Similar Re-Rupture Rates After Lateral Posterior Root Rupture Repairs With Or Without Separate Tunnels

A retrospective cohort study by Christoffer von Essen et al.

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Disclosure

Receive Royalty from ConMed Linvatec.

Consultant for ConMed Linvatec and Arthrex Inc.

Not related to this presentation

Background

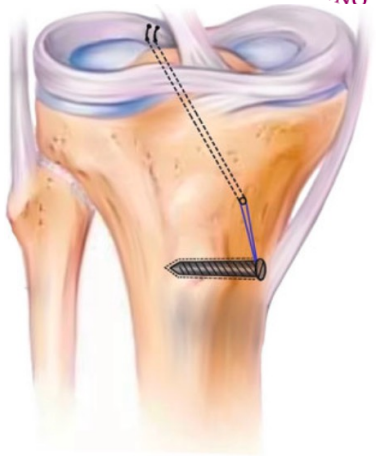
Lateral meniscal root tears (LMRTs) are commonly observed in association with anterior cruciate ligament (ACL) injuries, with a reported incidence of up to 18%.[1,2]

Different techniques to repair the LMRTs has been presented.[3-6] With Anatomical reconstruction with fixation of the root to the bone in a separate bone-tunnel (SB-T) and non-anatomical but easier to perform with the fixation of the meniscus root in the ACL-Reconstruction's (ACL-R) tibial tunnel (ACL-T).

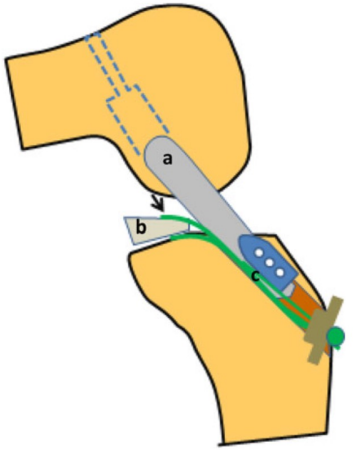
The reported outcome after repair is generally good but the published studies have small sample size and differ in techniques.[7,8]

Aim

The aim of this study was to compare the outcome of LMRTs repaired with a SB-T or ACL-T technique at the time of ACLR.



Schematic drawing of with the fixation of the meniscus root in a separate bone-tunnel (SB-T) as presented by Shekar et Al. OJSM (2022)[7]



Schematic drawing of with the fixation of the meniscus root in the ACL-Reconstruction's (ACL-R) tibial tunnel (ACL-T) as presented by Forkel et Al. Arch Orthop Trauma Surg (2012)[6]

Method Study design

Retrospective analysis of patient records at Capio Artro Clinic, Stockholm, Sweden. Patients with ACL-R + LMRTs repair between May 2017-May 2022 were assessed

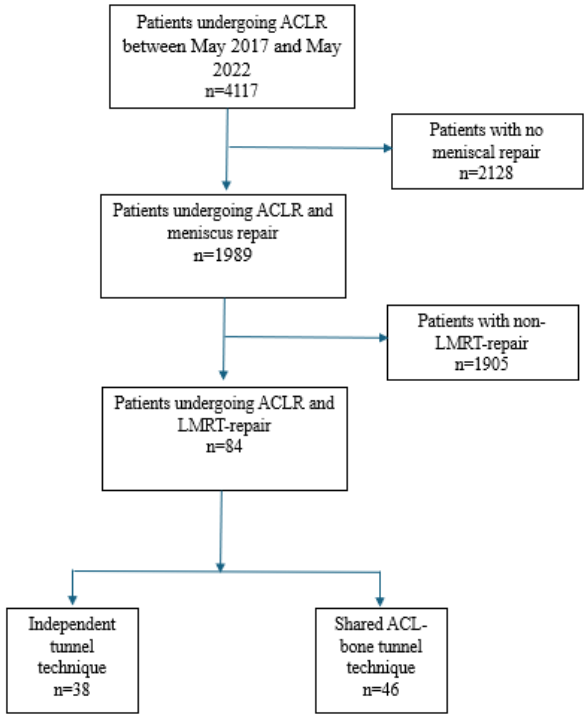
Revision ACL-R, injured CL leg and multiligament injuries were excluded

Surgical method

Looped sutures (Fiberlink, Arthrex) were used to create chinch stitches in the meniscal root with a suture passing device (Knee Scorpion, Arthrex)

SB-T technique: Separate tunnel performed with a meniscal root guide and fixation to a post (AO screw, Synthes) or a bone anchor (SwiveLock, Arthrex)

ACL-T technique: The meniscal sutures were passed through the ACL single bundle tibial tunnel and fixed in a similar fashion to a post or bone anchor.



