

Floating Knee with Vascular Compression Treated Non-Operatively in a Context of Limited Resources: A Case Report

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How to cite this paper: Musimwa, P.C., Alumeti, D., Nfundiko, K. and Berg, U. (2023) Floating Knee with Vascular Compression Treated Non-Operatively in a Context of Limited Resources: A Case Report. *Open Journal of Orthopedics*, 13, 246-253.

<https://doi.org/10.4236/ojo.2023.136025>

Received: April 24, 2023

Accepted: June 27, 2023

Published: June 30, 2023

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Abstract

Lower limb fractures like floating knees are more common in urban areas of low-income countries. In addition, associated complex lesions are manifestations of polytrauma requiring correct and appropriate management. The treatment is mostly surgical. We present a 19-year-old patient with a floating knee due to ipsilateral femoral and tibial fractures and vascular compression treated with femoral and calcaneus traction followed by a long limb cast. For our patient, the management of the concomitant vascular compression threatening vital and functional prognosis was in focus aiming at avoiding a radical decision such as limb amputation. The non-operative treatment managed to restore the blood supply and save the limb. At the follow-up after 10 months the fractures were clinically healed and radiologically consolidated and the walking capacity was almost restored. Non-surgical treatment accompanied by daily monitoring can prevent the radical solution of amputation in the context of a floating knee with vascular compression. We want to draw attention to the weakness of the existing classifications because they do not take into account vascular lesions as well as the presence of open fractures to define the severity and evaluate the prognosis.

Keywords

Floating Knee, Ipsilateral Fractures, Vascular Compression, Orthopedic Treatment, Case Report

1. Introduction

The floating knee is a concept, which was first used in 1975 by Blake and M.C., Bryde to describe an ipsilateral fracture of the femur and tibia [1]. This is high-energy trauma, often caused by road accidents (MVA) [2] [3] [4]. Very of-

ten this lesion is associated with potentially vital lesions embedded in a table of polytrauma [5]. The diagnosis of the floating knee is clinically evoked in front of pain and functional impotence with a double deformity (thigh and leg) of the pelvic limb and will be confirmed after standard radiological checkup. Treatment is mainly surgical except in children or adults with minimal displacement [6]. Vascular complications are rare and once present lead to amputation [5]. The purpose of this work is to report a rare case of complicated floating knee orthopedically treated vascular lesions.

2. Observation

This is a young boy of 19 years old, without profession, brought to the emergency department, two hours after a public road accident with a type of collision of two tricycles, for a functional impotence of the left pelvic limb, with sore on the inner thigh and anterior left leg and multiple abrasions on the left forearm. The physical examination noted a facial expression of pain, functional impotence of the lower left limb with a deformity in the thigh and leg. The absence of distal pulse, cyanosis from the foot to the upper third of the leg raised suspicion of vascular lesion. The clinical examination of the knee was normal except from a subcutaneous effusion limited to a few centimeters below the knee. Sensitivity and motor skills were abolished distally. The patient had other lesions associated with left forearm and pelvic contusion type. The diagnosis of a left floating knee with vascular disorders was evoked. X-rays of the left thigh and leg confirmed the diagnosis of a floating knee. Doppler ultrasound pleading for an absence of arterial flow in the left and anterior tibial and left pedal arteries; discussing compression in the popliteal artery or high vascular lesion (femoral artery) by bone fragments, especially since the level of arterial obstruction had not been visualized. Radiography of the left forearm and pelvis was normal. The CT scan of the left thigh and leg had not been performed following a financial limit. The blood count showed anemia with a hemoglobin level of 90 grams per liter but the patient was hemodynamically stable. A treatment made of analgesic, antibiotic and tetano-prevention by serum and tetanus vaccination had been introduced before a surgical trimming of the wounds, then the installation of a double traction (trans condylar and trans calcaneal) awaiting radical surgery (**Figure 1**). Given the risks of complications in the absence of equipment to obtain stable osteosynthesis, we decided to choose a non-surgical treatment. The priority was to align the limb and avoid vascular compression and thus improve blood circulation. After placing the traction, close examination of the limb was performed and had shown a progressive recoloration of the limb with resumption of sensitivity; and after 72 hours the limb was well colored. The patient was given preventive anticoagulants (enoxaparin 4000 IU). X-rays of the controls showed satisfactory alignment at the leg but there was a shift of the fracture line at the femur. After six weeks, we proceeded with the removal of the tractions and the installation of a cruro-pedious plaster for six weeks, to allow a verticalization and support of the limb (**Figure 2**). After removal of the plaster (**Figure 3**), a vicious

callus is observed waiting for support. Physiotherapy of the knee was started, with a continuous diet over several weeks. After 10 months he recovered the ability to walk without crutches or other support and clinically as well as radiologically the fractures are consolidated (**Figure 4** and **Figure 5**). Functional evaluation of the limb is satisfactory, recovery of walking amplitudes. A setback after a few years would interest us for a long-term evaluation.

