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Original Article

Tenosynovial giant cell tumor arising from the posterior cruciate ligament: a case report and literature review

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Abstract: The localized form of tenosynovial giant cell tumor or pigmented villonodular synovitis is rarely intraarticular in the knee. We reported a 40-year-old woman with a tenosynovial giant cell tumor arising from posterior cruciate ligament (PCL). She suffered sudden knee pain and locking without any reason for two days. A mass with a size of 1.7×0.8×0.7 cm in the fossa intercondyloidea was detected on the MRI. After one time hyperextension physical examination the patients felt sudden pain relief. During the arthroscopy examination, a loose soft tissue mass was found under the lateral meniscus. Only the synovium tissue lesion on the proximal PCL was detected. The mass had a conceivable thin pedicel and the shape matched well with the tumor bed on the PCL. The histopathology of the mass demonstrated a tenosynovial giant cell tumor. At six weeks follow-up, no clinical evidence of recurrence was noted. A *Literature Review* of tenosynovial giant cell tumor or pigmented villonodular synovitis arising from the PCL is present.

Keywords: Tenosynovial giant cell tumor, posterior cruciate ligament, arthroscopy, literature review

Introduction

Tenosynovial giant cell tumor, is also known as pigmented villonodular synovitis, arises in the synovial tissue of the joint, mucosal bursa, tendon sheath, and fibrous tissue adjacent to the tendon [1]. It has diffuse and localized forms based on the growth pattern and clinical behavior [2, 3]. The localized form of tenosynovial giant cell tumor predominantly involves the fingers [1, 4-6], which is rarely intraarticular in large joints like the hip [5, 7], knee [8-10] and the ankle [11, 12].

The reported tenosynovial giant cell tumor involving areas in the knee include the anterior cruciate ligament (ACL) [13, 14], posterior cruciate ligament (PCL) [15-18], medial plicae [19] and fat pad [10, 20], etc. There are only four reported cases of localized form of tenosynovial giant cell tumor or pigmented villonodular synovitis arising from posterior cruciate ligament (PCL) [15-18]. Three cases were reported in popliteal side of the PCL [16-18] and only one case was reported in the fossa intercondyloidea [15].

In this case report, we present a rare case with localized tenosynovial giant cell tumor arising from PCL in the fossa intercondyloidea. She had suffered sudden knee locking and severe pain. The tumor even detached from the PCL two days later during the physical examination.

Case report

It was a case of 40-year-old woman suffering from sudden knee pain and locking without any reason for two days. She also suffered from a kneeling injury while falling from the bike 3 years ago but the pain and swelling disappeared three days later without any sequelae left.

Because of the severe pain and locking (at 30 degrees flexion), the physical examination cannot be well performed. There was moderate joint effusion. The antero-posterior and lateral film and the MRI of the knee were examined but no bone pathology or meniscus injury was detected.

After the Celebrex therapy (200 mg per day) for two days the pain released remarkably and the knee could move easily, but there was still 15

Figure 1. A-D. Magnetic resonance imaging (examined 2 days before arthroscopy) showed a mass in front of the PCL. On T1 image, a mass with homogeneous low signal intensity was hard to be seen in front of the PCL femoral insertion (A). On T2 sagital, frontal and axial images, a mass with homogeneous intermediate signal intensity was seen (white hollow arrow) (B-D).

degrees restriction in extension. The Lachman, anterior and posterior drawer tests and medial-lateral stress tests were negative. There was no joint line tenderness. The McMurray test was negative. There was still a mild pain during extension. Interestingly after one time hyperextension examination the patients felt sudden pain relief but there was still 20 degrees restriction in flexion.

After careful MRI reading a suspected mass was found in the fossa intercondyloidea. It was measured as large as 1.7×0.8×0.7 cm on the MRI sagittal, axial and frontal plane images (**Figure 1A-D**). So we decided to perform the arthroscopy examination.

During the arthroscopy examination, the joint fluid was found cloudy with grey floccus. The cartilage, meniscus and ACL were all good. No mass was detached with the PCL as was shown on the MRI images. A loose soft tissue mass was found under the lateral meniscus and was taken out with clamp (**Figure 2A**, **2B**). The synovium tissue lesion on the proximal PCL was easily identified with clear tumor bed margin

