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Lesion of the Popliteal Artery Due to Traumatic Dislocation of the Knee: A Case Report

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Abstract **Case Report**

The case was of a 50-year-old patient. She was a victim of a home fall. The clinical examination revealed knee deformity with loss of anatomical guide and a shortened limb. The neurovascular examination revealed the abolition of the pedal and posterior tibial pulse without sensory-motor deficiency. Standard radiography confirmed posterior dislocation of the knee. The reduction of the dislocation was carried out under rachianesthesieezd four hours after the accident. stabilized by an external fixation. After reduction of dislocation, the popliteal and tibial postural pulse remained abolished. Computed tomography (CT) angiography confirmed the anatomic interruption of the popliteal artery. The repair consisted of femoral and popliteal bypass grafting of the saphenous vein autograft. Later, the patient underwent a ligamentoplasty of the knee with a satisfactory functional result.

Keywords: 50-year-old patient clinical examination kneeachianesthesieezd ligamentoplasty.

INTRODUCTION

Complete dislocations of the knee are rare lesions, secondary to a high energy trauma most often caused by a traffic accident or a sport of contact with a common fall, accompanied by a pluri-ligamentous rupture in particular central pivot and in 10 to 25 per cent of cases of paralysis of the common fibular nerve. Rarely, the popliteal artery is compressed, contused or interrupted by displacement of the femur or tibia Wascher *et al*. [1], Twaddle *et al*. [2], Martinez *et al*. [3], Niall *et al*. [4]. This last circumstance brings into play the vital prognosis of the limb and, by imposing a restoration of emergency vascular continuity, modifies the immediate and secondary therapeutic behavior.

CASE REPORT

A 50-year-old patient with no significant pathological history was admitted to the emergency department with a fall at her home with a right knee injury resulting in a feeling of drooping her right knee with total functional impotence associated with very intense pain.

The patient was hemodynamically and respiratory stable. Clinical examination revealed deformity of the knee in external rotation, with loss of anatomical spots and a shortened limb. The purpose of the neurovascular examination was to abolish the pedal and the posterior tibial pulse without motor-sensory deficit of the internal or external popliteal sciatic nerves. Standard knee radiography shows femoro-tibial dislocation without associated fracture. The reduction of dislocation was performed at the operating block under rachi-anesthesia within a period of 4 hours stabilized by an external fixator bridging the knee. The fixator was placed antero-laterally in femoral and anteromedial tibia; it was mono axial with non-transfixing plugs with a single articulated body.

Aponeurotomy of the anterolateral and posterior leg compartments were performed in our patient. After reduction of dislocation, interruption of the popliteal axis was confirmed by angiography. The repair consisted of a femoro-popliteal bypass grafted by saphenous autograph used in the reverse position. This graft was taken from the ipsilateral great saphenous vein

The revascularization of the limb was a success with the recovery of the arterial circulation proved by the reappearance of the immediate and definitive pulse in our patient. Doppler control was performed demonstrating the permeability of the bypass but no arteriography was performed. Our patient presented with transient acute renal failure caused by revascularization syndrome requiring dialysis for two

weeks. during the wearing of the external fixation, the patient presented flow on the valves treated by the local care. The results were appreciated with a fall of 4 months. in our patient a repair of the two ligaments crossed by autograft (ligament of the internal right and half-tendinous for the crossed anterior, gracilis and semi tendinous for the posterior cross) was carried out allowing him to have a stable and painless knee with recovery work. the knee had maintained active flexion greater than 110 ° and complete extension

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Fig-1: Radiological image of knee dislocation

Fig-2: Radiological control after reduction of dislocation by external fixator

Fig-3: CT image that shows interruption of the popliteal artery

DISCUSSION

The occurrence mechanisms of dislocations are variable including hyper-extension, anteroposterior shock, abduction or adduction, torsion, beyond the resistance of the capsulo-ligamentary structures and the limits of elasticity of the vessels; the popliteal artery undewent particularly this brutal elongation because relatively fixed to the femur at its passage in the ring of the adductors and the tibia by the arch of the soleus. The frequency of popliteal line interruptions is closely related to that of neurological involvement and soft tissue injury [Twaddle *et al*. [2], Wascher *et al*. [1], Wright *et al*. [5], Rosset [6]. The popliteal artery is particularly affected by this abrupt elongation as it is relatively attached to the femur as it passes through the adductor ring and the tibia through the soleus arch.

This epidemiological concept requires a thorough clinical examination (signs of Griffith's tetrad or Bloom's pulsatile hematoma), the symptoms of which may mask those of the other. Frequent (11% to 88%), they have a very varied amputation rate, depending on the revascularization delay and associated lesions (0% to 66%). The pragmatic attitude adopted in our case made it possible to bring the diagnosis of ischemic syndrome on the clinic and / or after the arteriography: it was systematically sought by evaluating the pedal and tibial pulse before and after reduction of the dislocation to affirm the organic character of arterial rupture. In case of initial total abolition, they must appear (after reduction) quickly, frankly and permanently.

In the absence of one of these characteristics, arteriography is the reference examination and it leaves

no indication to the angio-scanner in the monotraumatized patient.

