Original Article

Arthroscopic Measurements Predict Knee Chondral Lesion Size More Accurately Than Magnetic Resonance Imaging, and Mechanism of Injury Influences Ability of Either Technique to Predict Graft Size

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Purpose: To compare osteochondral defect size measurements and characteristics across magnetic resonance imaging (MRI) and arthroscopy and at the time of osteochondral allograft (OCA) transplantation or autologous chondrocyte implantation (ACI). **Methods:** Patients who underwent ACI and OCA transplantation at a single institution between 2015 and 2019 were retrospectively identified. Patients were excluded if they had severe osteoarthritis, MRI scans were not available for review, surgical records did not include defect sizing necessary for analysis, or operative reports were not available. Osteochondral lesion characteristics including size were collected preoperatively by MRI and arthroscopy and at the time of definitive open surgical intervention. Subgroup analysis was performed comparing measurement techniques depending on the corrective surgical approach used, as well as depending on the mechanism of chondral injury, to determine whether these factors had any effect on the ability of arthroscopy or MRI to predict graft size. **Results:** Overall, 136 chondral lesions were addressed, with restoration procedures in 117 patients (mean age, 32.5 years). The average difference between the final graft size and the lesion area measured with index arthroscopy was 116 mm^2, whereas the average difference between the final graft size and the lesion size measured with preoperative MRI was 182 mm^2 ($P < .001$). Depending on surgical technique, measurements with MRI were more similar to the final graft size when a patient underwent OCA transplantation versus ACI ($P = .007$). Depending on the mechanism of injury, MRI measurements of lesions were closer to the graft area when lesions resulted from trauma ($P = .047$). **Conclusions:** Chondral lesion size as determined by preoperative MRI is less accurate than arthroscopic measurement. The mechanism of injury leading to chondral damage and degree of damage may influence the ability of MRI and arthroscopy to accurately measure chondral lesions and predict the final graft size used in surgical correction. **Level of Evidence:** Level III, retrospective cohort study.

Osteochondral lesions are common sources of pain resulting from injury to cartilage and subchondral bone.[1] These injuries are common in young and active patients and have been identified in as many as 60% of patients undergoing knee arthroscopy.[2,3] They pose difficulty in treatment because of limited healing potential resulting from the avascular nature of hyaline cartilage.[4] The decision to perform surgical intervention of these lesions depends on the size and location of the defect, as well as the extent of injury to the surrounding structures.[5] Smaller lesions can be treated with debridement or marrow-stimulating techniques, whereas larger and more extensive lesions may require invasive cartilage restoration procedures such as autologous chondrocyte implantation (ACI) or osteochondral allograft (OCA) transplantation. ACI is a 2-stage procedure: The first stage involves obtaining arthroscopic biopsy specimens of a patient's own cartilage, which are grown on a matrix for later implantation at the second stage of the procedure, and the second stage is an open procedure in which the matrix

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Received July 8, 2023; accepted April 25, 2024.
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2666-061X/23911
https://doi.org/10.1016/j.asmr.2024.100951

is secured in place at the site of the chondral defect.[6] In contrast to ACI, OCA transplantation is a single-stage open procedure; however, patients commonly undergo diagnostic arthroscopy prior to the definitive restoration operation to allow for evaluation and sizing of the chondral defect prior to correction.[7] This step ensures the lesion is amenable to treatment and there is no previously unrecognized concomitant pathology. Arthroscopy is considered the gold standard for diagnosis of chondral lesions by some authors and allows for sizing prior to open correction to help ensure grafts are available in the size needed for correction.[8-11]

