

Arthroscopic treatment of symptomatic calcific periarthritis on the medial side of the knee after posterior cruciate ligament reconstruction: Case report and literature review



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ABSTRACT

Calcific periarthritis in the distal femur is a rare condition. Forty two year old Asian male visited to the outpatient clinic of orthopedic department with acute excruciating knee pain. The arthroscopic posterior cruciate ligament (PCL) reconstruction was performed 20 years ago with the bonepatellar tendon-bone (BPTB) autograft combined with Trevira (polyethylene terephthalate) artificial ligament. Severe tenderness was noted incidentally over the medial epicondyle area of the distal femur which the cancellous screw was inserted for PCL reconstruction, without any preceding trauma history or medial joint line tenderness due to degenerative change. The poorly defined calcific deposition was found in plain radiograph. The arthroscopic debridement of the calcification and screw removal from the distal femur was performed due to resist to conservative treatment with analgesics. After operation, the symptoms were resolved completely. The arthroscopic debridement of calcific periarthritis should be considered in specific cases, such as refractory cases with conservative management during 4–6 weeks. We present the arthroscopic treatment of the symptomatic calcific periarthritis on distal femur after PCL reconstruction can be effective.

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Introduction

Calcific periarthritis is a benign condition characterized by deposition of calcium hydroxyapatite in the soft tissues around joints. It is often related with specific metabolic disorders such as end stage renal failure, diabetes mellitus, hypophosphatasia, chronic repetitive injury or microtrauma.^{1–3} Calcific periarthritis predominantly found to the shoulder,^{1,4} but has also been described throughout the body such as wrist, hip, thigh, knee, ankle and foot,⁵ characterized by severe pain, swelling and disability of the each part. However, calcific periarthritis of the distal femur is an unusual cause of knee pain. Generally, the conservative treatments including rest, non-steroidal anti-inflammatory drugs, and analgesics are usually effective. Meanwhile, the surgical procedures including arthroscopic debridement also can be an effective

treatment in refractory to conservative treatment or severe cases for immediate pain relief and early return to normal condition.^{6,7}

We present an unusual case of calcific periarthritis on the distal femur just above the head of cancellous screw for the posterior cruciate ligament (PCL) reconstruction, which was treated by arthroscopy.

Case presentation

A 42-year-old male presented with a 5-day history of acute onset and nontraumatic knee pain to the outpatient orthopedic clinics. There were no previous medical histories, such as gout, diabetes, sepsis or relevant family history. Twenty years ago, the arthroscopic posterior cruciate ligament (PCL) reconstruction was performed with the bone-patellar tendon-bone (BPTB) autograft combined with Trevira (polyethylene terephthalate) artificial ligament. The graft was fixed with cancellous screw and staple on each proximal and distal end of tunnel. The outcomes of PCL reconstruction were successful in terms of clinical and functional results including knee pain, symptoms of instability before visiting the

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outpatient clinic. The pain was progressively aggravation and resisted to conservative treatment despite of the administration of analgesics. The physical examination revealed a moderate knee effusion without heating or skin lesions except postoperative scar. The severe tenderness was found over the medial epicondyle area of the knee, which the cancellous screw for PCL reconstruction was inserted. However, there were no tenderness points on medial knee joint line. The ligamentous laxity could not be checked exactly and both passive and active ranges of movements were restricted from 0° to 110° due to pain.

Plain radiographs of the knee anteroposterior (AP) and merchant view showed a calcific deposition over the medial aspect of the medial femoral condyle (Fig. 1). Magnetic resonance images were limited due to metal artifact except degeneration and suspicious horizontal tear in medial meniscus, but no other specific findings were found. The laboratory examinations showed all normal values including C-reactive protein, erythrocyte sedimentation rate, alkaline phosphatase and uric acid.

Because the refractory pain and point tenderness just above the inserted screw were persisted after conservative treatment using analgesics, the metal irritation or calcific peri-arthritis on distal femur were supposed to induce the patient's symptoms. Accordingly, the arthroscopic removal of calcific deposition was decided.

The patient was placed in supine position after general anesthesia. During arthroscopic exam with full extension position, the arthroscopy was placed on the anterolateral portal to evaluate the knee, and the anteromedial portal was used to probe the medial compartment of the knee. With a synovial congestion, some whitish, toothpaste-like, but hard deposition was found just above the screw head after partial synovectomy (Fig. 2). The calcification was removed entirely and washed out using the shaver and punch. The intraoperative tissue samples were sent for histopathology.

Then, cancellous screw and staple on distal femur were removed by mini-open incision (Fig. 3).