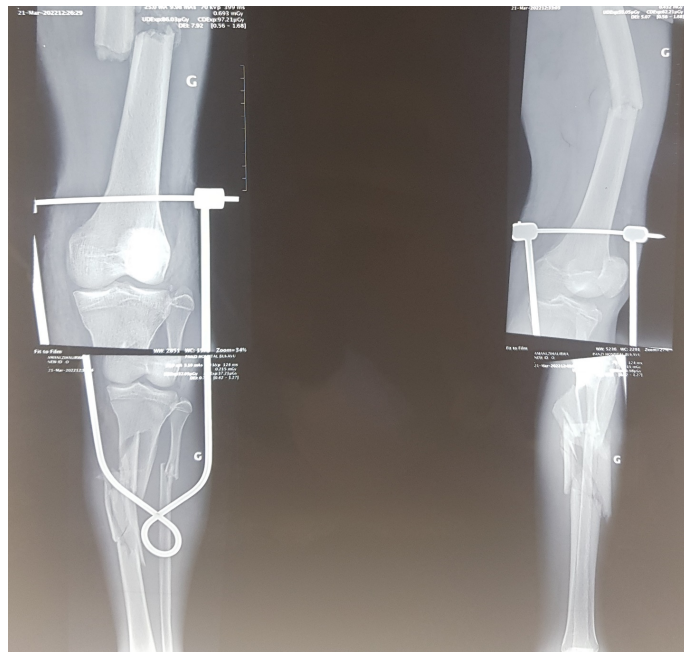


Figure 1. X-ray of lower left limb after double pull, frontal incidence.



Figure 2. Photo of patient with left cruro-pedious plaster.



Figure 3. Photo of left lower limb after 3 months.



Figure 4. Lower left limb X-ray after 10 months, frontal incidence.



Figure 5. Left lower extremity X-ray after 10 months, sagittal incidence.

3. Discussion

The floating knee is a high-energy trauma injury entity treated in the trauma department [7]. It occurs as a result of road accidents, which corroborates this clinical observation [4] [7]. The trauma occurred after the two high-speed three-wheelers (tricycles) collided. Studies conducted in sub-Saharan Africa show that this traumatic injury is often observed in young adults without a profession this is in line with the case we describe; it was a young boy of 19 years old with informal professional activities; one of the pathogenic factors described in the literature [4]. In Africa, it has been observed that subjects exercising in the informal sector very often move by a two-wheeled (motorcycle) or three-wheeled (tricycle) machine because the races are inexpensive and have access to inaccessible areas of the city. In a study conducted in Niamey, it was noted that road accidents were the 1st cause of severe trauma in their trauma departments and more than 2/3 of the cases are the main providers of floating knees [2]. The traumatized patient is brought to the service by persons at the place of the accident with suspicion of double fractures of a limb. Although the diagnosis is clinically evoked, it must be confirmed by standard radiography and a Doppler ultrasound at admission [3] which was done in our patient and confirmed the diagnosis of a floating knee without the level of obstruction being specified. However, the arterial flow

stopped at the femoral arteries with no flow at the left and anterior tibial and posterior left arteries, discussing compression at the popliteal artery or high vascular lesion (femoral artery). Fraser's classification distinguishes between 4 types of the floating knee [8], without considering open fractures but depending on the location of the fractures [9]. Treatment is surgical in most cases and several means of osteosynthesis are proposed. The floating knee may be associated with another traumatic entity which is a management difficulty. Recent publications in the scientific literature focus on surgical treatment of bone lesions by a Centro medullary nail as the first choice, but associated lesions that threaten blood circulation influence immediate actions [10] [11] [12]. Temporary stabilization by external fixation may be an option while blood flow is restored.

Given the risks of complications in the absence of equipment to obtain stable osteosynthesis, we decided to choose a non-surgical treatment. The priority was to align the limb and avoid vascular compression and thus improve blood circulation. In our case, the vascular component, the associated soft tissue lesions as well as the contextual limits made of no CT angiography, led us to proceed to orthopedic treatment made of double traction in first intention associated with antibiotic therapy and anticoagulants preventive dose which prevented an outright amputation. Complications are very common, first of the general order that can cause the death of the patient (fat emboli, pulmonary emboli, associated lesions) and local (infection, vicious Cal, pseudarthrosis, knee stiffness) [5]. Managing short- and medium-term complications remains a challenge for orthopedic treatment. For our patient, he had benefited from a surgical trim, followed by carefully conducted dressings as well as an observance of decubitus complications throughout his hospitalization. The risk of thromboembolic complications has been reduced by treatment with anticoagulants. In our case, the patient has a vicious callus that is waiting for treatment.

4. Conclusion

Floating knees with vascular lesions and soft tissue are rare at Panzi Hospital. In addition, the associated complex lesions perform tables of polytrauma requiring surgical management in the first intention, up to an amputation of the limb. In a context with limited resources, an orthopedic management made of traction can help to preserve the traumatized limb.

5. Contribution of Our Study to Knowledge

- The particularity of this observation is the fact that the concomitant lesions in the case of a floating knee will greatly affect the patient's vital and functional prognosis in terms of morbidity and mortality;
- Orthopedic management followed by day-to-day monitoring can help limit the radical solution of amputation;
- Our observation calls into question the different classifications proposed so

far because these classifications do not take into account vascular lesions as well as skin lesions. Our case reveals this particularity whose severity and prognosis are complementary to those of these proposed classifications.

Contribution of the Authors

All authors contributed to the development of this work. All authors read and approved the final version of the manuscript.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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