# Retrograde Locked Intramedullary Nailing For The Stabilisation Of Femoral Fractures With Ipsilateral Tibial Fractures (Floating Knee): A Case Report

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**Citation**

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**Abstract**

Floating knee is referred to when there is an ipsilateral fracture distal end of femur and proximal tibia. It is considered an orthopaedic emergency as it an unstable situation. Such injuries can lead to kinking or injury of the popliteal artery by the mobile fracture segment. This is so because the artery is fixed at 2 points, the adductor hiatus proximally at the femur and the soleal arch distally at the tibia. Therefore, immediate stabilization of such fractures is crucial. There are various methods of fixation available. We describe a method that we feel is safe and technically less demanding compared to others.

## CASE REPORT

A 27 years old male was involved in a road traffic accident on 29th December 2005. He is a motorcyclist who was hit by a car. He was brought in to our accident and emergency unit. He had a cerebral concussion with open fracture of midshaft left tibia (Winquist type III, Gustillo grade II) and closed fracture midshaft of left femur (Winquist type II), as shown in figure 1.

**Figure 1**

Figure 1: Preoperative x rays of the left femur and tibia.

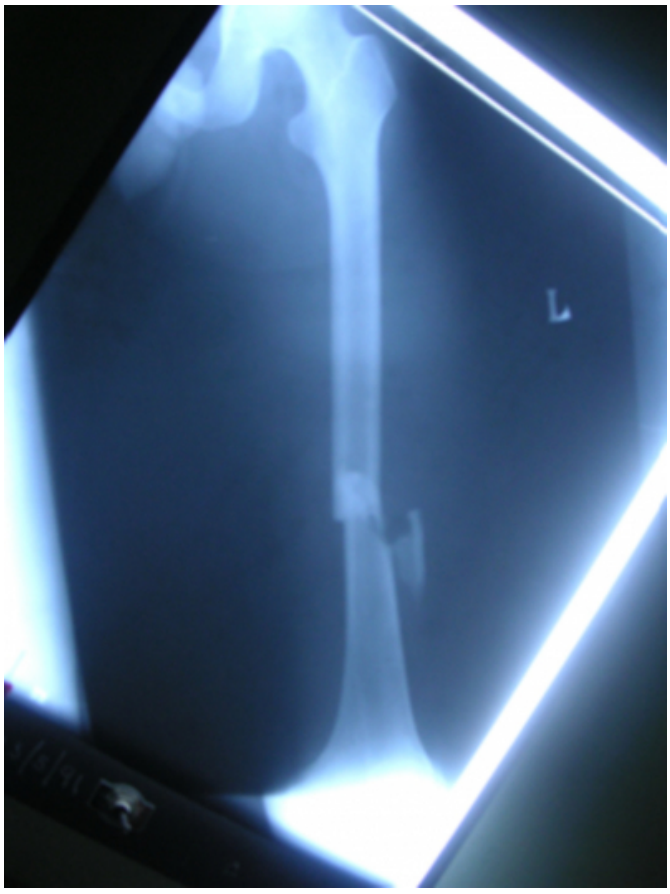

**Figure 2**

After the accident, he had transient loss of consciousness but regained full consciousness shortly after reaching the hospital. He was immediately brought to the operating theatre where toilet and debridement was done for the tibial open fracture and a Calcaneal Steinmann pin was inserted to immobilise both fractures temporarily. He was started on intravenous antibiotics (cloxacillin and metronidazole). The next day, his Glasgow Coma scale deteriorated from 15 to 11. An intracranial bleed was suspected and an urgent computed tomography scan (CT) of his brain was done which revealed a left parietal intracerebral bleed. He was managed conservatively with head chart and observation in the general surgical ward. His Glasgow coma scale subsequently improved and he was then transferred to the Orthopaedic ward for further management of his fractures.

On examination, his left leg wound associated with the tibial fracture was clean with the skin sutures intact. Vascularity of the left lower limb was normal and there was no evidence of nerve injury. Repeat x rays showed that there was also a closed fracture of the left proximal fibula. Other than that, there were no other associated injuries.

An arm sling was applied to immobilise his left clavicle fracture. Close observation was done to look for signs of restlessness, hyperthermia, tachycardia or conjuctival and trunk petechiaes (signs to indicate fat embolism syndrome). The wound over his left tibia was dressed daily with normal saline and bactigras dressing. Calcaneal traction was continued. He was started on intravenous Cefuroxime 1.5 g stat dose followed by 750 mg tds and also intravenous metronidazole 500 mg tds from the time of admission to our unit. Initially, he had a low-grade fever of 37.5 Celsius but resolved after 2 days and he remained afebrile subsequently. The wound was inspected and dressed daily.

