69%) were type I, whereas 13/42 patients (31%) were type 2.

All 117 patients received antibiotic prophylaxis with intravenous cefazolin 2 g, a half hour before surgery. Trombophylaxis treatment consisted of heparin, 4000 IU/die, until the patient was able to walk independently and bear his/her own weight.

All surgeries were performed by closed reduction, on a standard fracture table with fluoroscopy control.

The reduction was evaluated both on antero-posterior and lateral views. Criteria for good reduction were normal or slightly valgus alignment.

Screws were applied as described in the technique and three screw were always employed.

In Group II, after the reduction, the fractures were fixed with a DHS plate and single 7.3 mm trabecular screw, acting as a anti-rotational screw. The length of the incision was on average 5 cm in group I and 12 cm in group II. ($P < 0,05$)

All patients were mobilized 24h after surgery. The mean time from surgery to discharge was 72 hours after surgery (range 48-120). A partial load was allowed using crutches for the first 5 weeks after discharge.

The radiographic and clinical follow-up controls were done at 1, 2, 6 and 12 months.

Garden Score, the Garden Alignment Index for radiological evaluation, and the Harris Hip Score for functional and clinical results were used.

Consolidation of the fracture was defined as the development of a well-established trabecular pattern across the fracture site within 6 months following the date of injury.

Statistical analyses were performed using the student's t-test for parametric dispersions as well as Fisher's exact test and Chi-square test for non-parametric dispersions.

The study was performed in accordance with the ethical standards of the Declaration of Helsinki and informed consent was obtained from all patients.

RESULTS

In all cases, surgery was performed within 48 hours of hospital admission.

The average surgery time (skin to skin) was 33 min (20-51) for group I and 67 min (41-79) for group II. ($p < 0.05$).

The mean blood loss for group I was 156 cc and 210 cc for group II with no statistical difference resulting between the two. ($p < 0.05$).

Radiographic results showed 4 cases of non-union (5.3%) for group I whereas group II had 3 cases (7.1%). In all these cases prosthetic replacement of the hip was performed.

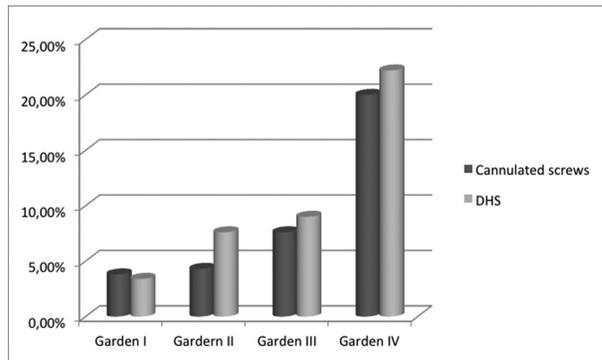


Fig. 1. — Avascular Necrosis in 2 groups

The incidence of avascular necrosis (AVN) (fig.1) was 26% for group I and 29% for group II ($p < 0.05$). The incidence of AVN related to Garden's classification system resulted being:

- Group I:
 - 2.6% type I (2 pt)
 - 1.3% type II (1pt)
- Group II:
 - 2.4 % type I (1pt)
 - 2.4 % type II (1pt)

Other variables such as ASA score, age and mechanism of injury did not result being statistically different according to AVN ($p < 0.05$). As well, radiological score (GARDEN ALIGNMENT INDEX) was not significant different between the two groups ($p < 0.05$): the group I index was between 150° - 170° ; while group II was between 151° - 173° . The evaluation of the functional score (Harris Hip Score) led to similar results: 88 % good, 8% fair and 4% bad for Group I; 91 % good, 5 % fair and 4 % bad for Group II (Fig.2).

