

Case Report

Chondral Injury Following Meniscal Repair With a Biodegradable Implant

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Summary: This case report presents chondral damage associated with a resorbable meniscal repair implant. Although the devices may not have been inserted properly, surgeons using these implants should be aware of the potential severe chondral injury that may occur. **Key Words:** Meniscal repair—Implant—Meniscus Arrow.

Meniscectomy has been shown to lead to degenerative changes in the knee.^{1,2} Arthroscopic meniscal repair is an effective procedure for young patients with meniscal tears in the vascular zone of the meniscus where the potential for healing exists.³⁻⁵ Traditional meniscal repair techniques involve open or arthroscopic suture of the meniscus. The surgery can be performed using an inside-out,⁶⁻⁹ outside-in,^{10,11} or all-inside^{12,13} technique. Recently, there has been a movement toward arthroscopic meniscal repair using biodegradable implants.¹⁴⁻¹⁶ Biomechanical studies have shown the failure strength of the Bionx Meniscus Arrow (Bionx Implants, Blue Bell, PA) to be comparable to that of a horizontal suture.¹⁷ Additional devices are becoming available in an attempt to improve fixation and decrease operative time. Using these im-

plants, the surgery can be performed arthroscopically without the need for an additional incision.¹⁸ Also, arthroscopic knot tying is not required for these systems, making the procedure less technically demanding.¹⁴ There may be a theoretical decrease in the complication rate because no dissection is required medially or laterally where injury can occur to the saphenous or common peroneal nerves,^{19,20} respectively, or the popliteal vessels.^{21,22} There are few reports describing complications related to these arrows.^{23,24}

To date, there have been no long-term follow-up studies describing the outcome for patients treated with these devices. A randomized trial of Meniscus Arrows versus a standard inside-out suturing technique found the healing rate to be similar at second-look arthroscopy 3 to 4 months postoperatively.¹⁸ Despite the lack of long-term evidence supporting the use of these implants, they are being used widely because of the technical simplicity of their application.

Recent studies have advocated repair of meniscal tears that extend into the avascular zone,²⁵ which may potentially lead to an increase in the number of meniscal repairs performed. Also, technical developments in meniscal repair could inappropriately broaden the indications for repair as opposed to partial resection. We report a complication in a patient who

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underwent meniscal repair with biodegradable Meniscus Arrows at another institution, and who presented with pain in the knee resulting from chondral damage caused by the implants used for the repair.

CASE REPORT

The patient was a 44-year-old woman who presented with persistent left medial knee pain. She reported having undergone an arthroscopic meniscus repair 5 months earlier. Although the character of her mechanical symptoms changed, she continued to have pain. The previous operative record reported that the repair had been performed using 2 Meniscus Arrows. Two months after this repair, the patient underwent repeat arthroscopy because of continuing pain, but she reported that the source of the pain had not been discovered. She presented to the treating physician at our institution (J.H.) complaining of persistent pain and swelling in the knee. On initial evaluation, a large effusion was seen and the working differential diagnosis was an occult postoperative infection versus a synovitis related to implant degradation. After synovial fluid tested negative for infection (cell count, cultures), the patient started a physical therapy regimen to attempt to increase range of motion and de-

crease swelling. She was also treated with oral non-steroidal anti-inflammatory medication.

On re-examination 2 months later, there was a mild effusion. She had marked posteromedial joint line tenderness, and she had a painful, but full, active range of motion. There was no evidence of instability. Magnetic resonance imaging (MRI) was performed to detect a meniscal tear or chondral injury (Fig 1). This showed signal abnormalities near the repair site in the posterior horn of the medial meniscus at the synovial junction with a possible cyst or articular erosion in the posterior medial femoral condyle (Fig 2).