As ACI and OCA transplantation procedures have increased in popularity and use, our understanding surrounding the limitations and cost-effectiveness of each has also increased. ACI requires 2 separate procedures and may have a prolonged recovery period; however, it is considered a relatively bone-sparing procedure because it does not affect the subchondral bone.[4] OCA transplantation has the benefit of consisting of only a single-stage procedure; however, limited availability of allografts contributes to delays and increases the need for the use of optional index arthroscopy for sizing.[4,12] Performing arthroscopy prior to OCA transplantation can contribute to the overall cost of treatment.[1,7] Additionally, some authors have questioned the accuracy of defect measurements made with arthroscopy,[8,9,11] and magnetic resonance imaging (MRI) has been proposed as a noninvasive, more cost-effective alternative to guide decisions in treatment interventions in lieu of staged diagnostic arthroscopy. Authors advocating this approach suggest that this would allow for lesion diagnosis and sizing while offering minimal risk to patients and providing insight into the chondral defect and surrounding structure involvement.[8,13,14] The performance of each method of measurement can be evaluated by comparing measurements made by each (i.e., arthroscopy vs MRI) with one another, as well as with final graft sizes.[7,9,11,15]

The purpose of this study was to compare osteochondral defect size measurements and characteristics across MRI and arthroscopy and at the time of OCA transplantation or ACI. We hypothesized that there would no difference in lesion sizing or predictability of graft size between MRI and arthroscopy.

Methods

This retrospective case series was approved by an institutional review board (Thomas Jefferson University, study No. 20E.119) prior to data collection. Consecutive patients who underwent ACI or OCA transplantation between 2015 and 2019 at a single institution were identified by Current Procedural Terminology codes 27412 and 27415. Staging arthroscopy was performed to determine the size of the defect in all patients, as well as to perform cartilage biopsy in those undergoing ACI. Patients were eligible for this study if they underwent preoperative MRI and if operative reports of staging arthroscopy and secondary implantation with documented graft size were available. Patients were excluded if MRI scans were not available for review, surgical records did not include defect sizing necessary for analysis, or operative reports were not available. Patients with severe osteoarthritis were also excluded from the study.

Data Collection

Charts of included patients were reviewed to collect patient demographic characteristics. Lesion characteristics (including length, width, involved thickness, and subchondral bone defect) were measured on MRI by 2 fellowship-trained sports medicine orthopaedic surgeons (A.L. and M.P.C.), both blinded to patients' surgical group to avoid bias. Lesion characteristics from index arthroscopy as well as final surgery were collected from operative reports; all arthroscopic measurements were performed intraoperatively using a probe. Cartilage defects were sized at the time of arthroscopy using a calibrated probe with millimeter measurement markings to determine the dimensions of cartilage affected. During open implantation surgery, the defects were measured with a calibrated ruler. Reported areas were calculated by multiplying reported lesion dimensions together. Variables recorded included mechanism of injury, location of lesion, grade of lesion, presence of bone defect and edema, Outerbridge classification,[16] and procedure (ACI or OCA transplantation).

Statistical Analysis

Lesions were analyzed for patients in the entire cohort and for patients subsequently stratified into groups based on the mechanism of injury and final surgical correction technique used. Examination was performed comparing the aforementioned lesion characteristics as well as measurements with MRI, at index arthroscopy, and at the time of surgical correction for graft sizing. Analysis was performed by examining the average difference between dimensions (area and greatest diameter) of grafts used in surgery and dimensions of chondral lesions determined by arthroscopy as well as MRI. Additionally, analysis was performed using the mean absolute difference (MAD) between graft dimensions and chondral lesion dimensions measured with arthroscopy as well as MRI. Use of the MAD in area and greatest diameter allows for examination of variability in area measurements. Categorical data were analyzed using the χ^2 test or Fisher exact t test, whereas the Mann-Whitney U test was used to analyze continuous data; results with $P < .05$ were considered statistically significant. All statistical analysis was performed using RStudio (version 3.6.3; Posit, Vienna, Austria).

Results

A total of 117 patients (mean age ± standard deviation, 32.5 ± 11.3 years; 69 female patients [59%]) with 136 Outerbridge grade 3 or 4 chondral lesions were included (Fig 1). Of the 136 lesions identified, 73 (53.7%) were treated with OCA transplantation and 63 (46.3%) were treated with ACI. Of the defects, 70 (51.5%) were atraumatic and 66 (48.5%) were traumatic.

