Focus on anterior cruciate ligament (ACL) repair: findings of a systematic literature review

Summary

- ACL repair offers advantages over ACL reconstruction,[1] but historically is associated with poor mid- to long-term outcomes[1,2]
- There is renewed interest in ACL repair with stricter patient selection and new surgical techniques[1–3]
- A systematic literature review evaluated the clinical outcomes of ACL repair in recent publications (2014–2019)[4]
- Results showed no significant difference in clinical outcomes between ACL repair and reconstruction, with promising results in mid- to long-term non-comparative studies for ACL repair[4]

Background

Anterior cruciate ligament (ACL) repair has the potential to offer several clinical advantages over ACL reconstruction, including:[1]

- Preserving natural anatomy
- Smaller bone tunnels
- No graft harvesting
- In the event of re-rupture following ACL repair, a primary ACL reconstruction can still be performed

Patient selection criteria:

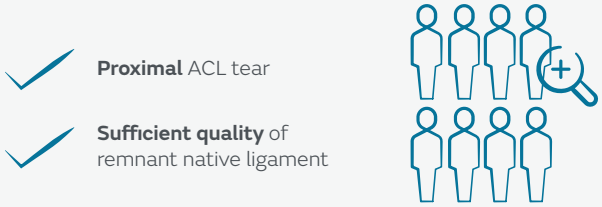

Figure 1. Patient selection criteria for ACL repair[3]

Historically, ACL repair has been associated with poor mid- to long-term outcomes, resulting in ACL reconstruction becoming the gold standard of surgical treatment for ACL tears.[1,2] **New evidence suggests that, with improved surgical techniques and stricter patient selection criteria (Figure 1),[3] ACL repair may offer good clinical outcomes.[1,2]**

A systematic review by Kandhari V, et al (2020) assessed the clinical outcomes of recent ACL repair studies to determine whether differences exist between ACL repair and reconstruction and the mid- to long-term outcomes associated with ACL repair.[4]

Study overview[4]

A systematic review of the literature using EMBASE, PubMed and Google Scholar was carried out to identify all studies reporting on clinical outcomes of primary ACL repair between January 2014 and January 2019. Studies were excluded if they were non-clinical, abstracts, technique articles, or isolated case reports.

Results[4]

Literature identified[4]

Nineteen studies were eligible for inclusion in the systematic literature review, which included five studies comparing ACL repair to ACL reconstruction (Figure 2). The studies totaled 1,002 patients who underwent arthroscopic primary ACL repair with either suture anchor repair (n=158), dynamic intra-ligamentary stabilisation with Ligamys™ (Mathys Ltd., Bettlach, Switzerland; n=779), bridge-enhanced ACL repair (BEAR; n=10), suture pull-out repair (cortical fixation; n=13) or augmented ACL repair using suture tape reinforcement with internal brace (n=42).

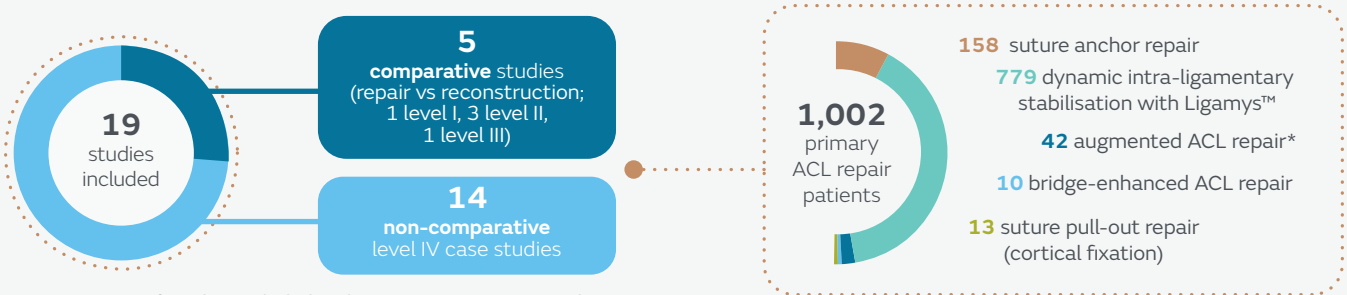

Figure 2. Overview of studies included in the ACL repair systematic literature review

*Using suture tape reinforcement with internal brace

✚ Evidence in focus

Clinical outcomes from comparative studies[4]

No significant difference between ACL repair and reconstruction was observed in any of the comparative studies reporting on clinical outcomes including International Knee Documentation Committee (IKDC) score (Figure 3), Lysholm score, side to side laxity, Lachmann test and Pivot shift test.

