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The Impingement/Instability Index for Mechanical Hip Pain

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Disclosures

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

Introduction

- Proximal femoral rotation is an important variable to consider in the setting of femoroacetabular impingement, as it may influence the effect of cam morphology.[1]
- Femoral Version is an important factor not always considered in the setting of FAI, although it contributes significantly to hip pathomechanics.
- Impingement and instability have been studied both in the native and arthroplasty settings
  - Impingement in hip arthroplasty has been shown to create greater wear damage, and in one series 94% of components removed for dislocation showed impingement. [2]
  - Femoral retroversion was found to be the most frequent error in a series of arthroplasty dislocation.[3]

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Purpose

- The Impingement/Instability Index aims to describe patients in terms of the femoral anatomy, by combining the alpha angle and femoral version.
- This has implications for surgical planning, as proximal femoral rotation impacts the effect of the cam morphology, and whether or not it needs to be addressed during hip arthroscopy.

Methods

- A retrospective analysis was conducted from a prospectively enrolled Hip Preservation Registry for those patients with available computed tomography (CT) data undergoing primary hip arthroscopy for mechanical hip pain between October 2010 and July 2014.
- The Impingement/Instability index was calculated by subtracting the femoral version from the alpha angle.
- The patients were grouped into 10 categories based upon the Index for ease of comparison.

Methods

- Patients with smaller numbers (Instability Index) had no cam morphology and increased femoral anteversion.
- Those with large indices (Impingement Index) had large cam morphology and femoral retroversion.