Lesions sized during arthroscopy had an average area of 353 ± 186 mm^2, and the average area of graft used in correction was 353 ± 183 mm^2. The average lesion area on arthroscopy was 0.38 ± 181 mm^2 larger than the area of graft used; in comparison, the average lesion area on MRI was 119 ± 195 mm^2 smaller than the area of graft used ($P < .001$) (Table 1). The MAD between graft area and measurements with arthroscopy was 116 ± 139 mm^2; this was significantly different from the MAD between graft area and area measured on MRI, which was 182 ± 138 mm^2 ($P < .001$). The average greatest diameter of lesions on arthroscopy was 1.27 ± 7.20 mm smaller than the average greatest diameter of graft used; this differed significantly from the average greatest diameter of lesions on MRI, which was 5.25 ± 8.09 mm smaller than the average greatest diameter of graft used ($P < .001$). The MAD between the greatest diameter of lesions measured on arthroscopy and greatest diameter of graft used was 4.35 ± 5.85 mm, which differed significantly from the MAD between the diameter of lesions measured on MRI and the diameter of graft used, at 7.45 ± 6.09 mm ($P < .001$).

Comparison Based on Surgical Corrective Technique

Further analysis was performed to assess the accuracy of arthroscopy and MRI in predicting final graft size depending on the surgical corrective technique implemented (Table 2). The lesion area in each group measured via arthroscopy did not differ significantly ($P = .191$), and neither did the final graft size used ($P = .359$) (Table 3). The average lesion area on arthroscopy was 37.2 ± 207 mm^2 smaller than the area of graft used