The preoperative visual analogue scale (VAS) score was 8, and then significantly decreased to 1 after surgery. At final follow up at 2 years after surgery, the symptoms were free and all calcifications were completely removed with no recurrence. Histopathology revealed degenerative fibrocollagenous tissue with calcification consistent (Fig. 4).

Discussion

Calcific peri-arthritis is a rare, monoarticular, periarticular process of dystrophic mineral deposition, a distinct clinical type of calcium hydroxyapatite deposition disease.² Patients often present with acute pain related to involved joints, with no history of prior injury. The process is usually monoarticular, most of which were in the rotator cuff in shoulder, however can affect several joints, such as in the elbow, wrist, finger, hip, knee.⁴ Calcific peri-arthritis that occurs other than adjacent to the shoulder is uncommon, especially rare in knee joint (Table 1).

As a differential diagnosis, the Pellegrini-Stieda syndrome that defined the calcification of the origin of the MCL should be considered. There were controversies of the pathogenesis of Pellegrini–Stieda lesion, however, the history of trauma should be followed by the delayed presentation of the lesion approximately 3 weeks.⁸ But in this case, the patient has no history of trauma and acute onset of symptoms, therefore, the clinical manifestations of this patient are different from that of the Pellegrini–Stieda syndrome.

It is generally thought to be caused by a variety of contributory factors and medical conditions. Many factors, such as acute injury, repetitive microtrauma, and chemical-induced trauma may cause



Fig. 1. Preoperative knee. (A) Anteroposterior and (B) Merchant radiographs. Calcifications (Black arrow) were deposited over the cancellous screw that was fixed on medial aspect of the medial femoral condyle.

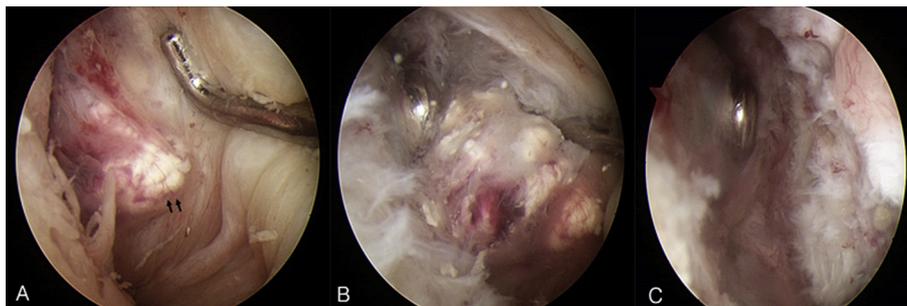


Fig. 2. Arthroscopic view. (A) Bulging of the calcific deposit (arrows) with synovial congestion around the distal femur medial compartment. (B) White and hard calcific depositions exuded from the excised synovial membrane. (C) After all calcific depositions were removed.

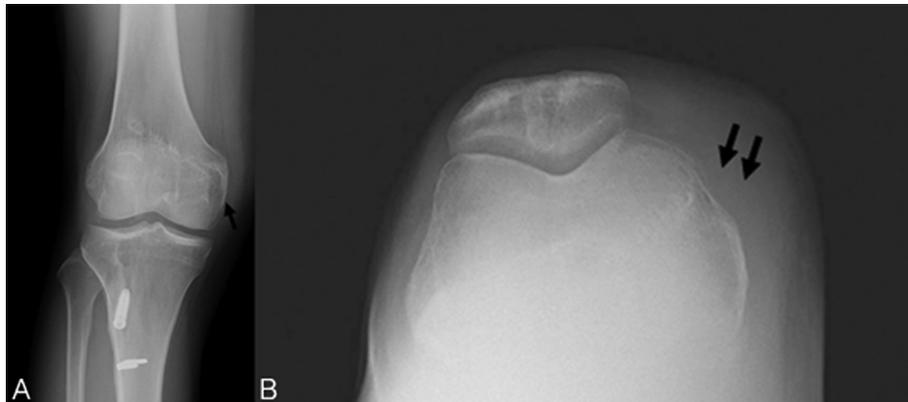


Fig. 3. 2 years follow up knee. (A) Anteroposterior and (B) Merchant radiographs. All calcific depositions were disappeared (Black arrow) on the medial compartment of the medial femoral condyle.

