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Solitary Osteogenic Exostosis of the Femur Revealed by Recurring Acute Distal Thigh Pain: About a Case

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Abstract

Introduction: Solitary exostoses are the most common benign tumors of the fertile metaphyses of the long bones of children. Their radiological diagnosis of metaphyseal bone growth must be confirmed on pathological examination. These tumors can remain asymptomatic for a long time and reveal themselves during a particularly vascular complication. The objective of this study was to describe the epidemiological, diagnostic, therapeutic and evolutionary aspects of these tumors. **Patient and Observation:** We report the case of a 15-year-old adolescent girl, with no particular pathological history, received in the pediatric surgery department of the Donka National Hospital (HND) of the Conakry University Hospital for recurrent acute painful swelling of the lower third of the left thigh in an afebrile context accompanied by lameness and stopping school for a few days (2 - 3 days). The symptoms appear to have evolved over the past 3 years and after physical activities. It regresses with rest, analgesics and non-steroidal anti-inflammatory drugs. The notion of trauma and sickle cell disease was not reported in the patient's clinical history. It is the persistence of the symptomatology which motivates the said consultation. On palpation, a small hard mass is noted at the expense of the internal metaphysis of the left distal femur. Deep palpation of this area causes a tingling sensation and during rapid mobilization of the knee. The remainder of the orthopedic examination was unremarkable. Standard x-ray of the femur shows a bony growth with a pointed tip from the distal metaphysis of the left femur. On surgical exploration, we noted a wedge-shaped exostosis oriented towards the vastus medialis muscle. Histological examination of the surgical specimen confirms osteogenic exostosis. There is no recurrence after 2 years. **Conclusion:** The distal femoral

metaphysis is the most common location of solitary osteochondromas in children. Their definitive diagnosis requires the histology of the surgical specimen. Only symptomatic exostoses should be operated on in children.

Keywords

Osteogenic Exostosis, Osteochondromas, Fertile Long Bone Metaphyses, Child

1. Introduction

Osteochondromas are the bone tumors most frequently found in adolescents or young adults. Often discovered accidentally, they can nevertheless be diagnosed during certain complications. They are most of the time described as being solitary while multiple exostoses are rather included in a hereditary pathology [1]. The surgical indication for osteochondroma or osteocartilaginous exostosis is only considered when the tumor becomes symptomatic [2]. The objective of this study is to describe the epidemiological, diagnostic, therapeutic and progressive aspects of solitary osteogenic exostosis in children.

2. Patient and Observation

AD is a 15-year-old adolescent, with no particular pathological history, who was seen at the pediatric surgery department of the Donka national hospital of the Conakry University Hospital for Conakry for recurrent acute painful swelling of the lower third of the left thigh in an afebrile context, accompanied by slight lameness and stopping school for a few days (2 - 3 days). The symptoms date back 3 years and appeared after intense physical activities (running, gymnastics). It regressed with rest, analgesics and anti-inflammatories. The last symptomatological episode dates back 2 months. The notion of trauma and sickle cell disease was not reported in the patient's clinical history. The delay in the consultation would be linked according to the patient's guardian to a financial problem, to negligence and the temporary nature of the pain which made people think that it was something transitory. Local examination revealed on palpation of the internal distal metaphysis of the left femur a small hard mass at the side of the femur, fixed. Deep palpation of this area causes a tingling sensation and during rapid mobilization of the knee; palpation of the other metaphyseal areas of the limbs reveals neither mass nor pain. The remainder of the orthopedic examination was unremarkable. The standard anteroposterior radiograph of the left femur showed an image of a sharp bony excrescence of the internal distal femoral metaphysis. This bony outgrowth was perpendicular to the axis of the femur; on the lateral view we observe a vertical radio opaque metaphyseal linear band parallel to the axis of the femoral diaphysis (**Figure 1**). The indication for removal of the exostosis under spinal anesthesia was made. We pass through a 4.5 cm transverse approach on the distal inner side of the left thigh followed by the hemo-

stasis dissection of the subcutaneous cellular tissue with an electric scalpel, opening of the aponeurosis and muscular dilaceration and followed by the reflexion of the vastus medialis or medial muscle; after opening the periosteum, exploration shows a bony outgrowth of the distal medial metaphysis of the left femur with a wide base forming one with the femoral metaphysis covered by the same periosteum and a beveled apex oriented towards the vastus medialis muscle with some muscle fibrosis lesions (Figure 2). Following this exploration, we strongly suspect

