A Cadaveric Study of Cam Type Femoroacetabular Impingement: Biomechanical Comparison of Contact Pressures Between Cam Deformity, Partial Femoral Osteoplasty, and Complete Femoral Osteoplasty

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Disclosures

I (and/or my co-authors) have something to disclose.

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http://www.aaos.org/disclosure
Background

- Incomplete Cam resection is the primary indicator for revision arthroscopic surgery
- The joint contact pressures of an incomplete resection are currently unknown
- Studies that analyze the joint contact properties of incomplete Cam deformity resections are needed
Objective

Determine the hip contact pressure properties in three conditions:

- Intact Cam deformity
- Cam deformity with incomplete resection
- Cam deformity with complete resection
Study Design

**Specimen Criteria:** 8 Hemi-pelvises with intact labrum and Cam deformity (alpha angle > 55°) confirmed via computed tomography (CT)

**Testing conditions:** Intra-articular pressure maps performed for each bony state:
- Intact
- Partial resection
- Complete resection
Technique: 5.5mm arthroscopic burr used to resect lateral aspect of Cam deformity to a depth of 3-4mm. Pressure map generated with specimens loaded in the MTS electromechanical test system to provide:

- Contact pressure
- Contact area
- Peak force

Statistical Analysis:

- Each test repeated 3x and averaged
- Data from each specimen normalized with respect to intact
- Repeated measures ANOVA with Tukey HSD post-hoc used to compare biomechanical values from each condition
Cadaveric hip with the (A) intact Cam deformity, (B) partial resection of Cam deformity, and (C) complete resection of Cam deformity.
Representative Pressure map from one specimen showing: (A) intact Cam deformity, (B) partial Cam resection, and (C) complete Cam resection.
There was a difference found for the normalized contact pressure, but not the normalized peak force or normalized contact area among the three states.

ANOVA Repeated Measures of Contact Area, Contact Pressure, Peak Force of Normalized ROI.

<table>
<thead>
<tr>
<th></th>
<th>INTACT</th>
<th>PARTIAL</th>
<th>COMPLETE</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contact Area (%)</td>
<td>100</td>
<td>106.5±22.3</td>
<td>102.0±19.4</td>
<td>0.2451</td>
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<tr>
<td>Contact Pressure (%)</td>
<td>100</td>
<td>93.6±8.3</td>
<td>82.6±16.2</td>
<td>&lt;0.0001</td>
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<tr>
<td>Peak Force (%)</td>
<td>100</td>
<td>105.9±21.1</td>
<td>98.7±31.6</td>
<td>0.3576</td>
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</tbody>
</table>
Complete resection of the Cam deformity yielded significantly lower pressure averages when compared to hips with the partial Cam resection and intact Cam deformity.

Contact pressure percentage reduction in the complete and partial state were 17.4% and 6.4%, respectively, compared to that of the intact state.
Conclusions

- A complete resection of a cam lesion results in lower intraarticular hip contact pressure compared to its intact

- The biomechanical change may translate into symptoms patients express, especially in impingement positions

- Underscores importance of ensuring complete resection of cam lesions in the treatment of FAIS
Thank you