Val d'Isère 2022

ALL-INSIDE MENISCAL REPAIR

-

OUTCOME IN 2022

LYON ORTHO CLINIC

LYON KNEE SCHOOL of SURGERY

David DEJOUR

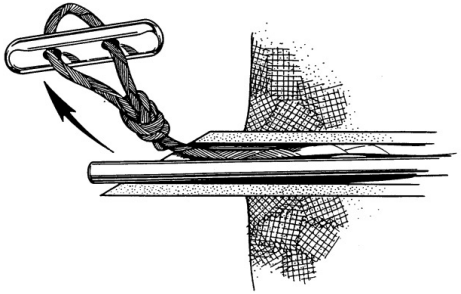
M. VALOROSO, G. LA BARBERA, E. Giovanetti

LYON ORTHO CLINIC

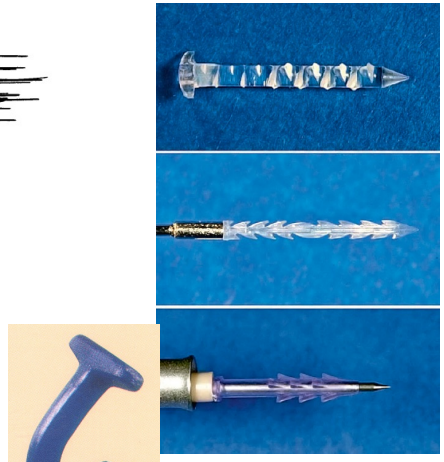
History of Devices

First generation

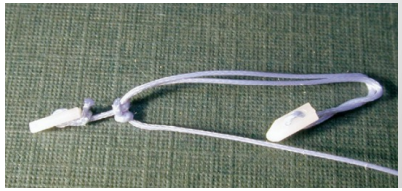
Second generation



Third generation



Fourth generation



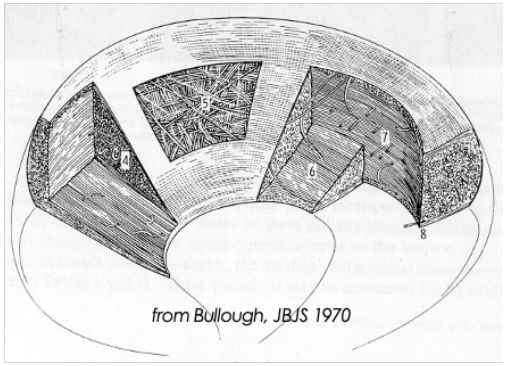
ALL-Inside PROs

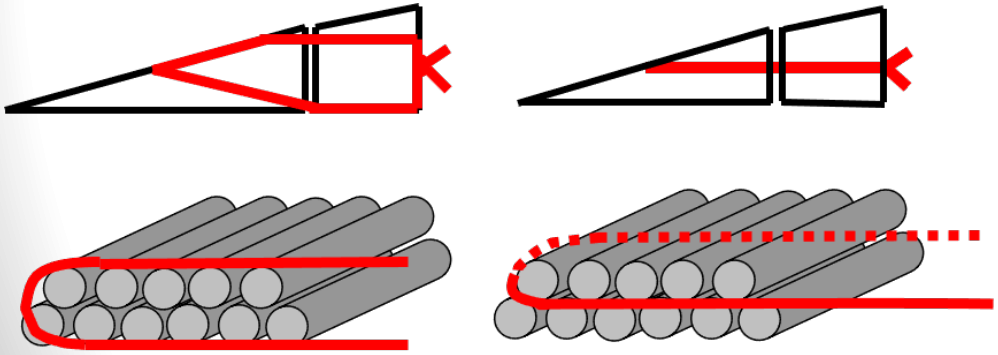
1. Simplifies a technically difficult procedure
2. Reduces the need for a skilled surgical assistant
3. Reduces surgical times
4. Improves cosmetic results
5. Decreases postop pain.

