

TECHNICAL NOTE

Anatomical Repair of Stener-like Lesion of Medial Collateral Ligament: A case Series and Technical Note

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Abstract

Medial collateral ligament tears usually will be treated through non-surgical methods, but, in some cases such as those with tears at the distal insertion where the reduction could be blocked by the pes anserine tendons (Stener-like lesion), surgery will be performed. Here, we present a surgical technique in such cases. In this retrospective case series, we describe six patients diagnosed with Stener-like lesion based on clinical evaluation and imaging results. In the one-year follow-up visit, there was no complaining of pain or joint instability and full range of motion and negative valgus stress test were reported in all cases. The results showed this surgical technique is a useful and safe treatment approach in such cases.

Keywords: Anatomical repair, Medial collateral ligament, Stener lesion, Technical note

Introduction

The medial collateral ligament is the main medial stabilizer of the knee against valgus stress and provides resistance against the external rotational trauma of lower extremity (1). Based on Hughston classification MCL injuries are classified as mild injuries (grade I-II) and complete ligament disruption (grade III). Almost all isolated low-grade injuries can be treated conservatively and surgery is indicated in the third grade injury, medial epicondyle bony avulsion, distal MCL incarceration, MCL tear combined with other ligaments injuries, and an open wound at the medial site of the knee (1-3). There are two surgical approaches for MCL injuries known as primary anatomical repair and MCL reconstruction (3). There are some disadvantages of MCL reconstruction such as donor site morbidity, weakness of medial knee, non-anatomical insertion site of MCL graft, rotational instability, high cost and complexity of technique can be mentioned (3, 4). Thus, it seems that anatomical reconstruction due to more availability, lower cost, and the better outcome could be considered as an appropriate technique for isolated MCL injuries (5). The MCL has superficial and deep components. The superficial MCL (sMCL) is the main valgus stabilizer of the knee and more susceptible to

acute injuries (5, 6). Surgery is indicated in the sMCL injury where it tears at its distal insertion to pull proximal and displace anterior to the pes anserine tendons which can block the reduction (6). A similar clinical scenario has been described in thumb as Stenar lesion, in which distal rupture of ulnar collateral ligament happens which displaces anterior to the aponeurosis of Adductor Pollicis muscle and prevents reduction without surgical intervention (7). Given the similarities between two lesions, the lesion in MCL could be called Stenar-like lesion, which is a rare condition and requires surgical fixation (6). There are few studies that have discussed this rare lesion in MCL (6, 8). Therefore, the aim of this study is to report the outcomes of surgical repair for this type of injury in our patients.

Patients and Methods

Research design

In this retrospective case series, we describe six patients who had attended to our referral hospital between 2013 to 2015. They were diagnosed with Stener-like lesion following sports injuries, and all of them underwent anatomical reconstruction technique. The diagnosis was confirmed by clinical evaluation and imaging techniques.

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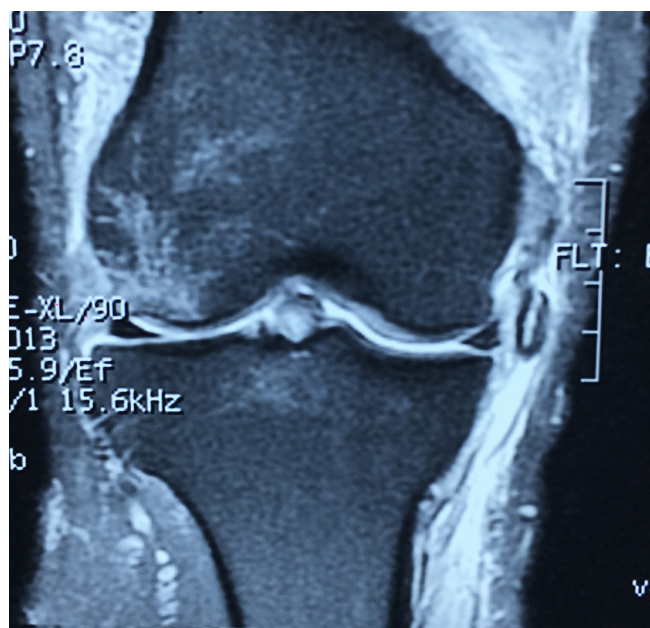


Figure1. Patient MRI with Stener-like lesion.

Physical examination revealed grade III knee laxity using valgus stress test with soft or no endpoint without laxity in extension.

