# Bilateral floating knee (About 3 cases)

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**Abstract:**

Bilateral floating knee is defined as bilateral fractures of the femur and tibia. It is a serious and extremely rare entity. The aim of our work was to monitor and evaluate the functional outcome of patients who presented with bilateral floating knee.

This was a prospective study of 3 patients admitted and treated surgically between August 2008 and May 2023 at the TOBC.

All patients underwent functional assessment using the Kalrstrom and Olerud scores. None of the patients had joint stiffness or deformity. However, a shortening of 1.5 cm was observed in one patient. Resumption of activity was observed in all patients after 12 months of follow-up.

Our study included 3 cases of patients with floating knees treated surgically with excellent functional results.

## I-INTRODUCTION:

The term "flail knee" refers to homolateral fractures of the femur and tibia. The term was first used by Blake and McBride in 1975. These injuries are often caused by high-energy trauma with often extensive soft tissue injury and are accompanied by potentially fatal systemic complications. Simultaneous bilateral floating knee (SBFK) is an extremely rare entity and an unusual type of fracture.

According to the classification established by Frazer et al, there are several types of fracture in BFK: fractures of both femoral and tibial diaphysis (Type 1), fracture of a diaphysis on one side and epiphyseal fracture on the other (Type 2) and epiphyseal fracture on both sides (Type 3) (fig. 1).

The aim of our work is to monitor and evaluate functional results in patients who have undergone surgical treatment for trauma resulting in a bilateral floating knee.

## II- PATIENTS AND METHOD:

This was a prospective study of the follow-up and evaluation of functional results in 3 patients admitted to trauma emergencies between August 2008 and May 2023. It was conducted at the TOBC of the Nouakchott National Hospital.

We included all patients with BFK. The Fraser classification was used to classify initial lesions and the Karlstrom score to assess functional outcome.

## III- PRESENTATION OF CASES:

**Case N°1:**

Patient aged 49 with no previous medical history, tradesman by profession, victim of a road traffic accident resulting in closed trauma to the lower limbs with total functional impotence.

Physical examination: patient was conscious Glasgow 15/15 hemodynamically stable with swelling and significant deformity of the thighs and an open fracture of 2 bones of the Cauchoix1 leg. Distal pulses were present with paralysis of the EPS on the right.

Radiological examination revealed bilateral diaphyseal fractures of the femurs and 2 leg bones(fig.2).

After immobilization of the lower limbs, the patient was hospitalized for 24 hours before being admitted to the operating theatre. Under spinal anesthesia, the left side was operated on first, with open reduction of the left femur using multiple cerclages after insertion of a long gamma nail, followed by closed Centro-medullary nailing (LCMN) of the other segments(fig3).

The operation lasted 7 hours, with a postoperative hospitalization of 12 days, marked by an early infection in the left femur which required surgical lavage, and which progressed well after appropriate antibiotic therapy. Rehabilitation of the knees was started after 4 weeks, and consolidation was achieved after 5 months with pseudarthrosis of the right femur, necessitating cure of the pseudarthrosis.

Functional assessment was carried out one year after surgery using the Kalstrom score, which was excellent, with resumption of all activities without any discomfort (fig4).

**Case N°2:**

44-year-old patient with no previous medical history, professional driver, victim of a road traffic accident admitted to emergency with closed lower limb trauma (fig.5).
On admission, patient conscious, GCS 13/15, BP 10/7 mm Hg.
Deformity of the thighs and legs with skin opening on the right leg (CAUCHOIX 2) and absolute functional impotence. No vasculo-nervous disorders.
Radiographic examination revealed a diaphyseal fracture of the 2 femurs and 2 leg bones (BFK).
Surgery was performed within 48 hours following an orthopedic damage control protocol. Under spinal anesthesia, the right side was first treated with a tibio-calcaneal external fixator and Centro-medullary fibular pinning, followed by closed reduction and centro-medullary nailing of the other fractures. The operation lasted 8 hours, with a postoperative hospital stay of 5 days.
Rehabilitation began after 3 weeks. No short- or medium-term complications were reported.
Consolidation was achieved after 4 months (fig.6).
Functional results according to the Kalrstrom and Olerud score were good despite a 1.5 cm shortening of the left lower limb. It should be noted that the patient returned to full activity after 6 months.