CONs

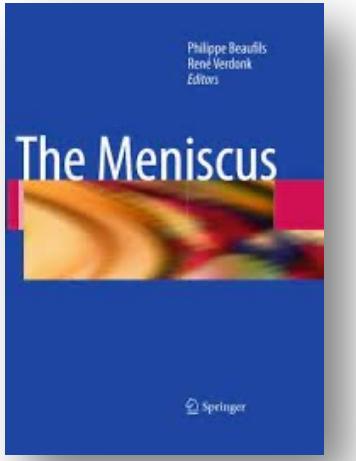
1. More expensive than sutures
2. Has technical issues of its own
3. Still have complications

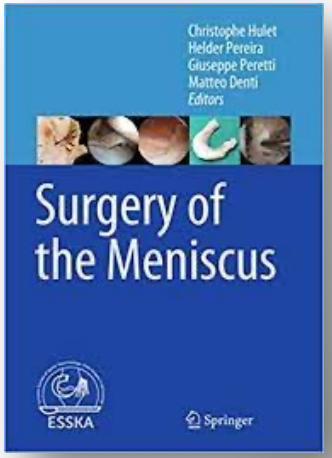
The technique, How to do…



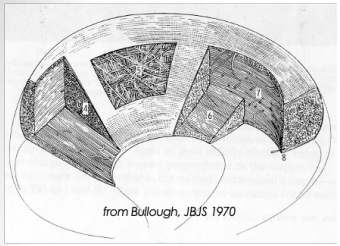


Kohn D, Siebert W, 1989

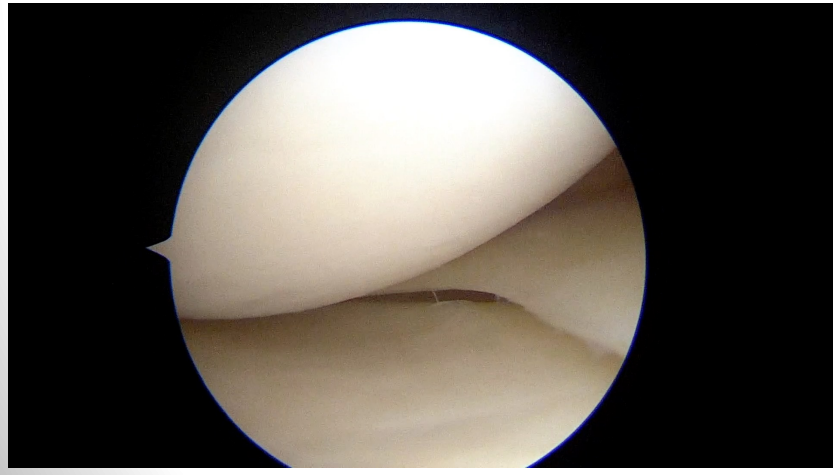




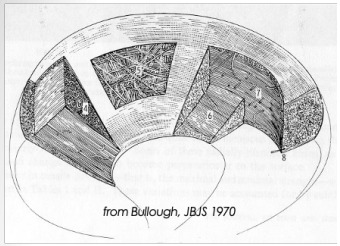
The technique, Exploration…



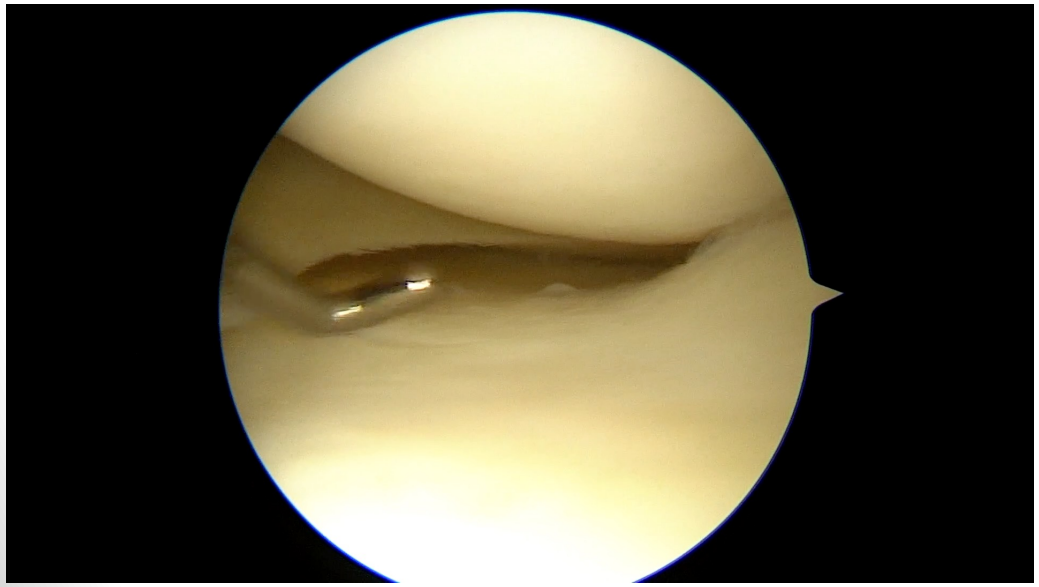
Exploration first