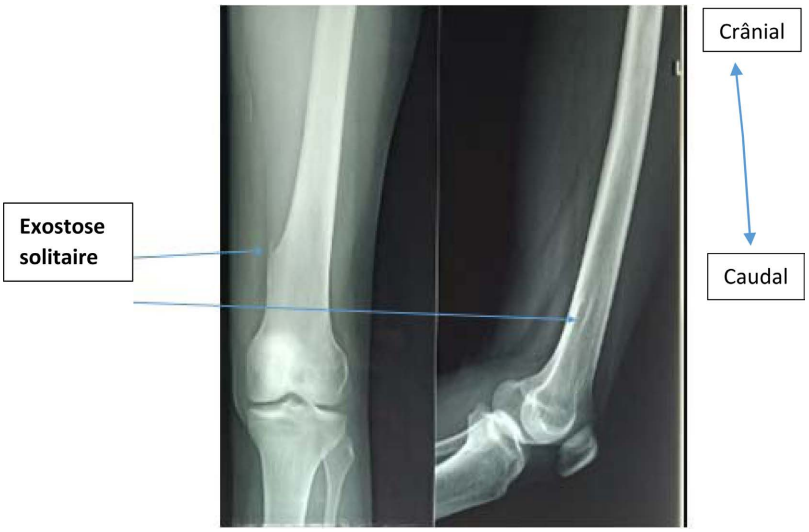

Figure 1. X-ray of the left femur: solitary exostosis of the distal metaphysis on the front and profile views. [Image from HND Pediatric Surgery Department].

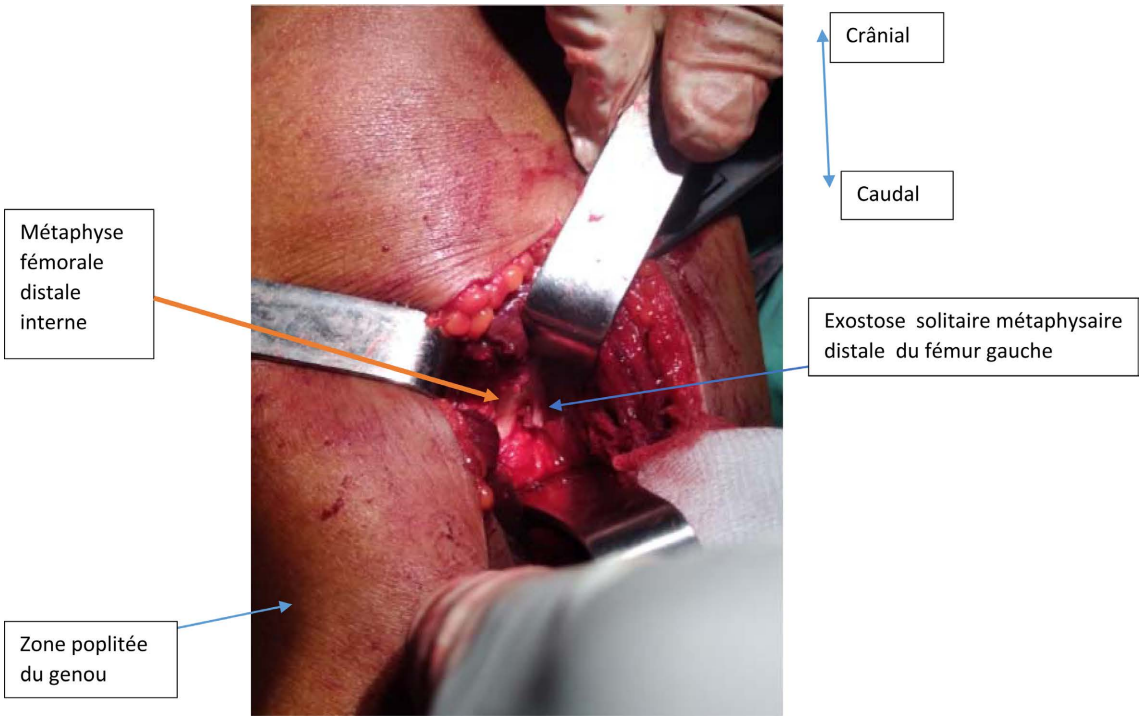

Figure 2. Intraoperative image: solitary exostosis with pointed tip implanted on the left internal femoral metaphysis. [Image from HND Pediatric Surgery Department].