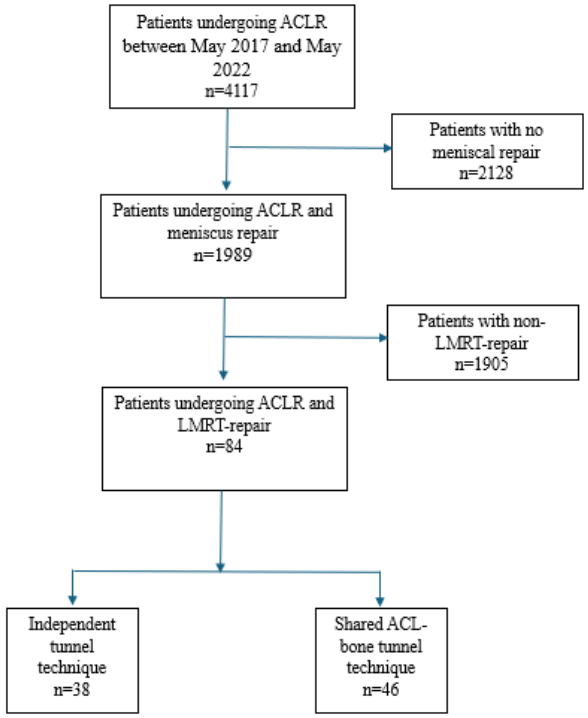
84 LMRTs during the study period
38 SB-T and 46 ACL-T

All patients adhered to the same rehabilitation protocol with partial wb for 6 weeks and a hinged brace during the same time 0-30° 2w, 0-60° 2w and 0-90° 2w.

Method Follow up

All patients followed the normal FU routine after ACL-R with a comprehensive evaluation at 6 months with a physiotherapist and the surgeon.

- ROM measured by a goniometer, loss of ROM was defined as >5° compared to CL healthy leg in extension and flexion.
- Knee laxity measured with KT-1000 at 134N at 20°(MEDmetric)
- Isokinetic strength measured at 90°/s (Biodex) and a Limb symmetry Index (LSI) calculated with proportional strength in the injured limb w the healthy limb as reference.
- Through the Swedish Knee Ligament Register (SKLR) KOOS[9] was collected preoperatively and at 2 years.
  - → A KOOS4 score was calculated (Average of the 4 subscales excluding the ADL subscale)[10]
  - → Patient Acceptable Symptom State (PASS) defined as 79 on KOOS4 and Treatment failure defined as 42 on KOOS4 was calculated to assess the KOOS[10]
- Complications, failures of the repairs and the need for further procedures were assessed trough records.
  - → Failure of repair was diagnosed at 2nd look arthroscopy due to persisting symptoms and/or suspected rupture on MRT



84 LMRTs during the study period
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Results Descriptives

Twelve surgeons performed the repairs. The minimum follow-up time was 2 years and mean follow up time for the cohort was 45 ± 12 months.

The groups were similar in age, gender and graft used for ACL-R.

Activity at the time of ACL injury was collected from SKLR:
Soccer was the most prevalent mode of injury, in line with all ACL injuries in Sweden.
In second place Other activity a combination variable in the register for non specified activities.
Downhill skiing and floorball in joint 3'rd place.

Table 1

SD = Standard deviation	Total n=84	SB-T n=38	ACL-T n=46	Sign
Age at surgery (Mean ± SD)	31± 10	31 ± 11	31 ± 11	n.s.
Gender, n (%)				n.s.
Male	52 (61.9)	26 (68.4)	26 (56.5)	
Graft type, n (%)				n.s.
Hamstrings tendon	48 (57.1)	22 (57.9)	26 (56.5)	
Quadriceps tendon	33 (39.2)	16 (42.1)	17 (36.9)	
Patellar tendon	3 (3.6)	0	3 (6.5)	
Activity at ACL inj.(SKLR), n(%)				n.s.
Soccer	31 (36.9)	16 (42.1)	15 (32.6)	
Other activity	15 (17.9)	7 (18.4)	8 (17.4)	
Skiing	8 (9.5)	5 (13.2)	3 (6.5)	
Floorball	8 (9.5)	3 (7.9)	5 (10.9)	
Handball	5 (6.0)	4 (10.5)	1 (2.2)	
Rugby	4 (4.8)	1 (2.6)	3 (6.5)	
Martial Arts	3 (3.6)	0	3 (6.5)	
Tennis	2 (2.4)	1 (2.6)	1 (2.2)	
Work	2 (2.4)	0	2 (4.3)	
Gymnastic	2 (2.4)	0	2 (4.3)	
Ice Hockey	2 (2.4)	0	2 (4.3)	
Skateboard	1 (1.2)	1 (2.6)	0	
Basketball	1 (1.2)	0	1 (2.2)	

Results Failure of repair

Six patients (7.1%) suffered failure of the lateral root repair confirmed by second look arthroscopy, 2(5%) in SB-T group and 4(9%) in ACL-T group.

There were additional 6 pt (6%) who had an ACL revision, 7 (8%) had a subsequent medial meniscal procedure and 8 (10%) patients had a cyclops lesion. No surgical-technique-related complication was reported.

Strength testing at 6 months with few patients reaching LSI>90% at 6 months. Unexpectedly more LSI flexion strength recovery in SB-T group than in ACL-T group.
No differences in ROM with few losses of >5° at 6 months.
No differences in laxity at 6 months, >80% with <2mm side to side difference on KT-1000, but low FU-frequency 11(29%) SB-T and 16(35%) ACL-T patients were assessed.

