Mass General Brigham

The Impact of **BMI** and **Concomitant Knee Pathology** on Medial and Lateral **Meniscus Tear Complexity** in the Pediatric Population

Reikersdorfer KN[1,2], Zotter SF[1], Paschos N[1,2]

[1] Massachusetts General Hospital, Department of Orthopaedics

[2] Harvard Medical School

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Disclosures

The authors have nothing to disclose.

Overview

Purpose: Complex meniscus tears are often degenerative and less amenable to repair. In the pediatric population, where preserving meniscus tissue is crucial for long-term knee health and osteoarthritis prevention, accurate identification and repair of these tears are vital. Previous research has identified obesity as a risk factor for meniscus tears, particularly complex and radial tears of the lateral meniscus. This study aims to evaluate how BMI, BMI percentile, and concomitant knee pathology influence the complexity of medial and lateral meniscus tears in the pediatric population.

Methods: This retrospective cohort study included all patients under 18 who underwent meniscus repair at our multi-center institution between 2017 and 2023, including both isolated and concomitant repairs. The primary outcome was the pattern of meniscal injury, classified intra-operatively as complex (≥2 tear patterns) or simple (single tear pattern). Demographic data collected included gender, age, weight, BMI, BMI percentile at the time of surgery, and injury mechanism. Logistic regression analyses were used to assess the impact of BMI, BMI percentile, concomitant knee pathology, and other demographic variables on the presence of complex meniscus tears. Separate regressions were performed due to multicollinearity between BMI and BMI percentile (VIF >10).

Results: The study included 401 patients with 487 meniscus tears. The cohort was 44.9% female, with a mean age of 15.8 ± 1.8 years, mean weight of 70.0 ± 18.9 kg, and mean BMI of 24.2 ± 5.2 kg/m². Among the tears, 82 were classified as complex (17 medial, 65 lateral). Logistic regression analysis revealed that increased BMI was significantly associated with complex lateral meniscus tears ($p < .05$, 95% CI [0.001, 0.098]). In contrast, BMI percentile, sex, contact injury mechanism, and concomitant knee pathology were not significant predictors for complex versus simple tear patterns. For medial meniscus tears, the presence of isolated injury (without concomitant pathology) was significantly associated with increased complexity ($p < .05$, 95% CI [0.285, 2.375]), whereas BMI, BMI percentile, sex, and contact injury mechanism did not significantly contribute to complexity.

Conclusions: These data re-demonstrate the association between elevated BMI and complex lateral meniscus tears, underscoring the impact of absolute body mass on knee joint stress and meniscus integrity. The prevalence of complex medial tears occurring as isolated injuries highlights their potential for significant symptomatic burden, leading these patients to present a primary meniscal injury. Clinicians should therefore prioritize thorough evaluation and diagnostic arthroscopy for patients with elevated BMI, irrespective of BMI percentile or WHO weight classification.

Purpose & Methods

Purpose

Background

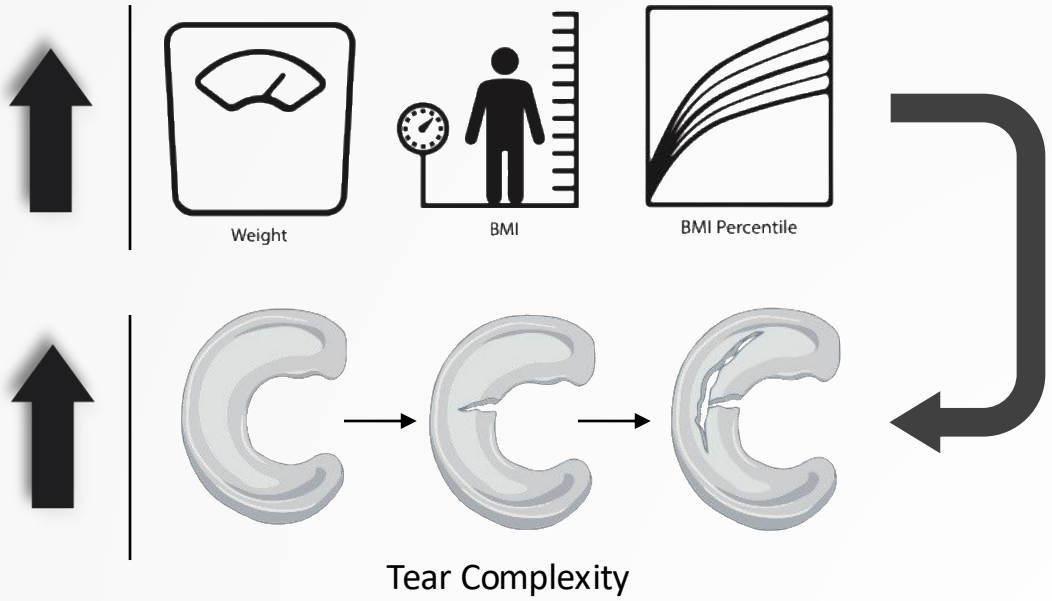
Complex meniscus tears are often **less amenable to repair**[1,2]. In the pediatric population, where preserving meniscus tissue is crucial for long-term knee health and osteoarthritis prevention, **accurate identification and repair of these tears is vital**[3,4].

