Popliteal artery entrapment syndrome secondary to a femoral osteochondroma

Syndrome de l'artère poplitée piégée secondaire à un ostéochondrome fémoral

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RÉSUMÉ

Introduction: Les ostéochondromes (ou exostoses) sont les tumeurs bénignes les plus fréquentes de l'os. Leurs complications vasculaires sont rares, mais sont de plus en plus rapportées dans la littérature.

But: A travers un cas rare de syndrome de l'artère poplitée piégée secondaire à un ostéochondrome fémoral, nous signalons la difficulté de la prise en charge chirurgicale qui nécessite une planification minutieuse et une rigueur technique lors de la résection.

Observation: Un patient âgé de 27 ans, aux antécédents de maladie exostosante diagnostiquée depuis l'enfance et jamais opérée, s'est présenté à notre consultation pour des claudications vasculaires, des paresthésies et une sensation de froideur de la jambe gauche depuis un an. Les examens radiographiques et angio-tomodensitométriques ont révélé une exostose fémorale inférieure gauche conflictuelle avec l'artère poplitée gauche. Nous avons réalisé une exérèse chirurgicale de la tumeur. Aucune complication périopératoire n'a été notée. Les douleurs ont disparu et le patient a récupéré une mobilité complète du genou au dernier recul.

Conclusion: Le syndrome de l'artère poplitée piégée peut être secondaire à une exostose solitaire ou multiple au niveau du genou. La résection prophylactique des exostoses du genou conflictuelles est indispensable pour éviter les séquelles. Dans tous les cas, le chirurgien orthopédiste devrait prendre les précautions nécessaires pour éviter la survenue de complications vasculaires au cours du traitement chirurgical des exostoses du genou.

Mots-clés : Exostose, Ostéochondrome, Artère poplitée, Tumeur osseuse.

SUMMARY

Background: Osteochondromas (or exostoses) are the most common benign tumors of the bone. Vascular complications of these tumors are rare but have been increasingly reported in recent literature.

Aim: Throughout an unusual case report of popliteal artery entrapment syndrome secondary to a femoral osteochondroma, we highlight the necessity of thorough clinical and radiological examinations as well as meticulous and prompt surgical resection.

Case Report: A 27-year-old male patient, who had been diagnosed with multiple osteochondromas and had never been operated on, presented with a one-year history of exercise-induced left calf pain, paresthesias of the left leg and pallor in cold weather. After radiographic and Computed Tomography angiographic evaluation, we diagnosed distal femur osteochondroma associated with an arterial compression of the left popliteal artery. A surgical treatment of all lesions was performed. No operative complications occurred. The pain was relieved. Good postoperative results have been noticed.

Conclusion: Popliteal aretery entrapment syndrome may be caused by solitary or multiple osteochondromas around the knee. Therefore, prophylactic resection of exostoses in the surrounding area of a vessel should be performed. Moreover, the orthopedic surgeon should consider and prevent vascular complications during surgical resection of knee osteochondromas.

Key words: Exostosis, Osteochondroma, Popliteal artery, Bone tumor

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INTRODUCTION

Osteochondromas (or exostoses) are the most common benign bone tumors. They occur particularly around the knee. They may be solitary or integrated into a hereditary multiple osteochondromas syndrome. They are generally asymptomatic. Nevertheless, vascular complications such as arterial compression, pseudo-aneurysm, thrombosis and ischemia have been increasingly reported in recent literature (1).

The popliteal artery entrapment syndrome (PAES) is a group of symptoms resulting from mechanical compression of the popliteal artery within the popliteal fossa. It is characterized by a diminished blood flow to the leg muscles during contraction, leading to intermittent claudication, pallor, and coldness. It has been often reported in young male athletes presenting with exertional leg pain. It is secondary to an abnormal anatomy of the popliteal artery or the adjacent musculotendinous structures (2).

Bony deformities in the popliteal space have not been yet classified as a cause of PAES, though they may result in arterial compression.

Throughout an unusual case report of popliteal artery entrapment syndrome secondary to a femoral osteochondroma, we highlight the necessity of thorough clinical and radiological examinations as well as meticulous and prompt surgical resection.