From AM an AL everything is almost possible…

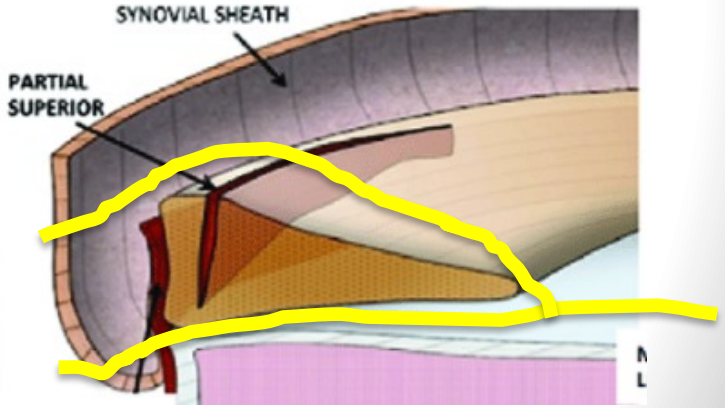


The technique, Suture from the front …



2 Sutures tighten alternatively
From AM an AL everything is almost possible…





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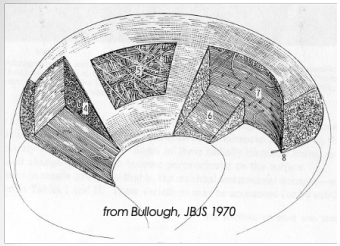

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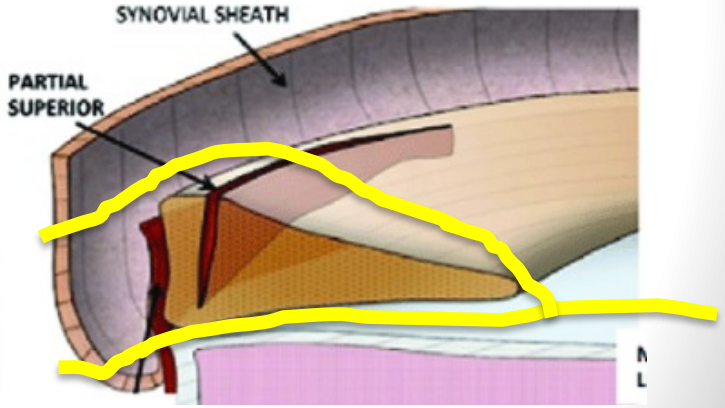

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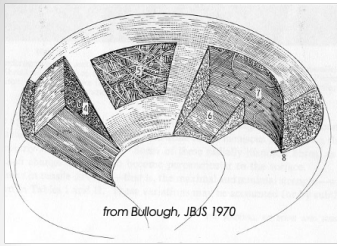

