

NON-IDENTICAL PRESENTATIONS OF INTRA-ARTICULAR ANTERIOR CRUCIATE LIGAMENT GANGLION CYSTS: A REPORT OF TWO CASES AND REVIEW OF LITERATURE

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Abstract-An uncommon cystic, tumor-like lesion of uncertain origin, an anterior cruciate ligament ganglion is encircled by dense connective tissue that is filled with a gelatinous fluid. Ganglion cysts and ACL mucoid degeneration may coexist. The size and location of the lesion determine how the lesion presents clinically. Two examples of ganglion cysts originating from the anterior cruciate ligament are presented here; one exhibits a painful restriction of flexion, while the other presents with chronic pain that is not related to motion restriction. With MRI, this uncommon clinical disease can be identified. It can be distinguished by magnetic resonance imaging (MRI) from pigmented villonodular synovitis, synovial sarcoma, mucoid degeneration of the ACL, and localized synovitis. It can be treated by arthroscopic cyst debridement or aspiration assisted by CT or USG. ACL damage must be prevented with caution. Following arthroscopic cyst debridement, both patients experienced complete functional recovery. Conclusion: Although uncommon, ganglion cysts of the ACL should be considered a differential diagnosis for knee discomfort. Diagnosis is confirmed by MRI evaluation. Good clinical results can be achieved by arthroscopic debridement of cysts without causing ligament damage.

Key words: mucoid cyst, ganglion, and anterior cruciate ligament, mucoid degeneration.

1. Introduction:

Anterior cruciate ligament (ACL) ganglion cysts and mucoid degeneration are two types of degenerative disorders of the ACL that can coexist in the same person¹. A ganglion is a cystic, tumour-like lesion of unclear origin that is encircled by a dense

layer of connective tissue that contains a gelatinous fluid that is high in mucopolysaccharides and hyaluronic acid². Numerous tissues in and around the knee joint, such as the popliteus tendon, alar folds, and cruciate ligaments and menisci, have been implicated in the development of ganglion cysts. Additionally, the infrapatellar fat pad may experience them³. The majority of individuals who have intra-articular ganglion cysts are asymptomatic, and the diagnosis is often detected by chance during routine arthroscopy or MRI³. Complicated ganglion cysts can cause pain, stiffness, and mechanical locking as clinical signs¹. These symptoms could be like those involving internal knee derangement⁴. Arthroscopic resection, debridement, and excision is currently the accepted course of treatment for a symptomatic knee intra-ligamentous ganglion cyst⁵. There have also been descriptions of percutaneous aspiration guided by computed tomography⁶. We present two examples of ACL ganglion cysts with various clinical manifestations.

Case 1: A male 17 years old who had trouble squatting and left knee pain for six months was brought in to see the senior author (SD). After the injury, he gradually lost the capacity to flex his knee joint (Figure 2) and became unable to sit cross-legged or squat. While walking, his knee hurt. Knee flexion was limited to 90 degrees and could not be flexed because of pain. Examination of the menisci and ligaments was normal. The knee's plain radiograph was normal. Multiple ganglion cysts affecting the middle and proximal third of the anterior cruciate ligament were discovered during an MRI evaluation (Figure 1). Most of the cysts were located posterior to the ACL, touching the posterior capsule. We made the decision to do arthroscopic cyst debridement in light of the worsening symptoms.



Figure 1: Sagittal and coronal MRI section of left knee showing moderate enlargement of Anterior cruciate ligament with large multiple cyst in mid and proximal segment.



Figure 2: Clinically restricted flexion at left knee

During diagnostic arthroscopy, a bulky ACL with a normal meniscus was discovered (Figure 3A). A grade 2 chondral lesion, possibly caused by an injury, was observed on the lateral femoral condyle. A cystic measuring 2 by 2 cm was discovered when a plane was made between the anterior and posterior cruciate ligaments in the notch (Figure 3B), and it was pierced with a shaver.

