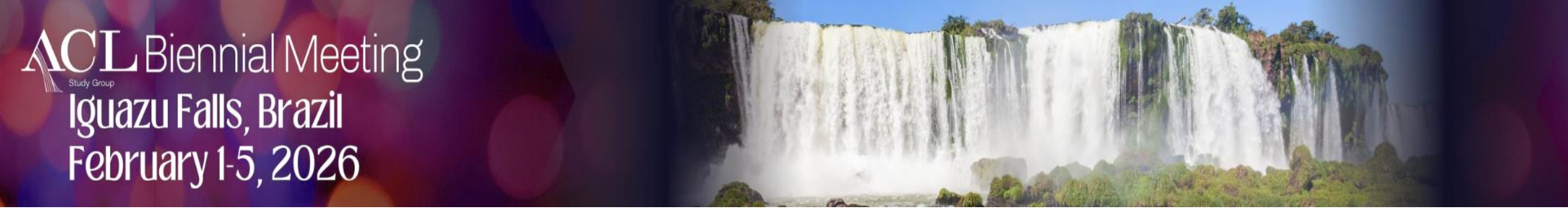

Return to Sport Tests: Do they reduce risk of re-rupture after Anterior Cruciate Ligament Reconstruction?

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Disclosure

- Consultant of Stryker
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- Consultant of Conmed
- Executive Committee and Board of ISAKOS
- 2nd Vice President ISAKOS
- Past- President SLARD.
- Editorial Board JISAKOS
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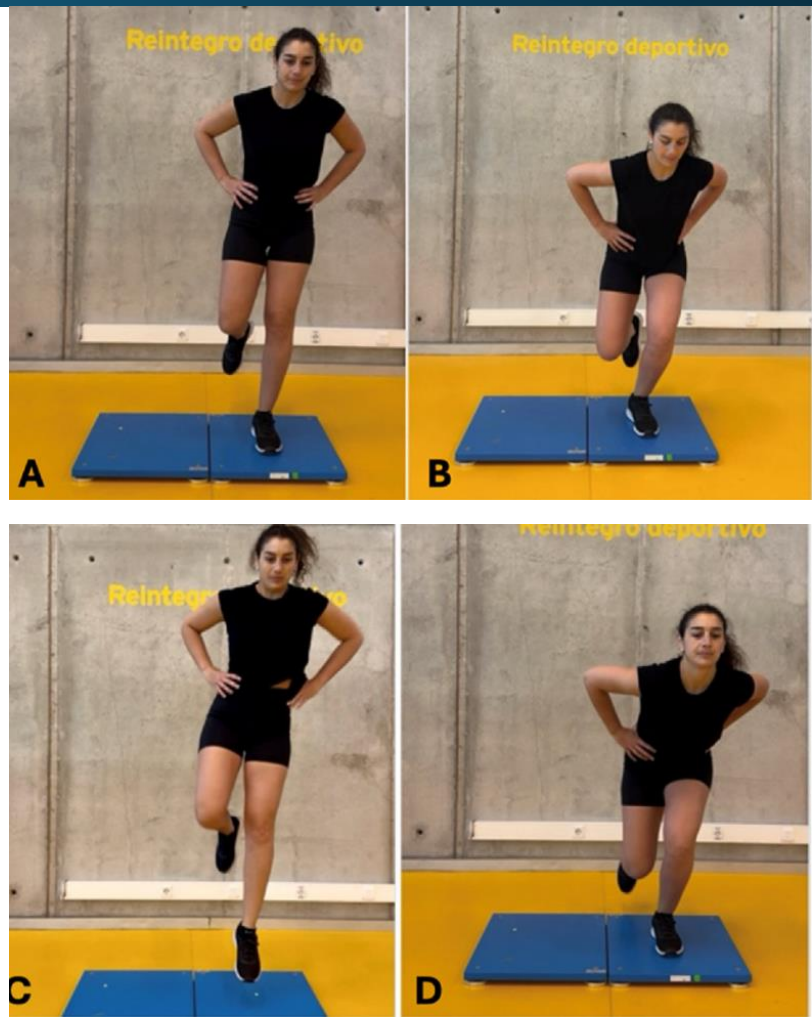
INTRODUCTION

