Arthroscopic Pullout Suture Repair of Posterior Root Tear of the Medial Meniscus: Radiographic and Clinical Results With a 2-Year Follow-up

Ju Hong Lee, M.D., Young Jin Lim, M.D., Ki Bum Kim, M.D., Kyu Hyung Kim, M.D., and Ji Hun Song, M.D.

Purpose: This study was undertaken to document the short-term clinical efficacy of arthroscopic pullout suture repair in treating posterior root tears of the medial meniscus. **Methods:** From March 2004 to August 2006, 26 patients (27 knees) with posterior root tears of the medial meniscus were treated with arthroscopic pullout suture repair surgery by the senior author. Of these, 20 consecutive patients (21 knees) with a minimum of 2 years' follow-up treated by arthroscopic pullout suture repair were analyzed. Clinical results by use of the Lysholm knee and Hospital for Special Surgery scores and radiographic grade were evaluated, both preoperatively and at final follow-up. In addition, the second-look arthroscopic findings for 10 knees were analyzed. **Results:** A radiographic evaluation using the criteria of Kellgren and Lawrence at final follow-up showed an increase in radiographic grade by 1 grade in only 1 knee. On the second-look arthroscopies performed in 10 knees (47.6%), all repaired menisci had healed completely without additional chondral lesions in the knee. The mean Hospital for Special Surgery scores improved from 61.1 preoperatively to 93.8 at final follow-up ($P < .0001$), and the mean preoperative Lysholm knee scores improved from 57.0 to 93.1 at final follow-up ($P < .0001$). Retear was found in 1 knee at the 6-month follow-up, and reoperation was performed with the same procedure used for the index surgery. **Conclusions:** Arthroscopic pullout suture repair is an effective treatment for alleviating meniscal symptoms in patients with a symptomatic posterior root tear of the medial meniscus with degenerated articular cartilage of less than grade III. In addition, no discernable degenerative arthritic changes were found in terms of radiographic features with our limited short-term follow-up. **Level of Evidence:** Level IV, therapeutic case series. **Key Words:** Root tear—Posterior root—Pullout suture repair—Degenerative change.

A tear of the posterior root of the medial meniscus was first described by Pagnani et al.[1] in 1991, in a 20-year-old football player. The tibial attachment of the posterior horn of the meniscus is considered essential for maintaining normal meniscal function by circumferential hoop tension and preventing extrusion of the meniscus.[2,3] Accordingly, a complete tear of the posterior root of the meniscus would theoretically lead to almost total loss of the biomechanical function of the meniscus, because complete disruption of the circumferential fibers of the meniscus prohibits the generation of hoop stress, which is crucial to meniscal function.[4] Although arthroscopic meniscectomy for posterior root tear of the medial meniscus provides moderate symptom relief in most cases, it does not halt the progression of degenerative changes in the articular cartilage of the knee.[5-9] A number of case studies have concentrated on the results of posterior root tear of the medial meniscus after arthroscopic

From the Department of Orthopedic Surgery, Chonbuk National University School of Medicine, Chonbuk National University Hospital, Jeonju, South Korea.

The authors report no conflict of interest.

Received October 23, 2008; accepted March 29, 2009.

Address correspondence and reprint requests to Young Jin Lim, M.D., Department of Orthopedic Surgery, Chonbuk National University Hospital, 634-18, Keum-am dong, Jeonju, 561-712, South Korea. E-mail: lyj2834@naver.com

0749-8063/09/2509-8600$36.00/0
doi:10.1016/j.arthro.2009.03.018

meniscectomy.[5,8-10] However, no follow-up clinical study of posterior root tears of the medial meniscus treated by arthroscopic repair has been reported. The purpose of this study was to document the clinical results of arthroscopic pullout suture repair for posterior root tears of the meniscus. We hypothesized that arthroscopic pullout suture repair would yield satisfactory clinical results without the progression of osteoarthritic changes over a short period based on radiographic features.