**Case N°3:**
Patient aged 28, mechanic by profession, with no pathological history, victim of a road traffic accident resulting in closed trauma to the lower limbs in August 2008.
On admission, the patient was conscious, GCS 15/15 and hemodynamically stable. Examination of the musculoskeletal system revealed swelling of both thighs with deformity of the lower limbs and absolute functional impotence. Distal pulses were present.
Radiological examination revealed a bilateral floating knee.
The operation was performed 48 hours after admission. Under spinal anesthesia, an open reduction was performed as well as centro-medullary nailing of both femurs associated with cerclage of the left femur followed by closed nailing with two alignment nails for both legs.
The patient had no post-operative complications, and rehabilitation was started after three weeks (Fig. 7).
Consolidation was achieved after 4 months.
Functional assessment using the Karlstrom score was excellent, with resumption of sport and work after 7 months.

## IV-DISCUSSION:

Bilateral floating knee is a rare lesion, an overall incidence of 4.6% and 3.8% has been reported for bilateral femoral and tibial shaft fractures respectively (7) but none for bilateral floating knee.
In our study, type I fractures according to the Blake et al Fraser classification were found in all our patients, which is consistent with the study conducted by Chi-Ming Wu (1).
Although stabilization of a femoral or tibial fracture is the first-line treatment in the first 24 hours, a staged approach using orthopedic damage control surgery first is also recommended depending on the patient's actual condition (5). Immediate reduction and definitive fixation are reserved for hemodynamically stable patients (5).
Chi-Ming Wu (1) reports a time of 4 hours between the patient's arrival in the emergency department and his admission to the operating theatre; this time is much shorter than the average in our series, which was 48 hours. This may be explained by the delay in management due to the precarious socio-economic conditions of the 3 patients and the failure of the health coverage system.
In our study, all our patients were treated with closed centro-medullary nailing except for one patient who had an open Cauchoix 2 leg fracture and who received external fixation, which corresponds to the indication given for the patient in the study conducted by Younes Ouchrif (2), unlike Chi-Ming Wu (1) and Yadav U (3), who performed open reduction with locked plates for all these fractures.
Rethnam et al (18) reported short fracture healing times and positive functional recovery in patients treated with centro-medullary nails for extra-articular fractures and plates for articular fractures.
The average duration of our surgical procedures was 8 hours, which is slightly longer than that of Chi-Ming Wu (1), which was 6 hours 40 minutes.
In our study, none of the patients had joint stiffness or displacement. However, a shortening of 1.5 cm was observed in one patient. After 12 months, all patients returned to full activity.
Chi-Ming Wu (1) reported a full recovery in his patient after 4 months, with a return to walking without assistance and a return to work after 6 months, while Yadav U (3) reported stiffness in his patient's left knee, although rehabilitation began after the 3rd week.

## V-CONCLUSION

Bilateral floating knee is an unusual and extremely rare condition.
It is a feature of high-energy trauma, especially road traffic accidents, and is often associated with life-threatening injuries, requiring multidisciplinary management.
Our study focused on 3 cases of patients with floating knees treated surgically with good short- and medium-term results.

**ABBREVIATION:**
BFK: Bilateral floating knee.
LCMN: locked centro-medullary nailing.
TOBC: Traumato-orthopaedic and burns center.
CHN: Centre Hospitalier National.
EPC: external popliteal sciatica.

**CONFLICTS OF INTEREST:**
NON.

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Figure 1: Schematic presentation of (1) Frazer's classification.

Figure 2: Preoperative X-ray of both lower limbs showing comminuted fractures of both femurs and both legs (Type 1).

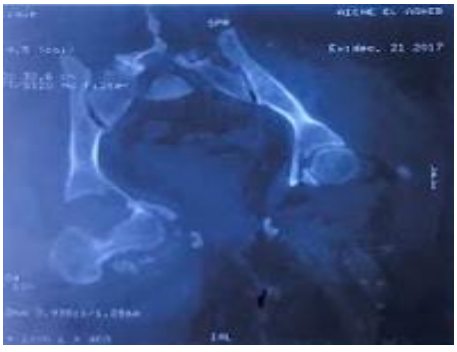

figure 3: Anteroinferior dislocation

Figure 4: Assessment of knee mobility (full flexion)

Figure 5: Preoperative x-rays of the lower limbs showing a bilateral floating knee

Figure 6 : X-rays of the lower limbs showing consolidation 4 months after osteosynthesis

gure 7: Assessment of knee joint mobility and equality of the lower limbs (flexion/extension)