Mass General Brigham

Pediatric Meniscus Repair Outcomes:

The Role of Weight, BMI, and BMI Percentile

Reikersdorfer KN[1,2], Zotter SF[1], Wright CT[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: The association between high BMI and risk of meniscus injury has been highlighted in the past, however, the risk of failure of subsequent meniscus repair remains unclear. This study aims to compare meniscus repair outcomes in the pediatric population based on weight, BMI, and BMI percentile.

Methods: This retrospective cohort study included pediatric and adolescent patients who underwent meniscus repair from 2017-2023. Meniscus repair failure was defined as the need for additional intervention or persistent clinical manifestations of meniscal pathology. Secondary outcomes evaluated included return to sport (RTS) and RTS at pre-injury level (RTSPIL). Repair failure, RTS, and RTSPIL were evaluated by weight, BMI, BMI percentile, and weight category.

Results: 203 patients were included (54.0% female, mean age 15.7±1.7 years, weight 70.0±9.7kg, and BMI 24.3±5.5 kg/m^2), with a mean follow-up of 23.3±13.9 months. Patients with graft failure were significantly heavier ($p < .05$) with higher BMIs ($p < .001$) than those without, but they did not differ in BMI percentile ($p = .10$). There were no significant differences in weight, BMI, or BMI percentile for those who failed to RTS or RTSPIL, compared to those who successfully returned (p's $> .09$). Increased weight category showed higher rates of graft failure, fRTS, and fRTSPIL. Graft failure and fRTS did not vary based on age, follow-up, or gender.

Conclusions: Increased weight and BMI are associated with meniscus repair failure amongst pediatric and adolescent patients. However, weight, BMI, and BMI percentile did not significantly predict RTS outcomes. Considering patient body habitus is crucial in managing post-op recovery and evaluating the risks and benefits of meniscus repair versus meniscectomy in this population.

Purpose & Methods

Purpose

Background

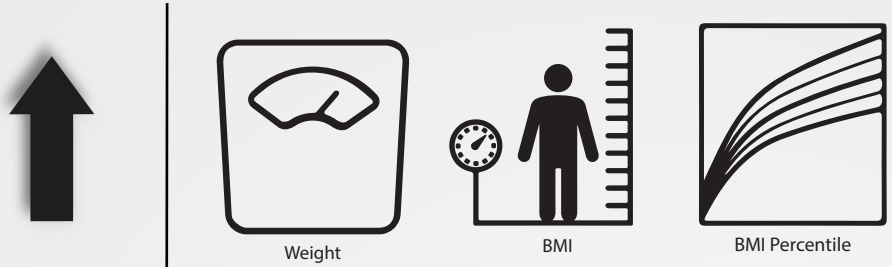
Increased BMI has been linked to a higher incidence of **complex and radial lateral meniscus tears** and associated repairs[1]

The literature reports a **wide range of meniscus repair failure rates** in the pediatric and adolescent populations, ranging from 0% to 42%[2-7]

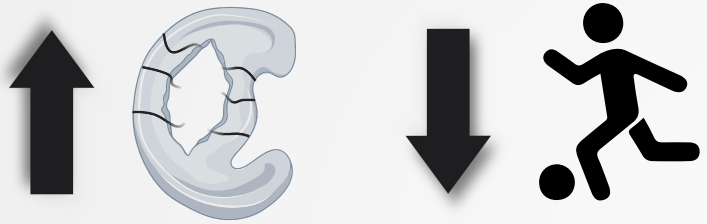
Despite our understanding of increased tear frequency in patients with elevated BMI, **the variation in patient outcomes following meniscal repairs remains unclear.**

Hypothesis

Increased Weight, BMI, and BMI Percentile



Are Associated with Increased Rates of Meniscus Repair Failure and Decreased Rates of Return to Sport



Methods

Multi-Center, Retrospective Cohort Study

Retrospective Cohort

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

Including both isolated and Concomitant repairs

n=203

Demographic Collection:

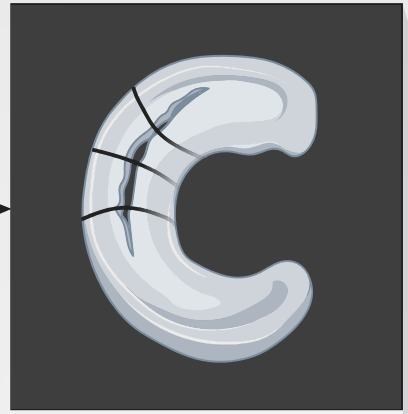
Patient Characteristics at the Time of Repair

