A Case Report of Synovial Inflammation and Osteochondral Lesion in The Medial Tibial Condyle of Young Adult

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ABSTRACT:

A 21-year-old male with no history of any illness came with 6 months of chronic swelling, stiffness, and pain in his right knee. He was clinically detected to have mild swelling over the medial aspect of the right knee joint and tenderness of the medial condyle of the tibia with restriction of the range of motion. Radiographs were normal with no bone lesions, but MRI revealed a grade 3 osteochondral lesion of the medial tibial condyle with secondary synovitis and mild joint effusion. Osteochondral lesion and right knee synovitis were diagnosed in the patient.

Spinal anesthesia with arthroscopic examination under surgery, joint lavage, and microfracture procedure for osteochondral defect repair was done. Postoperative rehabilitation was 6 weeks of non-weight-bearing status with gradual weight-bearing and physical therapy to maintain restoration of strength and range of motion. On follow-up at 6 months, the patient had an acceptable result with near-total pain relief, better flexion of the knee (120 degrees), and no instability. Radiographs showed good healing at the site of osteochondral lesion. It highlights the importance of early diagnosis and surgical treatment of synovitis of the knee and osteochondral defects, particularly in the young active individual, where less destructive techniques such as microfracture can provide a satisfactory functional result.

KEYWORDS:

Knee Synovitis, Osteochondral Lesion, Medial Tibial Condyle, Arthroscopy, Microfracture
Joint Lavage, Postoperative Rehabilitation.

INTRODUCTION:

Synovitis, derived from the inflammation of the synovial membrane, is commonly related to most knee abnormalities and is often linked with the consequences of trauma, as well as autoimmune and degenerative diseases. It results in the overproduction of synovial fluid. Overproduction leads to joint effusion, pain,

stiffness, and a loss of range of motion. Even though the inflammation may be secondary to OCLs, which the location is often related to the medial tibial condyle, it appears clinically more serious or difficult.

Knee Synovitis with osteochondral lesion over the medial tibial condyle is a complex clinical condition characterized by synovial membrane and cartilage and subchondral bone damage on the medial side of the knee that is associated with inflammation involving both inflammation of the synovial membrane and structural damage to cartilage and subchondral bone of the knee joint. Knee is one of the most susceptible joints to pathologies, particularly those affecting medial compartment, where forces are often concentrated during weight-bearing activities. This is the most common type of condition that is brought about by trauma or degenerative changes, which could cause serious pain, swelling, and impairment of joint function.

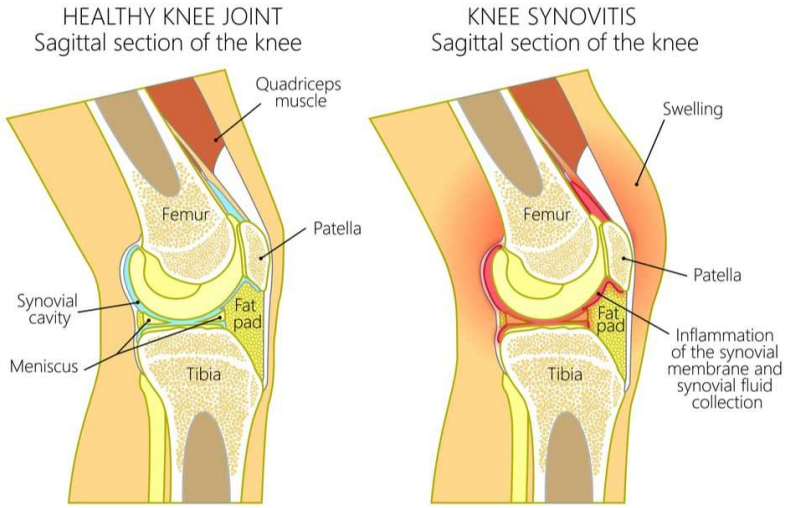

Figure 1.1: Describes Knee synovitis

A lesion of the osteochondral type is when the defect exists in both the cartilage as well as the subchondral bone. Lesions can result from degenerative changes, repetitive stress, or trauma and range from very superficial lesions to significant lesions. These lesions are most commonly located on the medial tibial condyle, which represents the point at which the normal ambulation biomechanical loads are placed on the medial aspect of the knee. Synovitis combined with an osteochondral injury is often a serious cause of substantial dysfunction, mainly due to accompanying symptoms such as pain, swelling, mechanical instability, and disturbed joint function.

