

The logo for the Hospital for Special Surgery, featuring a grid of squares in various shades of blue and grey. The text "HOSPITAL FOR SPECIAL SURGERY" is written in white, bold, uppercase letters on a blue rectangular background.

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The Morphologic Matrix for Mechanical Hip Pain: Classification System, Intra-Operative Findings, and Outcomes following Arthroscopic Surgery

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Disclosures

- Eilish O'Sullivan – I have no financial relationships to disclose.
- Asheesh Bedi has financial relationships with the following companies:
 - A3 Surgical: Shareholder
 - Arthrex: Consultant
- Bryan T. Kelly has financial relationships with the following companies:
 - A3 Surgical: Consultant, Shareholder
 - Arthrex: Consultant

Introduction

- Early hip pain and cartilage damage is related to joint pathomechanics, as has been demonstrated by numerous studies.¹⁻³
- The understanding of the primary mechanical factors and their prognostic significance is of paramount importance in successfully treating those with mechanical hip pain.
- Alpha angle and center edge angle are frequently utilized to characterize hip morphology, however they fail to account for the rotational anatomy of the proximal femur that may contribute to degenerative changes.⁴

Purpose

- To utilize a Matrix of radiographic parameters to classify patients with mechanical hip pain.
- To describe intra-operative findings associated with the matrices.
- To compare patient-reported outcome scores following arthroscopic management of labral injury and femoroacetabular impingement.

Methods

- A retrospective analysis was conducted from a prospectively enrolled patients in the Hip Preservation Registry with available computed tomography (CT) data undergoing hip arthroscopy for mechanical hip pain.
- The Matrix is built from the coronal center edge angle, maximum alpha angle, and femoral version as measured on CT.

CEA		Alpha		FV	
1.	<18	1.	<50	1.	>25
2.	18-25	2.	50-65	2.	5-25
3.	26-40	3.	66-80	3.	<5
4.	>40	4.	>80		

Methods

- The profiles range from that of instability to severe impingement.



111



332



443

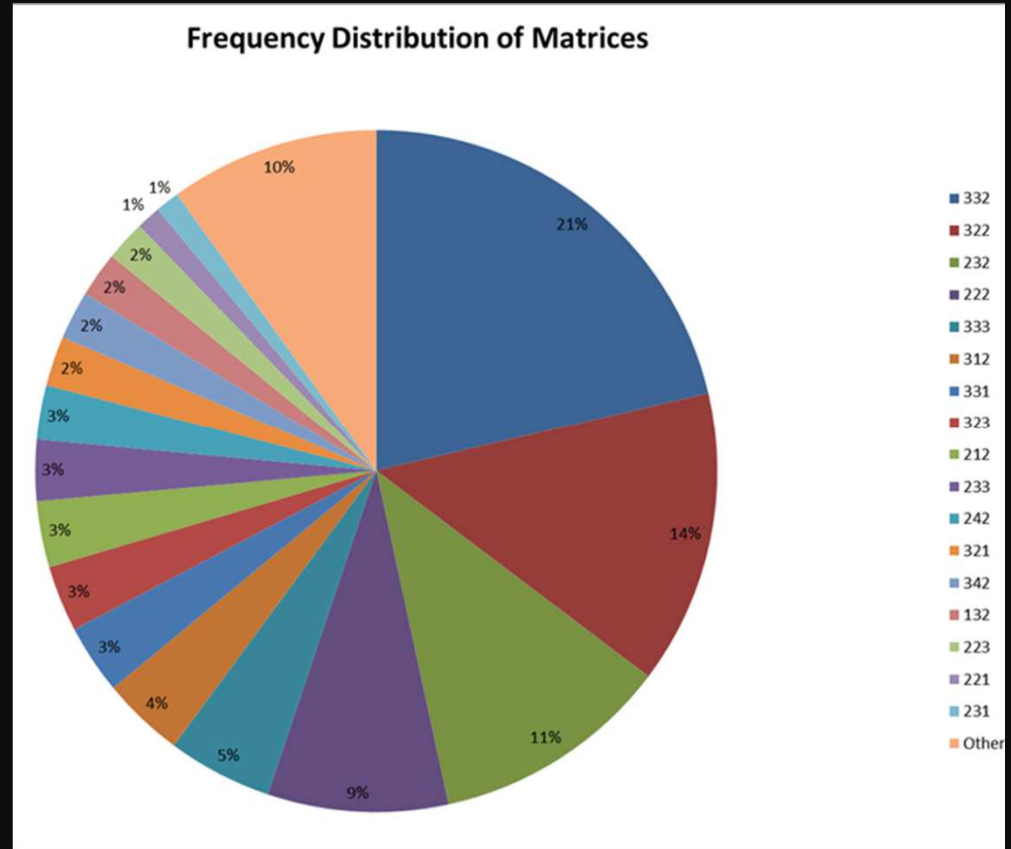
- Intra-operative findings including the presence of transition zone delamination, femoral and acetabular cartilage injury, whether or not cam, rim and/or subspine decompressions were performed, labral debridement versus refixation, along with the number of sutures for capsular closure.