METHODS

Patient Demographics

From March 2004 to August 2006, 228 knees underwent arthroscopic surgery for tears of the medial meniscus by the senior author. Among these, we reviewed 41 patients (42 knees [18.4%]) with posterior root tears of the meniscus who were treated with arthroscopic surgery. Of these, 26 patients (27 knees) underwent arthroscopic pullout suture repair. The remaining 15 patients (15 knees) who were treated with arthroscopic meniscectomy were excluded from this study. Of the 26 patients (27 knees), 6 patients (6 knees) who were unable to return for the final evaluation were excluded. Therefore in this study we reviewed 20 consecutive patients (21 knees [77.8%]) with a minimum of 2 years' follow-up who had undergone arthroscopic pullout suture repair.

This study included 9 men (9 knees) and 11 women (12 knees). The mean age at operation was 51.2 years (range, 23 to 58 years). Of the 21 knees, 10 were right knees and 9 were left knees; 1 patient had bilateral tears. The mean follow-up period was 31.8 months (range, 24 to 48 months). Surgery was performed if a patient had persistent mechanical pain despite 3 months of conservative treatment, including administration of nonsteroidal anti-inflammatory drugs and muscle-strengthening exercises. Before arthroscopic surgery, we obtained magnetic resonance imaging (MRI) studies that were suggestive of a posterior root tear of the medial meniscus in all patients.

Evaluation

All preoperative evaluations were performed for each parameter, and regular follow-up evaluations were performed in the outpatient department at 6 weeks, 3 months, 6 months, and 12 months after surgery and yearly thereafter. All patients were asked to return for a final evaluation. At the final follow-up, evaluations were performed by 2 of the authors. The mean elapsed time to surgery was 23.4 months (range, 3 to 48 months). Of the patients, 7 (35%) had minor trauma that caused symptoms. Pain on full flexion was the most frequent clinical manifestation (Table 1). Preoperative radiographic evaluations, which included weight-bearing anteroposterior, posteroanterior radiographs with 45° of flexion, lateral radiographs, and orthogroentgenoram were obtained in all patients. We used the original criteria of Kellgren and Lawrence[11] as follows: grade 0, no degenerative change; grade 1, questionable osteophytes and no joint space narrowing; grade 2, definitive osteophytes with possible joint space narrowing; grade 3, definitive joint space narrowing with moderate multiple osteophytes and some sclerosis; and grade 4, severe joint space narrowing with cysts, osteophytes, and sclerosis. All patients underwent preoperative MRI evaluation with a 1.5-T scanner (Siemens, Munich, Germany). All MRI studies were analyzed as film hard copies by 1 musculoskeletal radiologist. MRI findings described by Lee et al.[12] were used for the diagnosis of posterior root tear of the medial meniscus (Figs 1A-D).

TABLE 1. *Clinical Manifestation in 21 Posterior Root Tears of Medial Meniscus*

Manifestation	No. of Knees (%)
Pain on full flexion	14 (66.7)
Joint line tenderness	13 (61.9)
McMurray test (+)	12 (57.1)
Effusion	3 (14.3)
Locking	3 (14.3)
Giving way	2 (9.5)

The arthroscopic findings were analyzed. All knees were confirmed to have a posterior root tear of the medial meniscus. Arthroscopic classifications of the chondral lesions by use of the classification described by Outerbridge[13] are shown in Table 2. Before the index procedure was performed, we routinely recommended a second-look arthroscopic examination to confirm the healing of the repaired meniscus and to determine the extent of degenerative change in articular cartilage, even when meniscal symptoms were not present postoperatively. A second-look arthroscopic examination was performed in 10 patients (10 knees [47.6%]). Of the 10 patients, 9 provided informed consent in the absence of any meniscal symptoms, and the remaining patient had meniscal symptoms and required second-look arthroscopy.

Clinical results, both preoperatively and at final follow-up, were evaluated by use of Lysholm knee