Table 2

	Total n=84	SB-T n=38	ACL-T n=46	Sign
Failure of meniscus n(%)	**6 (7.1)**	**2 (5.3)**	**4(8.7)**	**n.s.**
Biodex LSI>90% n(%)				
6months	n=32	n=14	n=18	
Extension	6 (18.8)	4 (28.6)	2 (11.1)	n.s.
Flexion	20 (62.5)	12 (85.7)	8 (44.4)	0.03
ROM n(%)				
Pre-operative	n = 49	n=21	n=28	
Flexion deficit >5°	1 (2.0)	0	1 (3.6)	n.s.
Extension deficit >5°	7 (14.3)	1 (4.8)	6 (21.4)	n.s.
6 months	n=53	n=24	n=29	
Flexion deficit >5°	6 (11.5)	4 (17.4)	2 (6.9)	n.s.
Extension deficit >5°	5 (9.4)	4 (16.7)	1 (3.4)	n.s.

Results KOOS

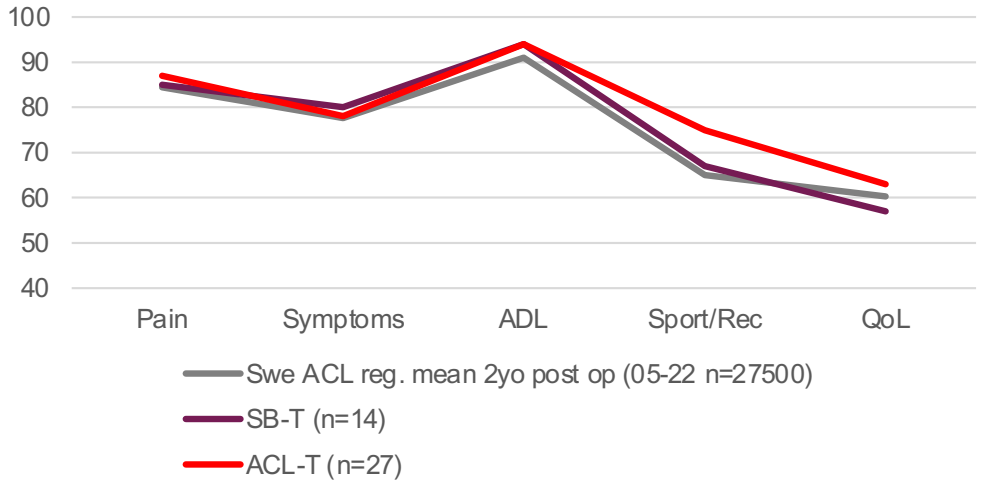
The mean KOOS were similar between the groups at 2 years.
KOOS Treatment failure lower than usually reported for ACLR-R.
PASS similar between the groups, the patients clearly are still affected by their knee injury.

KOOS for both groups are higher compared to the mean in SKLR at 2 years (fig. 1).
The numbers are small and differences inside earlier reported clinically relevant minimally detectable differences[10].

Table 3

KOOS 2y post ACLR (Mean ± SD)	Total n=41	SB-T n=14	ACL-T n=27	Sign
Pain	86 ± 15	85 ± 16	87 ± 15	n.s.
Symptoms	79 ± 19	80 ± 20	78 ± 19	n.s.
ADL	94 ± 11	94 ± 13	94 ± 11	n.s.
Sport	69 ± 25	67 ± 25	75 ± 28	n.s.
QoL	61 ± 25	57 ± 27	63 ± 25	n.s.
KOOS4				
Treatment Failure ≤42, n (%)	5 (12)	3 (21)	2(7)	n.s.
PASS ≥79, n (%)	12 (29)	3(21)	9 (33)	n.s.

Figure 1



Discussion

Few failures with repair independent of technique was observed, but with more proportional failures from the ACL-tunnel technique with no statistical difference. The failure proportion is in line with current literature with healing above 90% reported[11]. The ACL tunnel technique is non-anatomical, The lateral meniscus posterior root attachment center is located 6 to 11mm outside the tibial attachment of the ACL posterolateral bundle[12]. The clinical effect of an LMRT is unclear, in biomechanical studies a LMRT has been shown to increase anterior and rotatory instability and may increase loads on an ACLR-graft[13,] and LMRT-repair has been shown to reduce anterior laxity[14]. In this study the laxity was restored similarly in both groups. The effect of LMRT repair on the risk for osteoarthritis after ACLR + LMRT repair remains to be seen.

This study have several limitations; a retrospective design, loss to follow-up and variable fixation techniques for both groups. However, the clinical outcome of meniscus healing after repair seems to be met by both principal methods. The separate tunnel method is more technically demanding and require more instrumentation and OR time. This study failed to show the clinical effect that the theoretical advantages of separate tunnel technique has.

Conclusion

Repairing LMRTs can be recommended at the time of ACL-R. The surgeon should use their preferred repair technique until larger data suggests otherwise.

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