Faculty Disclosure Information

- My disclosure is
    - Kristian Samuelsson is a board member at Getinge AB

Background

Generalized joint hypermobility (GJH) is associated with an increased risk for a second anterior cruciate ligament (ACL) injury. Binary cut-offs are commonly used to diagnose GJH, but this may influence patient classification and lead to clouded risk assessment.

Purpose

The purpose of this study was to evaluate the short- and intermediate term rate of a second ACL injury based on the number of positive joint hypermobility tests on the Beighton Score.

Method

Data from an ACL-rehabilitation-specific registry from Gothenburg, Sweden, was used. This study included patients aged ≥15 years who underwent primary ACL reconstruction with either a hamstring tendon (HT) or bone-patellar tendon-bone (BPTB) autograft. The included patients had a recorded Beighton Score, engaged in knee-strenuous activity before injury, returned to sport after the primary ACL reconstruction, and either experienced a second ACL injury or had ≥1 year follow-up without injury. A multivariable Cox proportional hazard regression model was utilized to estimate the hazard ratio (HR) for a second ACL injury, considering the Beighton Score, adjusted for the Tegner Activity Scale (Tegner) score at return to sport (RTS), and autograft choice. Start point of analysis was time of RTS. End point for the primary analysis was one year after RTS. For the secondary analysis, end point was at the time of data extraction or time of second ACL injury.
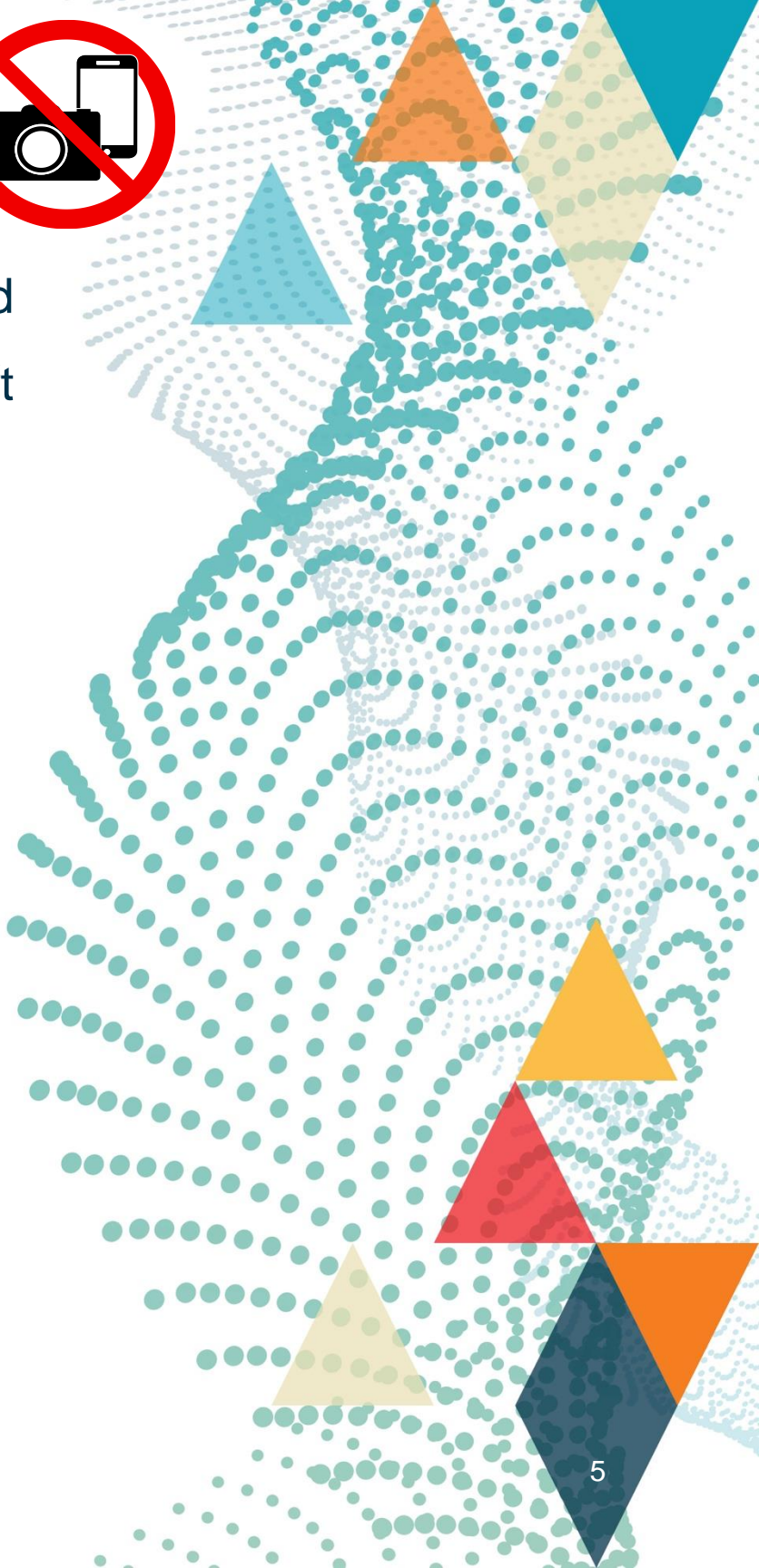
Results