Previous research has identified **obesity** as a **risk factor** for meniscus tears, particularly **complex and radial tears of the lateral meniscus**[5]. However, complexity based on other anthropomorphic measures has not been explored.

Aim

To evaluate the **effect of BMI, BMI percentile, and concomitant knee pathology on the complexity of** medial and lateral **meniscus tears** in the **pediatric** population**.**

Hypothesis



Methods

Retrospective Cohort

All patients <18 years of age who underwent meniscus repair between 2017 - 2023

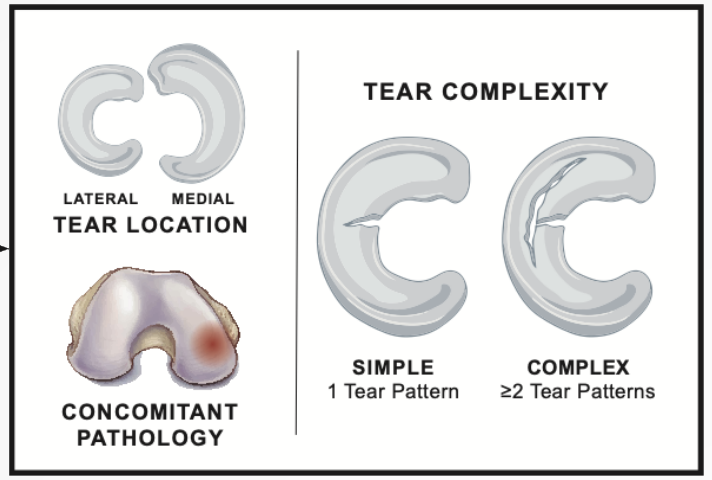
Including both isolated and concomitant repairs

