No Difference In Outcomes Between Coblation And Mechanical Chondroplasty In Patients Undergoing Autologous Chondrocyte Implantation (ACI)

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Disclosures

- All disclosures listed in ISAKOS website

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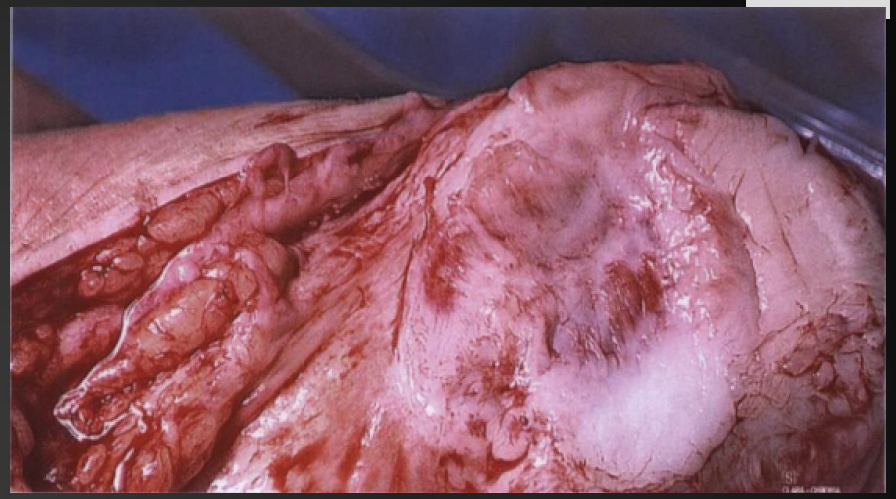
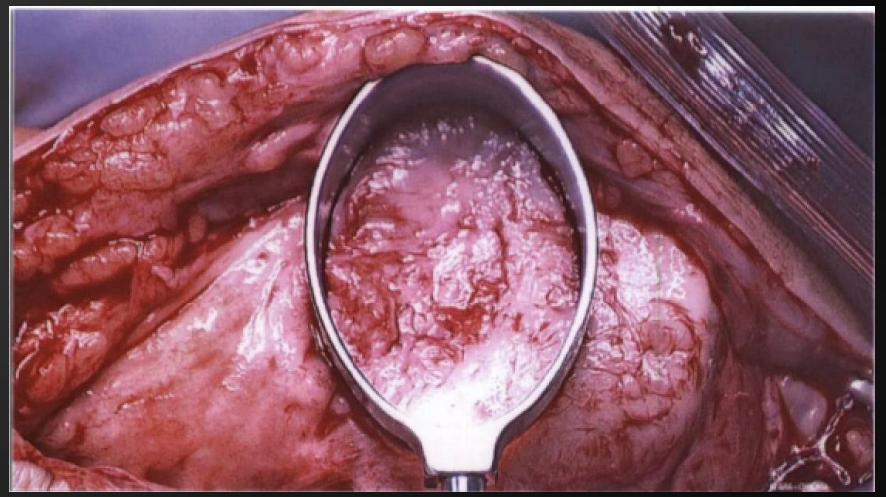
Background

- Osteochondral injuries are common[1].
- Autologous chondrocyte implantation (ACI) is a common treatment strategy[3]
  - Younger patients with larger defect size (> 2cm2)[4].
  - Excellent outcomes reported[5]
- Often includes chondroplasty
  - Traditionally performed with an arthroscopic shaver.





(Tetteh et al, J Orthop Sports Phys Ther. 2012. Chau et al. J Bone Joint Surg Am. 2021)

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Background

- Coblation devices have emerged as an option for chondroplasty.
- Tuthill et. al – coblation efficacious and safe in the use of chondroplasty within the knee[6]
- Use concomitantly during ACI has not yet been studied.

Review > Arthrosc Sports Med Rehabil. 2023 Jul 17;5(4):100749.
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Radiofrequency Chondroplasty of the Knee Yields Excellent Clinical Outcomes and Minimal Complications: A Systematic Review

Trevor Tuthill [1], Garrett R Jackson [1], Sabrina F Schundler [1], Jonathan S Lee [1], Sachin Allahabadi [1], Luis M Salazar [1], Johnathon R McCormick [1], Harkirat Jawanda [1], Anjay Batra [1], Zeeshan A Khan [1], Enzo S Mameri [1 2], Jorge Chahla [1], Nikhil N Verma [1]

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Arthroscopy, Sports Medicine, and Rehabilitation

(Tuthill et. al. Arthrosc Sports Med Rehabil. 2023.)