Radiography imaging (Stress radiographs) indicated increased medial joint gap, and MRI [Figure 1] demonstrated displacement of the sMCL attachment site from the tibia to pes anserine ligament and wave sign (9). All patients were followed up for one year postoperatively. Patients with past history of knee surgery were excluded from the study. Ethics committee approved this study and all patients were provided informed consent prior to being included in this case series.

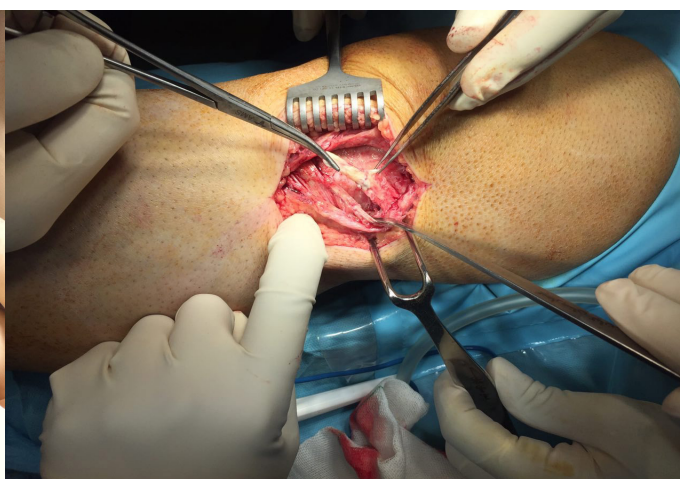
Surgical Technique

Diagnostic arthroscopy was performed to confirm the diagnosis and evaluate the articular space. At the end of the procedure, patients were placed in supine position with externally rotated hip and the knee was held in 40-60 degree flexion with full extension during all repairs.

A 5-7cm incision was made on medial joint line, the skin was retracted and fascia was exposed. The fascia was incised slowly from distal of vastus medialis fibers toward the attachment site of it on Pes anserine. After removing the fascia, pes anserine tendons were exposed and displacement of sMCL was identified. In all patients, femoral sMCL attachment and Pes anserine were intact. In knee-flexed position by using two retractors, the displaced sMCL was relocated from proximal of surgical field to the posterior of pes anserine and the disrupted part of sMCL was marked. The posteromedial corner was examined carefully for any ligament or capsular injury. No injuries were detected in deep MCL or posterior oblique ligament in our patients. A varus stress was applied to reposition the knee in figure of 4 position of the knee while careful considerations were made not to open the medial joint line or posteromedial capsule. Few bone anchors were applied on the tibia and the tip of sMCL was sutured using non-absorbable wires and bundle type stitches [Figures 2-3]. In 40-60 degree knee flexion, sutures were tightened and a gentle valgus test was performed to ensure that the repair was adequate. The incision site was closed using non-absorbable subdermal and intradermal sutures. In one of the patients an avulsion fragment of sMCL was detected in articular space [Figure 4].

Rehabilitation Protocol

The knee immobilization in 30° of flexion through using hinge knee brace used for 3 months after surgery. Physical therapy was started with isotonic and active full range of motion exercises. Weight-bearing was not allowed during the first week of surgery, following that two weeks of



Figures 2; 3. Pes anserine tendons retracted from surgical field and sMCL sutured.



Figure 4. Arthroscopic evaluation of patient with intra-articular sMCL lesion.

partial weight bearing was recommended and then full weight bearing within patients' tolerance was started. Full joint movement and closed chain exercises were allowed five weeks after surgery.

Results

Six patients have been evaluated in this study. Patients' information and clinical presentation before and after surgery are summarized in Table 1. During one-year follow-up, none of the patients have shown gross mal-alignment or gait abnormalities such as limping, varus or valgus. Full MCL stability without medial joint line opening in extension and 30° of flexion was found. The results of functional tests in final visit are shown in Table 1. In the one-year follow up visit, there was no complain of pain or joint instability and all the patients were able to get back to their normal lives after six months of surgery.

Full range of motion and negative valgus stress test were reported in all cases.

Discussion

In Biological studies, the healing capacity of MCL has been shown to be higher than other intra-articular ligaments. It also has been reported in animal experiments that the transected MCL can heal with sufficient stability without immobilization or surgical interventions (3, 5). However, surgery is indicated in specific circumstances such as Stener-like lesion in which the presence of pes anserine ligaments prevents the repair process of MCL (3, 6).