After a week, the patient was taken back to the operating theater to stabilise the fractures. The left femur was stabilised by closed reamed locked intramedullary nailing using the Synthes Distal Femoral nail (titanium) inserted via the retrograde approach through a midline infrapatellar incision with splitting of the patellar tendon and an intercondylar notch entry point. Through the same incision, we stabilised the tibial fracture via closed nailing using the Synthes tibial titanium nail. Immediate post-operative radiographs showed acceptable alignment of both fractures, as shown in figure 2. Physiotherapy to mobilise his left knee was instituted in the ward on postoperative day 2 and he was allowed ambulation by non-weight bearing with crutches. He was discharged well on 12 days after admission with outpatient physiotherapy.

**Figure 3**

Figure 2: Immediate postoperative x rays of the left femur and tibia.

He was subsequently followed up in our outpatient orthopaedic clinic. His wounds healed well without complications. His knee range of motion improved to full (0 to 135 degrees) after 3 months. Serial radiographs at 6 weeks and 3 months showed gradual formation of callus at the fracture site of both the left femur and left tibia. He was allowed partial weight bearing at 6 weeks follow-up and full weight bearing at 3 months after the surgery.

## DISCUSSION

There are various methods that have been described in the litreture for stabilization of the fractures in cases of floating knee. We prefer the use of locked intramedullary nails, which are done through a single incision. Locked intramedullary nailing currently is considered the treatment of choice for most types I, II, and IIIA open and closed tibial shaft fractures [1]. Intramedullary nailing preserves the soft tissue sleeve around the fracture site and allows early motion of the adjacent joints [1]. The ability to lock the nails proximally and distally provides control of length, alignment, and rotation in unstable fractures and permits stabilization of fractures located below the tibial tubercle or 3 to 4 cm proximal to the ankle joint [1]. The same principles also apply to the femur. The interlocking intramedullary nail is able to fulfil the above principles when used in the stabilization of femoral shaft fractures and is thus the gold standard for femoral fracture treatment [1].

We were able to achieve stable fixation for both the femoral and tibial fractures with the use of interlocking nail. Closed nailing also means preservation of the periosteal blood supply and soft tissue envelope around both fractures, enabling early union by callus formation. It has a distinct advantage over open reduction and Internal fixation with the use of plates as the procedure of plating involves stripping of soft tissue from the bone ends to reduce the fracture before fixation. This eventually leads to delay or non-union and a higher risk of infection [2,3]. In this case, the patient achieved complete union of the fractures within 3 months. Furthermore, plating being a load-shielding device, is not as strong compared to a nail [5]. It is the load sharing properties of the nail that enabled early weight bearing in these patients and thus earlier rehabilitation. This is why we choose to stabilise this patient's fractures by locked intramedullary nails.

Closed nailing of the tibia is done via a midline infrapatellar incision and dividing the patellar tendon to obtain an entry point through the anterior aspect of the intercondylar area of the tibial plateau. However, the femur can be nailed either via antegrade approach via the piriformis fossa as entry point or retrograde approach, through the intercondylar notch of the femur. Most interlocking nails of the femur are done via the antegrade approach (even for lower 3 $^{rd}$ fractures), as many surgeons believe that an entry point through the knee can cause knee complications of reduced motion, pain and possible patello-femoral arthritis [5]. The published papers so

far however do not conclusively support the fact that retrograde nailing leads to worse knee outcomes. Only Ricci et al [4] reported higher knee complications in their retrospective comparison of antegrade versus retrograde nailing of the femur. The only other comparative study between the two approaches is the one published by Ostrum et al [6] in this randomized prospective study he found no significant difference in the knee complications between both groups. Other studies solely looking at retrograde nailing of the femur (without comparing with antegrade) also showed no significant adverse complications to the knee. [7,8]

There are circumstances where the retrograde approach is the preferred approach such as this case, where both the femoral shaft and tibial is fractured on the same side [5]. The speed and ease of surgery is always important when dealing with patients with multiple long bone fractures, in an attempt to reduce morbidity and mortality due to complications such as fat embolism syndrome. We were able to achieve fast stabilisation of both the femur and tibia fractures via one incision. Nailing of the femur via the antegrade approach can be technically demanding especially in an obese patient. In additional to that, antegrade nailing can also cause Trendelenburg gait from abductor injury by the awl, heterotopic ossification and an increased incidence of hip and thigh pain [4,6,9,10]. Therefore, we strongly recommend nailing both fractures via a single Incision through the knee in cases of floating knee.

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