CASE REPORT

A 27-year-old active male patient presented to our department with a one-year history of exercise-induced left calf pain, paresthesias of the left leg and pallor in cold weather. He had been diagnosed with hereditary multiple osteochondromas since early childhood, and had never been operated on.

On physical examination, the patient presented solid, fixed and non-pulsatile protuberances in the two popliteal fossi. The left knee flexion was limited at 100° by pain. Peripheral pulses were present and there was no neurologic deficit.

Plain radiographies of the knees showed presence of sharp bone masses in the posterior aspects of the femurs and tibias, suggesting multiple exostoses. The largest osteochondroma laid on the posterior facet of the left medial femoral condyle (Figure 1).

The angio-computed tomography with three-dimensionnal reconstruction showed multiple osteochondromas bordering on the popliteal arteries, especially on the left side. A large osteochondroma of the left medial femoral condyle was impinging on the left popliteal artery. Distal arteries were not clearly visualized on the left side (Figure 2).

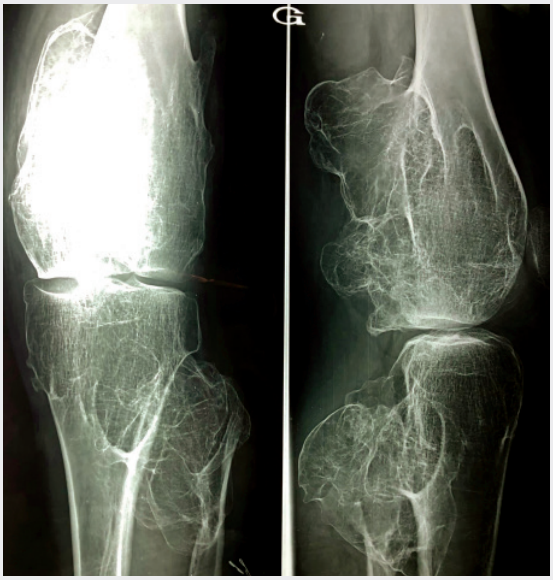

Figure 1: Anteroposterior and lateral radiographies of the left knee showing multiple femoral and tibial exostoses

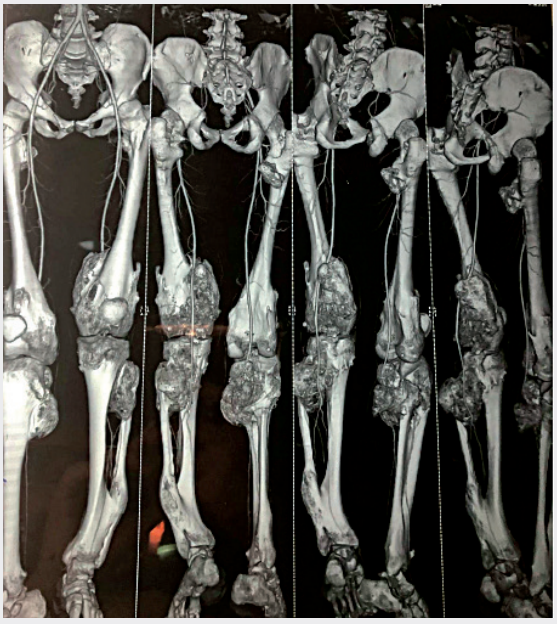

Figure 2: Angio-Computed Tomography with three-dimensionnal reconstruction of the lower limbs showing compression of the left proximal popliteal artery by a femoral osteochondroma.

Surgery was decided on the left side. We used a postero-medial approach to the distal femur. The popliteal vessels and nerves were controlled. Once the neurovascular bundle pulled back, a sharp bony protrusion with a cartilaginous cap arised from the posteromedial femoral condyle (Figure 3). Thereafter, we performed meticulous resection of the entire femoral osteochondroma using an osteotome. The histological examination confirmed the diagnosis of osteochondroma and there was no sign of malignant transformation.