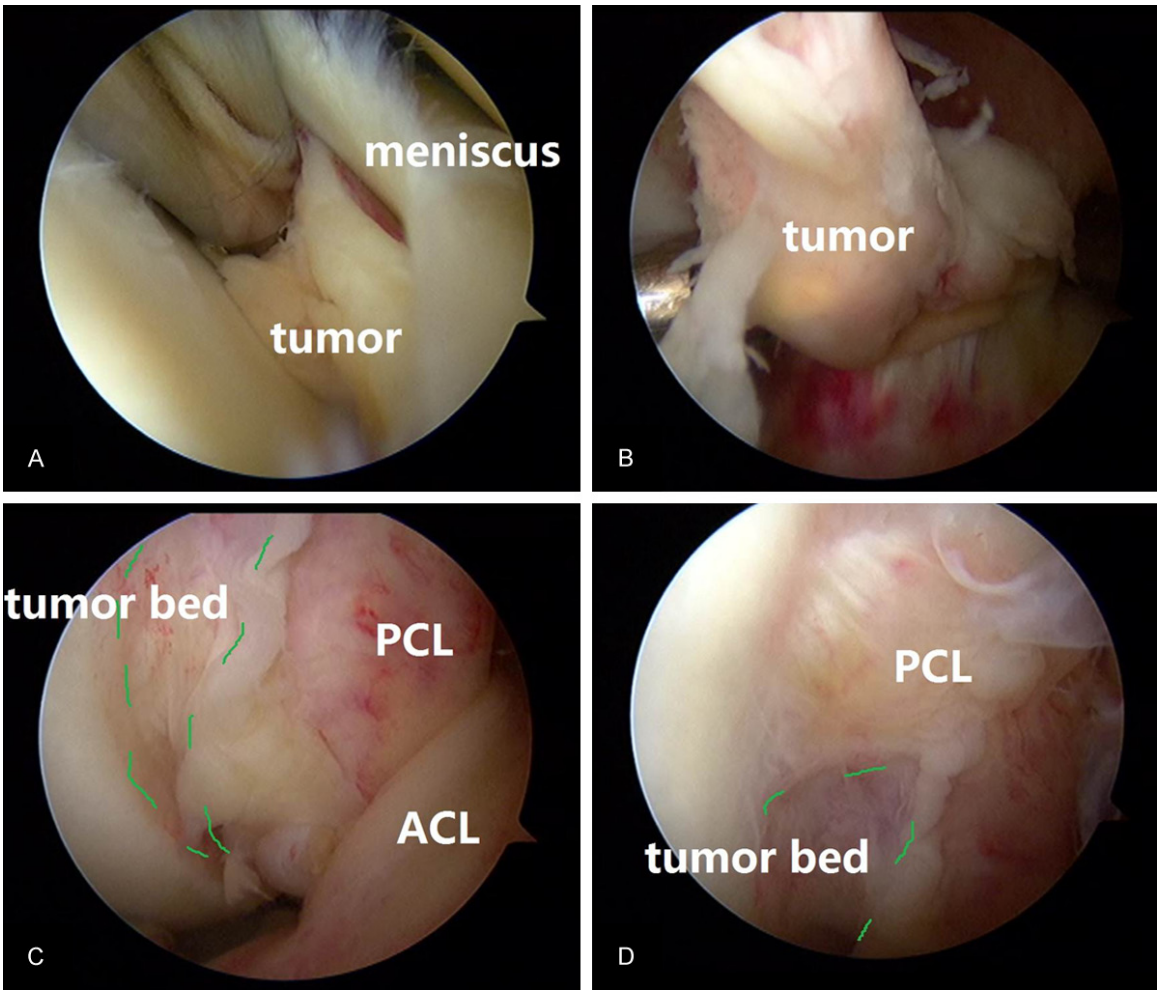

Figure 2. (A-D) The mass detached from the PCL into the knee joint and the synovium tissue lesion on PCL was detected with arthroscopy examination. The loose mass was under the lateral meniscus (A) and was moved to the fossa intercondyloidea with the suction (B) The tumor bed on the PCL (with green broken line showing the edge) can be identified which is surrounded by synovium tissue lesion in front of PCL (C, D).

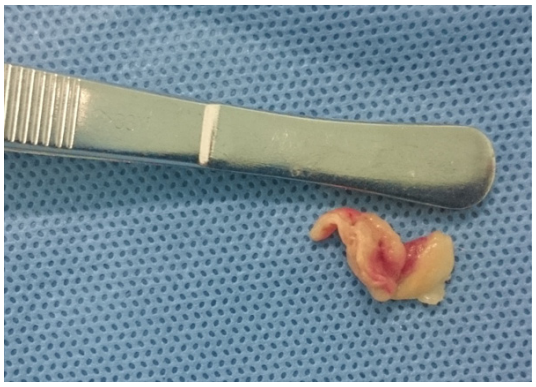

Figure 3. Gross examination of the soft tissue mass showed brown, red in color and patially dark yellow on the edge. The left side showed a conceivable pedicle matched well with the tumor bed showed on C. The shape of the right side matched well with the tumor bed showed on D.

(**Figure 2C**, **2D**). After careful examination, no more mass was detected in the joint and no other synovium tissue lesion in the knee was found. The synovium tissue lesion and the tumor bed were then treated with shaver and thermal ablation device.