In this case, there is a clinically important knee synovitis complicated by an osteochondral lesion on the medial tibial condyle. The pathology of both interplays in understanding the inflammatory process in the synovium and the degenerative changes occurring on the cartilage and the subchondral bone. The inflammation of the synovium contributes to breakdown of cartilage, but the osteochondral lesion disrupts normal joint mechanics, aggravating pain and limiting movement.

CAUSES: Direct trauma to the knee joint, caused by the loss of equilibrium, twisting movement, or a contusion, leads to synovitis and osteochondral injuries, Repetitive Stress, Age, Sports/Physical Activity, Previous Trauma, Obesity.

DIAGNOSIS: Swelling and tenderness are evident on medial tibial condyle together with reduced ranges of movement along with positive grind test at cartilage faults for diagnosing.

- **Imaging Studies:** MRI is the gold standard for the diagnosis of knee synovitis and osteochondral lesions, with excellent visualization of both soft tissue inflammation and bony defects.
- **Arthroscopy:** In selected cases, direct visualization of the joint may be necessary to evaluate the extent of osteochondral lesions.

MANAGEMENT:

CONSERVATIVE MANAGEMENT:

- **Rest and Activity Modification:** Provocative activities are avoided to reduce inflammation and further injury.
- **Physical Therapy:** Strengthening exercises and range-of-motion activities are used to enhance joint stability and function.
- **Medications:** Patients can be prescribed NSAIDs for pain and inflammation management.
- **Intracortical Corticosteroid Injections:** Patients with chronic synovitis are treated with intracortical corticosteroid injections to decrease the inflammation.

SURGICAL MANAGEMENT:

- **Osteochondral Grafting:** This procedure is mostly done in the case of severe loss of cartilage. Patients receive osteochondral autograft or allografts for the repair of cartilage.
- **Microfracture:** Small defects are operated by the microfracture procedure. The procedure facilitates the development of new cartilage.
- **Arthroscopy:** The osteochondral lesion is debided or the joint is assessed for other diseases.

CASE PRESENTATION:

It is a case report on presentation, diagnosis, and management of a 21-year-old male Synovial Inflammation and Osteochondral Lesion in The Medial Tibial Condyle along with his clinical workup and surgical management.

PATIENT HISTORY:

A male patient aged 21 years reported a complaint of chronic right knee pain for the past 6 months. The patient did not have any previous significant medical history or co-morbid conditions, which implied that the knee pain was not secondary to systemic illnesses. Pain was largely exacerbated by activity, especially when the patient ran or climbed stairs. The patient had also the symptoms of swelling and stiffness of the knee on an intermittent basis, particularly after periods of activity for a long time. The patient did not have a history of major trauma or prior knee injury, a sign that the pain must have been due to intrinsic pathology of the joint rather than extrinsic trauma. There was no such history in the past of locking or yielding of the knee, a finding that suggested no such meaningful mechanical derangement or ligamentous injury.

CLINICAL EXAMINATION:

Physical exam was significant for very mild swelling over the right knee joint limited to the medial compartment, an area in which osteochondral lesions usually occur. There was tenderness on palpation medially placed over the medial tibial condyle, indicating an intrinsic lesion or inflammation in the medial compartment. The patient also had decreased range of motion from pain, with 90-degree flexion of the knee, short of the normal range of about 130-140 degrees in a normal patient. Extension was not severely restricted.

