

Compilation of publications for reconstruction of the anterior cruciate ligament using the JewelACL.

Introduction

Recent publications suggest that the **JewelACL** for anterior cruciate ligament (ACL) reconstruction effectively restores joint stability and mobility, allowing patients a rapid return to daily activities and sports, with a low risk of complications and minimal donor site morbidity as a partial tissue-sparing device

Publications

Barnas et al, 2021

- Retrospective cohort study aimed to compare and evaluate two synthetic grafts for treating partial lesions of the ACL.
- Sixty patients who had undergone primary ACL reconstruction were included and divided into two groups of 30 patients each. Group I was treated using the JewelACL, and Group II using FiberTape.
- Follow-up examinations conducted at 6, 12, and 24 months after surgery.
- Statistically significant improvement observed in both groups when comparing preoperative examination with examinations at 6, 12, and 24 months in all 3 tests (Lachman test, anterior drawer test, and pivot-shift test). Analysis of stability assessment in the knee joint with these tests showed proper stability of the operated knee joint.
- In Group I, the range of active extension and active flexion increased significantly at 6 months. In both groups, active extension and active flexion were statistically comparable to the non-operated limb at 6 and 24 months, respectively.
- After 24 months, the Lysholm scale mean was 95.7 ± 4.25 for Group I and 95.5 ± 4.18 for Group II. There was no statistical difference between the groups.
- After 24 months, the IKDC 2000 scale was mean 94.79 ± 6.54 for Group I and 94.81 ± 5.63 for Group II. There was no statistical difference between the groups.
- Authors concluded that comparing the JewelACL and FiberTape treatments showed the same functional and objective results.

Table 1. Range of motion results summary for Barnas et al (2021)

Variable	Group I			Group II		
	Operated limb	Non-operated limb	p-value	Operated limb	Non-operated limb	p-value
Extension (degrees)						
Before surgery	9.78 ± 2.00	0.00 ± 0.00	0.001	4.07 ± 2.08	0.00 ± 0.00	≤ 0.001
6 months after surgery	0.52 ± 1.15	0.00 ± 0.00	0.072	0.48 ± 1.20	0.00 ± 0.00	0.098
12 months after surgery	0.00 ± 0.00	0.00 ± 0.00	1.000	0.00 ± 0.00	0.00 ± 0.00	1.000
24 months after surgery	0.00 ± 0.00	0.00 ± 0.00	1.000	0.00 ± 0.00	0.00 ± 0.00	1.000
p-value	≤ 0.001	1.000	-	≤ 0.001	1.000	-
Flexion (degrees)						
Before surgery	111.32 ± 8.32	129.19 ± 5.81	≤ 0.001	111.33 ± 10.82	129.19 ± 5.81	≤ 0.001
6 months after surgery	121.94 ± 10.46	129.19 ± 5.81	≤ 0.001	114.50 ± 16.10	129.19 ± 5.81	≤ 0.001
12 months after surgery	123.55 ± 5.80	129.19 ± 5.81	≤ 0.001	124.00 ± 7.36	129.19 ± 5.81	≤ 0.001
24 months after surgery	126.23 ± 2.75	129.19 ± 5.81	0.061	127.61 ± 6.16	129.19 ± 5.81	0.119
p-value	≤ 0.001	1.000	-	≤ 0.001	1.000	-

Values expressed as the arithmetic mean $\pm$ standard deviation (SD)

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Table 2. Functional outcomes results summary for Barnas et al (2021)

Functional outcome (24 months)	Group I	Group II	p-value
Lysholm scale	95.7 ± 4.25	95.5 ± 4.18	0.94
IKDC 2000 scale	94.79 ± 6.54	94.81 ± 5.63	0.98

Luna-Pizarro et al, 2018

- Case series study shown in the form of a poster presentation, evaluates clinical outcomes of patients with partial (50-70%) or total ACL ruptures treated using the JewelACL arthroscopically to reinforce or replace the ACL.
- Sixteen non-professional soccer players included (mean age 34 years old. Follow-ups were conducted at 1, 2, 3, 6, 12, 24, and 48 months after surgery.
- All patients received 25 sessions of physical therapy and rehabilitation during the postoperative period.
- Clinical stability, function (measured by the KOOS and KSSR scales), range of motion, and pain levels showed significant improvement compared to the preoperative assessment ($p < 0.05$).
- Fourteen patients (87.5%) showed no anteroposterior instability during clinical manoeuvres.
- Complications included loosening of the femoral fixation in one patient and signs of synovitis with decreased range of motion in another patient.
- Overall, 87.5% of patients achieved acceptable functional recovery for daily activities by the second month after surgery.
- Assisted walking was possible from the first postoperative month.
- Return to sports activities was possible for 9 (56.25%) patients by the fourth month, and for 2 (12.5%) patients to amateur soccer by the third and sixth months, respectively.