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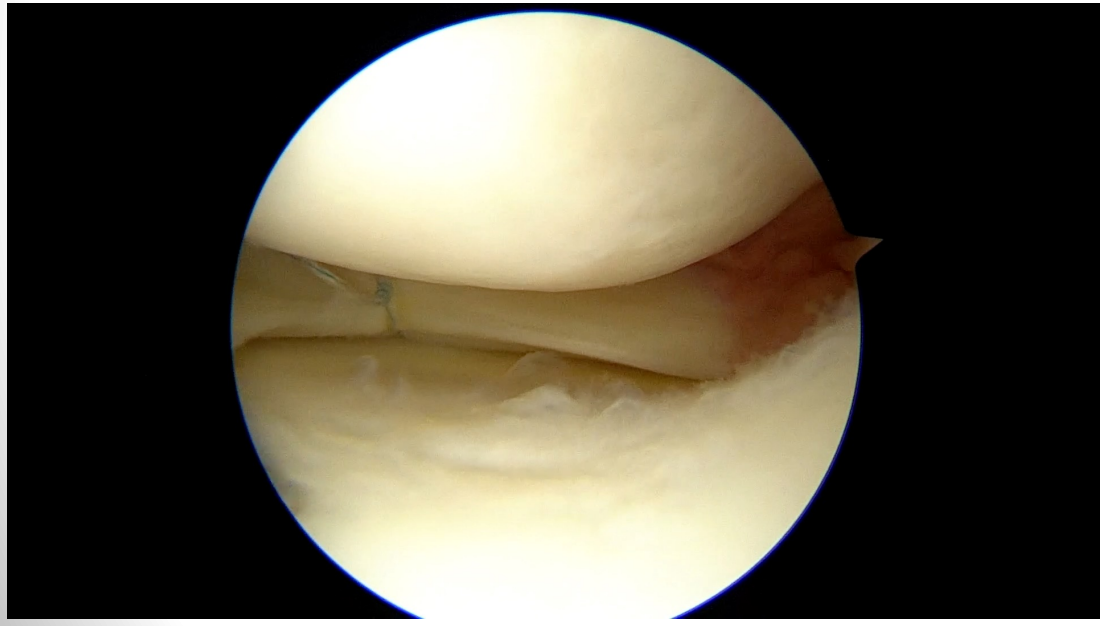

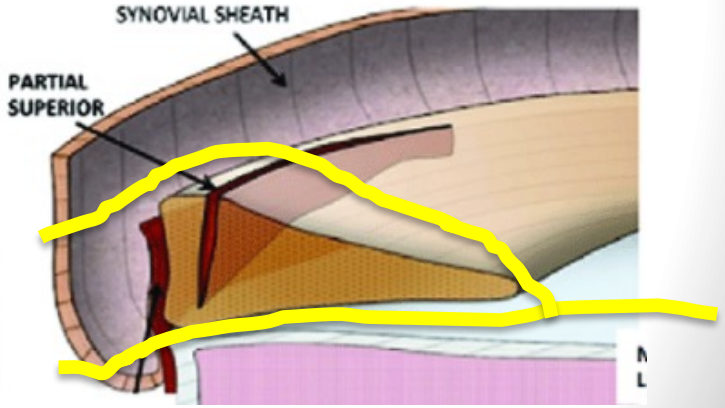

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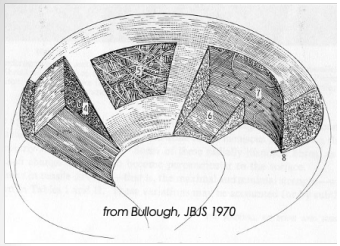

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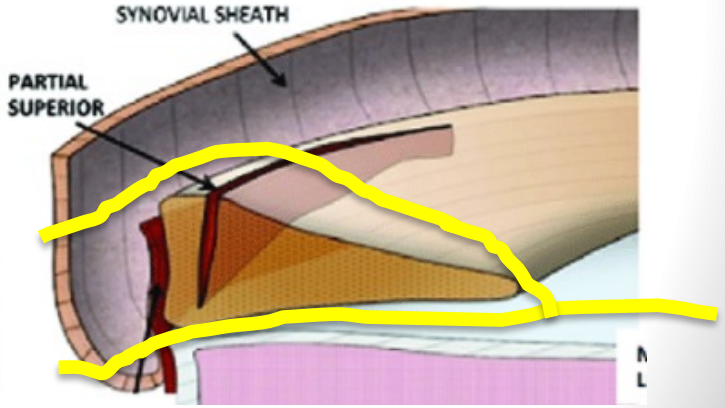