Given the duration of her symptoms and failure to improve despite several months of postoperative rehabilitation, repeat arthroscopy was performed. The initial view of the medial femoral condyle showed only mild degenerative change (Fig 3). However, with flexion to greater than 90°, the more posterior aspect of the condyle could be visualized. Here, there were 2 full-thickness, oblique, narrow defects measuring 2 to 3 mm wide and 8 to 10 mm long that corresponded precisely to the heads of the Meniscus Arrows used in the previous repair (Fig 4). Although the devices were nearly completely resorbed, the position of the implants was apparent in the meniscal tissue (Fig 5).

With flexion and extension of the knee, the remaining material of the arrows tracked directly in the

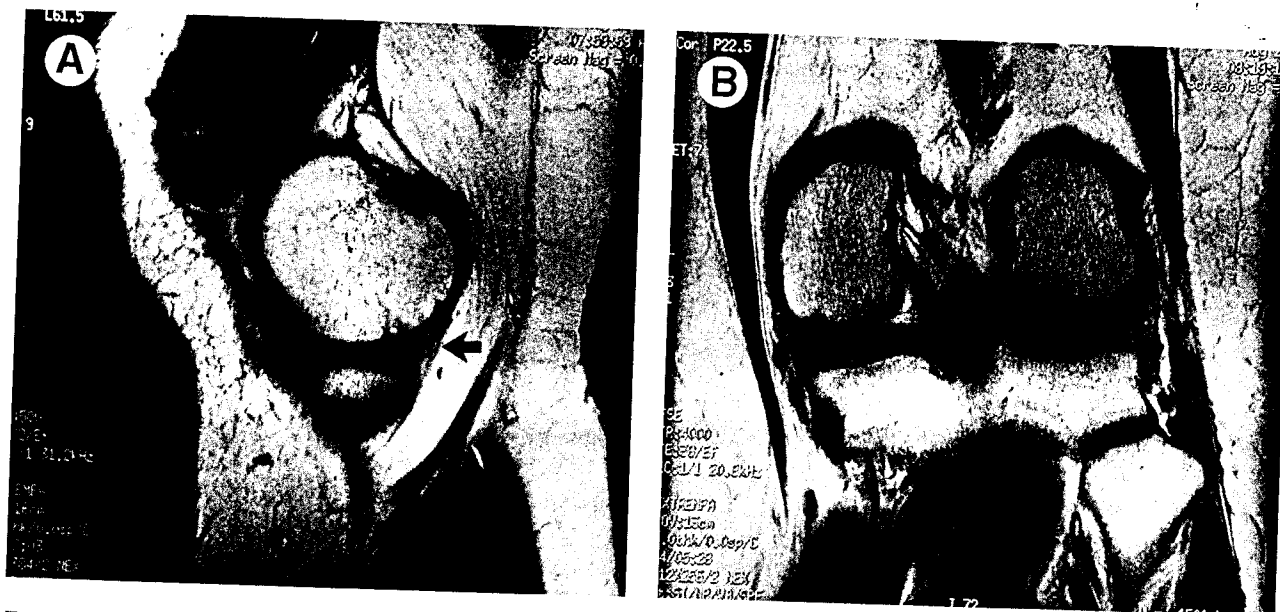


FIGURE 1. (A) Sagittal MRI showing increased signal in the posterior horn of the medial meniscus (arrow). (B) Coronal view showing diffuse signal at the meniscal-synovial junction.