The mass showed brown, red in color and patially dark yellow on the edge and had a conceivable thin pedicel (**Figure 3**). The size was similar to the measuring on the MRI and the shape matched well with the tumor bed on the PCL. Histopathology of the mass revealed a tenosynovial giant cell tumor (**Figure 4A-C**). The postoperative course was uneventful. At three months follow-up, the patient appeared to be asymptomatic and resumed normal daily life. No mass was found in the fossa intercondyloidea by MRI examination.

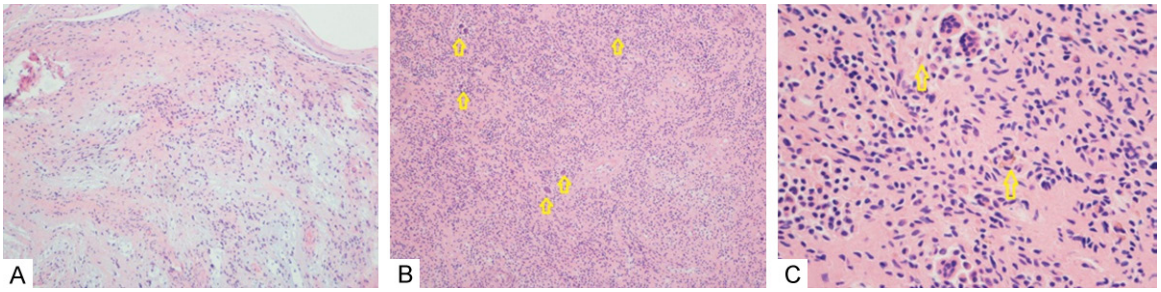

Figure 4. (A-C) The histopathology of H & E staining revealed that the lesion was a giant-cell tumor of the tendon sheath. The density of the cell on the border of the mass was lower than on the center and has mucinous degeneration (A) (×100). The mass was compose of sheets of round mononuclear cells together with a few scattered multiple nuclear giant cell (yellow arrow in B) (×100). The nuclear division was rarely seen. Scattered hemosiderin granules was present (yellow arrow in C) (×400).

Discussion

This is a rare case of detached localized tenosynovial giant cell tumor arising from the PCL. It is relatively hard to be diagnosed and treated for the small size of the tumor and the short history. A repeated reading and comparing of the normal MRI was essential. The decision was finally made by an experienced surgeon for the suspected tumor even when the pain and locking symptoms released. We take out the intact mass instead of using the shaver and the tumor bed was also treated with shaver and thermal ablation device.

A comprehensive literature search for tenosynovial giant cell tumor or pigmented villonodular synovitis arising from PCL was performed and only 4 cases were found. The age ranged from 18 to 54 years. Major symptom for these cases was ongoing mild pain with mild restriction in knee flexion or extension. Differently, this case presented acute severe pain and locking. Two of the four cases had a trauma history and the other two denied trauma history. The present case also had a trauma history three years before but there was no sequlae left. Three of the four cases had the tenosynovial giant cell tumors localized in the popliteal side of the PCL and the other one localized in front of the PCL (**Table 1**).

Because of the slow growing nature of the tenosynovial giant cell tumor [21], the previous reported four cases present a history of 2 months to 5 years after the initial onset of symptoms. The tumor size of the present case was relatively smaller than the three cases reported which located behind the PCL and similar to the case reported by Kim RS [15] which located in the fossa intercondyloidea.

The probable reason for the detachment of the present case was the pedunculated tumor with a thin pedicle, though it was not demonstrated by arthroscopy. Whether this kind of tumor is easily to detach from the PCL is not clear. Kim RS also reported a case of pedunculated pigmented villonodular synovitis in front of PCL which was easily removed. Recurrence of the four cases of localized tenosynovial giant cell tumor arising from the PCL was not reported before for 2 to 3 years' follow-up. The present patient was only followed for one month but we think the early diagnosis and timely treatment may lead to an expectant result.

Conclusion

Trenosynovial giant cell tumor may arise from posterior cruciate ligament in the fossa intercondyloidea. Such case may present severe knee pain and locking and the physical examination may even lead to the detachment of the tumor.

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Disclosure of conflict of interest

None.

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Table 1. Review of the localized tenosynovial giant cell tumor or pigmented villonodular synovitis arising from posterior cruciate ligament of the knee

No.	author	gender	age	location	size	history	trauma history	complaint	follow-up time	reccurence
1	Sheppard DG [18]	female	47	behind PCL	3.0×1.5×1.0 cm	2 month	yes	pain	NA	no
2	Aksoy B [17]	female	54	behind PCL	2.2×1.8×1.8 cm	2 years	no	pain in walking and climbing up and down the stairs	3 years	no
3	Camillieri G [16]	male	18	behind PCL	4.8×2.1×2.7 cm	2 years	no	mild pain and swelling localized in the popliteal region	2 years	no
4	Kim RS [15]	male	28	In front of PCL	1×1×0.8 cm	5 years	yes	pain	2 years	no

NA-not applied; PCL-posterior cruciate ligament.

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