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Determining the Predictive Value of A "Pop“ in Meniscal Root Tears

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Faculty Disclosure Information

Disclosures are as follows:

- Dr. Giovanna Medina: Consultant for Smith & Nephew; Consultant for Vericel
- Dr. Elizabeth Matzkin: Consultant for Arthrex; Editorial Board Member Arthroscopy Journal

Background

- Patients often report hearing or feeling a "pop" during knee injury
- This is often correlated with ligamentous injury (e.g.: ACL, MPFL) (Swain et al. 2014)
- In the absence of ligamentous injury, there has been conflicting evidence about whether a "pop" is predictive of **meniscal injury**, and particularly of **meniscal root tears** (Bae et al. 2012, Perez et al. 2024)

Purpose

To determine whether the sensation of a "pop" during knee injury is predictive of a meniscal root tears.

Hypothesis

The sensation of a “pop” will be predictive of meniscal root tears.

Methods – Study Design

- Retrospective review of medical records
- **Inclusion criteria**:
  - Isolated meniscal repair
  - January 1, 2017 to July 1, 2024
- **Exclusion criteria**:
  - Concomitant ligament injury
  - Previous ipsilateral surgery or fractures
  - Presence of loose bodies

Methods – Data Analysis

- Sensitivity, Specificity, Positive Predictive Value (PPV), Negative Predictive Value (NPV), and Accuracy were used to assess the diagnostic capabilities of a “pop” sensation.

- Logistic regression analysis was performed to assess the impact of “pop” sensation on type of tear (medial meniscal root tear, isolated root tear, and combined root tears) when adjusted for age, sex, and BMI.

Results – Cohort Characteristics

	Total	Males	Females	p-value
Total	**717**	**355 (49.51%)**	**362 (50.49%)**	
BMI (kg/m^2)	28.79 ± 12.04	28.02 ± 6.98	29.54 ± 15.42	0.096
Age at surgery (years)	38.63 ± 17.44	32.92 ± 16.35	44.24 ± 16.66	**p<.001**
Lateral Meniscus	201 (28.03%)	136 (38.31%)	65 (17.96%)	**p<.001**
Medial Meniscus	469 (65.41%)	197 (55.49%)	272 (75.14%)	
Both Menisci	47 (6.56%)	22 (6.20%)	25 (6.91%)	
Pop heard/felt	270 (37.66%)	133 (37.46%)	137 (37.85%)	0.978
No Pop heard/felt	447 (62.34%)	222 (62.54%)	225 (62.15%)	
Root tears	273 (35.23%)	83 (21.39%)	190 (49.10%)	**p<.001**
All other tear types	502 (64.77%)	305 (78.61%)	197 (50.90%)	

Results – Predictive value of a "pop"

There was a significant difference in the positive predictive value of a "pop" to indicate isolated root tear in females (59.85% %) vs males (30.83%) (p<0.001).

	Overall	Males	Females	p-value
Sensitivity	48.62%	53.25%	46.59%	0.3297
Specificity	68.32%	66.91%	70.43%	0.424
PPV	45.56%	30.83%	59.85%	**p<.001**
NPV	70.92%	83.78%	58.22%	**p<.001**
Accuracy	61.37%	63.94%	58.84%	0.1605

Adjusted for age, BMI, and sex, the perception of a "pop" was significantly associated with a 2.3x greater risk for both isolated and combined root tears compared to other types of tears.

Isolated Root Tears (medial or lateral)

Predictor	Odds Ratio	95% CI	p-value
Age	1.13	(1.11, 1.15)	**p<.001**
BMI	1.01	(0.99, 1.02)	0.332
Female Sex	1.83	(1.17, 2.88)	**0.008**
Pop	2.33	(1.48, 3.69)	**p<.001**

All Root Tears

Predictor	Odds Ratio	95% CI	p-value
Age	1.11	(1.09, 1.13)	**p<.001**
BMI	1.01	(0.99, 1.03)	0.220
Female Sex	1.73	(1.12, 2.67)	**0.0131**
Pop	2.31	(1.50, 3.56)	**p<.001**

Additionally, age, female sex, and report of a "pop" were significantly associated with the presence of a root tear, while BMI was not.

Conclusion

This study found that the **perception of a "pop"** during a knee injury is a **moderately predictive clinical indicator** of the presence of a **meniscal root tear** in **women**.

References

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