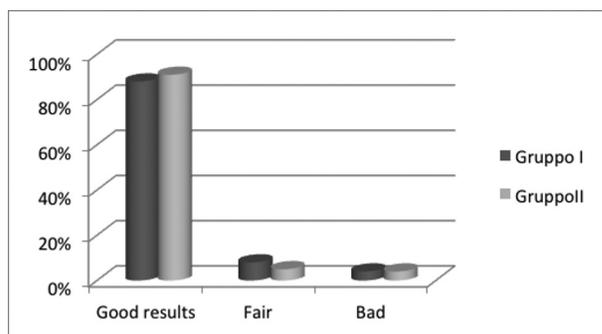


Fig.2 . — Harris Hip score at final follow-up

DISCUSSION

Femoral neck fractures are very common fractures in patients of all ages and the therapeutic goal should be the early recovery and the return to everyday activity as soon as possible.

The best treatment for displaced fractures of the femoral neck is highly debated. Many recent studies have shown that a total hip replacement has better results compared with the synthesis when placed in an elderly patient with good mental and general conditions (6,23,25). However, the best treatment in patients under 75 is still much debated and in the case of Garden type I and II fractures, several studies have argued that synthesis in older subjects is acceptable. The main factors conditioning the choice of the type of synthesis are: the general conditions of the patient before the fracture (especially gait), the environment where he lives and his mental state. Therein, the most important thing for a physician to do prior to considering surgery is to adequately assess the biological age.

Regarding the disadvantages of internal fixation devices, a high percentage of failures has been reported with a mobilization of a synthesis, avascular necrosis or nonunion. Moreover, when the femoral head replacement is not compulsory, the patient should be given the choice on whether to avoid replacement surgery.

In younger patients, the main complication associated with the synthesis of femoral neck fractures is AVN, with rates varying from 12 to 86% (5,7).

Another very important topic of discussion is the dislocation of the initial fracture. In fact, the Garden classification is the most used, given that it leads to the highest inter-observer. Indeed, in non-dislocated fractures (type I and II) the percentages of AVN have been reported to be between 4 and 19.5% (3,11). When we consider only dislocated fractures (III-IV), this complication is much more frequent with percentages ranging from 13.4% to 39.4% (14,16,17).

Another controversy concerns the timing of surgery which is critical (4,22). In fact, treatment with-in 24-48 hours is the most important factor for reducing AVN as well as accelerating bone healing (12).

Another issue to address is the quality of fracture reduction. Many authors recommend either anatomic position or in slight valgus (15,22). In our study we only had 2 cases of slight reduction in varus, but none of these went on to develop AVN.

The Garden classification of femoral neck fractures is the most commonly used. However, there is difficulty in differentiating the four types of fractures as shown by studies of inter-observer reliability. In our study, we classified femoral neck fractures as non-displaced (Garden Types I and II) or displaced (Garden Types III and IV). Furthermore, the classification of Garden appears well reproducible and very useful in predicting the results (8).

Non-displaced femoral neck fractures (Garden Types I and II) were stabilized internally using multiple (three) lag screws. Care should be taken to avoid any loss of reduction during the surgical procedure. Decompression of the hematoma by needle aspiration or capsulotomy successfully reduced intracapsular pressure and improved blood flow in the femoral head. However there is currently insufficient evidence to justify a routine capsulotomy. Complications after in situ fixation of non-displaced femoral neck fractures can be divided into two categories: general complications relating to comorbidities, surgery, or anaesthesia; and complications related with the use of cannulated screws such as unrecognized screw penetration of the hip, infection, non-union, and osteonecrosis.

There was no observed statistical difference between the two strategies regarding radiographic results (Garden Alignment score), functional evaluation (Harris hip score) and the incidence of AVN. Specifically, the use of cannulated screws was associated with a lower rate of blood loss and shorter average surgical time but with no significant differences in outcome (4,15). Therefore, as has already been widely reported in literature, the initial dislocation of the fracture resulted in being the major influencing factor in functional outcome.

CONCLUSION

Our results suggest that the outcome of femoral neck fractures seems to be highly correlated with

the degree of dislocation of the initial fracture as well as any subsequent vascular damage, rather than the method of synthesis used. Therefore, we recommend performing the technique in which the surgeon is more expert.

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