Superficial MCL originates from medial femoral epicondyle and attaches to proximal of the tibia, anterior to the posteromedial crest of the tibia, and lying beneath the pes anserine. The mean insertion area of sMCL on the tibia is $348.6 \pm 42.8 \text{ mm}^2$ (10) which is not a small area. Thus, sMCL rupture from tibia would need an intense trauma from cutting and pivoting sports such as skiing and football, that expose the MCL to indirect valgus forces and rotatory movement (7, 8). In acute phases, MCL injury is often going unreported; therefore focused physical examination is essential in all patients with knee trauma. Early diagnosis is necessary for identification of the injury grade and treatment planning, especially in Stener-like lesion that does not respond to non-surgical treatment.

Helpful diagnostic tips in MCL physical examination are as follows: lower extremity muscles should be relaxed, contralateral extremity can be used as the control, valgus stress test at both full extremity extension and with 30° of flexion to fully assess the MCL. This test has high sensitivity and is predictive of MCL pathology. The injury is classified into three grades based on the amount of medial joint line opening compared to the normal knee: grade I less than 5 mm, grade II 5-10 mm and grade III more than 10 mm. In grade I-II of MCL injuries, valgus laxity with 30° of flexion is increased but no instability is observed in extension. Valgus laxity with full extension is a sign of more severe injuries than the isolated injury of sMCL such as deep MCL involvement or combined injury of other ligaments. In the

Table 1. Patients background and final visit results

	Sex	Age (year)	BMI* (Kg/m ²)	Mechanism of injury	Clinical Presentations	Tegner Score		The last visit scores			
						Before Surgery	Last Visit	IKDC score** (0-100)	Lysholm score (0-100)	KOOS score** (0-100)	Satisfaction score (0-10)
Case 1	male	24	21	Soccer	Pain+ Laxity+ Swelling	5	10	87	90	90	10
Case 2	male	35	25	Skiing	Ecchymosis+ Pain+ Laxity	6	9	90	100	100	10
Case 3	male	23	28	Soccer	Swelling+ Ecchymosis	4	9	92	100	100	10
Case 4	male	22	22	Soccer	Pain+ Laxity	5	10	88	90	92	10
Case 5	male	32	30	Soccer	Pain+ Swelling	5	10	100	100	100	10
Case 6	Female	30	25	Aerobics	Pain+ Laxity+ Swelling	4	10	100	100	100	10

*BMI: Body Mass Index; **IKDC score: International Knee Documentation Committee, KOOS score: Knee injury and osteoarthritis outcome score.

physical examination of grade I-II lesions, a solid endpoint is palpated while a soft or no endpoint is palpated in full tear of MCL or Stener-like lesion (1, 6, 7).

Although the history and physical examination are critical to determining the type and degree of knee ligamentous damage, sometimes it may be difficult to distinguish between Stener-like lesion and grade I-II due to pain, swelling and symptom similarities. This emphasizes the indication of a standard radiographic knee series and Magnetic Resonance Imaging (MRI) in all suspected MCL injuries cases to screen the Stener-like lesion and combined ligaments damage and prevent the chronic complications including rotational instability and clinical sagittal valgus (6, 7).

MRI is the preferred imaging method for determining the location, the extent of damage, displacement of MCL and other concomitant structural damage (9).

However, it has shown that in MCL surgical reconstruction candidates, minimally invasive methods could result in healing due to its high healing ability. In 2013, Doral et al. introduced the percutaneous MCL reefing and shrinkage method with satisfactory results (1). Another study was published in 2014 by Lubowitz et al. recommending internal bracing as a method for MCL repair, which was resulted in positive outcomes with a low rate of complications (5).

In this study, we focused on anatomical repair method for Stener-like lesions that is more available and cheaper

than other ligament reconstruction methods. Advantages of this treatment include applying a tourniquet without esmarch bandaging. In this procedure knee is placed in flexion, therefore tendons become relaxed and more proximal to the tibia. In addition, complications like donor site morbidities are not faced in this procedure, as there is no graft needed. Although Stener-like lesion of SMCL is rare, it could be considered as grade 4 of MCL injuries. The authors emphasize on thorough physical examination and performing MRI in the case of suspected MCL injury to screen surgical candidates and prevent chronic valgus and joint instability.

Guilan University of Medical Sciences Ethics Committee approved the study.

All named authors hereby declare that they have no conflicts of interest to disclose.

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