- RTS tests are tools designed to **assess the functional capacity of the athlete, measuring both strength and movement control in dynamic situations that simulate the physical efforts of sport.** These have been used individually or combined, after a rehabilitation protocol, to try to determine the best time for the patient to RTS.
- Despite the implementation of these tests in many rehabilitation programs, **there is no consensus on their effectiveness in predicting whether passing them decreases the risk of re-rupture** .



The objective of this study is to determine if passing the RTS tests significantly reduces the re-rupture rate in patients undergoing ACLR.

METHODS

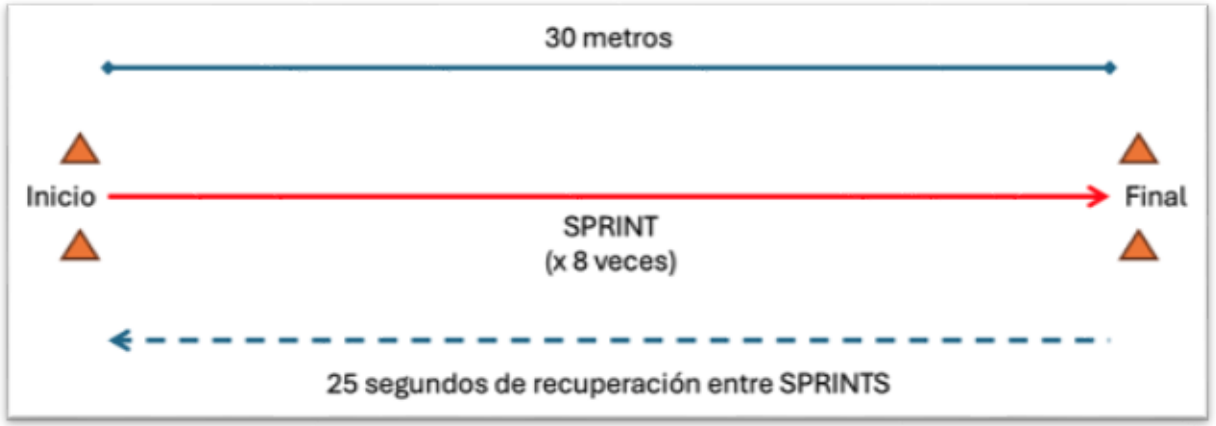
- Retrospective cohort study, which included patients who underwent ACLR surgery between June 2018 and May 2023.
- Excluded from the study were those with neurovascular injuries, tibial plateau fractures, multi-ligament reconstructions, or procedures combined with osteotomy or extra-articular tenodesis.
- After completing the rehabilitation protocol, at an average time of 9 months ,patients underwent a magnetic resonance image to assess graft ligamentization and performed RTS tests. Those who failed the tests were advised to continue rehabilitation or attend RTS sessions.
- Due to the lack of a standardized RTS battery in the literature, the test battery was designed collaboratively by the knee team’s orthopedic surgeons and physiotherapists based on current evidence.

METHODS

Return to Sport Tests:

- Repeat Sprint Ability (RSA)
- Dynamic Valgus
- Proagility Test
- Unipodal Counter Movement Jump (CMJ)
- Isokinetic
- Triple Hop Test
- Functional Movement Screen (FMS)

The Proagility test measures changes in direction over a ten-meter course, with the time being recorded