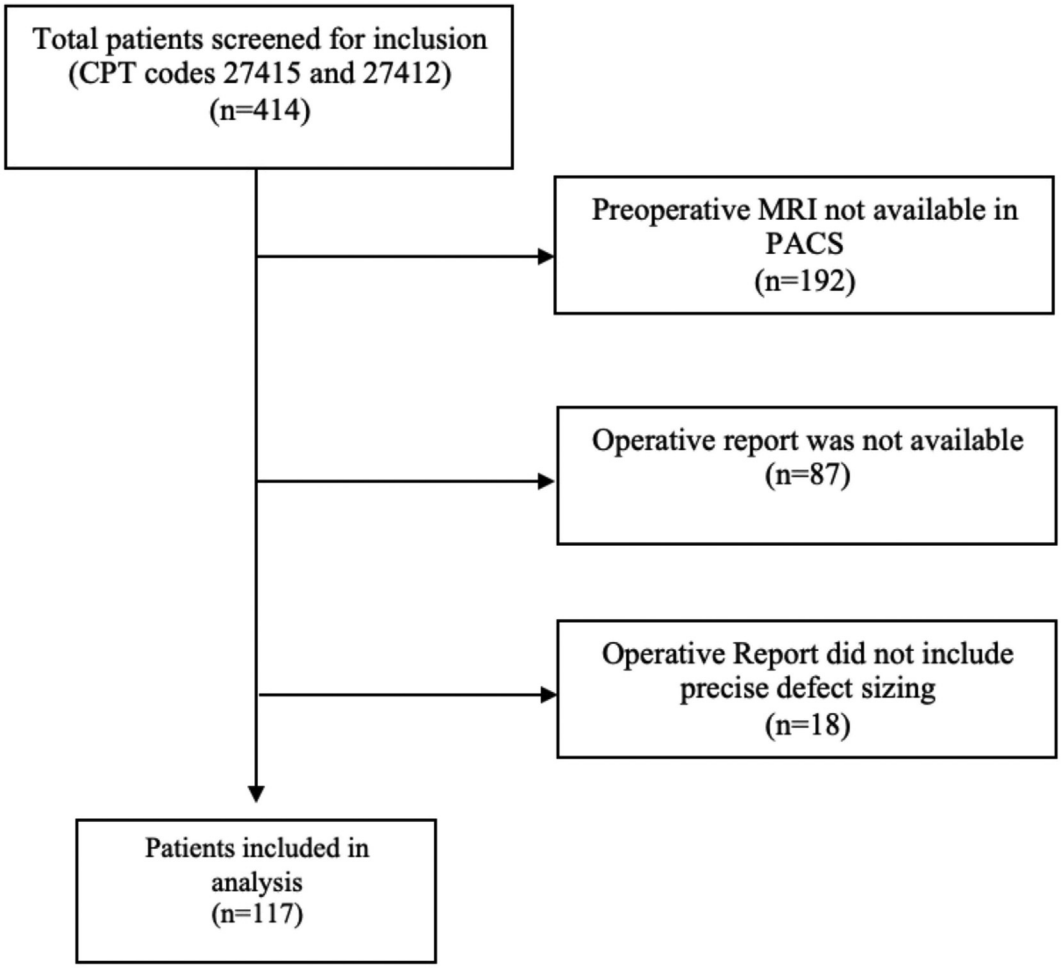

Figure 1. Flowchart of patient inclusion and exclusion process. (CPT, Current Procedural Terminology; MRI, magnetic resonance imaging; PACS, picture archiving and communication system.)

Table 1. Comparison of Measurements Made Via Different Techniques

Measurement	Arthroscopy	MRI	*P* Value
Graft vs measured lesion area, mm^2			
Delta	−0.38 (181)	119 (195)	<.001*
MAD	116 (139)	182 (138)	<.001*
Graft vs measured lesion diameter, mm			
Delta	1.27 (7.20)	5.25 (8.09)	<.001*
MAD	1.27 (7.20)	7.45 (6.09)	<.001*

NOTE. Data are presented as mean (standard deviation).
MAD, mean absolute difference; MRI, magnetic resonance imaging.
*Statistically significant.

in ACI procedures, whereas the average lesion area on arthroscopy was 32.77 ± 150 mm^2 larger than the area of graft used in OCA transplantations; these values differed significantly from one another ($P = .028$). The MAD between areas measured on arthroscopy and final graft size used in ACI procedures did not differ significantly from the MAD between areas measured on arthroscopy and graft size used in OCA transplantations ($P = .164$). The average lesion area on MRI was 144 ± 208 mm^2 smaller than the area of graft used in ACI procedures, whereas the average lesion area on MRI was 97.1 ± 182 mm^2 smaller than the area of graft used in OCA transplantations ($P = .165$). The MAD between areas measured on MRI and final graft size used in ACI procedures did not differ significantly from the MAD between areas measured on arthroscopy and graft size used in OCA transplantations ($P = .125$).

In the ACI group, the average greatest diameter of lesions measured at index arthroscopy was 2.76 ± 5.55 mm smaller than the average greatest diameter of graft used on implantation, whereas in the OCA transplantation group, the average greatest diameter of lesions measured on arthroscopy was 0.01 ± 6.67 mm larger ($P = .026$). However, the significant difference disappeared when evaluating the MAD between greatest graft diameter and greatest lesion diameter measured on arthroscopy in each group ($P = .281$). The average greatest diameter of lesions on MRI was 7.17 ± 8.89 mm smaller than the average greatest graft diameter for patients who underwent ACI, whereas on average, the greatest diameter measured on MRI was 3.60 ± 6.98 mm smaller than the final graft size for patients who underwent OCA transplantation ($P = .012$). The difference remained when evaluating

Table 2. Lesion Characteristics Depending on Whether Lesions Were Surgically Corrected With ACI or OCA Transplantation

