The Knee 23 (2016) 740–743

Contents lists available at ScienceDirect

The Knee

Technical tip

Arthroscopic repair of the posterior root of the medial meniscus using knotless suture anchor: A technical note

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ARTICLE INFO

Article history:
Received 2 February 2016
Received in revised form 3 March 2016
Accepted 13 March 2016

Keywords:
Medial meniscus
Root tear
Suture anchor
Knotless
Repair

ABSTRACT

There are numerous methods for repairing posterior root tears of the medial meniscus (PRTMM). Repair techniques using suture anchors through a high posteromedial portal have been reported. The present study found that using a knotless suture anchor instead of suture anchor seemed easier and faster because it avoided passing the sutures through the meniscus and tying a knot in a small space. This study describes a knotless suture anchor technique through a high posteromedial portal, and its clinical results.

1. Introduction

A posterior root tear of the medial meniscus (PRTMM) is defined as a tear that occurs within 10 mm of the posterior tibial attachment of the medial meniscus [1,2]. This radial tear is often found in patients with degenerative articular cartilage, who are >50 years old, and it is associated with major extrusion (>3 mm) of the mid-body, which is associated with progressive osteoarthritis of the knee [3,4,5]. It is also associated with increased contact pressures in the medial compartment of the knee, hence leading to progression of osteoarthritis. The standard treatment is medial meniscectomy; however, meniscectomy is biomechanically equivalent with non-repair of the PRTMM [6]. Repair of the PRTMM is shown to restore normal to near normal contact pressures with a theoretical decrease in clinical osteoarthritis [6,7].

The most well-known technique is a transtibial pull-out repair [8,9,10]. However, because of the disadvantages [1], other portal options, like the trans-septal portal [11] and standard anterior parapatellar portal [12], have been developed. Repair techniques using suture anchors through a high posterior medial portal were described by Choi et al. in 2008 [13]. In the present study, it was found that using a knotless suture anchor instead of a suture anchor was easier and faster because it avoids passing the sutures through the meniscus and tying a knot in a small space. This paper describes a knotless suture anchor technique through a high posteromedial portal, and its clinical results.

2. Method

From October 2013 to April 2014 six patients with a diagnosis of PRTMM by magnetic resonance imaging (MRI) underwent arthroscopic repair using the knotless suture anchor technique performed by one surgeon. Acute or degenerative tears could not be distinguished intraoperatively; however, the gap between the remnant root and torn meniscus was <2 mm. According to LaPrade's classification, all tears are Type-2 tears [14]. Therefore, adequate approximation of the meniscus was possible. Exclusion criteria for PMMR repair were: varus deformity, damaged tibial cartilage, and a wide gap between the remnant root and torn meniscus. Elderly patients who do not meet the exclusion criteria were indicated for the repair.

A Lysholm score was obtained preoperatively and in every outpatient. Meniscal extrusion was measured in millimeters on preoperative and immediate postoperative coronal knee MRI image from the medial tibial border to the medial margin of the meniscus. Two surgeons performed the procedure and the average values were presented.

2.1. Technique

The arthroscopic repair of the PMMR using a knotless suture anchor was performed accordingly as follows: the patient was given an indicated anesthetic and laid supine on the operating table. The operative knee was

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http://dx.doi.org/10.1016/j.knee.2016.03.001
0968-0160/

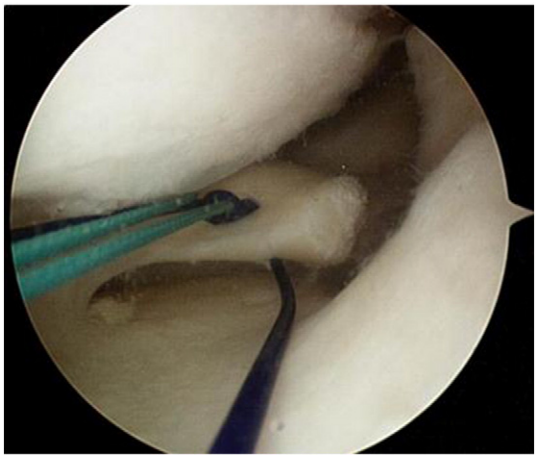

Figure 1. A shuttle relay is made using the PDS to relay No. 2 Ethibond through the meniscus.