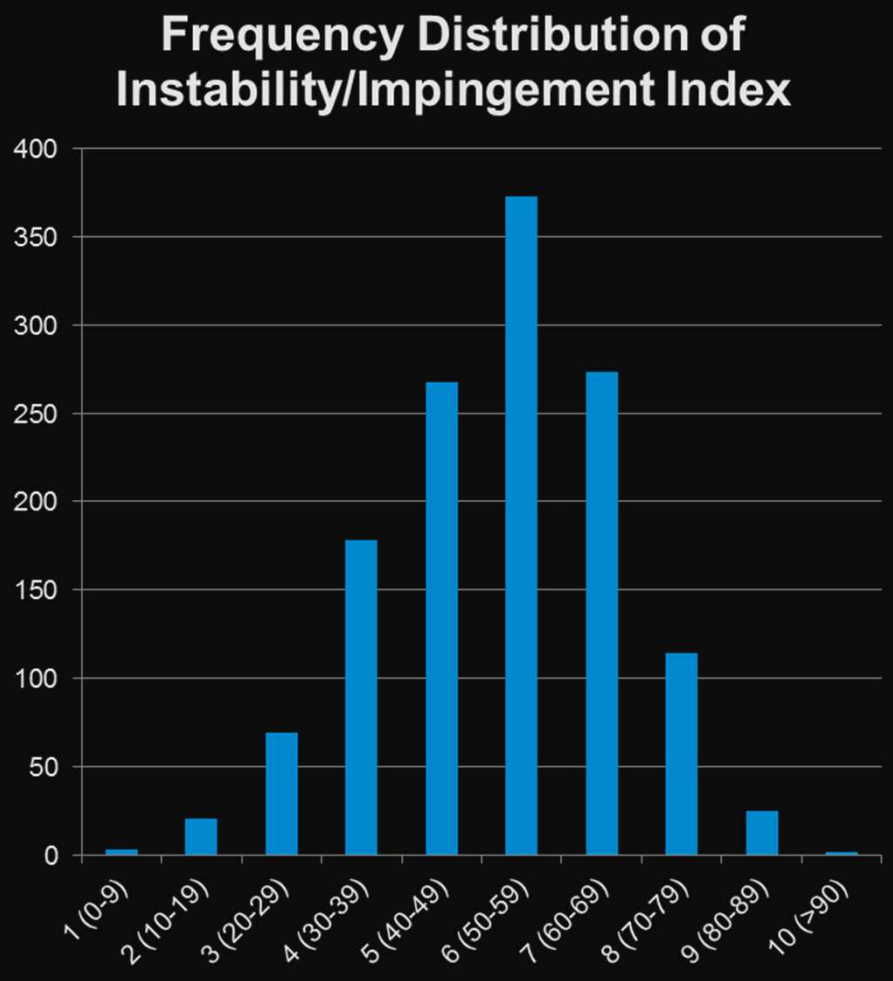
Results

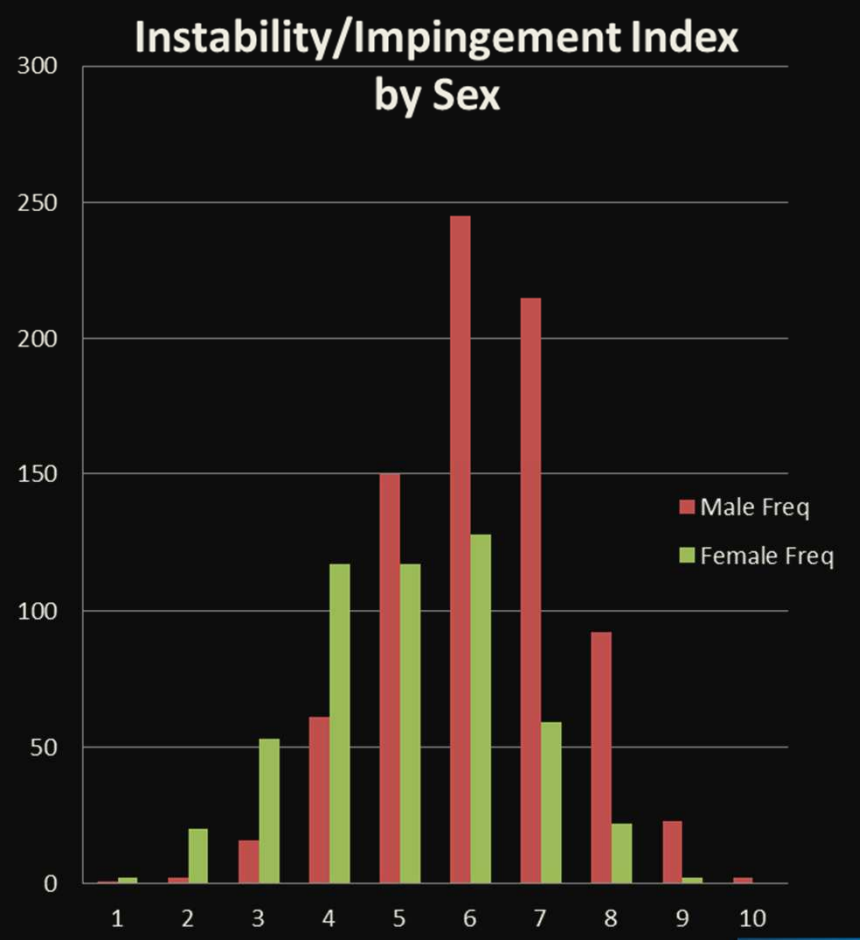
- Criteria were met for 1077 patients (1330 hips), 40% were female, and the average age was 27.1 years.
- Range of Instability/Impingement Index was 5-103
- There was a significant difference between the average Index for males (average 56, range 8-103) and females (average 45, 5-82), with an average for all patients of 51.9 ±14.6.

Results

- 514 patients had available >/=2 year follow up.
- All groups demonstrated significant increases ($p<0.05$) in mHHS, HOS, and iHOT-33.
- Those on the extremes of the spectrum (Severe Instability or Impingement) had lower outcome scores, although not statistically significant.