Only one study reported range of motion (ROM), with significantly greater ROM following ACL repair compared to reconstruction at 1 week (p<0.01), 1 month (p<0.01) and 3 months (p=0.03) post-operation (Figure 4).

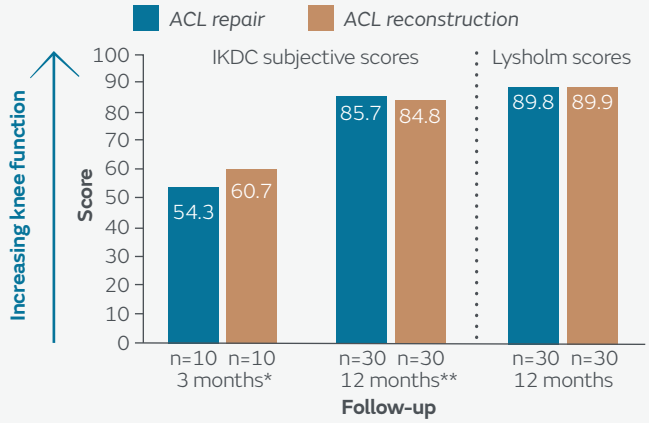

Figure 3. IKDC and Lysholm results reported by comparative studies

*Using the BEAR ACL repair technique. **Using dynamic intra ligamentary stabilisation with Ligamys™

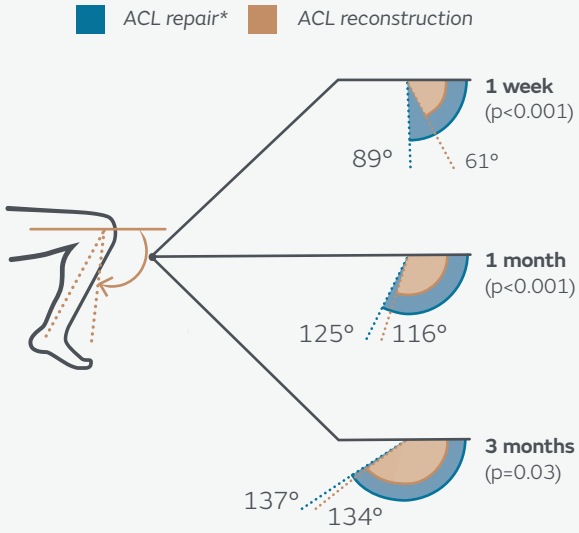

Figure 4. Range of motion results reported by comparative studies

*ACL repair techniques included dynamic intra-ligamentary stabilisation with Ligamys™ and the BEAR technique

Reported post-operative infection rates and stiffness were not significantly different between ACL repair and reconstruction patients. One study reported a significantly greater reoperation rate with repair compared to reconstruction at a mean follow-up of 28 months (20 vs 0%; p=0.001). No significant difference in reoperation rates was observed in any of the other comparative studies; however, they reported on short follow-up periods (<6 months).

Clinical outcomes from non-comparative studies[4]

Promising clinical outcome scores were reported by the non-comparative studies included in the systematic literature review. Four non-comparative studies reported clinical outcome scores at mid- to long-term follow-up (range of mean follow-up, 43.3–79.0 months; Figure 5) and ten reported on short-term follow-up (12.0–38.4 months; Figure 5).

