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CASE REPORT

Solitary osteochondroma causing popliteal pseudoaneurysm that presented as a mass lesion

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ABSTRACT
Osteochondromas are the most frequently occurring bone tumors and can rarely lead to vascular complications. A 14-year-old boy with solitary exostosis of the right femur presented with a mass lesion at the posterior aspect of the thigh. Radiological studies demonstrated a popliteal artery pseudoaneurysm. In this case report, radiological findings of this lesion are reviewed.

Key words: • *osteochondroma* • *aneurysm, false*

Osteochondromas are the most frequent benign bone tumors. They are most often found at the metaphyseal or meta-diaphyseal region around the knee joint (1, 2). Many osteochondromas are asymptomatic lesions that are found as incidental findings in radiographs, while some others present as asymptomatic masses. Symptoms, when present, are often secondary to the size and location of the lesion (3). Vascular complications of osteochondromas, such as thrombosis or pseudoaneurysm formation, are rare (4, 5). Osteochondromas located around the knee joint can cause popliteal artery pseudoaneurysm. Herein, a patient with a distal femoral osteochondroma presenting with popliteal artery pseudoaneurysm is presented.

Case report

A 14-year-old boy presented with a 1-month history of pain and swelling on the posterior aspect of his right thigh. He had no history of trauma. On physical examination, a 10-cm diameter mass was found on the distal and posterior region of the patient's right thigh. No pulsation or thrill was detected. Plain radiograph of the right femur demonstrated a sessile osteochondroma at the posteromedial side of the distal femoral diaphysis. In addition, a large soft tissue mass was seen at the posterior part of the thigh in close proximity to the osteochondroma (Fig. 1). Initially, reactive bursitis due to osteochondroma was considered in the differential diagnosis and further examinations with ultrasonography (US) and magnetic resonance imaging (MRI) were performed.

On color Doppler US examination, the mass appeared cystic and had high turbulent flow consistent with a pseudoaneurysm. The narrow neck of the lesion originating from the popliteal artery was also demonstrated (Fig. 2). MRI characteristics of the lesion included pulsation and flow artifacts, and the lesion had heterogenous signal intensity in all sequences. A cortical broad-based sessile outgrowing osteochondroma was seen on the posteromedial side of the femur, anterior to the aneurysm; however, the cartilage cap of the osteochondroma could not be determined on T2-weighted images. On contrast-enhanced images, an increased signal intensity pattern and flow artifacts were detected within the lesion (Figs. 3, 4). In order to determine the internal structure of the osteochondroma, a computed tomography (CT) examination was performed. CT images in the bone window demonstrated cortical scalloping on the posterior side of the distal part of the femur, which was probably formed by the pulsation and pressure effect of the aneurysm (Fig. 5).

On preoperative digital subtraction angiographic examination, a large pseudoaneurysm originating from the right popliteal artery was seen. The pressure effect of the aneurysm on the popliteal artery had resulted in compressive thinning of the popliteal artery, but blood flow to the distal segments was normal (Fig. 6).

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Figure 1. Lateral X-ray of the femur shows a broad-based cortical osteochondroma at the posterior distal femoral diaphysis and an adjacent soft tissue mass.

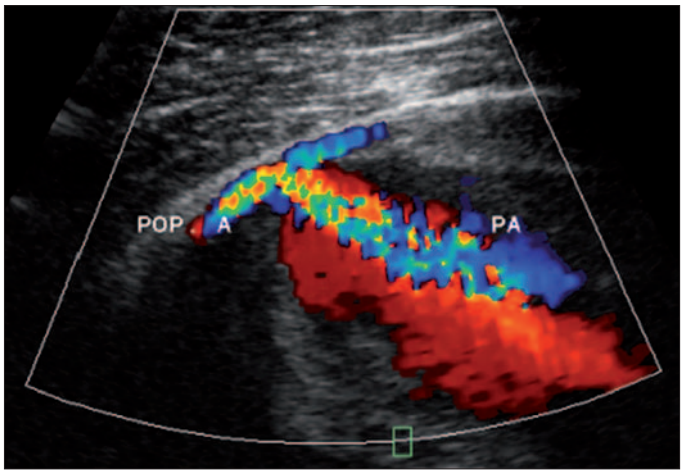

Figure 2. On color Doppler US, the high turbulent flow and narrow neck of the pseudoaneurysm (PA), which originated from the popliteal artery (POP A), are demonstrated.