Frequency Distribution of Indices





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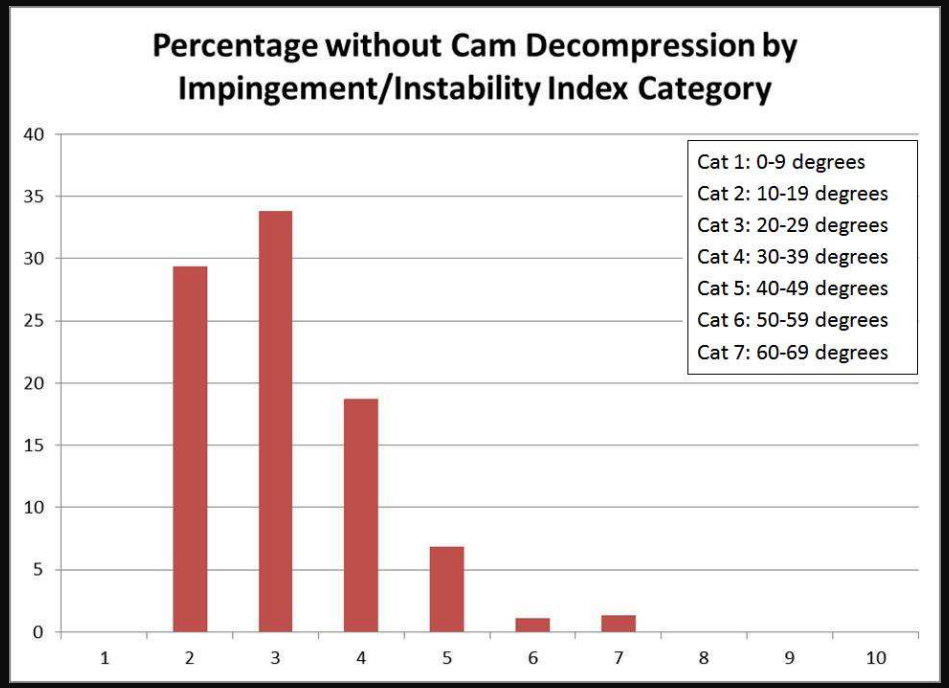
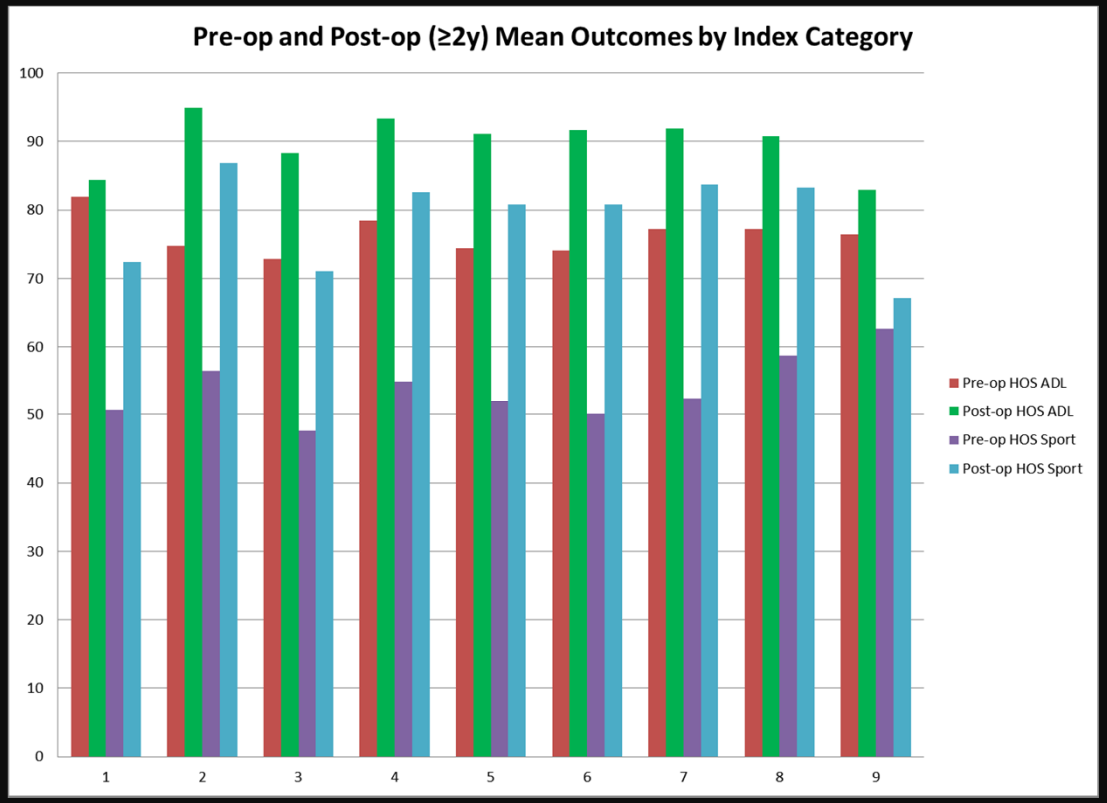
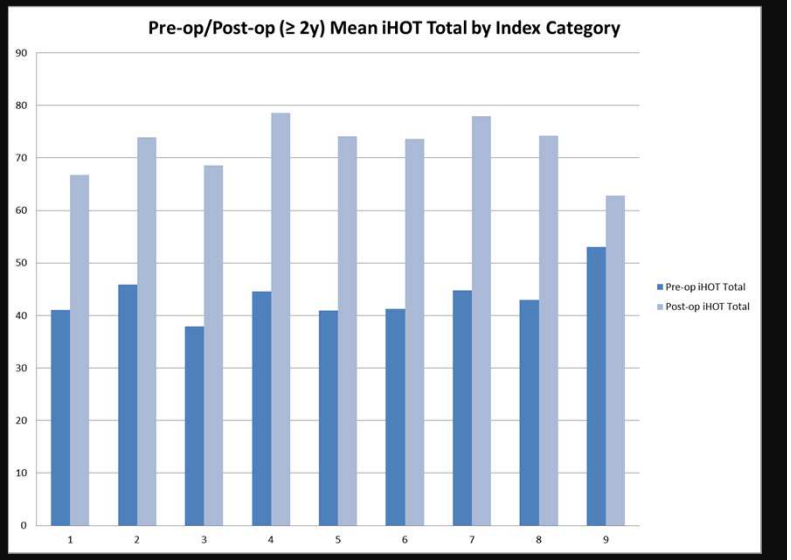
Cam Decompression and I/I Index



- The frequency of patients not requiring cam decompression was evaluated by group.
- Those with Instability Indices (≤40) were more likely to not require decompression.

Outcomes by Index Category





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Conclusion

- The Impingement-Instability Index allows for reliable categorization of patients in terms of the femoral side, and may aid in potentially predicting outcomes.
- Males and females have distinct proximal femoral morphology.
- We do recognize that the acetabular side must be taken into consideration in determining the mechanical profile of the hip.
- Understanding of the mechanical pattern of injury is paramount for optimal surgical management and successful outcomes in these patients.

References

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3. Fackler, C. D., & POSS, R. (1980). Dislocation in total hip arthroplasties. Clinical Orthopaedics and Related Research, 151, 169-178.

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