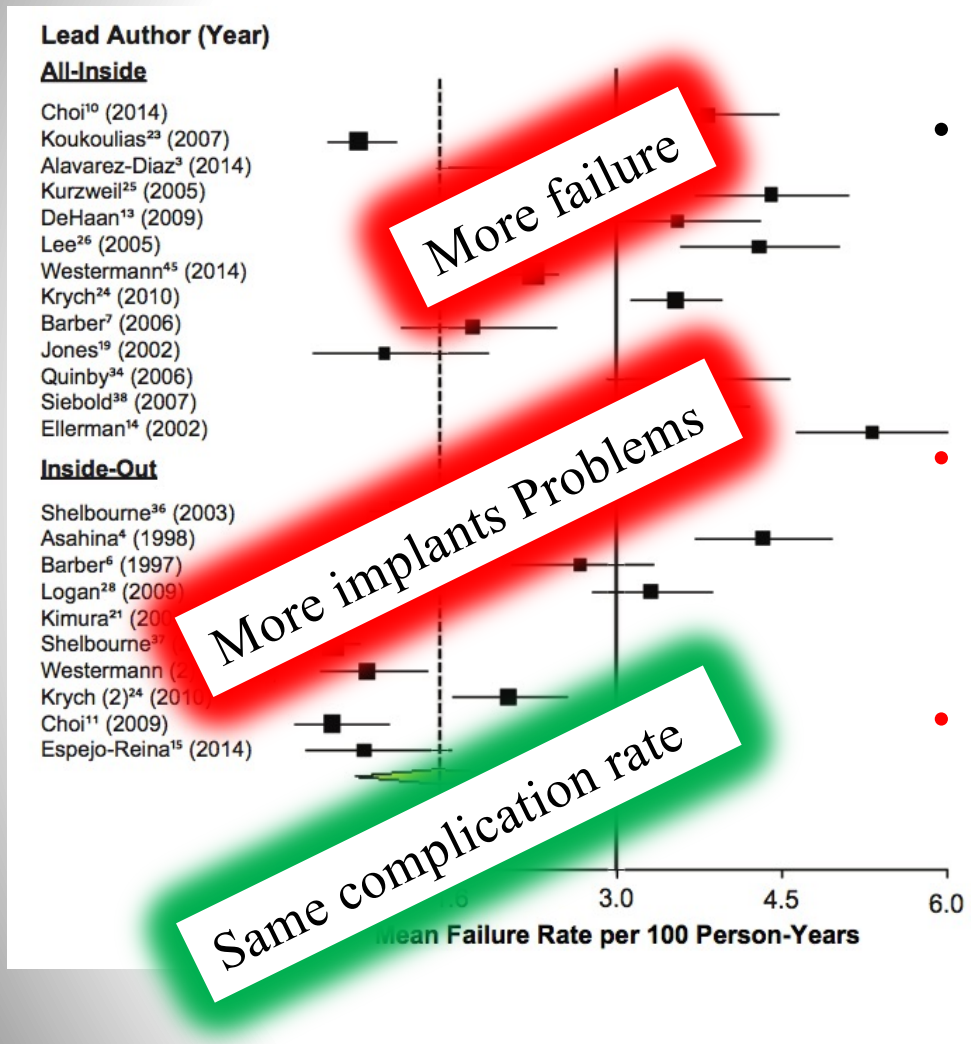
All-Inside Versus Inside-Out Meniscal Repair With Concurrent Anterior Cruciate Ligament Reconstruction

A Meta-regression Analysis

Robert W. Westermann,*y MD, Kyle R. Duchman,y MD, Annunziato Amendola,y MD, Natalie Glass,y PhD, and Brian R. Wolf,y MD, MS AJSM 2016

- Failure rates after meniscal repair
- All-inside or inside- out technique performed in conjunction with ACLR were identified between 1980 and 2015
- A minimum 2-year follow-up were required

ALL Inside sutures



- The clinical **failure** rate for **all-inside** meniscal repair performed concurrently with ACLR was **16%** (121/744) **compared** with **10%** (39/382) for **inside-out** repair (P = .016)
- **Implant irritation** and **device migration** were the most common complications reported for **all-inside repair**
- **Complication rates** did **not differ** between the groups.