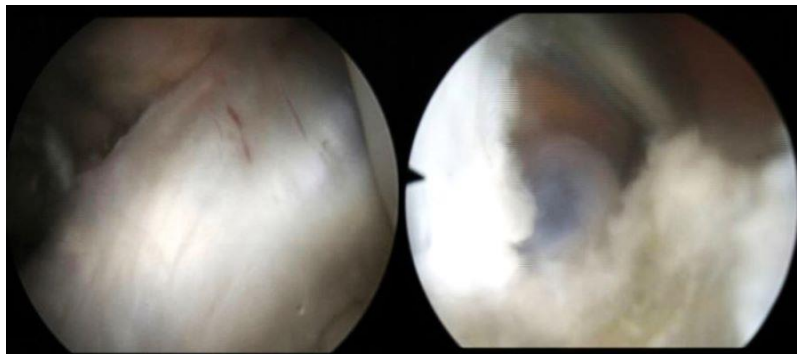


Figure 3: (A) Grossly thickened Anterior Cruciate Ligament on Arthroscopy. (B) Visible cyst after creating a plane between ACL and PCL.

Figure 4A shows mucinous fluid emerging from the cyst. Behind the ACL, another cyst was visible (Figure 4A, B). Since the ACL was still thick, the cyst was punctured through the ACL using a needle and shaver. The ACL reverted to its original shape.

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Wounds were covered with drains and treated with joint lavage. The following day, knee motion exercises were begun. After two months, the patient could fully bend their knee without pain.

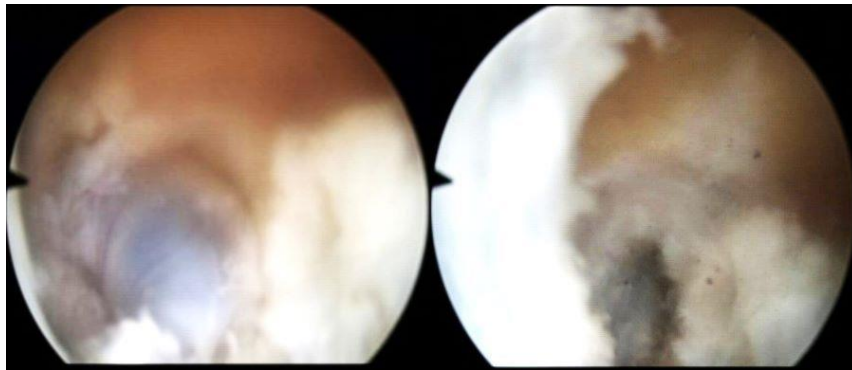


Figure 4: (A) Second cyst after debridement of the first cyst with visible mucinous fluid. (B) Debrided second Cyst.

Case 2: A 40-year-old man complained that she had been experiencing right knee pain all day for the previous two years. He has never had an injury. Despite undergoing physiotherapy, the patient's symptoms did not improve. Meniscal symptoms and ligament laxity were not shown by the clinical examination. Painless complete knee flexion was achieved. The knee joint's X-ray is normal. An MRI study revealed a ganglion cyst involving the anterior cruciate ligament's tibial connection (Figure 5).

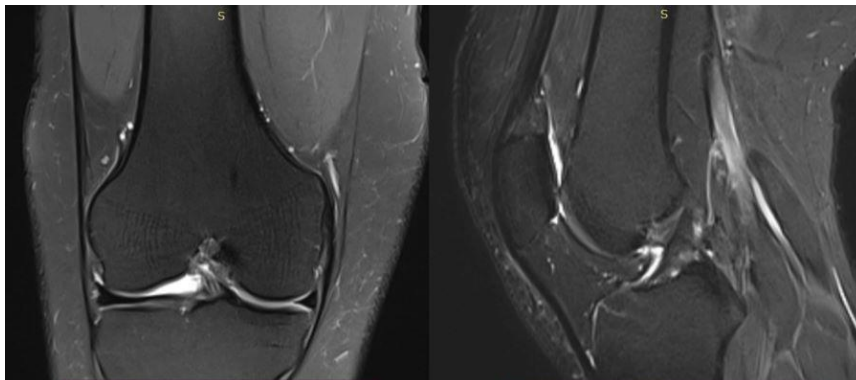


Figure 5: (A) Sagittal and (B) coronal MRI section of the right knee showing enlargement of anterior cruciate ligament with cyst in the antero-distal area of the tibial attachment of the Anterior Cruciate Ligament.

