Does Prior Cartilage Restoration Impact Outcomes Following Knee Arthroplasty?

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KEYWORDS

• Cartilage restoration • Meniscus transplantation • Knee joint preservation • Arthroplasty

KEY POINTS

- When compared with matched control subjects, patients undergoing arthroplasty after prior cartilage/meniscal restoration have significantly less pain relief, lower functional outcomes, and less improvement following partial or total knee arthroplasty.
- Patients undergoing arthroplasty after prior cartilage/meniscal restoration have significantly less severe arthritic findings on radiographs as measured by the Kellegren and Lawrence grade compared with matched control subjects.
- In this study, patients who underwent arthroplasty after failed prior cartilage/meniscal restoration did not experience symptom relief after cartilage/meniscal restoration, which is atypical of the typical patient undergoing cartilage/meniscal restoration.

INTRODUCTION

Injuries to the articular cartilage of the knee are seen in up to 63% of arthroscopies.[1,2] Articular cartilage defects do not reliably heal and can lead to degenerative joint disease,[3–5] ultimately resulting in significant pain and disability.[6–10] The optimal treatment strategy for these defects, one that provides the highest likelihood of a painless return to activity, remains unknown.[6–10] In particular, young, active patients with symptomatic articular cartilage defects are challenging, because arthroplasty may lead to wear-related complications and a need for multiple revisions over an individual's lifetime[11] and hence articular cartilage and meniscal restoration procedures are being performed with increasing frequency.[12–14]

Techniques including autologous chondrocyte implantation or variations thereof (Fig. 1), osteochondral autograft transfer, osteochondral allograft transplantation, and meniscus allograft transplantation (MAT) provide alternatives to arthroplasty to help improve function and reduce pain.[15–31] In some settings, both cartilage restoration and arthroplasty may be viable surgical alternatives for these patients. Given that patients' status-post cartilage restoration can be revised to arthroplasty and arthroplasty cannot be revised back to native cartilage, cartilage restoration has been advocated as a "conservative" surgical approach that does not "burn any bridges."[15–31] If cartilage restoration fails, patients may progress to knee arthroplasty, including total knee arthroplasty (TKA) and

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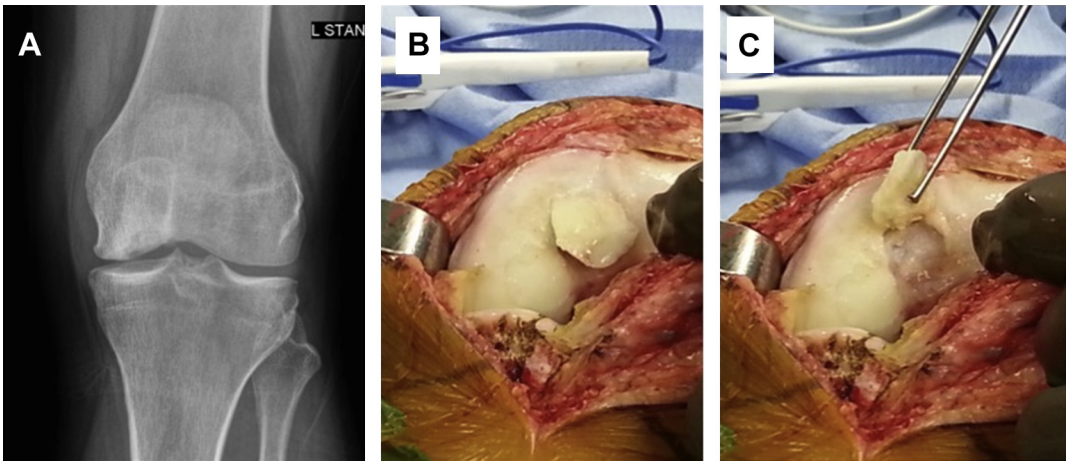

Fig. 1. A 39-year-old woman with continued left knee medial compartment pain after undergoing medial femoral condyle osteochondral allograft transplantation. (*A*) A 45° flexion weight-bearing posteroanterior radiograph demonstrating cystic changes of the left knee medial femoral condyle. (*B*, *C*) Osteochondral graft not healed at the time of unicompartmental knee arthroplasty, approximately 1.5 years following transplantation.

unicompartmental knee arthroplasty (UKA), as their definitive pain-relieving surgical solution. It remains unknown whether the outcome of knee arthroplasty after cartilage restoration is equivalent to the outcome had the knee arthroplasty been performed primarily.

To date, no data are available regarding clinical outcomes following conversion of a joint preservation procedure, such as cartilage/meniscal restoration, to TKA. Such information would be especially important with respect to preoperative counseling for patients related to the outcomes following arthroplasty procedures. Therefore, the purpose of this study was to compare the clinical outcomes of patients with a history of cartilage or meniscal restorative procedures with age-, sex-, and procedure-matched control patients undergoing primary TKA or UKA. The authors hypothesized that outcomes following primary TKA will be equivalent to those with TKA following cartilage and/or meniscus restoration.

METHODS

This study underwent approval by our university's institutional review board. A retrospective review of prospectively collected data on consecutive patients who underwent cartilage restoration by a single surgeon and subsequently progressed to arthroplasty was performed. Inclusion criteria included patients with a history of a prior open or arthroscopic cartilage and/or meniscal restoration procedure and subsequent ipsilateral UKA or TKA. The cartilage/meniscal restoration procedures included osteochondral autograft transfer, osteochondral allograft transplantation, and/or MAT of the same condyle and joint. All cartilage patients were matched with control patients based on sex, age $\pm$ 5 years, body mass index (BMI) $\pm$ 5, smoking status, and arthroplasty type. All patients in both the cartilage and the control groups were followed for a minimum of 2 years. Exclusion criteria in the cartilage group included patients whose cartilage/meniscal procedure was complicated by infection or chondrolysis as a complication of the index cartilage procedure and patients undergoing revision cartilage/meniscal restoration.

In the cartilage group, indications for cartilage/meniscal restoration versus primary knee arthroplasty included symptomatic, unipolar, full-thickness articular cartilage lesions and/or symptomatic meniscal deficiency not amenable to repair, in patients without diffuse arthritic changes in the affected compartment. Patients were also required to be ligamentously stable (or correctable) with neutral (or correctable) coronal plane alignment. In the cartilage group and the control groups, indications for arthroplasty were symptomatic medial or lateral tibiofemoral pain (UKA) or diffuse symptomatic bicompartmental or tricompartmental degenerative changes (TKA), unresponsive to prior treatment. In addition, indications for UKA included intact cruciate ligament status, lack of patellofemoral arthritis greater than grade III or IV on radiographs, lack of coronal plane deformity greater than 5°, and lack of knee flexion contracture