

The treatment of femoral neck fractures by percutaneous pinning

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Summary

Sixty two patients with displaced femoral neck fractures treated by percutaneous pinning are reviewed. There were 37 females and 25 males with an average age of 63.7 years. There were 36 Garden grade III and 26 grade IV fractures. Twenty three patients had other medical conditions. Fourteen patients were operated under local anaesthesia. Superficial wound infection was found in three cases with no deep infection. Union occurred in 41 patients by eight months. Of the 21 non-unions 15 remained painless. The pins migrated outwards in seven cases but caused no clinical problem. Avascular necrosis was seen in 11 patients by 18 months. Avascular necrosis and non-union occurred together in six patients. Secondary hemiarthroplasty was performed in only ten patients. Routine hemiarthroplasty for femoral neck fractures is not always indicated. Femoral head preservation should be attempted before prosthetic replacement. The pinning surgery is simple, fast and can be performed under local anaesthesia. Hemiarthroplasty should be reserved for failed cases only.

Key words: Femoral neck fracture, percutaneous pinning.

Introduction

Fracture of the neck of femur is a common injury in the geriatric patient often brought about by trivial trauma, in bones weakened by age related or post-menopausal osteoporosis. Most of these patients often have other unrelated diseases like diabetes mellitus, hypertension, chronic obstructive airway disease, ischaemic heart disease and Parkinsonism. When they are treated by recumbency and prolonged traction, a number of added complications creep in to further compromise their general health and rehabilitation. It is therefore imperative that these old people should be on their feet and ambulant as soon as possible. Though primary hemiarthroplasty is being successfully employed in the treatment of these patients, there is a need to preserve the femoral head whenever possible, thereby minimising the complications of prosthetic replacement of the femoral head. There is therefore a place for internal fixation of the displaced fracture of femoral neck in the first instance before consideration of femoral head replacement surgery.

Materials and methods

Seventy-four cases of displaced subcapital fracture of the femoral neck were treated by percutaneous Knowles' pinning² between June 1982 and May 1986 at the University

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Orthopaedic Department in the General Hospital Kuala Lumpur. All displaced fractures were reduced prior to surgery by the Leadbetter manoeuvre on the fracture table under image intensifier control. When the procedure was done under local anaesthesia the patient was well sedated with intravenous dormicum or diazepam during manipulative reduction. The skin and the periosteum was anaesthetised with 0.5% bupivacaine infiltration. When satisfactory reduction was achieved the fractures were fixed with three parallel percutaneous Knowles' pins, introduced in a valgus position. Occasionally a small incision was made in the obese patient to facilitate palpation of bony landmarks for the accurate placement of the pins. The patients were allowed to ambulate with a walking frame on the third post-operative day, under the close supervision of the surgeon and the physiotherapist. In the majority of elderly patients it was difficult to ensure that they actually used the walking frame. At the end of four weeks all the patients were encouraged to walk full weight bearing. Some elderly patients chose to retain the walking aid longer for the purpose of stability. Twelve cases were lost to follow up.

Results

In the study of 62 patients there were 37 females and 25 males with an average of 63.7 years (range 46 years to 79 years). Forty-eight patients sustained fractures following a fall at home while the rest were involved in road traffic accidents. There were 36 grade III and 26 grade IV fractures.⁶ Twenty-three patients had other unrelated medical conditions (Table 1). Ten patients had sacral pressure sores due to prolonged recumbency at home prior to admission, including five of the 12 lost to subsequent follow up. Fourteen patients were medically unfit for general or regional anaesthesia and were operated under local infiltration anaesthesia.

Table 1
Associated medical conditions*

Diseases	Patients
Diabetes mellitus	8
Hypertension	9
Chronic bronchitis	5
Cerebro-vascular accident	4
Parkinsonism	2
Ischaemic heart disease	3
Total	31

* Eight patients had multiple problems.

Post-operative X-rays taken just before discharge showed loss of reduction of the fracture in three patients, all of whom subsequently developed non-union. There was no incidence of deep infection. Three patients developed early superficial wound infection which responded to local treatment (Table 2).

Sixty-two of the total 74 patients were followed up for two to six years, with an average of 3.8 years. Clinical and radiological union of the femoral neck fracture occurred in 41 patients

Table 2
Post-operative complications

Problems	Patients	Percentage
Non-union	21	33.8
Avascular necrosis	12	19.3
Non-union and avascular necrosis	6	9.6
Infection – superficial	3	4.8
deep	0	0.0
Pin migration	8	12.9
Revision surgery	10	16.1

(66.1%) by eight months. Of the 21 non-unions 15 (71.4%) remained painless and required no further treatment. In most of the non-union group the pins had been horizontally placed or the fracture had been inaccurately reduced. In 20 of the 41 which united there was significant collapse and shortening of the femoral neck (Fig. 1). In seven cases the pins extruded but did not cause any skin problem. In one case a pin had migrated proximally into the hip joint.