We chose to do arthroscopic debridement of the cysts due to the worsening symptoms. Near the ACL's tibial connection, a 1 cm by 1 cm ganglion cyst was observed with coexisting mucoid degeneration. A spinal needle was used to puncture the cyst, and the fluid was removed. The cyst wall and ligament bulk were cut down with an arthroscopic shaver without endangering the tendon (Figure 6). The cartilage and menisci were normal. Six months after the surgery, she no longer had any knee pain.

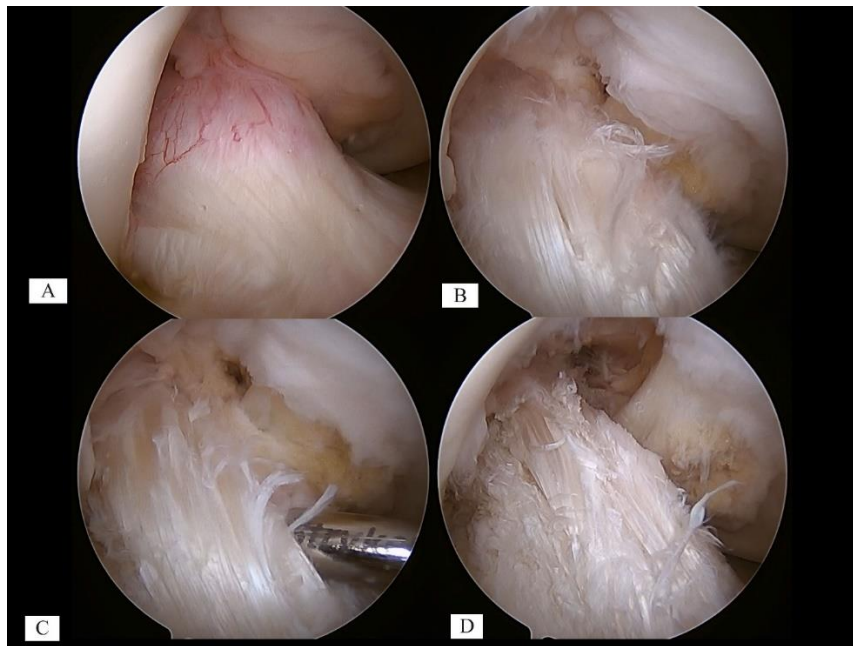


Figure 6: (A) Thickened Anterior Cruciate Ligament on Arthroscopy with absent synovium, (B) Release of mucous like deposition between fibres, (C) completely covered inter-condylar notch with thickened ligament, (D) final clinical image with adequate partial ligament debridement.

1. Discussion

Compared to ganglion cysts on the dorsum of the wrist and the palm of the hand, ganglion cysts within the knee cavity are incredibly rare⁷. In two studies that examined a large number of knee examinations, the incidence on MRI was 0.29%^{3,4} and 0.44%⁸. This is consistent with an analysis of 6,500 arthroscopic exams that found a 0.54% incidence⁹.

Following a cadaveric examination of an elderly male patient, Caan described the first case of an intra-articular knee cyst in 1929¹⁰. These tumours could have many lobules or just one¹¹. Though they are infrequently observed within knee ligaments, ganglion cysts typically develop within muscles, tendon sheaths, or joint capsules¹².

ACL ganglia and mucoid degeneration are frequently found together, and Bergin et al. reported these two conditions may have a similar pathophysiology^{6,1}. According to a different view, ganglia arise as a result of synovial tissue herniating through a breach in the tendon sheath¹². A third explains synovial tissue displacement during the embryonic stage⁴. It is unclear how trauma relates to this. The literature indicates that between 38% and 67% of patients with symptomatic ganglion cysts report having experienced a traumatic knee event prior to the onset of symptoms^{8,9,13}. The release of hyaluronic acid, a muco substance, by the cells in reaction to trauma is one explanation. This causes the ligament's fusiform dilatation by being woven throughout its fibers. The mucin material dissects the ligament fibers with joint and tissue motion; it can be found in the knee's intercondylar notch or at the ligament attachments¹⁴.