clinically a solitary exostosis of the distal fertile metaphysis of the left femur. This exostosis was perpendicular to the axis of the femur. We proceeded to the complete excision of the exostosis at its base and it presented a periosteum, a cortex and a medulla in continuity with that of the femur (Figure 3). Hemostasis was satisfactory. Parietal closure of the operating wound and simple non-absorbable 3/0 stitches on the skin with placement of a posterior splint. We remove the wires on the 10th post-operative day and the splint on the 14th post-operative day. Histological examination of the surgical specimen was in favor of an osteogenic exostosis. The postoperative course was good with 1st intension healing. The control x-ray of the femur 4 months postoperatively showed healing of the femoral bone with complete disappearance of the exostosis on the frontal and lateral views of the distal femur (Figure 4). No recurrence was noted after 2 years of follow-up and the patient resumed her normal physical activities without pain.

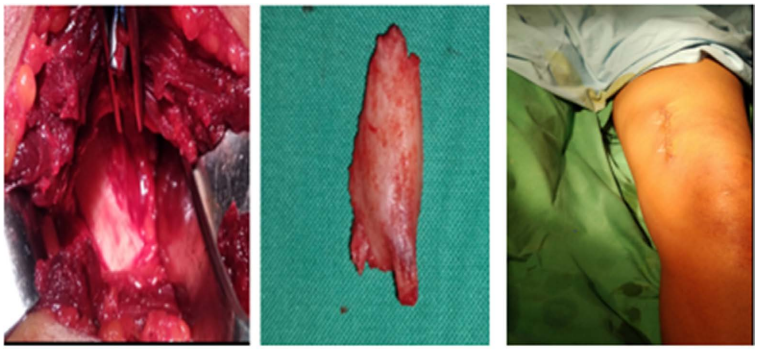

Figure 3. (a) metaphyseal implantation area of the exostosis; (b) operating room; (c) suture of the operating wound. [Image from HND Pediatric Surgery Department].

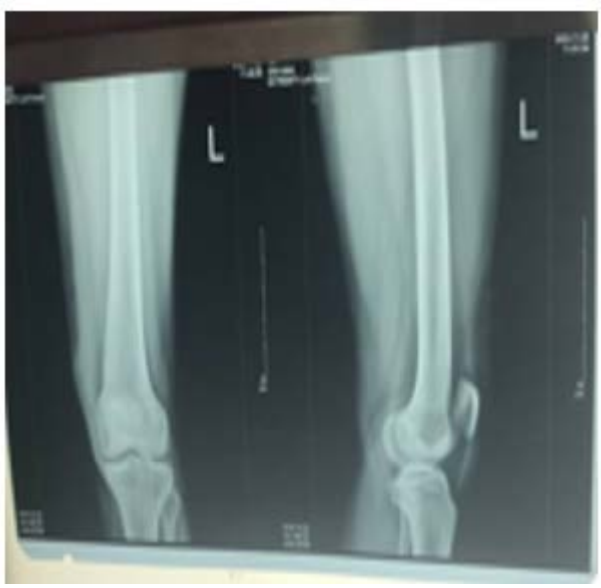

Figure 4. Control radiograph 4 months post-operative (face and profile): shows healing of the left femoral bone with complete disappearance of the bony outgrowth on the distal metaphysis. [Image from HND Pediatric Surgery Department].

3. Discussion

Osteogenic exostoses, also called osteochondromas, correspond to bony outgrowths covered by a cartilaginous cap [3]. It is the most common benign skeletal tumor after non-ossifying fibroma [2] [4] [5]. Despite their congenital nature, these benign tumors are more similar to hamartomas and they represent 40% of benign tumors and 10% of all primary bone tumors [3].

Multiple exostoses which are not the subject of this study represent only 10% of cases and are associated with a hereditary disease. [1] [6]. In children, solitary osteochondroma often occurs in adolescents and rarely in newborns; there is no difference between the two sexes [3] [7]. In our study, it was a 15-year-old girl. Our study is comparable to that of K Adabra *et al.* [8] who reports a case of a solitary exostosis of the femur in an 11-year-old girl. The predilection site for these tumors is the lower end of the femur (30%), more rarely at the level of other bones, notably the fibula and the tibia [7] [9] as is the case in our study.

On the pathophysiological level, several hypotheses have been raised. Exostoses result from subperiosteal displacement of the adjacent epiphyses or from a 90˚ tilt of a fragment of the growth cartilage [5] [10]. This development would be favored by a breach in the perichondrial shell. The disorganization of the growth cartilage by irradiation seems to be the cause of the isolation of cartilaginous fragments, the starting point of exostoses.. In the cases reported, the children were irradiated in early childhood (on average at 5 years) with a total dose of 10 to 60 Gy, with exostosis developing in the irradiation field on average seven years later. Osteomyelitis and trauma have also been reported to cause solitary exostosis [10].