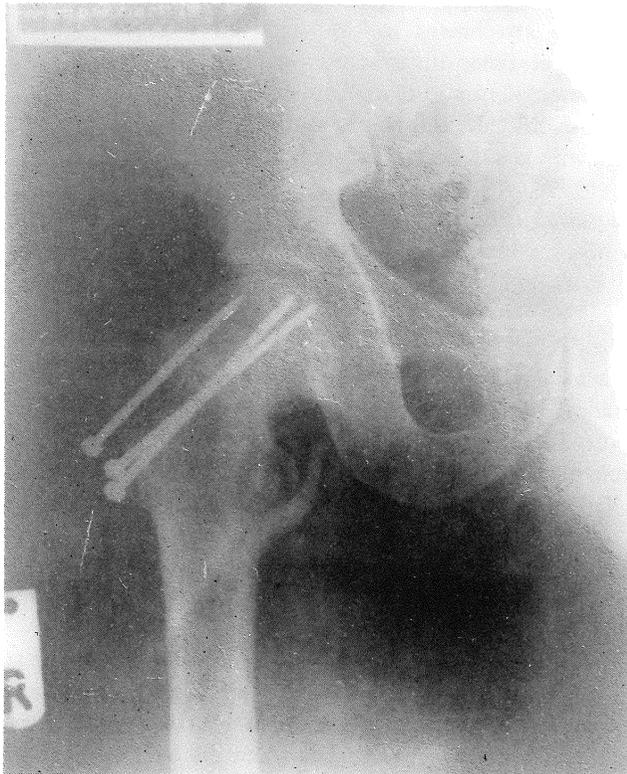


Fig. 1: United subcapital fracture showing collapse of the femoral neck

Avascular necrosis was evident in 11 patients by 18 months. Avascular necrosis and non-union was present concurrently in six patients. All the six required revision surgery. Most of the others though requiring walking aids, maintained a useful range of motion in the hip joint. The one patient who had proximal migration of the pin and two others had total hip arthroplasty. Amongst the 52 patients who did not require revision surgery 24 were able to walk without any aid. (Table 3).

Table 3
Mobility

Aid	Patients	Percentage
None	26	50.0
One stick	16	25.8
Walking frame	10	16.1

Discussion

The success in the treatment of femoral neck fractures by internal fixation depends to a large extent on the accuracy of reduction of the fracture.^{1,7} It is our experience that the grade III fractures are more difficult to reduce than the grade IV fractures. This is probably due to the intact posterior soft tissue attachment in the grade III fractures. Although the Leadbetter manoeuvre is often used, at times the fractures reduce satisfactorily simply by longitudinal traction of the limb in internal rotation. As Garden (1971)⁷ pointed out, it is the initial step of reduction which is most difficult, and this is borne out by the fact that out of the 62 fractures 26 (42%) had been fixed with less than satisfactory reduction.

The three pins were inserted in valgus and parallel to one another. This is to ensure rotational stability and to allow postural impaction and compression at the fracture site as the patient begins early weight bearing.¹ Horizontal placement of the pins increased the chances of non-union of the fracture.

A high incidence of avascular collapse of the femoral neck (48.7%) with resultant shortening was observed in this series. Though this was not a major problem in other reported series, Leung and Lam (1986)⁸ reported a similar finding in four out of 41 femoral neck fractures in children. This phenomenon probably supports the findings of Ratliff (1970)⁹ who described collapse of the femoral neck as a variant of avascular necrosis affecting primarily the neck region.

Although the rate of complications, i.e. non-union and avascular necrosis was high, most of these patients were symptom free and retained a useful range of motion in the hips.

The fact that only ten patients out of 62 needed replacement arthroplasty at a later date makes percutaneous pinning as a mode of initial treatment, a useful alternative. Although there are other methods of internal fixation of femoral neck fractures^{3,4,5} most of these involve extensive dissection of soft tissue which will not be possible when the operation is carried out under local infiltration anaesthesia. Percutaneous pinning is simple, fast, reliable and possible under local anaesthesia provided accurate pre-pinning reduction is achieved. Moreover in cases presenting

late, as in the present series with sacral sores, when hemiarthroplasty is contraindicated this method would be most preferable so that the patients can be ambulated early. If hemiarthroplasty becomes indicated at a later stage then it could still be carried out. Delayed hemiarthroplasty has been found to be more satisfactory than when done primarily.^{10,11} Furthermore replacement surgery in femoral neck fractures should be considered as a salvage procedure rather than primary treatment.¹² It is important to emphasise that hemiarthroplasty could be avoided in a majority of patients. In the present series this became absolutely necessary only in ten patients or 16 percent.

Acknowledgement

The authors would like to thank En. Alias Omar, En. Kamaruzaman and the Medical Education Department of UKM for the illustration.

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