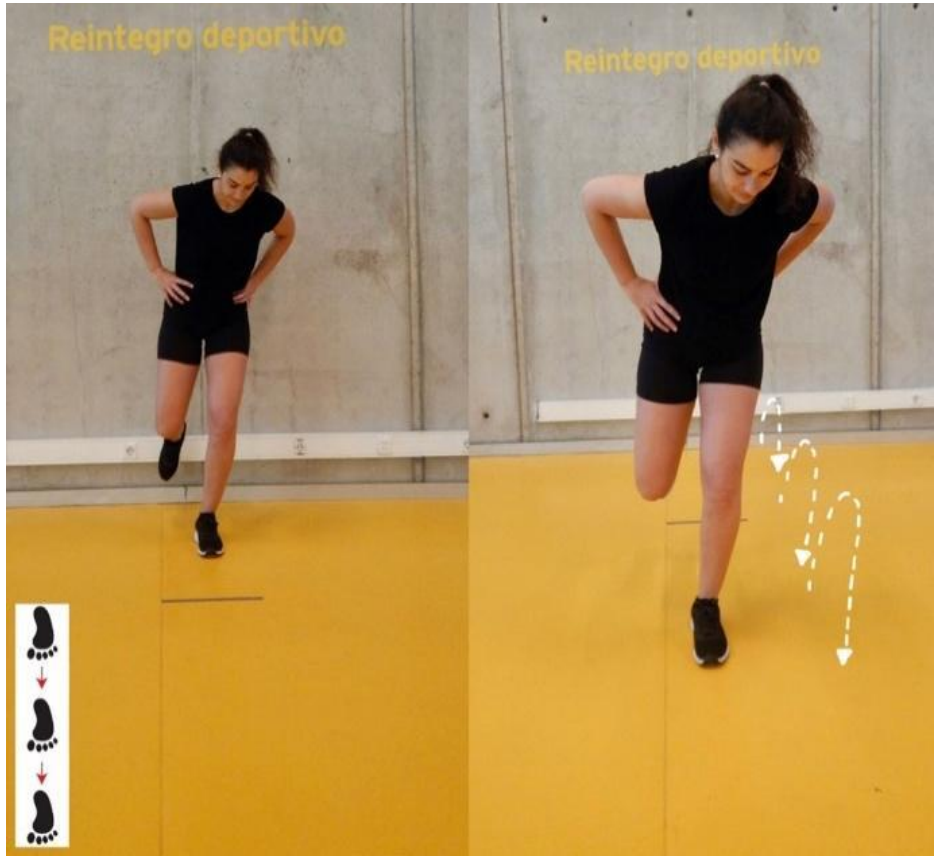


RSA: This test evaluates athletes' resistance to fatigue during high-intensity sports involving short sprints.