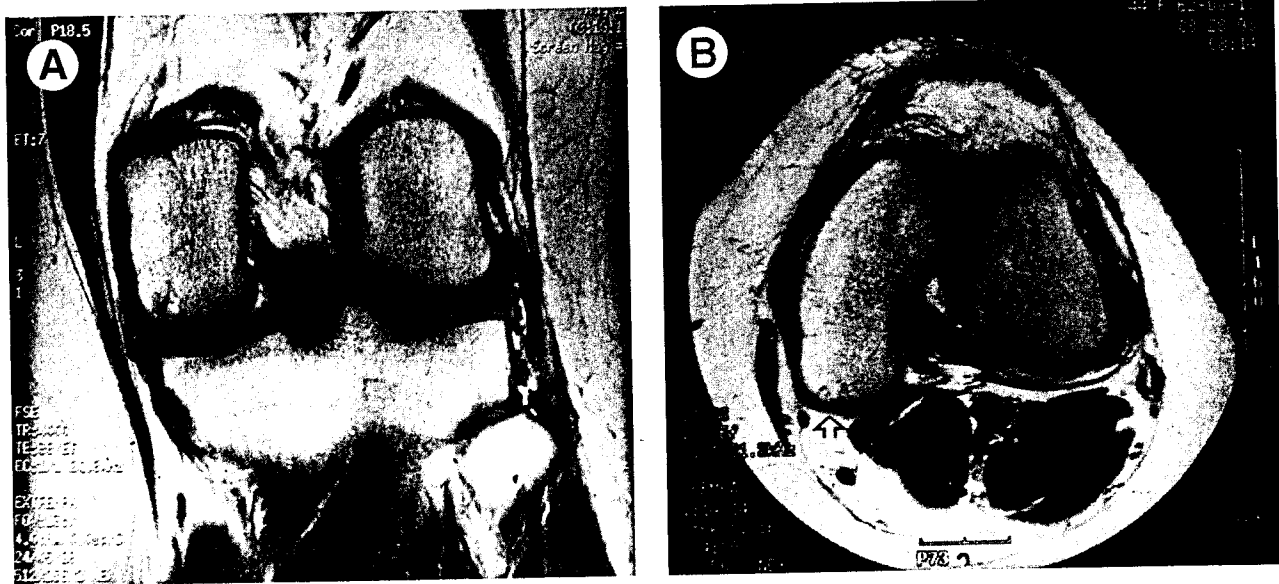


FIGURE 2. (A) Coronal MRI image with focal abnormality in the medial femoral condyle representing a cartilage defect or a possible small cyst. (B) Axial image also showing the focal abnormality (open arrow) in the area of the previous meniscal repair.

grooves in the femoral condylar articular cartilage. Although it is theoretically possible that the chondral damage could have occurred at the time of the initial surgery, this is highly unlikely because of the intimate anatomic relationship between the remaining articular material and the chondral grooves. Furthermore, visualization of the chondral defects was not possible until the knee was flexed to 90° . This position is inconsis-

tent with arthroscopic iatrogenic injury during posterior medial meniscal surgery, as the latter is performed with the knee in relative extension. The meniscal repair site was incompletely healed and the surrounding meniscal tissue was degenerated and unstable (Fig 6). A partial meniscectomy was performed. The defects in the femoral condyle were treated with a microfracture technique.²⁶

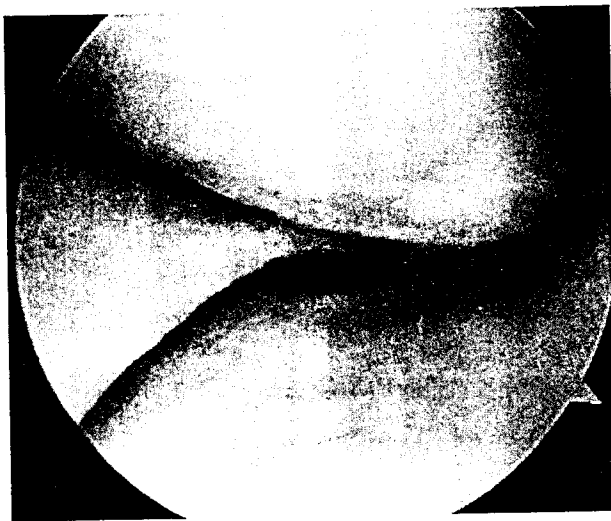


FIGURE 3. Initial arthroscopic view of the medial compartment with the knee in 30° of flexion.