The study included 874 patients (mean age 23.8 ± 7.9 years, 50.2% female). One-hundred thirteen patients (12.9%) sustained a second ACL injury, of which 63 (55.8%) were graft ruptures, and 50 (44.2%) were contralateral ACL injuries.

Table 1 – Demographic data on all included patients.	
Patient demographics	Total, n = 874
Patient sex, females, n (%)	439 (50.2)
Age, years mean ± SD	23.8 ± 7.9
BMI, mean ± SD	23.5 ± 2.6
Time from injury to ACL reconstruction, years median (IQR)	0.3 (0.3)
Time from ACL reconstruction to RTS, years median (IQRI)	1.0 (0.4)
Knee hyperextension, n (%)	236 (27.0)
Level of sport pre-injury, Tegner median (IQR)	9.0 (1.0)
Level of sport at RTS, Tegner median (IQR)	7.0 (2.0)
Beighton Score, median (IQR)	1.0 (4.0)
Graft choice, n (%)	
Hamstring tendon autograft	681 (77.9)
Bone-patellar tendon-bone autograft	193 (22.1)
IQR = Interquartile range, n = Number, RTS = Return To Sport, SD = Standard Deviation, Tegner = Tegner Activity Scale.	

Results

For the primary analysis, the adjusted one-year HR for a second ACL injury was increased by 17% for each positive Beighton Score (95% CI: 5-29%, p=0.003).

Table 2 – Adjusted cox model to estimate the rate of second ACL injury at 1 year after RTS based on Beighton Score		
	Adjusted for Tegner Level at RTS and choice of autograft for ACL reconstruction. Number of second ACL injuries = 53.	
Covariate	Hazard ratio (95% CI)	p-value
Beighton Score	1.17 (1.05-1.29)	0.003
ACL = Anterior Cruciate Ligament, CI = Confidence Interval, RTS = Return To Sport, Tegner = Tegner Activity Scale		

Results

For the secondary analysis, the median follow-up time after RTS was 4.2 years (IQR: 3.5 years), and the adjusted HR of a second ACL injury for the longest available time after RTS was increased by 15% for each positive joint hypermobility test on the Beighton Score (95% CI: 7-23%, p<0.001).

Table 3 – Adjusted cox model to estimate the rate of second ACL injury at longest available time after RTS based on Beighton Score		
	Adjusted for Tegner Level at RTS and choice of autograft for ACL reconstruction. Number of second ACL injuries = 113.	
Covariate	Hazard ratio (95% CI)	p-value
Beighton Score	1.15 (1.07-1.23)	<0.001
ACL = Anterior Cruciate Ligament, CI = Confidence Interval, RTS = Return To Sport, Tegner = Tegner Activity Scale.		

Conclusion

For every positive test on the Beighton Score, the rate of second ACL injuries was increased by 17% adjusted for Tegner level at RTS and choice of autograft for primary ACL reconstruction within the first-year post-reconstruction. These findings suggest that clinicians should not exclusively rely on binary GJH classifications but should also consider the sheer number of hypermobile joints when assessing the risk of subsequent ACL injuries after RTS.

Want to know more?

Name: Jakob Lindskog

E-mail: jakob.Lindskog@gu.se

References

Zsidai B, Piussi R, Thomeé R, et al. Generalised joint hypermobility leads to increased odds of sustaining a second ACL injury within 12 months of return to sport after ACL reconstruction. *Br J Sports Med.* 2023.

Beighton P, Solomon L, Soskolne CL. Articular mobility in an African population. *Ann Rheum Dis.* 1973;32(5):413-418.

Castori M, Tinkle B, Levy H, Grahame R, Malfait F, Hakim A. A framework for the classification of joint hypermobility and related conditions. *Am J Med Genet C Semin Med Genet.* 2017;175(1):148-157.