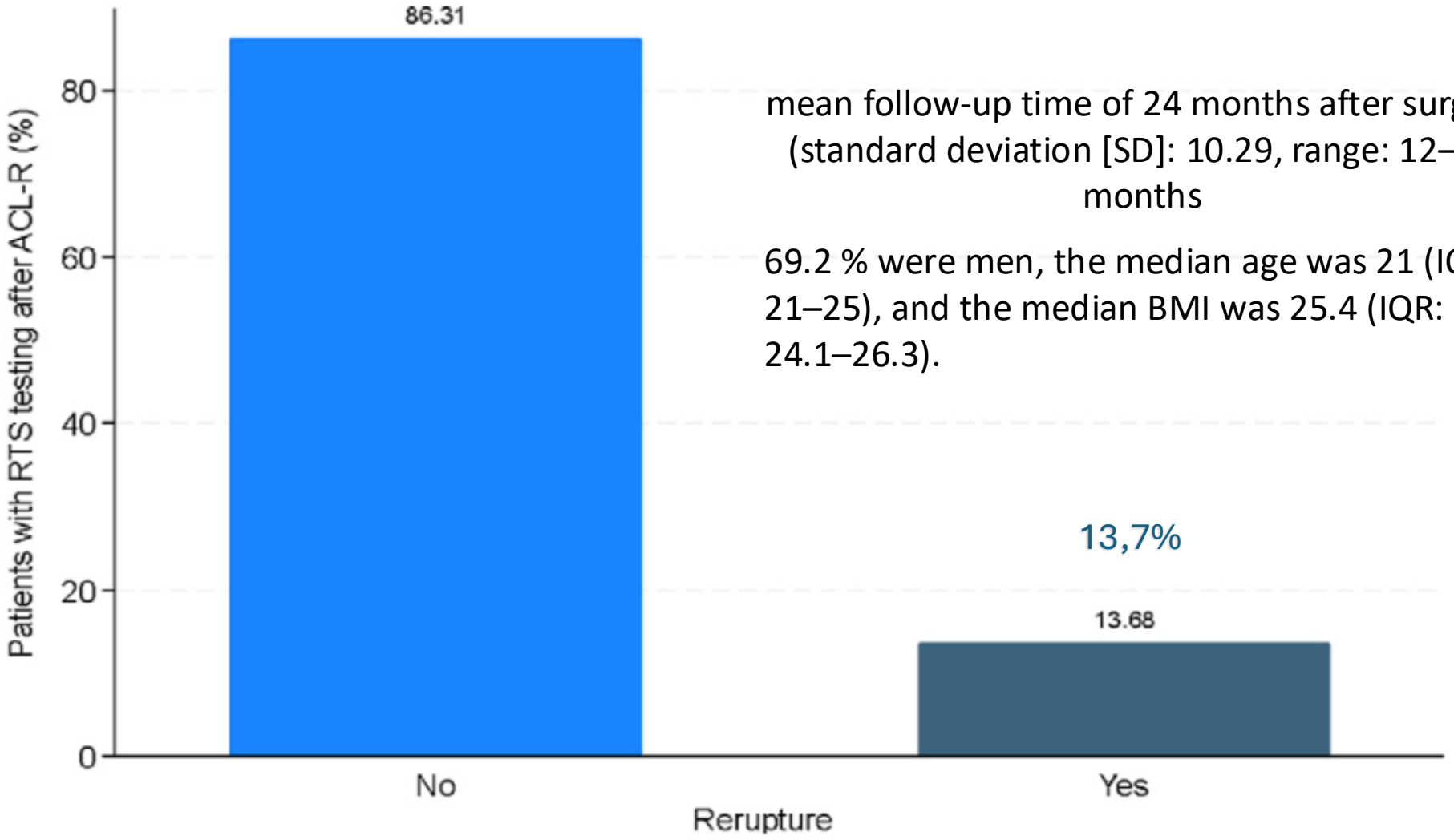
METHODS

Evaluation of the degrees of dynamic valgus, from dropping off a 30 cm high box followed by a maximum vertical jump.

Measurement of quadriceps and hamstring muscle strength using the HUMAC NORM isokinetic dynamometer (Computer Sports Medicine Inc., 101 Tosca Drive, Stoughton, MA, USA).



Initial and final position after performing three consecutives jumps during the Triple Hop Test. The best result obtained is recorded.



mean follow-up time of 24 months after surgery (standard deviation [SD]: 10.29, range: 12–69 months

69.2 % were men, the median age was 21 (IQR: 21–25), and the median BMI was 25.4 (IQR: 24.1–26.3).

Regarding the sports practiced by patients before the injury, 43 % played soccer; 24.5 % played racket sports, 10.5 % practiced volleyball or basketball;, and 7 % participated in skiing

RESULTS

- A total of 109 patients underwent ACLR and RTS testing.
- All patients were contacted between July and September 2024 for a review.
- At follow-up, 95 patients were available, giving a follow-up rate of 87% at a mean follow-up time of 24 months.