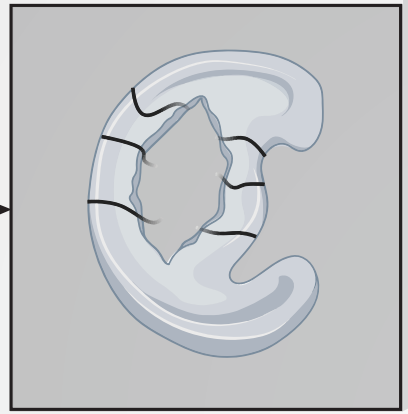
+ CDC Weight Category

n=153

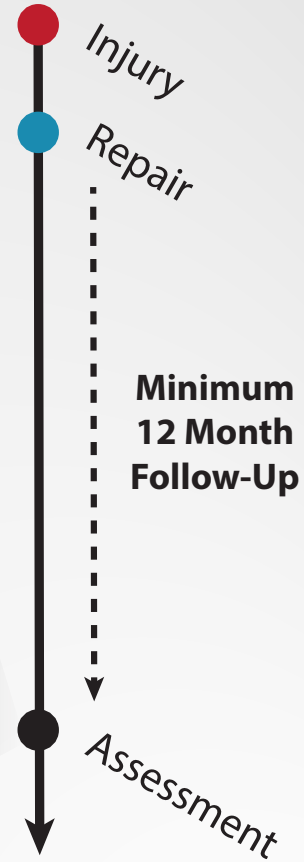
n=50

Successful Repair





Repair Failure†



Primary Outcome: Repair Failure†

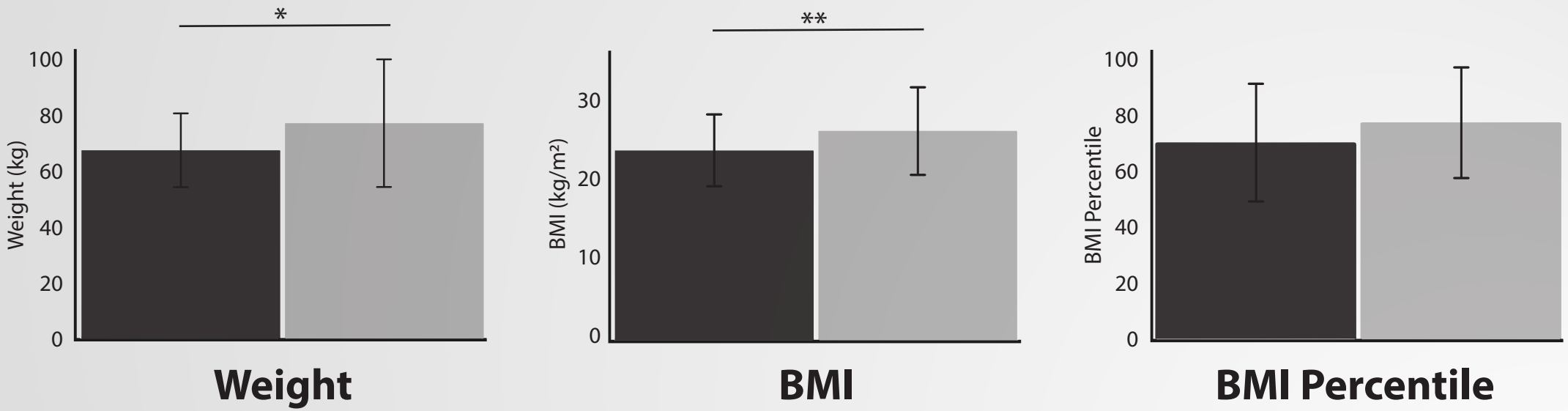
Secondary Outcomes: Return to Sport (RTS), Return to Sport at Pre-Injury Level (RTSPIL)

†Repair Failure defined as the need for additional meniscal intervention prior to 1-year post-op or persistent knee symptoms suggesting repair failure, indicated by joint line pain, a positive McMurray's, or MRI signs of a new tear

