



Treatment of Focal Cartilage Defects of the Knee: An International Survey

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Introduction

A focal articular cartilage defect is a well-defined area of damage to the hyaline cartilage which comprises the articular surface of a joint.⁴ These defects have numerous etiologies, including inflammation, trauma, vascular accidents, and joint instability.¹⁵ They have limited healing potential and can contribute to premature osteoarthritis if untreated.⁴

Many techniques for cartilage restoration have been developed, popular options including debridement, microfracture, autologous chondrocyte implantation (ACI), osteochondral autograft transfer (OAT), and osteochondral allograft transplantation (OCA).¹⁵ Debridement removes the damaged cartilage; microfracture breaches the subchondral bone to fill the defect with fibrocartilage.¹⁵ OAT and OCA both utilize osteochondral plugs to fill the defect;¹⁵ OCA uses cadaveric tissues, while OAT harvests from less critical areas of the joint.¹⁵ ACI uses cultured chondrocytes derived from a patient's own cells.¹⁵ Techniques like total (TKA) and partial knee arthroplasty (PKA) restore joint surfaces, but are not typically used to treat focal defects.^{1,3}

Currently, there is no consensus regarding the best method to repair focal cartilage defects of the knee.¹³ Surgeons addressing these defects must consider numerous surgical options and conservative measures (e.g., physical therapy).⁷ A review of the literature yielded case series, randomized controlled trials, and reviews evaluating various techniques.^{2,8,10,11,14,16} One review identified five controlled trials evaluating ACI, OAT, and microfracture; the authors concluded that no single technique consistently or significantly outperformed the others.¹³ Recent prospective trials have concurred.¹²

This project aimed to examine the variation in selecting, settings for selecting, and regional preferences of treatments being used by orthopaedic surgeons around the world in hopes of guiding knowledge translation strategies for evidence-based management of these injuries. We hypothesized that management of focal cartilage defects of the knee will differ by geographical region.

Methods

We surveyed 33 internationally-based orthopaedic surgeons who were acquainted with

the investigators. Surveys were distributed and collected electronically via REDCap (Research Electronic Data Capture); non-responders received automated reminders.

Surgeons were asked for demographic information and treatment preferences for two mock cases. We collected data regarding location of training/practice and years of experience. Both cases presented an 18 year-old male complaining of knee pain: Case 1 presented a small lesion (1 cm by 1 cm); Case 2 presented a large lesion (2 cm by 3 cm). Surgeons selected either physical therapy or surgery. Those who initially treated with surgery or selected surgery after conservative management failed were presented with seven techniques: debridement, microfracture, OAT, ACI, OCA, PKA, and TKA. Cases and treatment options were illustrated to ensure the surgeon could respond regardless of their proficiency in English (Figure 3).

Data collected from the survey was analyzed by grouped frequency analysis. Fisher's exact test was used to evaluate statistical significance.

Results

We received 18 completed surveys (54.5%); 1 survey was incomplete and discarded. All surgeons completed medical school and residency abroad. Fourteen countries were represented for medical school (5.5% North American, 16.7% South American, 33.3% European, 16.7% Middle Eastern, 22.2% Asian, and 5.5% Oceanian). 14 countries were represented for residency with 16 surgeons training in the same country as their medical school. For fellowship, 10 surgeons (55.5%) trained abroad, 3 (16.7%) trained abroad and in the USA, and 5 (27.8%) trained in the USA. 50% practiced in an academic setting, 17% in a private setting, and 33% in a mixed setting. The average level of experience was 11.2 years of unsupervised practice (range 0 - 35).

For Case 1, 67% initially treated with surgery meanwhile 33% attempted physical therapy (Figure 1); all surgeons would treat with surgery if conservative management failed. 72% preferred microfracture, 17% preferred OAT, and 11% preferred ACI (Figure 2).