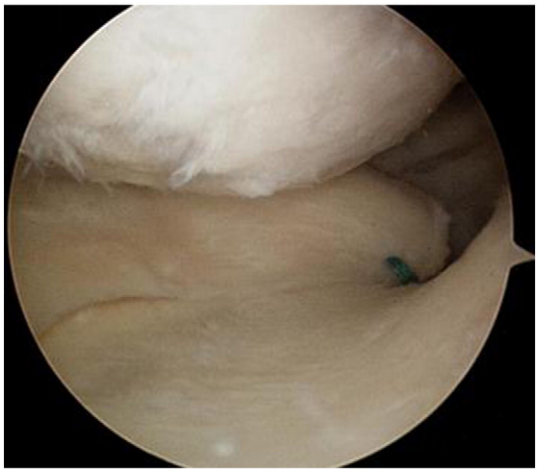

Figure 3. The final image of the repair from the anterolateral viewing portal.

kept at 90° of knee flexion and a mid-thigh lateral post was placed before preparation and draping. An MRI showed preoperative confirmation of a posterior root tear. Surface landmarks were identified and planned incisions were drawn over standard anterolateral and anteromedial parapatellar arthroscopic portals.

Diagnostic arthroscopy was performed with the arthroscope in the anterolateral portal. When visual confirmation of the PRTMM was noted, the tibial cartilage under the tear was prepared with a currette.

A suture shuttle loaded with a non-absorbable monofilament suture, No. 1 Polydioxanone suture (PDS), was then passed through the anteromedial portal and manipulated to pierce the upper side of the meniscal root. The suture shuttle was then removed from the joint while the PDS end inside the joint remained through the meniscal root. The free end of the suture outside of the joint was then tied to the midportion of a No. 2 non-absorbable braided suture (No. 2 Ethibond 2; Ethicon, Somerville, NJ) and relayed through the medial meniscus (Figure 1) by pulling on the inside end of the PDS to form an Ethibond loop.

The PDS was removed from the joint and the Ethibond loop returned through the joint. A loop stitch was made by grasping the free ends of the Ethibond suture through the previously formed loop and pulling it tight (Figure 2).

The arthroscope was then advanced between the medial femoral condyle (MFC) and the posterior cruciate ligament (PCL). A high posteromedial portal was formed about four centimeters above the joint line and posterosuperior to the MFC with pre-insertion of a spinal needle. The vertical angle was inspected to see if the knotless suture technique would be possible. If the tear side of the meniscus could not be reached, another repair technique was chosen, such as the pull-out technique; otherwise the procedure continued.

A clear five-millimeter cannula was passed through the high posteromedial portal. The Ethibond sutures were retrieved from the high posteromedial portal. A bone punch was used to create a pilot hole into the medial portion of the posterior insertion site of the medial meniscus. The Ethibond sutures were then loaded through a 3.5 all PEEK knotless suture anchor (Poplok, ConMed, Linvatec). The suture anchor was then inserted into the pilot hole under appropriate tension. Following the manufacturer's advice, the suture anchor was then fixed to the bone and the driver was removed. Extra sutures were cut and the surgery was completed (Figure 3). The steps in the repair are illustrated in Figure 4.

2.2. Postoperative protocol

The patient was sent for an immediate postoperative MRI one day later (Figure 5). A non-weight bearing protocol was instructed for four weeks with an ACL brace. Crutches were weaned off at four weeks. A gradual increase of 15° flexion was allowed every week until full flexion was achieved and quadriceps-strengthening exercises were performed. After four weeks, partial weight bearing to full weight bearing was encouraged, as tolerated. Patients were back to their daily activity by two months.

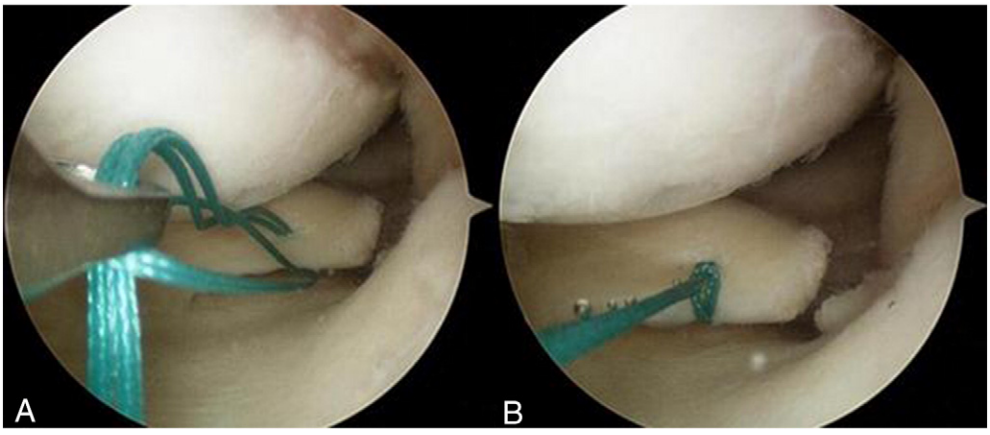

Figure 2. (A) A loop stitch is made by pulling the free ends of the Ethibond and (B) pulling it tight.