Results

Primary Outcome: **Repair Failure**

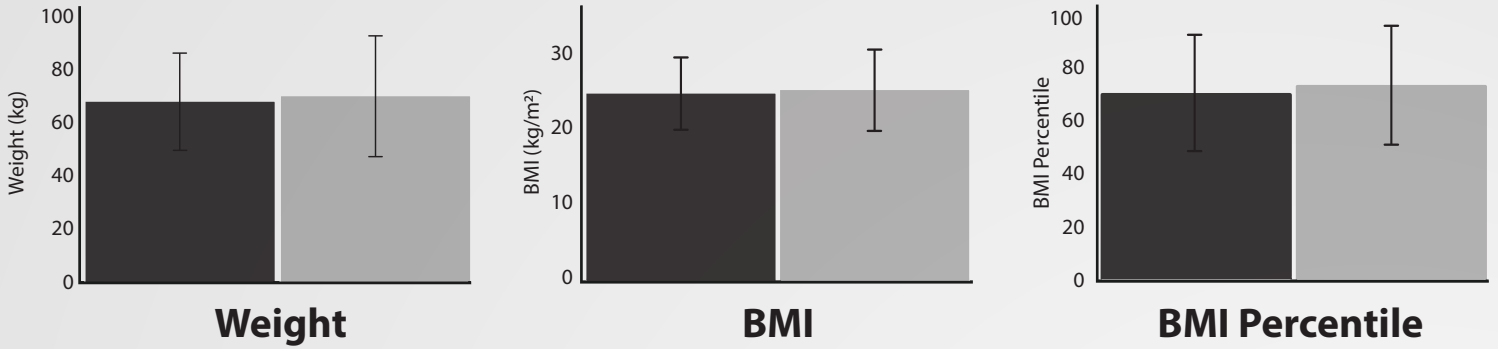
Increased Weight and BMI are Associated with Increased Rates of Meniscus Repair Failure



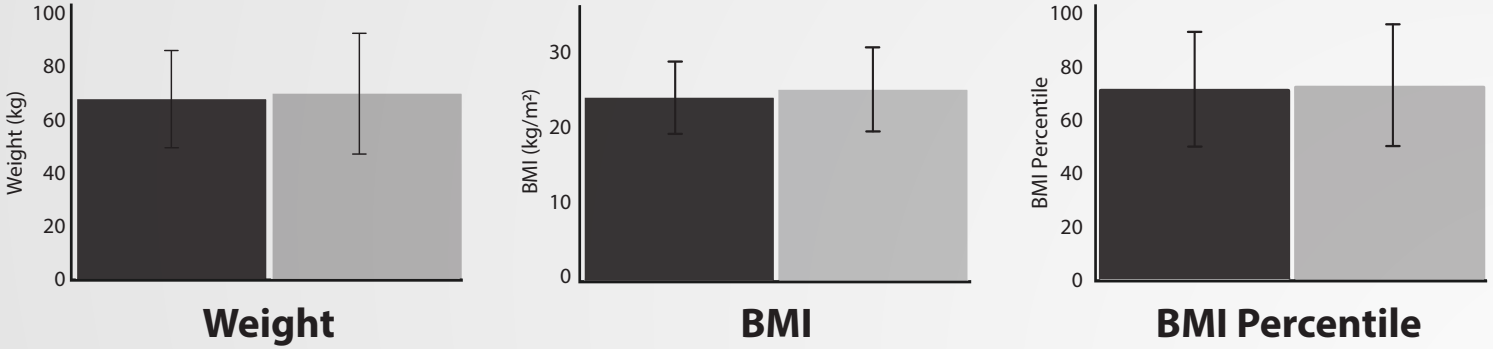
Patients who experienced meniscus repair failure were significantly heavier (76.2±25.7 vs. 68.0±16.9 kg, $p< .05$) and had higher BMIs (23.7±4.6 vs. 26.0±7.3 kg/m² $p<.001$) than those that did not, but they did not significantly differ in BMI percentile (77.8± 20.7 vs. 71.9±22.5, $p=.10$).

Secondary Outcomes: **Return to Sport**

Return to Sport (RTS)



Return to Sport at Pre-Injury Level (RTSPIL)



Weight, BMI, and BMI percentile were increased, though not significantly, for patients unable to return to sport (72.4±22.1 vs. 68.0±17.5 kgs, *p*=.16; 24.9±6.4 vs. 23.6±4.8 kg/m² *p*=.14; 74.7± 22.5 vs. 71.4±22.1, *p*= .37, respectively). Patients who failed to RTSPIL displayed the same trend (71.9±21.7 vs. 67.3±16.5 kgs, *p*= .10; 24.7±6.2 vs. 23.4±4.4 kg/m² *p*= .10; 73.1± 23.0 vs. 71.7±21.7, *p*= .67).