		Treatment Option		
Characteristic	Total	ACI	OCA Transplantation	*P* Value
No. of lesions	136	63	73	
Mechanism of injury				>.999
Atraumatic	70 (51.5)	32 (50.8)	38 (52.1)	
Trauma	66 (48.5)	31 (49.2)	35 (47.9)	
Location of injury				.103
Medial femoral condyle	39 (28.7)	16 (25.4)	23 (31.5)	
Lateral femoral condyle	24 (17.6)	7 (11.1)	17 (23.3)	
Patellar lateral facet	13 (9.56)	6 (9.52)	7 (9.59)	
Patellar medial facet	19 (14.0)	12 (19.0)	7 (9.59)	
Patellar inferior pole	1 (0.74)	0 (0.00)	1 (1.37)	
Central trochlear groove	11 (8.09)	8 (12.7)	3 (4.11)	
Medial trochlea	3 (2.21)	2 (3.17)	1 (1.37)	
Lateral trochlea	9 (6.62)	2 (3.17)	7 (9.59)	
Medial tibial plateau	1 (0.74)	1 (1.59)	0 (0.00)	
Patellar central facet	16 (11.8)	9 (14.3)	7 (9.59)	
Grade of injury				.011*
Partial	29 (21.3)	20 (31.7)	9 (12.3)	
Full	107 (78.7)	43 (68.3)	64 (87.7)	
Subchondral bone defect				.478
No defect	78 (57.4)	37 (58.7)	41 (56.2)	
<5 mm	40 (29.4)	20 (31.7)	20 (27.4)	
>5 mm	18 (13.2)	6 (9.52)	12 (16.4)	
Bone edema present				.893
No	65 (47.8)	31 (49.2)	34 (46.6)	
Yes	71 (52.2)	32 (50.8)	39 (53.4)	
Outerbridge classification				.515
Grade 3	28 (20.6)	15 (23.8)	13 (17.8)	
Grade 4	108 (79.4)	48 (76.2)	60 (82.2)	

NOTE. Data are presented as number (percentage) unless otherwise indicated.
ACI, autologous chondrocyte implantation; OCA, osteochondral allograft.
*Statistically significant.

Table 3. Measurements of Graft and Lesion Sizes Depending on Surgical Corrective Technique Used

Measurement	Total	Treatment Option		*P* Value
		ACI	OCA Transplantation	
Area of graft, mm^2	353 (183)	368 (187)	339 (180)	.359
Comparison of measurement of graft size to sizing of lesion via MRI				
Size of articular injury on MRI, mm^2	234 (173)	224 (172)	242 (174)	.545
Graft vs lesion area with MRI, mm^2				
Delta	119 (195)	144 (208)	97.1 (182)	.165
MAD	182 (138)	202 (151)	165 (123)	.125
Graft vs diameter with MRI, mm				
Delta	5.25 (8.09)	7.16 (8.89)	3.60 (6.98)	.012*
MAD	7.45 (6.09)	8.99 (6.99)	6.12 (4.87)	.007*
Comparison of measurement of graft size to sizing of lesion via arthroscopy				
Area of lesion on arthroscopy, mm^2	353 (186)	331 (139)	372 (219)	.191
Graft vs lesion area with arthroscopy, mm^2				
Delta	−0.38 (181)	37.2 (207)	−32.77 (150)	.028*
MAD	116 (139)	135 (161)	101 (115)	.164
Graft vs diameter with arthroscopy, mm				
Delta	1.27 (7.20)	2.76 (7.55)	−0.01 (6.67)	.026*
MAD	4.35 (5.85)	4.94 (6.31)	3.84 (5.42)	.281

NOTE. Data are presented as mean (standard deviation).
ACI, autologous chondrocyte implantation; MAD, mean absolute difference; MRI, magnetic resonance imaging; OCA, osteochondral allograft.
*Statistically significant.

the MAD between average greatest graft diameter and greatest lesion diameter measured on MRI in each group ($P = .007$) (Table 3).