For Case 2, all but one surgeon (94%) initially treated with surgery (Figure 1); all surgeons would treat with surgery if conservative

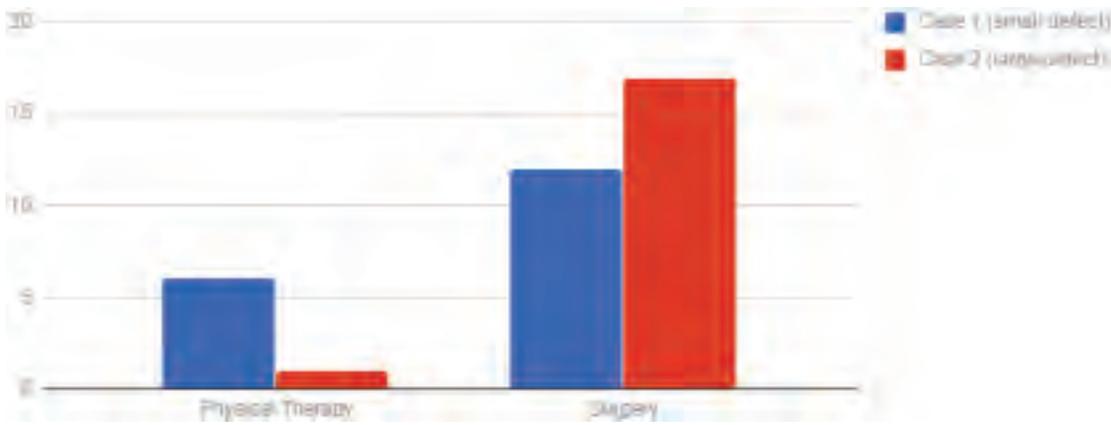


Figure 1. Conservative vs. Surgical Management of Focal Cartilage Defect.

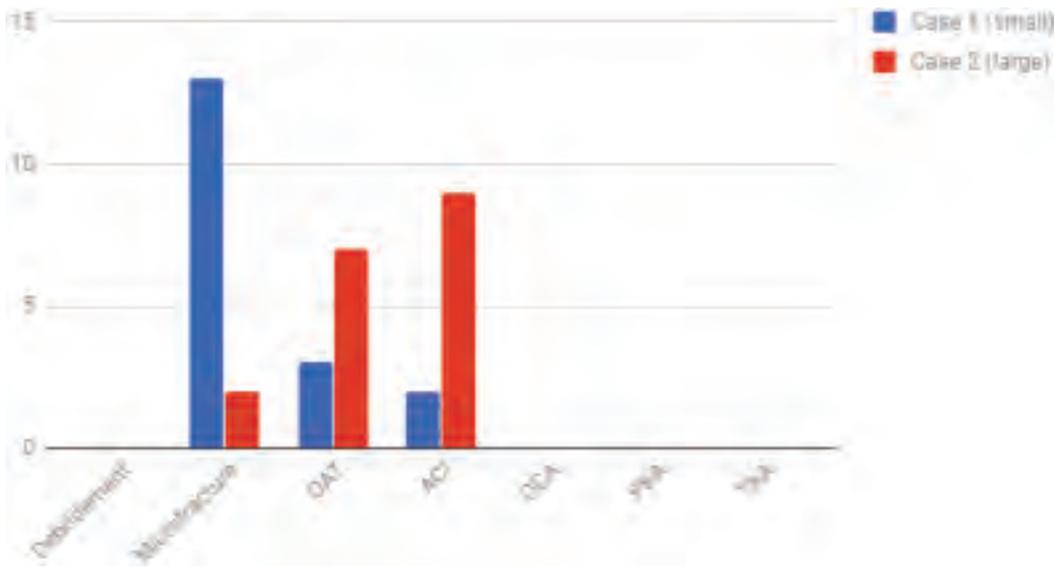


Figure 2. Surgical Management of Focal Cartilage Defects

management failed. 50% preferred ACI, 39% preferred OAT, and 11% preferred microfracture (Figure 3).

No statistically significant variations between geographic regions were observed in either case.

Discussion

We wanted to examine common treatment practices among orthopaedic surgeons worldwide for focal articular cartilage defects of the knee in skeletally mature individuals. A literature search identified similar efforts in medicine and orthopaedics.^{5,6} However, none focused on focal articular cartilage defects.