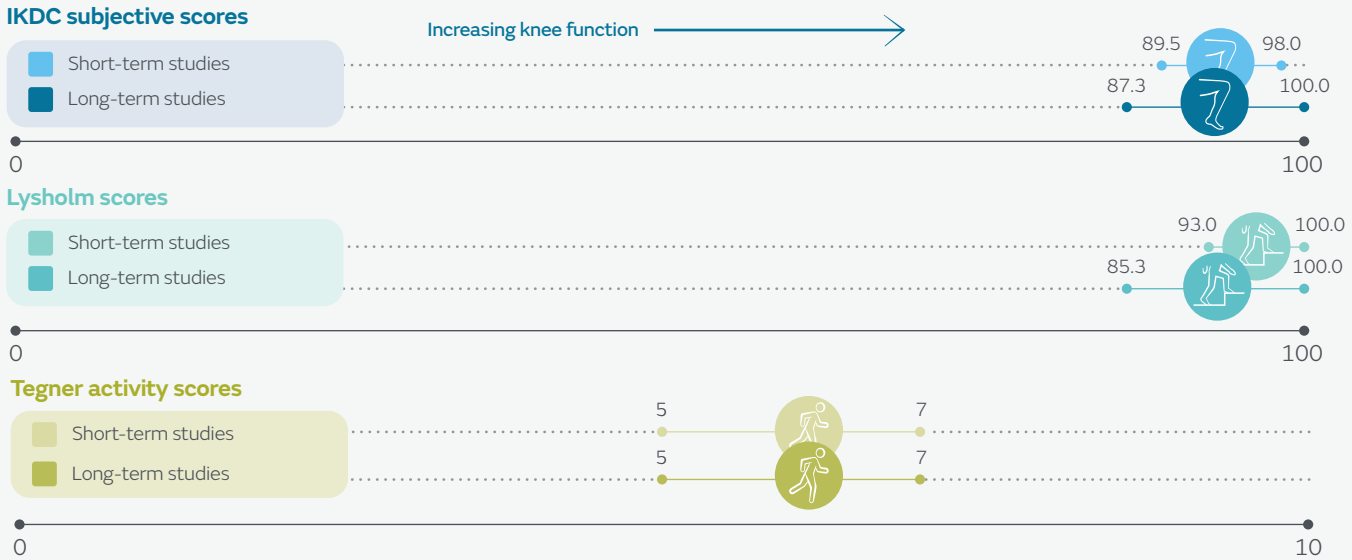

Figure 5. Range of mean clinical outcome scores following ACL repair reported by non-comparative studies

✚ Evidence in focus

Reoperation rates reported in the non-comparative studies ranged depending on the technique used (Table), this is likely due to the low number of patients, the eligibility criteria of the studies and varying follow-up periods.

Table. Reintervention rates reported in non-comparative studies

Technique	Number of studies	Range of reinterventions rates	
		Total reinterventions	Percentage that went on to have ACL reconstruction
Suture anchor repair	4	0.0–16.7%	0.0–16.7%
Dynamic intra-ligamentary stabilisation Ligamys™ group	9	6.0–100.0%*	2.9–20.0%
Suture pull-out repair (cortical fixation)	1	0.0%	0.0%
Augmented ACL repair†	1	NR	4.8%

*Eligibility criteria for study reporting 100% reintervention rate required all patients to have undergone implant removal. †Using suture tape reinforcement with internal brace. Abbreviations: ACL = anterior cruciate ligament, NR = not reported.

Conclusions

A recent systematic literature review has found:[4]

- **No significant difference in clinical outcomes** such as IKDC, Lysholm, side to side laxity, Lachmann test and Pivot shift test, between ACL repair and reconstruction, in comparative studies
- **Promising IKDC, Lysholm and Tegner activity scores** for ACL repair, in case series reporting mid- to long-term results of ACL repair

Together these findings highlight that, despite previous perceptions, ACL repair can be a suitable treatment for eligible patients

Considerations[4]

All of the included studies demonstrated a high risk of bias. The study was limited by the low total number of included patients in recent (2014–2019) comparative studies, all of which had short durations of follow-up. In addition, complications and knee laxity were not reported in all studies and early return to sport was not evaluated in the comparative studies.

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References:
1. Heusdens CHW. ACL repair: a game changer or will history repeat itself? A critical appraisal. *J Clin Med*. 2021;10(5):912. **2.** van der List JP, Vermeijden HD, Sierevelt IN, DiFelice GS, van Noort A, Kerkhoffs GMMJ. Arthroscopic primary repair of proximal anterior cruciate ligament tears seems safe but higher level of evidence is needed: a systematic review and meta-analysis of recent literature. *Knee Surg Sports Traumatol Arthrosc*. 2020;30(3):1123–1125. **3.** Olmos MI, Sonnery-Cotte B, Barth J. How to succeed in arthroscopic anterior cruciate ligament primary repair? Step-by-step technique. *Arthrosc Tech*. 2019;8(1):37–46. **4.** Kandhari V, Vieira TD, Ouanezar H, et al. Clinical outcomes of arthroscopic primary anterior cruciate ligament repair: a systematic review from the scientific anterior cruciate ligament network international study group. *Arthroscopy*. 2020;36(2):594–612.

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