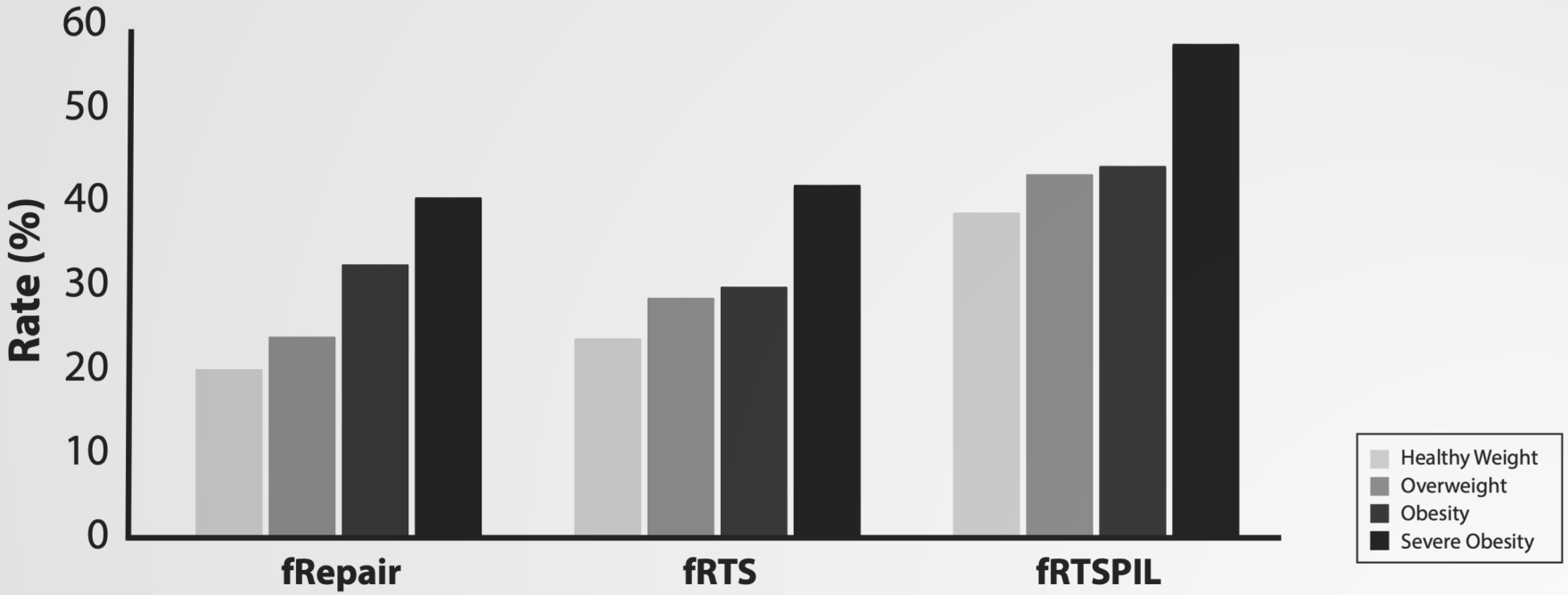
RTS
No RTS

RTSPIL
No RTSPIL

* p<.05
** p<.001

Effect Moderation by **Weight Category†**

Increased Weight Category is Associated with Increased Failure Rates, Across Outcomes



Sub-group analysis of patients by weight category show increased rates of repair failure (fRepair) (20.6, 24.5, 33.3, 40.0%), failure to RTS (fRTS) (24.3, 28.9, 29.4, 41.7%), and failure to RTSPIL (fRTSPIL) (38.2, 42.2, 44.4, 58.3%) with ascending category. †Healthy Weight: 5th-85th percentile, Overweight: 85th-95th percentile, Obesity: >95th percentile, Severe Obesity: > 120% of the 95th percentile

Conclusions

Conclusions

Clinicians should have **heightened clinical awareness** and **close** postoperative **monitoring** in patients with **elevated Weight and BMI**.

Repair Failure

↑ Weight

↑ BMI

= ↑ Repair Failure

Increased load on the repair site during recovery, irrespective of normative age/gender trends.

Return to Sport

No significant association between return to sport and Weight, BMI, or BMI Percentile

Likely due to the contribution of **Patients with Increased Musculature**:
Increased BMI but also enhanced ability to adequately rehabilitate and support knee biomechanics.

References

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