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Determining Accuracy of Chondral Lesion Sizing Methods Prior to Surgery

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INTRODUCTION

Osteochondral lesions of the knee may require cartilage restoration such as osteochondral allograft (OCA) transplantation or autologous chondrocyte implantation (ACI).

Although MRI and arthroscopy can offer valuable information regarding lesion characteristics prior to these procedures, no study has compared the use of each in estimating the sizes of grafts used at the time of surgical correction.

The goal of this study is to compare osteochondral defect size measurements and characteristics across MRI, arthroscopy, and at the time of implantation with OCA or ACI.

MATERIALS & METHODS

Patients who underwent ACI and OCA transplantation at a single institution between 2015 and 2019 were retrospectively identified.

Osteochondral lesion characteristics including size were collected preoperatively from 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 if these had any effect on the ability of arthroscopy or MRI to predict graft size.

FIGURES and TABLES

	Arthroscopy	MRI	P Value
Delta Graft-Measured Lesion Area (mm ²)	-0.38 (181)	119 (195)	<.001*
MAD Graft-Measured Lesion Area (mm ²)	116 (139)	182 (138)	<.001*
Delta Graft-Measured Lesion Diameter (mm)	1.27 (7.20)	5.25 (8.09)	<.001*
MAD Graft-Measured Lesion Diameter (mm)	1.27 (7.20)	7.45 (6.09)	<.001*

Table 1. Comparison of measurements made via different techniques. Bold indicates significance. MAD = Mean Absolute Difference, Mean (SD)

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

Table 2. Measurements of graft and lesion sizes depending on surgical corrective technique used. Mean (standard deviation). Bold indicates significance. MAD = Mean Absolute Difference. ACI = autologous chondrocyte implantation. OCA = osteochondral allograft.

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

Table 3. Information regarding graft and lesion sizes depending on MOI. Continuous variables are presented as mean (standard deviation), Bold indicates significance. MAD = Mean Absolute Difference.

RESULTS

Average difference between final graft size and lesion area measured with index arthroscopy was 116 mm² vs Average difference between final graft size and lesion size measured with preoperative MRI was 182 mm² ($P < .001$).

Depending on surgical technique, measurements with MRI were more similar to final graft size when a patient underwent OCA transplantation versus ACI ($P = .007$).

Depending on mechanism of injury, MRI measurements of lesions were closer to graft area when lesions resulted from trauma ($P = .047$).

DISCUSSION

Chondral lesion size determined by preoperative MRI imaging is less accurate than arthroscopic measurements.

The mechanism 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.

REFERENCES

- Bae S, Lee HK, Lee K, et al. Comparison of Arthroscopic and Magnetic Resonance Imaging Findings in Osteochondral Lesions of the Talus. *Foot Ankle Int*. 2012;33(12):1058-1062. doi:10.3113/FAI.2012.1058
- ones KJ, Mosich GM, Williams RJ. Fresh Precut Osteochondral Allograft Core Transplantation for the Treatment of Femoral Cartilage Defects. *Arthroscopy Techniques*. 2018;7(8):e791-e795. doi:10.1016/j.eats.2018.03.016
- Makovicika JL, Patel KA, Hassebroek JD, Hartigan DE, Wong M, Chhabra A. Arthroscopic Evaluation of Knee Cartilage Using Optical Reflection Spectroscopy. *Arthroscopy Techniques*. 2019;8(4):e399-e405. doi:10.1016/j.eats.2018.11.019
- Niemeyer P, Pestka JM, Erggelet C, Steinwachs M, Salzmann GM, Südkamp NP. Comparison of arthroscopic and open assessment of size and grade of cartilage defects of the knee. *Arthroscopy*. 2011;27(1):46-51. doi:10.1016/j.arthro.2010.05.024