Ganglions are classified into three broad groups based on their location surrounding a joint: periosteal, intra-articular, and juxta-articular¹⁵. In general, juxta-articular ganglia are rather widespread, with more than half of them situated in the wrist region¹⁶. Intra-articular ganglia are relatively rare lesions that are usually related to the cruciate ligaments, but they have also been shown to originate from the posterior joint capsule and Hoffa's fat pad¹⁵. Few periosteal ganglia have been reported in the literature, making them uncommon lesions. Men account for almost 50% of cases of periosteal ganglia, with the majority of patients in their fourth or fifth decade. The majority of them are mostly found at the extremities of long tubular bones, with the majority being found in the pes anserinus area¹⁷.

Mild localized pain, usually intermittent and worsening with weight bearing, is frequently linked with intra-articular cysts³. They often imitate other types of internal derangement of the knee and are also linked to recurrent effusions or locking in the extremes of flexion or extension^{7,9}. It seems that the position of the cyst affects the amount of knee motion limitation. Primary cysts situated anterior to the cruciate ligament tended to restrict knee extension, while primary cysts situated posterior to the ligament tended to restrict knee flexion¹⁸⁻²⁰. According to Sumen et al.¹⁸, variations in the length and Torsion of the cruciate ligaments during knee motion may cause the cysts to traction or compress, which may excite the nerve terminals on the nearby synovium. This theory provides an additional reason for the knee motion limitation.

The lesions are cystic formations anatomically. Under a microscope, multiple layers of randomly aligned collagen fibers make up the exterior wall. With few fibroblasts and mesenchymal cells interspersed among the collagen fibers, the wall is essentially acellular. Due to its absence of an epithelial coating, this formation differs significantly from synovial tissue and is not a real cyst. A clear, sticky mucin that contains globulin, albumin, glucosamine, and hyaluronic acid is found inside¹¹.

Although neither anterior cruciate ganglia nor mucoid degeneration of the ACL are usually linked to ligamentous instability, they can happen separately or together. Guidelines for the MR distinction of ACL ganglia and mucoid degeneration were put forth by Bergin and associates¹. ACL ganglia criteria include a fluid signal in the ligament's material that is out of proportion to the amount of joint fluid and affects intact ligament fibers mass-wise. An intact ligament that appears poorly on T1-weighted or proton density MR sequences but clearly on T2-weighted sequences is referred to as mucoid degeneration. Posterior cruciate ganglia are usually well-defined cystic entities situated

along the surface of the ligament, whereas ACL ganglia usually have a fusiform appearance and may be scattered inside the ligament's fibers¹.

A meniscal cyst, an intraarticular ganglion, pigmented villonodular synovitis, and synovial sarcoma are among the possible diagnoses for an intracapsular cystic mass of the knee. With the exception of meniscal cysts, all these entities have distinctive MR imaging appearances and should not present a diagnostic challenge¹. Meniscal cysts are typically linked to horizontal meniscal tears and can occur anywhere in the knee joint. Medial cysts are less common than lateral cysts. Image quality of T1 and T2 weighted images shows isointense meniscal cysts. Meniscal cysts that are complicated may contain septations. Additionally, a meniscal cyst may separate Hoffa's fat pad and manifest as a palpable mass¹⁴.

It has been demonstrated that arthroscopic removal of ganglionic cysts is the preferred course of treatment, with 95% of patients reporting favourable or outstanding outcomes⁹. Although arthroscopic excision has a low recurrence rate, it necessitates hospitalization and general anaesthesia^{3,21}. One advantage of percutaneous aspiration with CT and ultrasound guidance is that it is an outpatient surgery with a shorter recovery period²¹. Although recurrence rates are unclear, PCL ganglion cysts have been effectively treated with CT and ultrasound-guided aspiration^{21,22}. Additionally, it has been proposed that, under conservative care, certain cysts may spontaneously diminish or vanish^{4,18}.

2. Conclusion

Even though they are uncommon, intra-articular ganglion cysts should be considered a differential diagnosis when mechanical locking or unexplained progressive knee pain occur, especially when there has not been any obvious damage. These cases emphasize how crucial it is to take this diagnosis into account, especially for individuals who present with knee discomfort and difficulties bending. The preferred method of identification for ganglia in the knee joint is magnetic resonance imaging (MRI). It is necessary to differentiate ACL from mucoid degeneration. They might coexist in some situations and make management more difficult. Accurate identification of the size, shape, and position facilitates preoperative planning for the preferred treatment, arthroscopic resection.

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