MENISCAL INJURY ASSOCIATED WITH FEMORAL SHAFT FRACTURES

AN ARTHROSCOPIC EVALUATION OF INCIDENCE

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We studied 47 patients with closed, displaced, diaphyseal fractures of the femur caused by blunt trauma, to determine the incidence of associated knee injuries, particularly of the meniscus. After femoral nailing, all patients had an examination under anaesthesia and an arthroscopy.

There were 12 medial meniscal injuries (5 tears) and 13 injuries of the lateral meniscus (8 tears). Ten of the 13 tears were in the posterior third of the meniscus, and two patients had tears of both menisci. Synovitis was common at the meniscal attachments. Complex and radial tears were more common than peripheral or bucket-handle tears.

Examination under anaesthesia revealed ligamentous laxity in 23 patients (49%), but meniscal injuries had a similar incidence in knees with and without ligament injury.

Femoral shaft fractures are often associated with injuries to the ipsilateral knee, and a high index of suspicion is necessary to identify these lesions.


Fracture of the femur often requires surgical stabilisation, and closed nailing is commonly used for diaphyseal injuries. The considerable energy required to cause these fractures often damages other structures as well.

Ipsilateral injury to knee ligaments has been described in 17 to 48% of femoral fractures (Ritchey, Schonholtz and Thompson 1958; Shelton, Neer and Grantham 1971; Hughston et al 1976; Nagel, Burton and Manning 1977; Dunbar and Coleman 1978; Fraser, Hunter and Waddell 1978; Noyes et al 1980; Viano and Stalnaker 1980; Walker and Kennedy 1980; Rowntree and Getty 1981; Walker and Stein 1982; Barber et al 1988; McAndrew and Pontarelli 1988). Many authors have reported delays of many weeks or months in the diagnosis of such knee lesions. Few studies have addressed concomitant meniscal injuries with femoral fractures (Pedersen and Serra 1968; Viano and Stalnaker 1980) and we could find only one paper which discussed the importance of meniscal tears (Barber et al 1988).

We have made a prospective arthroscopic study of the incidence of knee injuries in patients with displaced femoral fractures caused by blunt trauma, with particular emphasis on meniscal injuries.

PATIENTS AND METHODS

In our non-consecutive prospective study, 47 adults with acute closed fractures of the femoral shaft were studied. We excluded patients with open injuries of the knee, intra-articular fractures, pathological fractures or gunshot injuries. We also excluded patients with previous injuries to either knee, tibia or femur. Standard antero-posterior and lateral radiographs of the hip, femur, and ipsilateral knee were obtained in all cases. After resuscitation and the treatment of other associated injuries, operations on the femur and knee were performed as soon as possible. If surgery was delayed by more than eight hours, the leg was placed in balanced skeletal traction using a femoral or tibial pin.

All 47 patients had closed, femoral nailing. Both knees were then examined under the same anaesthetic.
Ligament stability was graded I, II or III by the system of the American Academy of Orthopaedic Surgeons (Walling, Seradge and Spiegel 1982; White et al 1986) and the results of the Lachman, anterior drawer, posterior drawer, valgus stress, and varus stress tests were recorded.

After nailing, the arthroscopy was performed, using a leg holder attached to the fracture table and a tourniquet. The menisci were examined with a probe, and the presence and location of tears, haemorrhage or inflammatory changes were noted.

RESULTS

There were 38 men and nine women, whose ages ranged from 18 to 50 years (mean 31, median 29.5). The right femur was fractured in 26 and the left in 21. In 19 patients it was the only apparent injury. The other 28 patients had associated injuries including 18 ipsilateral fractures, 14 ipsilateral soft-tissue injuries, 12 other fractures, 10 head injuries, 3 chest injuries and 14 renal injuries. The causes were high-energy trauma in 31 patients from motor-vehicle (23) or motor-cycle (8) accidents. Falls accounted for six injuries and injuries to pedestrians by motor vehicles for eight. Two patients had other direct blows. Of the 23 patients involved in motor-vehicle accidents, nine said that the injured knee had struck the dashboard.

The fractures were graded according to Winquist, Hansen and Clawson (1984); there were four of type 1, 18 type 2, 16 type 3, and six type 4 fractures, two with distal comminution, and one with a segmental fracture. Intramedullary fixation was by ten unlocked nails, 32 statically locked and five dynamically locked nails.