Comparison Based on Mechanism of Chondral Injury

Lesions were also analyzed depending on the mechanism of chondral injury: atraumatic (n = 70) or traumatic (n = 66). Lesion characteristics were similar, including location, number of partial lesions (28.6% vs 13.6%, $P = .055$), size of articular injury (238 ± 190 mm^2 vs 229 ± 153 mm^2, $P = .752$), defects without subchondral bone defect (60.0% vs 54.5%, $P = .801$), presence of bone edema (54.3% vs 50.0%, $P = .743$), Outerbridge classification (grade 3 in 78.6% vs 80.3%, $P = .970$), and treatment (54.3% vs 53.0%, $P > .999$).

Areas of lesions measured on arthroscopy were similar between groups ($P = .481$), as were graft sizes

Table 4. Measurements of Graft and Lesion Sizes Depending on Method of Injury

Measurement	Total	Mechanism of Injury		*P* Value
		Atraumatic	Trauma	
Area of graft, mm^2	353 (183)	379 (203)	325 (157)	.084
Comparison of measurement of graft size to sizing of lesion via MRI				
Size of articular injury on MRI, mm^2	234 (173)	238 (190)	229 (153)	.752
Graft vs lesion area with MRI, mm^2				
Delta	119 (195)	141 (216)	96.0 (170)	.181
MAD	182 (138)	205 (155)	158 (113)	.047*
Graft vs diameter with MRI, mm				
Delta	5.25 (8.09)	6.06 (8.92)	4.39 (7.06)	.229
MAD	7.45 (6.09)	7.99 (7.20)	6.88 (4.63)	.286
Comparison of measurement of graft size to sizing of lesion via arthroscopy				
Area of lesion on arthroscopy, mm^2	353 (186)	364 (205)	342 (166)	.481
Graft vs lesion area with arthroscopy, mm^2				
Delta	−0.38 (181)	14.9 (194)	−16.56 (167)	.312
MAD	116 (139)	127 (146)	106 (130)	.373
Graft vs diameter with arthroscopy, mm				
Delta	1.27 (7.20)	1.56 (8.90)	0.97 (4.83)	.631
MAD	4.35 (5.85)	5.11 (7.41)	3.55 (3.39)	.112

NOTE. Continuous variables are presented as mean (standard deviation).
MAD, mean absolute difference; MRI, magnetic resonance imaging.
*Statistically significant.

used at implantation ($P = .084$). In atraumatic lesions, areas measured on arthroscopy were, on average, 14.9 $\pm$ 194 mm^2 smaller than the area of graft used at implantation, whereas traumatic lesions were, on average, measured to be 16.56 $\pm$ 167 mm^2 larger on arthroscopy than the final graft size ($P = .312$). When we evaluated the MAD between the areas measured on arthroscopy and final graft sizes, the average differences were also similar between groups ($P = .373$). The average area of atraumatic lesions that were measured with MRI was, on average, 141 $\pm$ 216 mm^2 smaller than the final graft size, whereas the average area of traumatic lesions was 96.0 $\pm$ 170 mm^2 smaller than the final graft size used when measured with MRI ($P = .181$). On examination of the MAD between areas measured with MRI and final graft sizes, a significant difference was found depending on whether lesions were atraumatic or traumatic ($P = .047$) (Table 4).

In atraumatic lesions, the greatest diameter measured on arthroscopy was, on average, 1.56 $\pm$ 8.90 mm smaller than the greatest diameter of graft used at implantation, whereas in traumatic lesions, the greatest diameter on arthroscopy was, on average, 0.97 $\pm$ 4.83 mm smaller than the greatest dimension of graft used ($P = .631$). Evaluation of the MAD between greatest graft diameter and greatest lesion diameter measured on arthroscopy also showed no significance between groups ($P = .112$). On average, the greatest diameter measured on MRI was 6.06 mm smaller than the final graft diameter in atraumatic lesions compared with 4.39 mm smaller in traumatic lesions ($P = .229$). No significant difference was found when comparing the MAD between MRI-measured lesion diameter and final graft diameter in both groups ($P = .286$) (Table 4).