Methods

- Patient-reported outcomes including modified Harris Hip score, Hip Outcome Score, and iHOT-33 were examined in those patients whom had greater than or equal to two years follow up.
- Need for revision surgery (arthroscopic or open) was also noted.

Results

- Criteria were met for 1077 patients (1330 hips)
- 60% were male
- 78% of patients were between the ages of 16-39 (average 27.1)
- 55% of patients were distributed in 4 of 48 possible categories, the two largest comprising the “arthroscopic safe zone.”



Results

- There were significant differences in category distributions with respect to sex according to Chi-Square test ($p < 0.001$), with females predominating the instability end of the spectrum, and males the impingement end.
- 514 patients had both pre- and post-op outcomes scores available at an average of 32.8 months.
- All groups improved significantly ($p < 0.05$) in mHHS, HOS, and iHOT-33, but both pre-op and post-op scores were lower in female patients.
- The greatest incidence of revision surgery ($n=7$; 6 scopes/1 PAO) with a category greater than 20 patients was 222, and was predominantly female.

Results: Intra-Operative Findings

Percentage of patients with Intra-op findings/procedures							
MATRIX Category	Transition Zone Delamination	Acetabular Cartilage Defect	Femoral Cartilage Defect	Labral Refixation	Cam Decomp	Sub-spine Decomp	Ligamentum Teres Debridement
Instability	83.1	1.7	3.4	86.4	72.9	72.9	23.7
Safe Zone	97.9	1.9	4.1	85.7	94.9	83.2	11.1
Impingement	98.1	3.8	3.8	92.5	98.1	86.8	5.7

Surgical Procedures (N=1330 hips)

N (percent)

1122 (84)

214 (16)

1244 (94)

1075 (81)

1314 (99)

360 (27)

169 (13)

Procedure

Labral Refixation

Labral Debridement

Cam Decompression

Sub-spine Decompression

Capsular Repair

Rim Trimming

Ligamentum Teres Debridement

Results: Outcomes by Category

MATRIX group	Pre-op mHHS	Post-op mHHS	Pre-op HOS ADL	Post-op HOS ADL	Pre-op HOS Sport	Post-op HOS Sport	Pre-op iHOT Total	Post-op iHOT Total
Instability Group	59.73 (±9.0)	85.38 (±15.0)	81.95 (±11.2)	92.07 (±8.6)	62.81 (±25.1)	79.75 (±24.6)	49.21 (±21.5)	75.58 (±20.4)
Arthroscopic Safe Zone	63.58 (±12.7)	87.13 (±13.4)	76.93 (±15.7)	92.77 (±11.5)	53.27 (±24.2)	83.26 (±21.3)	44.87 (±20.1)	77.89 (±21.4)
Impingement Group	70.40 (±10.7)	85.42 (±15.8)	81.60 (±10.6)	95.56 (±5.6)	62.66 (±18.3)	89.95 (±12.9)	49.97 (±13.4)	80.76 (±18.5)
p value	0.916	0.290	0.825	0.170	0.967	0.654	0.458	*0.015

Patient reported outcomes broken down by group for pre-operative and post-operative scores (mean ±standard deviation).

Conclusion

- The Matrix is a classification method for those with mechanical hip pain that may aid in identifying the best-suited candidates for arthroscopic management of mechanical hip pain.
- Further comparison with open surgical cohort required for further evaluation of extreme profiles.
- Significant improvements were seen in patient-reported outcomes across all matrices.
- The Matrix should be utilized in combination with physical exam findings to determine the most appropriate treatment algorithm.

References

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