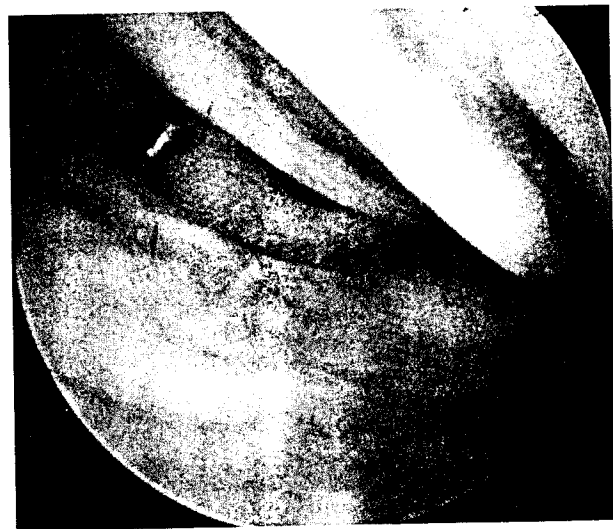


FIGURE 4. Increased knee flexion exposed 2 longitudinal defects in the posterior aspect of the medial femoral condyle.

DISCUSSION

Arthroscopic meniscal repair can be technically demanding. A bioabsorbable device that can facilitate the surgery and eliminate the need for additional incisions is desirable. It is evident from the widespread use of these devices that many orthopaedic surgeons find them to be useful if not preferable to traditional repair techniques. However, clinical and arthroscopic follow-up data are limited. One study reported knee pain in 31% of patients who underwent meniscal repair using these implants. These symptoms resolved spontaneously by the sixth postoperative month.²⁴ Implant removal may expedite the resolution of these symptoms but risks failure of healing.

It is not known whether the complication described above resulted from improper technique or if this problem is inherent in the device used. It is important that the head of the device is properly buried in the meniscal tissue because a prominent head may damage the chondral surface. It is essential to assess the amount of meniscal tissue involved in the fixation. The sizing recommendations according to location of the tear must be followed closely. This case is an example of the potential harmful effect of device prominence on articular cartilage. Surgeons who use this implant should be aware of this potential serious complication.



FIGURE 5. The defects corresponded to the position of the heads (arrow) of the meniscal implants.

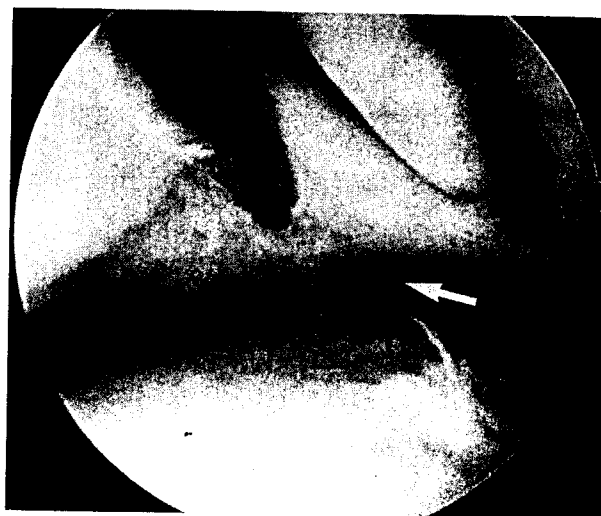


FIGURE 6. An arthroscopic probe was used to palpate the meniscus and reveal the incomplete healing.