Aim

- To investigate differences between mechanical chondroplasty and coblation during ACI procedure

Reoperation Rate

Return to Activity

Failure Rate

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Methods

- Retrospective chart review
- Patients who underwent ACI + chondroplasty
  - 2010 to 2022
- Patient demographics, cartilage defect location and size, and outcome metrics were collected.

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Statistical Analysis

Shapiro-Wilk test

- To assess normality

T-test, Mann-Whitney U test

- To analyze difference between groups

Fisher Exact Test or Chi-Squared Test

- To analyze association between categorical variables

$p < 0.05$ to establish significance

*all statistical analyses were performed with SYSTAT (version 13.1, Chicago, IL).

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Results

- 105 patients met inclusion criteria.
  - 84 patients received mechanical chondroplasty
    - 43 males (50.5%)
    - mean BMI of 27.15 kg/m2
  - 21 received coblation
    - 11 males (52.4%)
    - mean BMI of 29.14 kg/m2
- No statistical differences between groups were found in patient or defect demographic data ($p>0.05$).

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Lesion Location	Mechanical Chondroplasty	Coblation Chondroplasty
Patella (%)	26 (30.6)	9 (42.9)
Medial Femoral Condyle (%)	36 (42.4)	13 (61.9)
Lateral Femoral Condyle (%)	31 (36.5)	7 (33.3)
Trochlea (%)	37 (43.5)	11 (52.4)
Multiple Lesions (%)	32 (37.6)	13 (61.9

*No statistical differences between groups were found in defect demographic data

	Mechanical Chondroplasty	Coblation Chondroplasty	p-value
Return to Activity, %	85.9	66.7	0.056
Time to return, days	382	502.9	0.385
Reoperation Rate, %	31.7	33.3	1.00
Delamination at time of Reoperation, %	8.2	19.0	0.22
Failure, %	18.8	28.6	0.37

Discussion

- No significant difference between outcomes of reoperation, failure and return to activity
- Return to activity approached statistical significance with a p value of 0.056
- As the use of coblation becomes more routine, continued study into its safety and efficacy are necessary.
- Further studies needed to evaluate the true impact of its use in ACI.

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Limitations

- Retrospective study
- Small sample size (n = 105)
- Did not separate based on any concomitant procedures (MPFL reconstruction, tibial tubercle osteotomy, etc.)
- Patient Reported Outcomes not assessed

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Conclusion

- No significant difference in return to activity, reoperation, and failure rate was observed between coblation and mechanical chondroplasty in patients undergoing ACI.

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References

1. Tetteh ES, Bajaj S, Ghodadra NS. Basic science and surgical treatment options for articular cartilage injuries of the knee. J Orthop Sports Phys Ther. 2012 Mar;42(3):243-53. doi: 10.2519/jospt.2012.3673. Epub 2012 Feb 29. PMID: 22383075.
2. Chau MM, Klimstra MA, Wise KL, Ellermann JM, Tóth F, Carlson CS, Nelson BJ, Tompkins MA. Osteochondritis Dissecans: Current Understanding of Epidemiology, Etiology, Management, and Outcomes. J Bone Joint Surg Am. 2021 Jun 16;103(12):1132-1151. doi: 10.2106/JBJS.20.01399. PMID: 34109940; PMCID: PMC8272630.
3. Carey JL, Remmers AE, Flanigan DC. Use of MACI (Autologous Cultured Chondrocytes on Porcine Collagen Membrane) in the United States: Preliminary Experience. Orthop J Sports Med. 2020 Aug 12;8(8):2325967120941816. doi: 10.1177/2325967120941816. PMID: 32851104; PMCID: PMC7425279.
4. Dekker TJ, Aman ZS, DePhillipo NN, Dickens JF, Anz AW, LaPrade RF. Chondral Lesions of the Knee: An Evidence-Based Approach. J Bone Joint Surg Am. 2021 Apr 7;103(7):629-645. doi: 10.2106/JBJS.20.01161. PMID: 33470591.
5. Minas T, Von Keudell A, Bryant T, Gomoll AH. The John Insall Award: A minimum 10-year outcome study of autologous chondrocyte implantation. Clin Orthop Relat Res. 2014 Jan;472(1):41-51. doi: 10.1007/s11999-013-3146-9. PMID: 23979923; PMCID: PMC3889462.
6. Tuthill T, Jackson GR, Schundler SF, Lee JS, Allahabadi S, Salazar LM, McCormick JR, Jawanda H, Batra A, Khan ZA, Mameri ES, Chahla J, Verma NN. Radiofrequency Chondroplasty of the Knee Yields Excellent Clinical Outcomes and Minimal Complications: A Systematic Review. Arthrosc Sports Med Rehabil. 2023 Jul 17;5(4):100749. doi: 10.1016/j.asmr.2023.05.006. PMID: 37520504; PMCID: PMC10373658.