Table 3. Results Summary for Luna-Pizarro et al (2018)

	Preo-op	Months post-op						
		1	2	3	6	12	24	48
Pain	5.8	4.0	2.1	1.0	1.0	1.0	1.0	-
Flexion	45°	75°	90°	110°	112°	111°	111°	112°
KSSR	64	72	82	89	95	97	97	-
KOOS	36.4	68	75	87	95	96	96	96

Kosowski et al, 2014

- Study aimed at assessing knee function after ACL reconstruction using the JewelACL. Assessment performed using an isokinetic dynamometer (Biodex 4 Pro).
- Twenty-six patients included. Inclusion criteria: isolated ACL rupture, isolated anterior instability, age 18-60 years, acute or chronic ACL rupture with intact ACL remnants, correct limb alignment, chondral defects grade 2 or less in the ICRS grading system, and no meniscal defects.
- At 24 months postoperatively, peak torque, total work, and average power improved, showing similar characteristics to those of the uninvolved limb.
- Lysholm score and IKDC 2000 score were 92.57 and 81.76, respectively, 24 months after surgery.
- The JewelACL method is a good alternative to other ACL reconstructive procedures.
- Lasting knee stability was confirmed by objective and subjective tests

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Table 4. Results Summary for Kosowski et al (2014)

PROMs	Lysholm score	IKDC 2000 score
Mean value	92.57	81.76
Standard Deviation	8.79	11.38

Alevrogiannis et al, 2012

- Study in the form of a presentation shows an anatomical single-bundle technique for primary ACL reconstruction using a four-stranded graft consisting of a semitendinosus autograft combined with the JewelACL.
- Eighteen male elite football players underwent primary ACL reconstruction after an acute ACL injury, with an average delay of 11 days between injury and surgery.
- Patients were evaluated at 6 and 12 months postoperatively.
- No significant complications were reported.
- The IKDC score increased from a median of 45 (range 41 to 56) preoperatively to 88 (range 82 to 92) at 6 months and to 94 (range 85 to 96) at 12 months post-surgery. No rotational instability was detected.
- No side-to-side difference was detected using the rolimeter 6 months after surgery.
- All patients returned to full power training programs 2.5 months after surgery.
- Return to full athletic performance occurred at a mean of 3.5 months after surgery.
- The technique presented does not require sacrificing both hamstring tendons for ACL reconstruction and is therefore less time consuming.
- A quick return to full football performance is achieved as there is no concern about autograft revascularization

Kosowski et al, 2012

- This presentation displays preliminary results using the JewelACL in ACL reconstruction.
- Twenty patients underwent ACL reconstruction and were followed up for a minimum of 6 months (mean follow-up: 12.8 months).
- JewelACL alone as an augmentation device was used if arthroscopy confirmed ACL avulsion from the femoral attachment with preserved natural ligament continuity. However, if arthroscopy confirmed only residual ACL tissue or a stump, a combined JewelACL and autograft reconstruction was used, with an ST graft placed inside the tubular structure of the JewelACL.
- The Lysholm score improved from a preoperative mean of 42.8 to a postoperative mean of 90.8. Specifically for instability, the score increased from a mean of 9.75 preoperatively to 23 post-surgery. Overall, 85% of patients achieved a good (84–90) or excellent (>90) score.
- The mean Tegner score improved from 2.6 preoperatively to 5.7 postoperatively.
- The IKDC score improved from 42.8 preoperatively to 89.36 postoperatively, with 85% of patients achieving a good (80–89) or excellent (90–100) score.
- Clinical results were excellent, and no laxity was found in any case. All patients returned to their preoperative activity levels.
- The technique combined with the JewelACL allows for joint preservation and ligament healing rather than replacement. It provides instant stability, allows for aggressive rehabilitation, avoids complications associated with graft harvesting, and prevents the detrimental effects of immobilization.

Table 5. Results Summary for Kosowski et al (2012)

	Mean Lysholm score	Mean Lysholm score (instability)	Mean Tegner score	Mean IKDC score
Pre-operative	42.8	9.75	2.6	42.8
Post-operative	90.8	23	5.7	89.36



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Conclusions from the recent studies

- The JewelACL has been shown to provide adequate knee stability, as measured by objective stability tests, when used for ACL reconstruction. Subjective assessments of knee stability are also favourable.
- It enables early restoration of range of motion (ROM), achieving mobility comparable to that of an uninjured knee.
- A rapid return to daily activities and sports is achievable, as there are no concerns regarding autograft healing and revascularization.
- Avoids detrimental effects of immobilisation
- When used as a partial or total tissue-sparing device, it minimizes or avoids complications associated with graft harvesting

Abbreviations

ACL:	Anterior Cruciate Ligament
ICRS:	International Cartilage Repair Society
IKDC:	International Knee Documentation Committee
KOOS:	Knee Injury and Osteoarthritis Outcome Score
KSSR:	Knee Society Score Rating
ROM:	Range of Motion
SD:	Standard Deviation
ST:	Semitendinosus

Study Citations

Alevrogiannis, S. and G. Skarpas (2012). Four Stranded Anatomical S.B Technique For Primary ACL Reconstruction Using Both Autograft & A Biomimetic Graft A Novel Technique For Elite Football Players. Isokinetic 2012: Football Medicine Strategies for Knee Injuries. London, England.

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WP 045 1.00