Discussion

We found that there was a significant difference in the ability of arthroscopy and MRI to predict graft sizes used in final surgical correction, with estimates made by arthroscopy being more accurate. On the basis of this finding, the null hypothesis was rejected because preoperative MRI lesion measurements did not correspond to arthroscopic lesion measurements and graft size. Analysis was also performed to evaluate which factors may influence the ability of arthroscopy and MRI to predict graft size. The results suggest that the accuracy of arthroscopy and MRI in predicting graft size from lesion measurements may be influenced by the surgical technique used for lesion correction and that the ability of MRI to predict graft size from lesion measurements may be influenced by the mechanism of chondral injury.

Previously, investigators have examined the accuracy of index arthroscopy in measuring chondral lesions. In a study of cartilage defects in 10 cadaveric knees, Siston et al.[1] found arthroscopy to underestimate true chondral size, whereas a study of 407 patients (mean age, 35.7 years) by Niemeyer et al.[9] concluded that arthroscopy can, at times, overestimate true lesion size. Notably, in their study of 450 chondral lesions in 407 patients, Niemeyer et al. noted that arthroscopy is a reliable and accurate method for determining the grade of chondral damage compared with open evaluation, helping explain why many authors still consider it the gold standard in the diagnosis of knee cartilage injuries and a useful tool in the evaluation of other techniques in evaluating chondral lesions.[9,17] Recently, MRI has also been suggested as a means of estimating lesion size. In their study of 92 cartilage defects in 77 patients (mean age, 38 years) undergoing preoperative MRI within 1 year of arthroscopic knee surgery for high-grade cartilage defects, Campbell et al.[5] reported that compared with arthroscopy, MRI underestimated lesion size by an average of 70%—and by as much as 92% for lesions in specific locations such as the medial femoral condyle, lateral femoral condyle, and trochlea. In their retrospective study of 38 patients (mean age, 37 years) with preoperative MRI who underwent open cartilage repair within 12 months, Gomoll et al.[18] further confirmed these findings, showing that MRI underestimated true lesion size by 65%. In our study, the accuracy of each pre-implantation chondral lesion measurement technique for predicting graft size was evaluated. Across all measurements used in evaluating the predictive ability of arthroscopy and MRI in estimating graft size (difference between graft diameter and measured diameter of chondral lesion, MAD between graft diameter and measured diameter of lesion, difference between graft area and measured area of lesion, and MAD between graft area and measured area of lesion), the measurements made by arthroscopy were closer to the true graft size, indicating significant superiority in predicting graft size compared with MRI (Table 4).

Prior studies have examined factors that can influence the accuracy of both arthroscopy and MRI in sizing chondral lesions. Niemeyer et al.[9] outlined that arthroscopy had a greater tendency to overestimate the true size of chondral lesions—with even greater overestimation when lesions were smaller. Campbell et al.[5] found that in terms of accuracy, MRI further underestimated lesion size by 22% for lesions found in the medial femoral condyle, lateral femoral condyle, and trochlea compared with other lesions in other areas, which were already being underestimated. In our study, there was no difference in the characteristics of lesions when examined based on the mechanism of injury, that is, atraumatic versus traumatic defects. However, a difference was found in the ability of MRI to accurately predict graft area in this scenario. The average difference between final graft

area and area measured on MRI was 158 mm^2 in traumatic lesions compared with 205 mm^2 in atraumatic lesions ($P = .047$). Possible explanations for this difference despite the similarities in the groups may consist of factors not accounted for in this study. One possible explanation is MRI's limitation in the ability to delineate irregularly shaped lesions and surrounding degeneration, fissuring, or any unstable cartilage, which may present in different amounts depending on the cause of the defect.[5,19] Figueroa et al.[8] have previously noted differences in the sensitivity of MRI in evaluating chondral lesions depending on classification according to the 10-tier International Cartilage Repair Society Cartilage Lesion Classification System, which further subclassifies lesions, whereas our study only classified lesions based on the 5-tier Outerbridge system.[8,19] Notably, differences in MRI measurements were only present when comparing graft area with MRI measurements and were not present when comparing greatest dimensions between graft and lesion.