The main reason for consultation for these tumors remains pain. In our case it was an adolescent with a recurring picture of distal thigh pain with inflammation occurring during physical activity, requiring the activity to be stopped. The incidental discovery is a frequent diagnostic circumstance for asymptomatic exostoses in children during a radiological assessment carried out for another reason. The appearance of clinical manifestations is often linked to the occurrence of complications; these occur in approximately 4% of cases. These complications can be extrinsic by irritation or compression of a neighboring anatomical structure (vascular complications, neurological disorder, muscular trauma); intrinsic by the occurrence of a bone fracture or bone deformities [1] [2] [4]. Musculoskeletal and vascular complications are described in children, especially adolescents [3]. In our study, surgical exploration revealed fibrosis of the vastus medialis in contact with an exostosis with a pointed tip (beveled). Muscle fibrosis lesions demonstrate the chronicity of the lesions. This situation is widely described in the literature [8]. Jemni Sonia *et al.* [3] in Tunisia reported a case of osteochondroma of the distal femur revealed by an iterative lesion of the vastus lateralis muscle with hematoma. In this case, the ultrasound showed a tear of the vastus lateralis, with a hematoma indicating a re-

cent lesion and the presence of nearby bone fragments suggesting bone tearing. A standard radiological assessment showed a pedicle exostosis in the upper part of the femoral shaft complicated by a fracture. The CT scan suggested an anterior femoral exostosis whose boundaries were regular and well corticalized. The origin of pain and swelling could be explained by chronic friction of the muscle by the exostosis or tendon which can produce bursitis, which can become infected or hemorrhagic [3]. The rigidity of the cartilaginous cap of the exostosis at the end of growth linked to its ossification reinforces this theory [1]. In fact, ultrasound makes it easy to distinguish the hypoechoic aspect of the non-mineralized cartilaginous layer with the surrounding hyperechoic fat and muscle but also the mineralized sectors of the cartilaginous layer. MRI shows the cortical and medullary continuity between the exostosis and the supporting bone, allowing a better view as opposed to radiography, in complex anatomical locations [10]. The x-ray of the femur with frontal and lateral view in our patient was sufficient to make the diagnosis of solitary distal exostosis of the femur. In the complications of solitary exostosis, pseudoaneurysm remains the most frequent vascular complication (popliteal artery), often associated with sessile osteochondromas, which exert more frictional forces on the vessel, compared to pedunculated osteochondromas [1] [7] [9]. It most often involves the popliteal artery. We have not encountered cases of nerve compression or fracture in our clinical practice [3] [11].

The risk of degeneration of the osteocartilaginous exostosis is 1% - 2% in solitary exostosis and 10% - 20% in exostotic disease. The malignant transformation occurs within the cartilaginous cap [10], of which the increase in thickness is the earliest sign, and which must be detected by ultrasound or MRI. It is still chondrosarcoma. It is generally late, always occurring after 20 years, generally around 40 to 50 years. It is the prerogative of adults [2] [3]. This is why any exostosis diagnosed as non-symptomatic in children must be subject to close clinical and radiological monitoring in adulthood. The appearance of certain signs should make us fear a malignant transformation, namely the increase in the size of the tumor; the appearance of osteolysis; the blurred appearance of the edges of the exostosis; the presence of calcifications outside the main ossification; erosion of the supporting bone or neighboring bone; a thickness of more than 1 cm of the cartilage cap and hyperuptake scintigraphy in adults. The presence of only one of these signs should lead to oncological excision [10].

In children, surgical treatment is only indicated in cases of troublesome or complicated exostosis as in our clinical situation; it consists of excision of the excrescence in order to avoid complications of vascular compression, or sarcomatous degeneration [8]. Our patient was operated on with an en bloc resection of an exostosis with a pointed tip. There was a fibrous area of the vastus medialis linked to repeated irritation of the tumor. Pathological examination of the surgical specimen confirmed the diagnosis of osteogenic exostosis. The postoperative course was simple and the patient resumed her physical activities normally

after 1 month postoperatively.

4. Conclusion

The distal femoral metaphysis is the most common location for solitary benign osteochondromas in children. The diagnosis should be easy given the radiological appearance of bony excrescence on a fertile area and confirmed by the anatomopathological examination of the surgical specimen. Only symptomatic solitary exostoses should be operated on in children.

Conflicts of Interest

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

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