A Modified Outside-in Suture Technique for Repair of the Middle Segment of the Meniscus Using a Spinal Needle

Jin-Ho Cho, MD
Department of Orthopaedic Surgery, Inje University Ilsan Paik Hospital, Goyang, Korea

Introduction: Several techniques have been used for arthroscopic repair of middle segment, posteromedial or posterolateral corner tears of the meniscus. One of the commonly used methods is the inside-out double arm needle technique.

Surgical Technique: We have developed a vertical mattress absorbable suture technique. It is easy to perform with a small sized skin incision for knot tying. This technique just necessitates 1 or 2 spinal needles for repair.

Materials and Methods: Between March 2010 and February 2012, 20 menisci were treated by this technique, a modified method of the outside-in vertical meniscal repair using a spinal needle and No. 2 PDS absorbable suture material. Evaluation of clinical results was done using the Lysholm score.

Results: The mean preoperative Lysholm score was 63.9 and the mean postoperative score was 97.3. A second look arthroscopy was performed in 13 knees (65%) and the repair sites were well healed.

Conclusions: We recommend this method as an alternative technique for repair of the middle segment, posteromedial or posterolateral corner of the meniscus.

Keywords: Meniscus, Middle segment, Tear, Modified outside-in suture

Introduction

Numerous surgical techniques have been developed for meniscal repair: all-inside, inside-out, outside-in, and modifications of these techniques. Each technique poses different advantages and disadvantages. Thus, a repair technique is chosen by a surgeon depending on the location and pattern of a meniscal injury. The inside-out technique uses double-armed sutures passed through arthroscopic cannulas and then tied directly over the joint capsule. This technique has several disadvantages. One is the horizontal suture for peripheral tears of the meniscus. Second is the double arm needle technique directed to a far posterolateral or posteromedial side. It may cause neurovascular injuries during procedure. Third is foreign body reaction caused by non-absorbable double arm needle suture materials. The outside-in technique is most applicable to tears in the anterior and middle segments of the meniscus. But, this technique is horizontal suture and uses a nonabsorbable suture material, which is different from our technique. The all-inside repair technique is indicated for unstable, vertical-longitudinal tears of the posterior horns of the meniscus. When repairing a meniscal tear, an adequate approximation of torn surfaces with firm fixation is important for yielding an optimal healing. For repair of a middle segment, posteromedial or posterolateral corner tear, a meniscal fixator or the inside-out double arm needle technique is considered effective. However, with a meniscal fixator, it is not only difficult to attain good coaptation between torn surfaces, the holding power is expected relatively weak. We introduce a modified outside-in vertical suture technique with a spinal needle that provides a safe
and vertically oriented suture with good coaptation and strong holding power. Therefore, we believe this technique could be effective for repairing most parts of the meniscus, especially for the middle segment, posteromedial or posterolateral corner injuries.

**Surgical Technique**

The patient is positioned for standard knee arthroscopy. This technique for lateral meniscus bucket-handle tear of the left knee (Fig. 1) requires an 18-gauge spinal needle, a suture retriever, and an absorbable suture material. After confirmation of a tear, the tear site is debrided with a 3.5 mm full-radius motorized shaver (Dyonics; Smith & Nephew, Andover, MA, USA) and a rasp to encourage healing through the portal. At first, the posterior horn tear site is repaired with 2 or 3 all inside sutures via a posterolateral portal. Then, the middle horn is repaired using modified outside-in vertical sutures. On the skin near the middle portion of the tear site, the 18-gauge spinal needle first penetrates the capsular portion, crosses the tear, and then exits the tibial surface of the inner fragment of the middle horn of the lateral meniscus. This procedure can be made easier by the use of a grasper introduced through the far anteromedial portal to provide counter pressure on the torn meniscus. No. 2 PDS (Ethicon, Somerville, NJ, USA) suture material is advanced through the spinal needle (Fig. 2). The procedure of pulling out the suture tip via the anteromedial portal should be performed carefully so as not to cut the suture material by the beveled needle tip. Then, the needle is pulled back out of the skin. A second needle is reinsetted downward and penetrated through the tibial side of the tear of meniscus. No. 0 Maxon (Covidien, Mansfield, MA, USA) suture material is advanced through the spinal needle (Fig. 3). The procedure of pulling out the suture tip via the anteromedial portal using a suture retriever should be performed carefully so as not to cut the

![Fig. 1. Arthroscopic view of a lateral meniscus bucket-handle tear visualized through the anterolateral portal of the left knee.](image)

![Fig. 2. (A) An 18-gauge spinal needle first penetrates the capsular portion, crosses the tear, and then exits the tibial surface of the inner fragment of the middle segment of the lateral meniscus in the bone model. (B) Arthroscopic image of No. 2 PDS suture material advanced through the spinal needle.](image)

![Fig. 3. (A) The arthroscopic view from the anterolateral portal shows the second needle is reinsetted downward and penetrates through the tibial side of the tear of the meniscus. No. 0 Maxon suture material is advanced through the spinal needle. (B) A bone model showing the same procedure.](image)