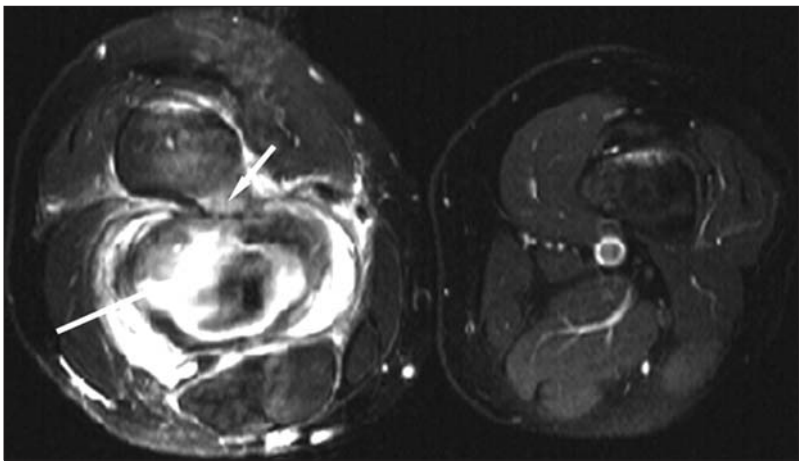

Figure 3. Transverse T2-weighted fat-suppressed MR image. On the posteromedial side of the distal femoral diaphysis the cortical broad-based osteochondroma is seen. Note that the cartilage cap is not present *(short arrow).* On the posterior aspect of the thigh, in close proximity to the osteochondroma, an aneurysm is seen as a heterogenous mass lesion due to the high turbulent flow within it *(long arrow).*

Figure 4. On sagittal contrast-enhanced dynamic MR image, the pseudoaneurysm has high signal intensity in the arterial phase.

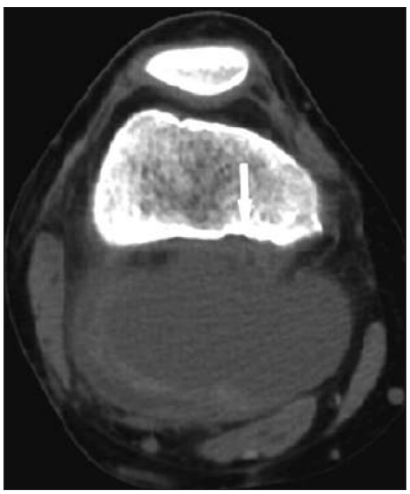

Figure 5. Transverse CT image in bone window demonstrates cortical scalloping on the posterior side of the distal part of the femur *(arrow).*

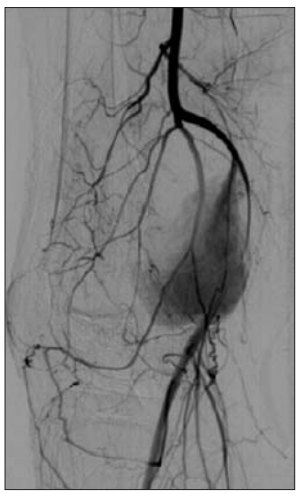

Figure 6. Digital subtraction arteriogram shows the filling of the pseudoaneurysm and distal patency of the popliteal artery.

The patient was treated surgically with a saphenous vein graft.

Discussion

Osteochondromas are osseous outgrowths arising from the bony cortex. They usually grow slowly during childhood and adolescence, with enchondral ossification. These tumors arise mainly in tubular bones near the metaphysis and are particularly common around the knee and the proximal end of the humerus (6). Although osteochondromas are usually asymptomatic, complications such as deformities, nerve compression, and malignant degeneration, and arteriovenous complications can occur (1, 3, 6, 7).

The most commonly reported vascular complication is pseudoaneurysm,

and the majority of vessels involved are either the popliteal or the superficial femoral arteries (8). Arterial and venous compression, as well as associated thrombosis, has also been documented (4, 8, 9).

Because the artery is proximally fixed at the aponeurotic hiatus in the adductor magnus and distally at the trifurcation, the popliteal artery is especially vulnerable to injury by osteochondromas (5, 8); therefore, the artery has little motility and, with the pressure effect from exostosis, it may erode and result in pseudoaneurysm formation.

The underlying mechanism in the formation of the pseudoaneurysm is a matter of debate. While, some authors believe that the loss of the cartilage cap of the osteochondroma is due to the pressure necrosis of exostosis induced by enlarging pseudoaneurysm (5), many others think that the lack of the cartilage cap leads to pseudoaneurysm formation. They propose that the cartilaginous cap that protects the artery ossifies and becomes rigid as the growth of the adult ceases, and the constant friction between the artery and the exostosis results in pseudoaneurysm formation (10–13). In our case, the cartilaginous cap was not present and on CT examination we detected scalloping on the posterior side of the distal femur. These findings point out that the lesion developed through a long period.

Radiologically, plain radiography is an excellent tool to determine the location, number, and morphology of exostoses. In our patient, we also examined the other extremity bones to rule out multiplicity of the osteochondroma. Color Doppler US is a helpful and inexpensive method for evaluating mass lesions associated with osteochondromas; however, the cartilaginous cap of the lesion is not easily detected on plain radiograms or US. MRI is useful in evaluating the thickness of the cartilaginous cap and also demonstrates the anatomic relationship between the osteochondroma and the pseudoaneurysm; therefore, it is the modality of choice in determining osteochondroma complications. Angiography provides a useful map in preoperative planning of the surgery.

In conclusion, in young patients with a palpable mass around the knee, the possibility of a vascular injury associated with an osteochondroma should be a consideration. Sessile osteochondromas, as in our case, may not be easily detected on plain radiographs. In cases with popliteal masses, cross-sectional imaging studies play an important role in demonstrating the presence of an osteochondroma, as well as its relationship to the surrounding structures.

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