During stress-testing, the knee was stable and there was no evidence of ligamentous injury, as in valgus and varus stress tests, which assess the medial and lateral collateral ligaments' stability. No tenderness over the joint line was observed as well, which further excluded meniscal injury. Patellar mobility was also normal without any dysfunction in the patellofemoral joint. The research thus hypothesized that the symptoms in the patient were more probable to be secondary to an intra-articular pathology or osteochondral lesion as opposed to a structural ligamentous lesion.

INVESTIGATIONS:

To make a diagnosis, the patient had radiographic images and MRI scans:

Radiographs: Right knee X-rays were done to exclude any gross bone abnormality like fractures or osteophytes. The X-rays were unremarkable for any significant change in bones, which meant that there were no gross deformity, fracture, or end-stage osteoarthritis. Radiographs are, however, very limited in detecting soft tissue abnormality, and hence further imaging was warranted.

Figure 2.1: Shows Radiograph of Osteo-chondral defect

Magnetic Resonance Imaging (MRI): MRI of the knee showed a medium-sized osteochondral lesion in the medial tibial condyle. It was grade 3 on Outerbridge classification, meaning that cartilage and also the subchondral bone beneath it were involved to full thickness. Synovitis, inflammation of synovial membrane secondary to irritation by the damaged cartilage, was also observed on MRI. In addition to that, there was only a small joint effusion (fluid in the knee), most often related to inflammation or trauma.

These MRI results were consistent with the fact that there was indeed an osteochondral defect within the tibial condyle responsible for the patient's symptoms.

DIAGNOSIS:

Based on the MRI report and clinical examination, the right knee medial tibial condyle osteochondral lesion and synovitis were diagnosed. Synovitis was clinically diagnosed on the basis of joint effusion and synovial inflammation of the lining, which was corroborated on imaging. The osteochondral lesion was the focal pain source and functionally limiting since it involved the articular cartilage as well as the subchondral bone.

SURGICAL MANAGEMENT:

Since the conservative management failed and the osteochondral defect was significant, the patient was listed for arthroscopy to treat the synovitis as well as the osteochondral defect. The procedure would be minimally invasive as possible and under spinal anaesthesia with 0.5% heavy bupivacaine to provide sufficient analgesia and muscle relaxation.

The operation was conducted in an aseptic environment in an operating room that was set up for arthroscopic surgery. The surgeon then conducted the following procedure:

1. **Arthroscopic Evaluation:** An arthroscope was placed within the knee joint, and there was an unobstructed view of the articular surface, and visualization of the osteochondral defect on the medial tibial condyle was possible. The defect was grade 3, with subchondral bone and full-thickness cartilage injury. Synovitis was also observed, with thickened and inflamed synovial tissue.
2. **Joint Lavage:** Irrigation of the joint with saline to eliminate inflamed tissue, debris, and loose bodies that may lead to sustained inflammation was done. Joint lavage allows the flushing out of the joint and diminishment of inflammation that will enhance healing.
3. **Microfracture Technique:** A microfracture procedure was performed to facilitate healing of the osteochondral defect. Subchondral bone perforation with a small hole was created using an arthroscopic awl, and bleeding from the underlying bone marrow ensued. Bleeding permits growth factors that induce fibrocartilage formation, which can heal the injured articular surface, despite the fact that fibrocartilage is not as resilient as hyaline cartilage.

POSTOPERATIVE CARE:

The patient was postoperatively taught to perform a systematic rehabilitation program to enable recovery and minimize the risk of complications:

1. **6 weeks non-weight-bearing:** The patient was taught to walk using crutches and avoid weight bearing on the affected limb for 6 weeks. This was done to enable sufficient healing at the site of the osteochondral lesion and prevent undue stress across the healing fibrocartilage.
2. **Progressive Weight-Bearing:** The patient was progressively progressed to weight bear on the affected limb as tolerated with the aid of a walking aid for support on transition at 6 weeks.
3. **Physical Therapy:** Early physical therapy was required in an attempt to strengthen the range of motion, quadriceps, and hamstrings and stabilize the joint. The patient also required a course of physiotherapy with gradual strengthening exercise as well as stretching.
4. **Limitations of activity:** The patient was also discouraged from high-impact activities such as running, jumping, or heavy lifting until recovery.