The responses revealed surgeons were more likely to treat with surgery, especially if defects were large. Regardless of size, all surgeons who initially preferred conservative management chose to pursue a surgical option if no improvement occurred.

Microfracture was preferred for small defects. Far fewer preferred ACI or OAT, and none selected arthroplasty, which was expected for multiple reasons. Additionally, none chose debridement or OCA.

For large defects, we did not find a clear frontrunner. 50% selected ACI but almost as many selected OAT. Far fewer chose microfracture which is consistent with prior studies which

observed poorer outcomes when using microfracture to treat defects larger than 2 to 4 cm².^{8,11} Again, none selected debridement, OCA, or arthroplasty. We were surprised that none chose OCA but this may be due to unavailability of fresh osteochondral allograft in their regions.

We were not able to detect any significant variation in management by location of residency or fellowship training. It is possible that significant variation exists but was not captured due to small sample size.

Additional challenges we encountered included the high percentage who completed at least part of their fellowship in the USA. We presumed that fellowship would have the greatest impact on a surgeon’s preferences. We had not fully considered the impact of a surgeon’s current setting and location of practice on preference of technique and did not capture this data. In the future, we hope to have a larger survey pool and a higher response rate.

Conclusion

Surgeon preferences did not differ significantly worldwide. Microfracture was the preferred treatment for small defects, but most were split between ACI and OAT for large defects.

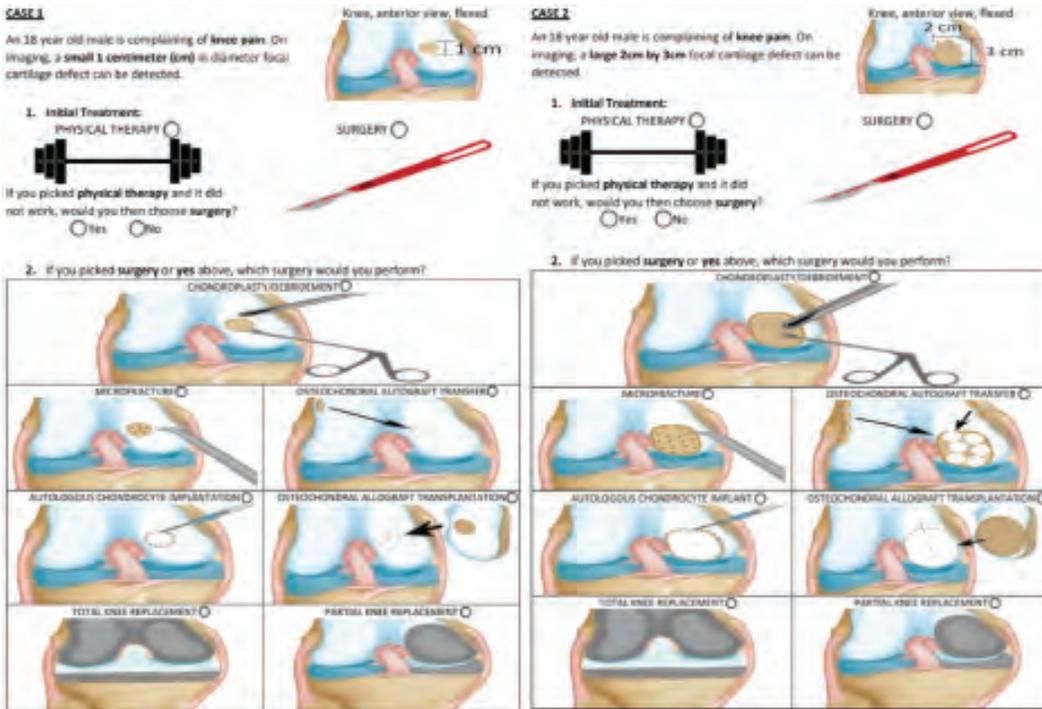


Figure 3. Cases and Treatment Options

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