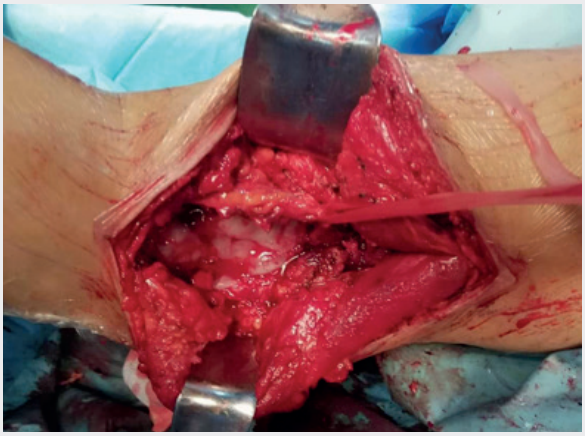

Figure 3: Per-operative photography showing the cartilaginous cap of the femoral osteochondroma arising once the popliteal neurovascular bundle retracted.

No operative complications occurred. The postoperative period was uneventful. The pain was relieved. The patient was discharged in the second week after surgery and began rehabilitation. The patient remained asymptomatic one year after surgery and achieved complete range of motion of the knees.

DISCUSSION

Vascular intermittent claudication in young patients is uncommon. Arterial insufficiency may be due to various immune diseases such as Buerger's disease, vascular malformations, PAES and early-onset atherosclerosis (3).

PAES is characterized by reduced distal blood flow during muscle contractions, generating intermittent claudication, pallor, and coldness of the extremity. Generally, these signs remit at rest. It is typically caused by embryonic developmental aberration of the popliteal artery or of the musculotendinous components of the popliteal fossa. Almeida et al classified PAES into six types, the type 3 being the most common form (4). Yet, bone protuberances, such as osteochondromas, have been increasingly reported to be a cause of PAES (1,3).

Osteochondromas (or exostoses) are the most common bone tumors (1–2% of the population), especially in men (genre ratio 4:1). They result generally from a misguided growth of the epiphyseal bone, capped by cartilage. All locations are possible, but they occur more frequently in metaphyses of long bones : tibia, femur and humerus. They may be solitary or integrated into a hereditary multiple osteochondromas syndrome. They are typically asymptomatic and may be first diagnosed incidentally in childhood or adolescence during radiological examinations. They may have spike-like or sessile appearance (5).

Complications are rare. They occur in approximately 4% of osteochondromas. Neurological deficit, growth abnormality, malignant degeneration and vascular lesions have been reported. Vascular complications are extremely rare. Symptoms depend on tumor location, size and type of vascular lesion: pseudoaneurysm, arterial or veinous thrombosis, compression and bleeding (6).

Angio-Computed Tomography is useful to illustrate osteochondromas and their vascular complications at the same time. As in our case, three-dimensionnal reconstruction may help in surgical planning. Otherwise, Magnetic Resonance Angiography has been used as an alternative to ordinary angiography. Furthermore, Magnetic Resonance Imaging may demonstrate the anatomic relationship between vessels and exostoses (5,7).

Our case is particular by the size and location of the femoral osteochondroma responsible for PAES and by the association with multiple exostoses. In these circumstances, preventive resection of all osteochondromas may be discussed. However, such a prophylactic surgery could be too invasive and useless (8–10). To date, prophylactic resection of asymptomatic multiple osteochondromas has been controversial.

Various surgical approaches around the knee have been described in similar cases such as the Trickey approach (posterior approach of the popliteal fossa using a Z incision), medial supra-geniculate and infra-geniculate approach, posterior approach of the popliteal fossa with S incision and lateral approach of the distal femur (9,10). The choices of the authors varied depending on

the location and the size of the osteochondromas. In our case, we planned to remove only the femoral exostosis using a direct approach, once the popliteal artery would be protected. The use of an osteotome seems to be safer than electric bone saw because of the proximity of vessels.

Postoperative period is generally uneventful. Rehabilitation should begin as soon as possible in the first week. No degeneration has been observed in our case and in previous reports.

To conclude, prompt diagnosis and surgical treatment of osteochondromas with vascular complications are recommended in order to avoid irreversible damages. For instance, surgical resection of osteochondromas around the knee should be well planned and considered as a preventive or therapeutic measure. Nevertheless, prophylactic resection of all osteochondromas in the case of hereditary multiple osteochondromas is still controversial.

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