FOLLOWUP:

6-month follow-up, the patient had excellent relief of symptoms and return of function:

1. **Pain:** There was significant relief of pain, with almost complete absence of swelling and pain. Pain that was increased with activity before now remained at baseline and only appeared on maximal physical exertion.

2. **Range of Motion:** The range of motion improved to 120 degrees of flexion of the knee, very close to that of a healthy young individual's knee. It was improved over the preoperative restriction of 90 degrees of flexion.
3. **Knee Stability:** Instability was not evident on follow-up examination, and the functioning of the knee under stress by the patient was normal.
4. **Radiograph Findings:** Good healing at the site of osteochondral lesion and no evidence of failure of uncorrected bone remodeling or microfracture failure on follow-up radiographs were observed.
5. **Return to Activity:** Patient recovered safely for resumption of normal routine daily activity, sport, and physical exercising without hindrance by or with no major discomfort.

DISCUSSION:

Knee synovitis, as a general rule secondary to osteochondral damage, is an inflammatory syndrome produced by the inflammatory process of the synovial membrane with manifestation of joint effusion, pain, stiffness, and reduction of range of motion. It most frequently occurs in conditions that are traumatic, degenerative changes within the joint, and repetitive stress. Osteochondral lesions most commonly affect both the cartilage and subchondral bone, and the medial tibial condyle is one of the most common sites because it bears weight on running, jumping, and walking. The patient, a young man with no relevant past medical history, in this instance, complained of chronic knee pain, swelling, and stiffness for 6 months. Lack of antecedent trauma implied that knee pain was more likely to be secondary to an intrinsic joint lesion than trauma. Tenderness over the medial tibial condyle and restricted range of motion on clinical examination indicated an osteochondral defect. MRI diagnosis was made with a grade 3 osteochondral lesion and synovitis. Treatment of synovitis of the knee and osteochondral injury is multi-modality, with initial conservative treatment consisting of rest, physical therapy, and anti-inflammatory medication. Conservative treatment in this patient does not succeed and, therefore, surgical treatment would be indicated. Arthroscopy, being a minimally invasive procedure, is a method of direct visualization of the joint to allow therapeutic intervention and diagnostic evaluation. Microfracture, that procedure intended to allow for the growth of fibrocartilage through induced subchondral bone bleeding, is typically reserved for small lesions of treatment osteochondral. The procedure has been shown effective both in promoting healing as well as functional rehabilitation of a joint, although the resulting fibrocartilage is weaker than hyaline cartilage. Postoperative care was non-weight-bearing for 6 weeks to facilitate maximum healing, with progressive weight-bearing and physical therapy to regain range of motion and strength. Early mobilization and rehabilitation are crucial to avoid stiffness and muscle atrophy, which can hinder recovery. At 6 months follow-up, it was satisfactory with relief of pain, gain in range of motion, and radiological healing at the site of osteochondral lesion.

This case highlights the value of early diagnosis and proper surgical treatment of knee synovitis and osteochondral lesions. Arthroscopic surgery with adjuvant modalities such as microfracture is able to control both the inflammatory and the structural aspects of the disease and results in satisfactory outcomes in young active individuals.

CONCLUSION:

This is a report of the successful arthroscopic and microfracture treatment of knee synovitis and osteochondral lesions. Early treatment achieved significant pain relief, increased range of motion, and return to function in an active young patient. Healing of fibrocartilage ensued with joint lavage and microfracture, resulting in a stable knee without sequelae. This technique demonstrates that early, minimal access surgery can be very effective and enable patients to return to normal activities and sports.

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