Intraosseous ganglion is a benign non-neoplastic lesion of unknown etiology. In the previous reports, the femoral head and the tibia are relatively commonly affected\(^1\). However, its occurrence in the subchondral region of the knee is rare and the occurrence in a childhood is even rarely reported. We report a case of an 11-year-old girl with an intraosseous ganglion cyst at the subchondral area of the lateral femoral condyle, without communication with the joint. Previously, only two cases with similar clinical presentation have been reported.

**Case report:**

An 11-year-old girl was evaluated for right knee pain following a twisting injury. She belonged to a volleyball club and practiced almost every day. However, no history of antecedent trauma and no relevant medical history were noted. She had suffered mild knee pain in activities of daily living for three days before the injury and been managed by her primary care physician. Radiographic examination was performed by the initial doctor, and she was referred to our clinic for investigation of an abnormal lesion found in the radiograph.

Physical examination on her initial presentation at our clinic showed a full range of motion of the affected knee without limping, while effusion, swelling, local heat, instability or tenderness was not detected. Plain radiographs of the knee showed a small circumscribed radiolucency with a thin sclerotic margin in the subchondral region of the lateral femoral condyle. The lesion was located near the contact area at maximum knee extension (Fig 1). The size of the cyst was about seven millimeters in diameter. MRI examination showed a fluid signal in this structure with low signal intensity on T1-weighted images and high signal intensity on T2-weighted images (Fig 2). Complete blood count, erythrocyte sedimentation rate, and serum chemistry studies were normal.
In the differential diagnosis, osteochondritis dissecans and tumorous lesions such as chondroblastoma, chondromyxoid fibroma, giant cell tumor, and fibrous dysplasia were into account. Although the image findings and location are atypical, the lesion was tentatively diagnosed as osteochondritis dissecans. Since the accompanying clinical symptom and sign were minimal, we instructed her to stop any sports activities and wear a hinged brace limiting full extension during daytime. Six months after the treatment, although the symptom remained free, the size of the bony lesion had not decreased, and we decided to perform arthroscopy to make a definitive diagnosis.

On arthroscopic examination, an area with dimple and surface irregularity was seen at the weight bearing region of the lateral femoral condyle, where it contacted the tibial articular surface at full extension (Fig 3). The remaining structure within the knee joint was normal. On excision of the overlying tissue, the lesion was cystic containing brown mucous fluid. Removal of the surrounding lining tissue and curettage were performed. The biopsy included the wall of the cyst and the overlying cartilage. No association between the cyst and the articular structures such as the joint capsule, cruciate ligaments and meniscusi was observed. Histologically, the lining tissue consisted of dense fibrous tissue with spotty areas of calcification suggesting a repetitive microtrauma or longstanding inflammation. The overlying cartilage appeared to be necrotic and degenerative. These findings were consistent with those reported in the previous studies as ganglion.

At the nine-month postoperative follow-up, the radiographic examination showed that the bony lesion was hardly recognized with apparent healing (Fig 1). She was permitted to resume sports activity without recurrence of symptoms afterwards.
**Discussion**

Our patient presented with an intraosseous ganglion in the subchondral region of the femoral condyle. The occurrence of a ganglion in this location and the age group is rare. The youngest patient previously reported with this type of ganglion was a 6-year-old boy (2). His past medical history was significant as he suffered from Pierre-Robin syndrome. No ligamentous attachment was seen in his knee, but the cystic lesion existed within the joint. The only other report of an intraosseous ganglion in a younger patient was a 12-year-old boy (3). In this case, the cyst originated from a posterior cruciate ligament.

The cause of the interasseous ganglion is unknown. Kambolis reported that ganglionic cysts of the bone developed by invasion of the ganglion-like connective tissue into the bone from the local soft parts (4). Schajowicz et al. stated that the intraosseous ganglion has two fundamentally different types (5). They suggested that approximately 15% originate as a result of penetration of an extra-osseous ganglion into the underlying bone, while the remaining 85% are of intraosseous origin related to altered mechanical stress leading to intramedullary vascular disturbance and aseptic necrosis. They attributed the etiology of the cystic formation in the latter type to revitalization of necrotic areas by fibroblastic proliferation and subsequent mucoid degeneration.

In the presented case, extension of the ganglion into the joint cavity was not present and the lesion was located in the subchondral region of the lateral femoral condyle. Location of the cyst was the area of contact at full extension where the repetitive mechanical stress may be applied, since the patient was a volleyball player. We speculated the lesion in this case might have occurred as a result of repetitive overstress or microtrauma. Histological findings of the cyst wall seem to be coincident with our
speculation. Arthroscopic examination of the articular surface of the lesion showed dimple and thinning of the overlying cartilage. There may have been a subtle communication between the cyst and the intraarticular space. Influx of the synovial fluid and the resultant pumping action can be considered as a potential cause of cyst enlargement. Another possible etiology of the presented case based on the patient age and activity is osteochondritis dissecans of atypical image presentation. Although both arthroscopic and histological findings in this case are not consistent with those of osteochondritis dissecans, repetitive overstress to the weak subchondral bone in the growing athlete is thought to be a common causative factor.

Management of the intraosseous ganglion in the previous reports is usually simple curettage with or without bone graft, and the prognosis is generally good without recurrence. Only curettage was performed in this case because the lesion was small and left open. The subsequent healing was observed in several months. However, continued check-up seems to be required for the possibility of recurrence of the lesion.
References


Figure Legend

FIGURE 1. Pre- and postoperative radiographs
(A) Preoperative radiograph showing a small circumscribed radiolucency with a thin sclerotic margin in the subchondral region of the lateral femoral condyle (black arrow).
(B) A radiograph taken at nine months showing healing of the lesion.

FIGURE 2. (A) T1-weighted coronal MR image (B) T2-weighted coronal MR image
A cystic structure is seen in the lateral femoral condyle (black arrow). A lesion of low signal intensity on T1-weighted image and high signal intensity on T2-weighted image is evident.

FIGURE 3
(A) On arthroscopic examination, a small dimple and surface irregularity of the overlying cartilage is seen at the lateral femoral condyle, where it contacted at full-extension (black arrow). (B) After the curettage, bloody mucous content flows inside of the cavity.
Figure 1

A Pre ope

B At nine months

FIGURE 1
FIGURE 2
FIGURE 3

A  Lat.condyle
   Lat.meniscus

B

FIGURE 3