Overall, 21 patients (25,6 %) passed the RTS test; 74 patients (74.4 %) failed the RTS tests. Thirteen graft re-ruptures were reported during follow-up, giving an overall re-rupture rate of 13.68 %

	Re-rupture (n=13; 13.7%)	Without Re-rupture (n=82; 86.3%)	P-value
Demographic and anthropometric characteristics			
Women	4 (30.8)	23 (28.1)	0,84
Median age (IQR)	21 (21-25)	23.5 (19-32)	0,69
Median BMI (IQR)	25.4 (24.1)	24.1 (22.3-26.4)	0,27
Surgical and rehabilitation characteristics			
Type Allograft			0,94
- Allograft	1 (7.7)	8 (9.8)	
- PT	3 (23.1)	21 (25.6)	
- STG	9 (69.2)	53 (64.6)	
Days Surgery-RTS Test			0,10
- Median days (IQR)	342 (269-419)	297 (256-317)	
RTS test			0.03*
Pass	0 (0)	21 (25.6)	
Fail	13 (100)	61 (74.4)	

Baseline characteristics of patients with ACLR according to the presence of re-rupture. Legend: (*) denotes statistical significance ($p<0.05$). Abbreviations: BMI: body mass index; IQR: interquartile range; PT: patellar tendon; STG: semitendinosus and gracilis. RTS: return-to-sport.

DISCUSSION

- This study evaluates ACLR outcomes and re-ruptures following rehabilitation and RTS tests, aiming to determine if these tests help prevent second ACL injuries in the medium term.
  - **The first finding was that no re-ruptures were reported up to the follow-up point in those patients who passed the RTS tests.**
  - Second ACL injury occurred in the group of patients **who failed these tests**. Therefore, the results suggest that passing the RTS tests after an ACLR is associated with a lower rate of re-ruptures in the medium term.
  - This finding aligns with previous studies suggesting that functional tests are effective predictors of injury risk .

O'Dowd DP, Stanley J, Rosenfeldt MP, et al. Reduction in re-rupture rates following implementation of return-to-sport testing after anterior cruciate ligament reconstruction in 313 patients with a mean follow-up of 50 months. J ISAKOS 2024 Jun;9(3):264–71

Grindem H, Snyder-Mackler L, Moksnes H, Engebretsen L, Risberg MA. Simple decision rules can reduce reinjury risk by 84% after ACL reconstruction: the Delaware-Oslo ACL cohort study. Br J Sports Med 2016 Jul;50(13):804–8.

DISCUSSION

- In our study, those patients who suffered re-rupture, the average number of days after surgery until the RTS tests was 357 days.
  - **Second ACL injuries typically occur within the first 6 months to 2 years after returning to sport.**
  - The time between surgery and return to sport (RTS) appears to be a critical factor in reducing the risk of reinjury. However, there is no consensus on the optimal timing for RTS.
- **The third finding of our study was that 18.18% (10 of 55 patients) of patients aged 25 years or younger suffered a re-rupture.**
    - This concurs with the findings by Wiggins et al. that determined the incidence of a second ACL injury is 23 % in individuals under 25 years old

- Weakness of this study is the **statistical power that was 70%**, which limits the generalization of the results. A larger sample size and longer follow-up would be needed to confirm these findings.

Wiggins AJ, Grandhi RK, Schneider DK, Stanfield D, Webster KE, Myer GD. Risk of secondary injury in younger athletes after anterior cruciate ligament reconstruction: a systematic review and meta-analysis. Am J Sports Med 2016 Jul;44(7):1861–76.

CONCLUSION

- **Patients with re-ruptures were more likely to be from the group that failed the RTS tests (Pass: 0% vs. Fail: 18,1%; p= 0.03), with a statistical power of 0.70.**
- Passing the RTS tests appears to be a protective factor against re-ruptures, according to the results obtained in this study. These tests allow for an objective assessment of the patient's functional capacity before returning to competition, reducing the risk of new injuries.
- However, more research is needed to confirm these findings and optimize rehabilitation protocols.

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Original Research

Return-to-sport tests: Do they reduce risk of re-rupture after anterior cruciate ligament reconstruction?

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