Examination under anaesthesia. Five patients had an isolated anterior cruciate ligament injury, diagnosed by the presence of at least a grade I Lachman test. Eight other patients showed some ACL laxity in addition to other ligament laxities. There was varus instability at 30° in four patients as an isolated injury, while two had varus instability with other ligament injuries. Five patients had isolated valgus instability at 30° of flexion, and seven had valgus instability combined with other ligament injuries. There was posterior instability in three patients, one of whom exhibited an isolated posterior sag. Eight patients had multiplanar laxity, demonstrating an ACL injury combined with other ligament injuries. An effusion was present in 27 knees.

Arthroscopy. Synovitis and inflammation were commonly seen at the meniscal fringe, and 12 medial meniscal injuries were seen; seven menisci showed haemorrhage and surface abrasions without tears and five were torn, three radially, one peripherally and one with a bucket-handle tear. Nine of the 12 injuries and four of the five tears were in the posterior third of the meniscus. Partial meniscectomy was performed in four cases and meniscal repair in one.

There were 13 lateral meniscal injuries including eight tears. One discoid meniscus had a complex tear in its central third, and there were two radial tears, and two horizontal cleavage tears, but no peripheral or bucket-handle injuries. Three tears were complex. Six of the eight tears were in the posterior third of the meniscus, and all tears required partial meniscectomy. In two patients both menisci were torn.

In the four patients with isolated varus laxity, there were no meniscal tears, but in five with isolated valgus laxity there were two meniscal tears, one medial and one lateral. The five patients with isolated injury of the anterior cruciate ligament had four meniscal tears, one medial, one lateral and bilateral in one knee. One medial and one lateral meniscal injury were noted in the patient with both anterior cruciate and posterior cruciate injury. Of the 23 patients with clinical ligament laxity, six had eight tears; of the 24 patients with no laxity five had five tears.

There was a haemarthrosis in 20 patients, and synovitis in 18 of these. Articular damage or chondromalacia was seen in 25 patients. We found no correlation between the presence of haemarthrosis, articular injury, type of fracture pattern or the presence of meniscal tears.

DISCUSSION

Only Barber et al (1988) have specifically discussed meniscal injury and femoral fractures, finding five meniscal tears in four of their 20 patients. Pedersen and Serra (1968) reported four collateral ligament injuries in ten patients with femoral fractures, and four associated medial meniscal tears. Shelton et al (1971) described both medial and lateral meniscal tears associated with fractures of the lower extremity.

In our series, examination under anaesthesia revealed that a high percentage of patients had ligament injuries. Meniscal pathology is commonly associated with ACL tears (Noyes et al 1980), but we found little difference between the incidence in patients with and without ligament laxity, and no correlation between isolated or combined ligament injury and specific types of meniscal injury.

Knee effusion in patients with ipsilateral femoral fracture should not be ignored. It may indicate meniscal or articular pathology, or ligament disruption. Twenty of our patients (43%) had a haemarthrosis, but we could not correlate this with any specific meniscal injury pattern.

The presence of a displaced femoral fracture makes the evaluation of the ipsilateral knee very difficult. Before traction is applied, it is important to examine the knee clinically and by radiography. If there is evidence of ligament injury, a supracondylar femoral pin is recommended rather than one in the tibia (Viano and Stalnaker 1980).

None of our patients had pre-existing knee symptoms, but it is well known that there are meniscal abnormalities in the asymptomatic population. Cadaver studies have shown meniscal abnormalities in 8% to
57% of knees, with little or no correlation with symptoms or history (Noble and Hamblen 1975; Casscells 1978; Fahmy, Williams and Noble 1983). A 25% incidence of meniscal abnormalities was found in an asymptomatic population by MRI (Kornick et al 1990). However, nearly all of our patients had clear evidence of the acute nature of their meniscal injury.

It is not the purpose of this paper to address the treatment of ligament and meniscal injuries but rather to document their incidence. Surgical treatment may include partial meniscectomy or repair of appropriate peripheral tears, and delays in diagnosis are undesirable and may hinder rehabilitation (Dunbar and Coleman 1978; Barber et al 1988; McAndrew and Pontarelli 1988).

We conclude that there is a high incidence of ipsilateral knee injury in patients with diaphyseal fractures of the femur and that the knee should be carefully examined before the application of skeletal traction and again after femoral nailing.

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REFERENCES