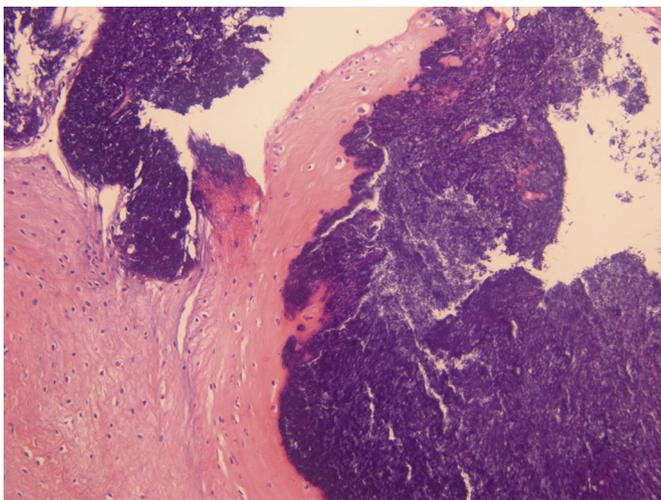


Fig. 4. Biopsy result from obtained specimen. The lesion shows extensive calcium deposit in the articular joint. (HE, $\times 200$).

damage to the soft tissue and trigger the healing process. The tendon healing process is organized sequential steps such as matrix synthesis and remodeling, inflammatory cytokine synthesis, neo-vascularization, recruitment healing cells. The thyroid and estrogen metabolism or some medical conditions, especially diabetes mellitus, may contribute to tendon healing process.¹ Disturbances at

different stages with any reason may lead to different histopathological changes. The failed healing response can induce calcific deposition with abnormal growth factors and erroneous differentiation of cells.⁴

There is another differential diagnosis of calcific periartthritis, hypophosphatasia as a heritable metabolic disease. Hypophosphatasia results from mutations in the gene for the tissue-nonspecific isozyme of alkaline phosphatase and the inorganic pyrophosphate accumulates extracellularly, leading to rickets or osteomalacia.⁹ The clinical manifestations of hypophosphatasia range from neonatal death to only dental problems in adults without any bone problems.¹⁰ The definite pathogenesis of this disease is still unclear, however, lesser concentrations of inorganic pyrophosphate seems to enhance calcium precipitation and to form calcium phosphate and hydroxyl apatite deposition in certain tissue around joint.^{10–12} For the patient in this study, there are no familial disease as well as no abnormality of laboratory results, therefore hypophosphatasia could be ruled out for this patient.

Calcific periartthritis of the distal femur is a rare condition. Mansfield and Trezies¹³ reported one case which was diagnosed as calcific tendinitis of the MCL, and improved with conservative treatments. Muschol et al¹⁴ and Chang et al¹⁵ each reported five cases and one case of calcific tendinitis of the medial collateral ligament (MCL) presented with severe pain at the proximal part of the MCL. These two studies diagnosed and treated of the calcific tendinitis by open resection instead of the arthroscopy. Only in the report of Song et al,⁷ calcific tendinitis of the MCL of knee were treated with the arthroscopy (Table 1).

Table 1

Comparison of previous reports of calcific periartthritis around the distal femur medial compartment.

Author(s) (yr)	Number of cases	Location	Treatment method	Clinical outcome	Other
Muschol et al ¹⁴ (2005)	5	MCL	Needling and Local injection (1 case) Open resection (4 case)	Immediate complete pain relief	
Chang WC et al ¹⁵ (2006)	1	MCL	Open resection	Complete symptom-free at 1-year follow-up	
Mansfield and Trezies ¹³ (2009)	1	MCL	Medication	Complete symptom-free at 2-months follow-up	
K Song et al ⁷ (2006)	1	MCL	Arthroscopic excision	Complete symptom-free at 1-month follow-up	
Present case report	1	Distal femur just above the head of interference screw is positioned after PCL reconstruction	Arthroscopic excision	Complete symptom-free at 2-months follow-up	First report of arthroscopic excision Location of calcification is just above the head of interference screw which was used PCL reconstruction

MCL, Medial collateral ligament.

There are several treatment options including conservative managements, ultrasound-guided needle decompression, extracorporeal shock wave therapy, arthroscopic removal, and open decompression. They are mostly originated from the treatment results of calcific tendinitis of the shoulder. Although conservative methods have known to be effective to calcific periarthritis, arthroscopic removal of calcification can resolve the pain immediately and provide earlier rehabilitation postoperatively with less invasive technique to whom with refractory symptoms. Simultaneously, the arthroscopic procedure can evaluated other anatomical disease of the knee joint such as meniscus, ligament and chondral lesions on knee joint.

To our knowledge, this is the first report of calcific periarthritis on the distal femur just above the head of cancellous screw after PCL reconstruction, treated with the arthroscopy. Although calcific periarthritis on knee joint is rare, the possibility of calcific periarthritis must be kept in mind after ligament reconstruction because the inserted screws could induce repetitive microtrauma. The arthroscopic removal of calcific deposition is the first treatment option with histologic confirmation in this condition.

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