His practice remains controversial in the literature: unnecessary for some because of the reliability of the clinical examination and wasting valuable time Klineberg *et al*. [7], Kendall *et al*. [8] Stannard *et al*. [9], Miranda *et al*. [10], systematic for others Gabble *et al*. [11], Barbes *et al*. [12]; it allows not to ignore an organic arterial lesion in continuity - localized dissection, intimal flap - leaving the limb in warm ischemia thanks to an effective collaterality.

The reduction of dislocation by traction and manipulation does not generally pose any difficulty; the interposition of a broken ligament can be an exceptional source of irreducibility Chirpaz-Cervat *et al*. [13]. The reduction is followed by an assessment of the frontal and sagittal laxities and its stability. In the event of major instability and immediate recurrence of displacement, strict femoro-tibial immobilization is necessary: it is only possible by an external femorotibial fixator bridging the knee.

The external knee bridging is between femoral plugs implanted in a fronto-lateral plane and tibial plugs on the medial side. This implies a distortion of the union bar to the limit of the possibilities of the device despite the adjustable wrists.

The fixator, placed first, did not interfere with the dissection of the popliteal fossa made knee slightly bent: on the contrary, during vascular sutures, it stabilizes the knee best, and avoids any recurrence of the femoro-tibial displacement. At the end of the vascular bypass, the fixator is replaced in extension, while ensuring by fluoroscopic control a perfect fronto-sagittal alignment and the equidistance of the femoro-tibial line.

The repair of the arterial vascular axis has always consisted of a bridge between the high popliteal artery and the popliteal arterial artery or the fibular tibio trunk: this technique is made necessary by the lesions of the arterial walls contused and torn several centimeters Rozycki *et al.* [14] Crolais *et al*. [15]. An immediate provisional arterial shunt has been proposed Johansen *et al*. [16].

The venous graft was removed from the saphenous vein of the thigh. As popliteal venous repair was not performed, it appeared preferable to use the contralateral great saphenous vein to avoid obtrusing the venous return of the traumatized limb.

The frequency of joint fibular nerve palsy in the context of knee dislocation is between 25 and 40% Twaddle *et al*. [2], Niall *et al.* [4], Wright *et al*. [5], Rosset [6]. All authors emphasize a higher rate when dislocation is complicated by ischemia. The trunk of the sciatica and especially its common fibular terminal branch are particularly exposed to traction in the frontal and / or sagittal displacements, and all the more so since it includes an anatomical point of fixity during its circumvention of the neck of the fibula.

In emergency, in case of section of the fibular nerve it is recommended to fix the nerve ends to avoid retraction and facilitate a transplant [Sedel and Nizard [17], Bleton *et al*. [18], Piton *et al*. [19]. Beyond the third month, in the absence of a primer for clinical and electromyographic recovery, surgical exploration is recommended with a repair gesture depending on the anatomical state. Ultrasound capable of evaluating the anatomical continuity of the nerve could be integrated into this surveillance scheme [Brasseur et Sans [31], Gruber *et al*. [20].

Complete femorotibial dislocation defined by displacement of the tibial skeleton with respect to the femur, whatever is its direction, it involves the rupture of the two elements of the central pivot with participation of the collateral structures. Some luxation observations sparing the cruciate ligament (s) have been reported [Loubignac *et al*. [21]. The anatomical meniscal ligament lesions are generally multiple and polymorphic, known by the operative approach [Wascher *et al*. [1], Twaddle *et al*. [2], Richter *et al*. [22], Rios *et al*. [23], Yeh *et al*. [24] and magnetic resonance explorations [Twaddle *et al*. [2], Yu *et al*. [25], Potter *et al*. [26], Lonner *et al*. [27]. Wascher *et al*. [1] integrate very precisely in this nosological framework, dislocations spontaneously reduced but involving a rupture of all the ligamentous structures. The healing potential of medial collateral structures is known subject to strict immobilization. It is not the same for lateral lesions which do not spontaneously recover their anatomical and functional properties, or of the anterior cruciate whose rupture in the body is final. The posterior crus has a significant healing capacity subject to immobilization, knee reduced in the sagittal plane. The periods of immobilization of the traumatized knee are not codified.

Several comparative retrospective studies have shown that better results are obtained after complete surgical repair of ligamentous structures [Dedmond and Almekinders [28], Wong *et al*. [29]. Even if the functional prognosis remains unclear, the surgery gives more mobile knees, a higher overall functional score.

All authors recommend an early secondary gesture on the peripheral structures and at least the posterior cross. It seems preferable to wait for the certainty of the permeability of the bypass and the complete cutaneous cicatrization before proposing the secondary ligamentous gesture.

CONCLUSION

Knee dislocation with anatomical rupture of the popliteal artery is a rare trauma requiring immediate management by a traumatologist and a vascular surgeon. After reduction of dislocation, the absence of immediate reappearance of distal pulses requires surgical exploration. Doubtful cases will be explored by an arteriogram whose indication must be wide. The femoro-tibial external fixator quickly and effectively stabilizes dislocation while facilitating vascular action and fasciotomy. It is desirable to repair in an emergency, at the time of the bypass, any ligament rupture evident and / or located on the operative approach such as avulsion of the posterior tibial spine or a rupture in the body of the posterior crusader or medial collateral. Paralysis of the common fibular nerve is common, usually by simple elongation of the nerve trunk, but a poor prognosis: it definitely obstructs the future functional ambitions of the traumatized limb. Secondary ligament repair procedures will be discussed on a case-by-case basis, depending on the age, traumatic context of neurological recovery.

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