We noted differences in the ability of MRI to predict the greatest dimension of graft used in surgery depending on the final corrective technique used. In this case, the greatest dimensions of final OCA transplantation grafts used differed from the dimensions obtained through MRI by an average of 6.12 mm, as compared with a difference of 8.99 mm in MRI dimensions obtained for defects treated with ACI techniques ($P = .007$). Many lesion characteristics were again similar between groups but did differ by grade of injury: 87.7% of defects treated with OCA transplantation were full defects compared with 68.3% of those treated via ACI ($P = .011$). In a prospective study evaluating chondral lesions in patients with symptomatic osteoarthritis using MRI, consisting of 13 patients (mean age, 53.8 years), Kuikka et al.[20] found that MRI had differing sensitivity in detecting and measuring chondral defects depending on the lesion depth. By use of the articular cartilage loss grading scale described by Tyrrell et al.[21] in 1988, it was found that MRI had a sensitivity and diagnostic accuracy of 28.6% for grade I lesions (moderate irregularity), 46.15% for grade II lesions (severe irregularity but not full thickness), and 76.9% for grade III lesions (full-thickness loss).[20] This may offer a possible explanation for the difference in the ability of MRI to predict graft diameter in this scenario. Additional differences were noted in arthroscopy's ability to predict graft area and diameter; however, these differences disappeared when evaluating the MAD, which—as mentioned previously—gives insight into the variability of measurements from the mean. Future studies may be warranted to further investigate influencing factors that alter the reliability of arthroscopy and MRI in measuring chondral lesions.

Limitations

The limitations of this study include the significant difference in lesion characteristics between the ACI and OCA transplantation cohorts, specifically in terms of grade of chondral injury. Studies have shown that the accuracy of MRI can be influenced by the depth of injury,[20] limiting the conclusions that can be drawn from the comparison of these 2 cohorts. Because this study was retrospective in design, the ability to explicitly control for participant demographic characteristics and lesion characteristics was limited. This study also lacks a cost-benefit analysis, a useful approach in assessing the value of health interventions.[22] ACI is a 2-stage procedure and OCA transplantation is a single-stage procedure with common utilization of diagnostic arthroscopy for the evaluation of chondral defects.[7] Performing a cost analysis of MRI as a potential alternative to arthroscopy in the initial evaluation of chondral injury would allow for an understanding of the economic impact and clinical impact of any implementation of changes.[22,23] Another limitation in this study is potential variability in the arthroscopic and MRI measurements of chondral lesions because the same individuals did not perform these techniques for all participants. Studies have reported on the influence of observer experience and the types of probes used on the accuracy of measuring cartilage defects in the knee,[1,24] highlighting a possible source of error in the results not accounted for in the study in its current design.

Conclusions

Chondral lesion size as determined by preoperative MRI is less accurate than arthroscopic measurement. The mechanism of injury leading to chondral damage and degree of damage may influence the ability of MRI and arthroscopy to accurately measure chondral lesions and predict the final graft size used in surgical correction.

Disclosures

The authors report the following potential conflicts of interest or sources of funding: B.S.T. receives funding grants from GID; reports a consulting or advisory relationship with DePuy Synthes, Mitek, DePuy, and Pacira BioSciences; receives lecture fees from Mitek and DePuy; owns equity or stocks in Johnson & Johnson; and receives nonfinancial support from Mitek and Knee Creations. K.B.F. reports a consulting or advisory relationship with DePuy Synthes, Vericel, and Innocoll Biotherapeutics and reports board membership with American Orthopaedic Society for Sports Medicine. All other authors (A.J.H., A.R.P., H.D., M.P.C., A.L., D.F., J.P.) declare they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Full ICMJE author disclosure forms are available for this article online, as supplementary material.

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