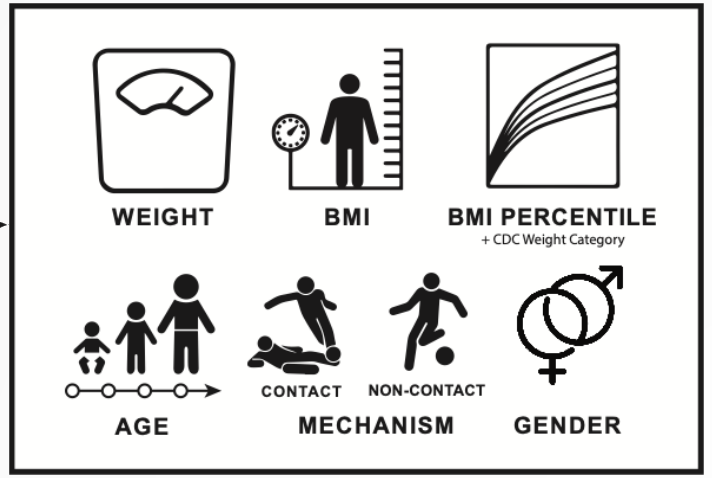
N = 487 tears

Intra-Operative Evaluation

Retrospective Data Collection

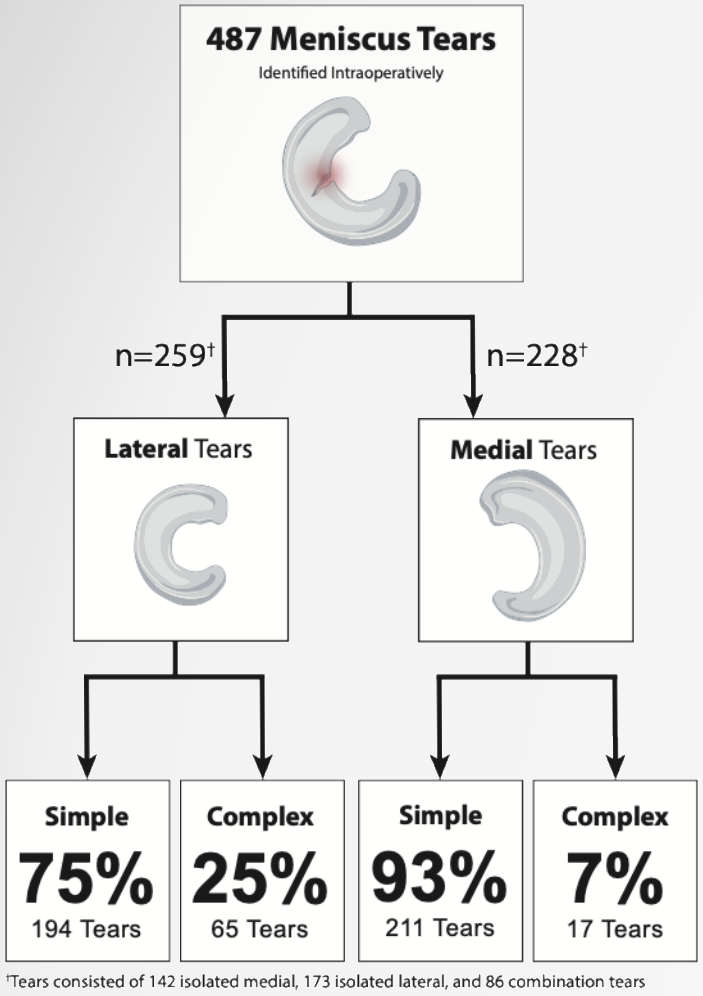
Evaluated at the Time of Repair





Results

Results

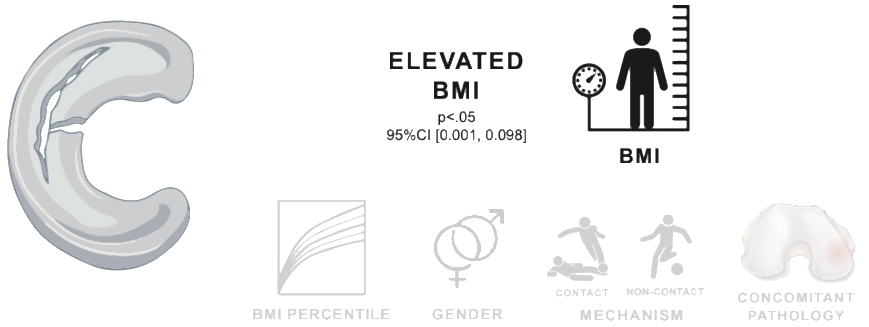


†Tears consisted of 142 isolated medial, 173 isolated lateral, and 86 combination tears

Logistic Regression Shows:

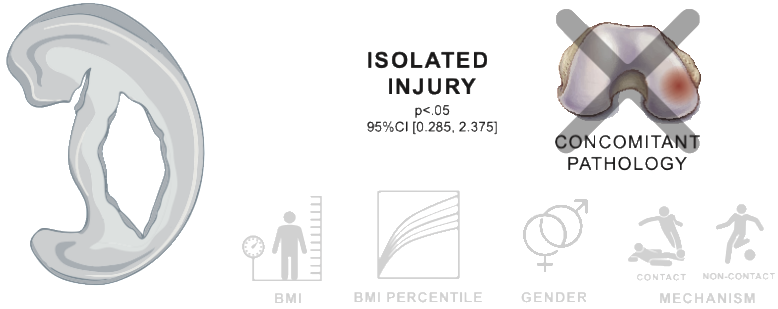
Complex Lateral Meniscus Tears are Associated with Elevated BMI

But not BMI Percentile, Gender, Injury Mechanism, or the presence of Concomitant Pathology



Complex Medial Meniscus Tears are Associated with Isolated Injuries

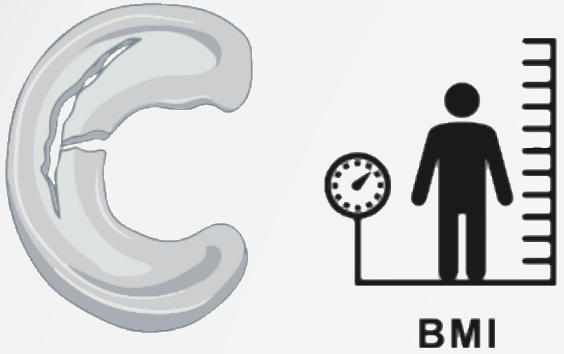
But not BMI, BMI Percentile, Gender, or Injury Mechanism



Conclusions

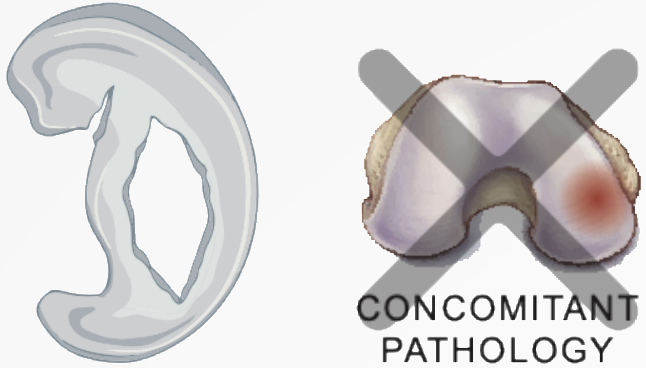
Conclusions

Complex Lateral Meniscus Tears



These data re-demonstrate the association between BMI and complex lateral meniscus tears, underscoring the impact of absolute body mass on knee joint stress and meniscus integrity

Complex Medial Meniscus Tears



Complex medial meniscus tears occur primarily as isolated injuries, highlighting their potential to cause significant symptomatic burden, leading these patients to present with meniscus tears alone.

Clinicians should prioritize **thorough clinical evaluation** and **diagnostic arthroscopy** for patients with **elevated BMI**, *irrespective of* BMI Percentile or WHO Weight Classification

References

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