REFERENCES

1. Fairbank TJ. Knee joint changes after meniscectomy. *J Bone Joint Surg Br* 1948;30:664-670.
2. Petrosini AV, Sherman OH. A historical perspective on meniscal repair. *Clin Sports Med* 1996;15:445-453.
3. Horibe S, Shino K, Nakata K, Maeda A, Nakamura N, Matsumoto N. Second-look arthroscopy after meniscal repair. Review of 132 menisci repaired by an arthroscopic inside-out technique. *J Bone Joint Surg Br* 1995;77:245-249.
4. Horibe S, Shino K, Maeda A, Nakamura N, Matsumoto N, Ochi T. Results of isolated meniscal repair evaluated by second-look arthroscopy. *Arthroscopy* 1996;12:150-155.
5. Perdue PS Jr, Hummer CD III, Offosimo AJ, Heidt RS Jr, Dormer SG. Meniscal repair: Outcomes and clinical follow-up. *Arthroscopy* 1996;12:694-698.
6. Brown GC, Rosenberg TD, Deffner KT. Inside-out meniscal repair using zone-specific instruments. *Am J Knee Surg* 1996;9:144-150.
7. Cannon WD Jr. Arthroscopic meniscal repair. Inside-out technique and results. *Am J Knee Surg* 1996;9:137-143.
8. Schulte KR, Fu FH. Meniscal repair using the inside-to-outside technique. *Clin Sports Med* 1996;15:455-467.
9. Stone RG, Frewin PR, Gonzales S. Long-term assessment of arthroscopic meniscus repair: A two- to six-year follow-up study. *Arthroscopy* 1990;6:73-78.
10. Esser RD. Arthroscopic meniscus repair: The easy way. *Arthroscopy* 1993;9:231-233.
11. Rodeo SA, Warren RF. Meniscal repair using the outside-to-inside technique. *Clin Sports Med* 1996;15:469-481.
12. Morgan CD. The "all-inside" meniscus repair. *Arthroscopy* 1991;7:120-125.
13. Reigel CA, Mulhollan JS, Morgan CD. Arthroscopic all-inside meniscus repair. *Clin Sports Med* 1996;15:483-498.
14. Albrecht-Olsen P, Kristensen G, Tormala P. Meniscus bucket-handle fixation with an absorbable Biofix tack: Development of a new technique. *Knee Surg Sports Traumatol Arthrosc* 1993;1:104-106.
15. Barrett GR, Richardson K, Koenig V. T-Fix endoscopic meniscal repair: Technique and approach to different types of tears. *Arthroscopy* 1995;11:245-251.

16. Barrett GR, Treacy SH. Use of the T-fix suture anchor in fascial sheath reconstruction of complex meniscal tears. *Arthroscopy* 1996;12:251-255.
17. Albrecht-Olsen P, Lind T, Kristensen G, Falkenberg B. Failure strength of a new meniscus arrow repair technique: Biomechanical comparison with horizontal suture. *Arthroscopy* 1997;13:183-187.
18. Kristensen G, Albrecht-Olsen P, Burgaard P, Jorgensen U, Torholm C. Biofix Meniscus Tack versus inside-out suturing technique in the treatment of bucket-handle lesions—A randomized study. *Acta Orthop Scand* 1994;65:17 (suppl 260).
19. Austin KS. Complications of arthroscopic meniscal repair. *Clin Sports Med* 1996;15:613-619.
20. Small NC. Complications in arthroscopic surgery performed by experienced arthroscopists. *Arthroscopy* 1988;4:215-221.
21. Small NC. Complications in arthroscopic meniscal surgery. *Clin Sports Med* 1990;9:609-617.
22. Stone RG, Sprague NFI. Complications of arthroscopic meniscal repair. In: Sprague NFI, ed. *Complications in arthroscopy*. New York: Raven, 1989;157-168.
23. Kurzweil PR, Schreck PJ. Meniscus fixation using the Arrow in human and goat knees. *Arthroscopy* 1998;14:444 (abstr).
24. Whitman TL, Diduch DR. Transient posterior knee pain with the Meniscal Arrow. *Arthroscopy* 1998;14:762-763.
25. Rubman MH, Noyes FR, Barber-Westin SD. Arthroscopic repair of meniscal tears that extend into the avascular zone. A review of 198 single and complex tears. *Am J Sports Med* 1998;26:87-95.
26. Rodrigo JJ, Steadman JR, Silliman JF, Fulstone HA. Improvement of full-thickness chondral defect healing in the human knee after debridement and microfracture using continuous passive motion. *Am J Knee Surg* 1994;7:109-116.