Prognostic factors for all-inside meniscal repair. A 87-case series

L. Laurendon[a,*], T. Neri[a,b], F. Farizon[a,b], R. Philippot[a,b]

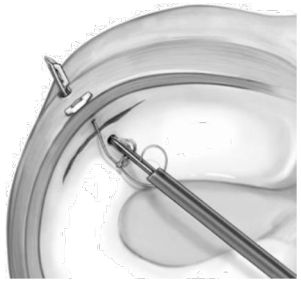
A single-center retro. study All-Inside meniscal repair (Fast fix^{Tm})

Inclusion criteria:

- non- degenerative tears
- red-red or red-white zones
- acute or chronic 1-, 2- or 3-segment lesions
- with or without associated anterior cruciate ligament (ACL) tear

Exclusion criteria:

- radial meniscal lesion
- history of knee surgery
- Infection
- fracture



Patient characteristics.

Gender	87
Female	26
Male	61
Mean age, years (range)	28.3 (15–63)
Side	
Right	43
Left	44
Meniscus laterality	
MM, *n* (%)	51 (58.6)
LM, *n* (%)	32 (36.8)
MM & LM, *n* (%)	4 (4.6)
Knee stability	
Intact ACLs	26
Reconstructions	61

MM: medial meniscus; LM: lateral meniscus; ACL: anterior cruciate ligament.

Univariate and multivariate analysis of anatomic factors.

	Univariate (*P*)	Multivariate (*P*)
Lesion side	0.274	–
MM posterior segment	0.357	–
MM medial segment	0.094	–
MM anterior segment	0.218	–
LM posterior segment	0.497	–
LM medial segment	0.548	–
LM anterior segment	0.658	–
Bucket-handle	0.046	0.002
ACL lesion	0.170	–
Medial compartment chondropathy	0.325	–
Lateral compartment chondropathy	0.171	–

MM: medial meniscus; LM: lateral meniscus; ACL: anterior cruciate ligament.

Univariate and multivariate analysis of clinical and epidemiological factors.

	Univariate (*P*)	Multivariate (*P*)
Smoking	0.375	–
Sport	0.251	–
Gender	0.413	–
Age	0.611	–
BMI > 25	0.042*	0.014*
Trauma-to-surgery time	0.377	–
Morphotype	0.517	–

BMI: body mass index.
* $P < 0.05$.

Univariate and multivariate analysis of surgical factors.

	Univariate (*P*)	Multivariate (*P*)
Number of MM FasT-Fix	0.365	–
Number of LM FasT-Fix	0.634	–
Type of ACL reconstruction	0.421	–
Rehabilitation protocol	0.334	–

MM: medial meniscus; LM: lateral meniscus; ACL: anterior cruciate ligament.
* $P < 0.05$.

- **Follow-up: 31 months**
- **Failure rate :14.9%**

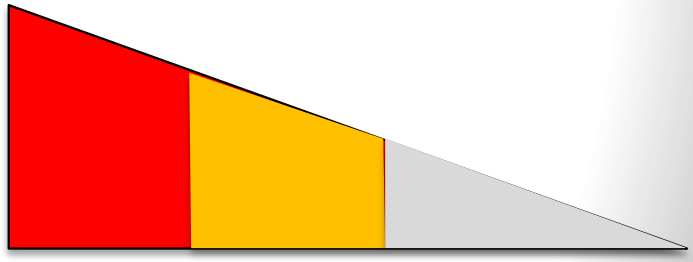
Bucket-handle lesion (P = 0.002)
BMI > 25 (P = 0.014)
Predictive factors for failure

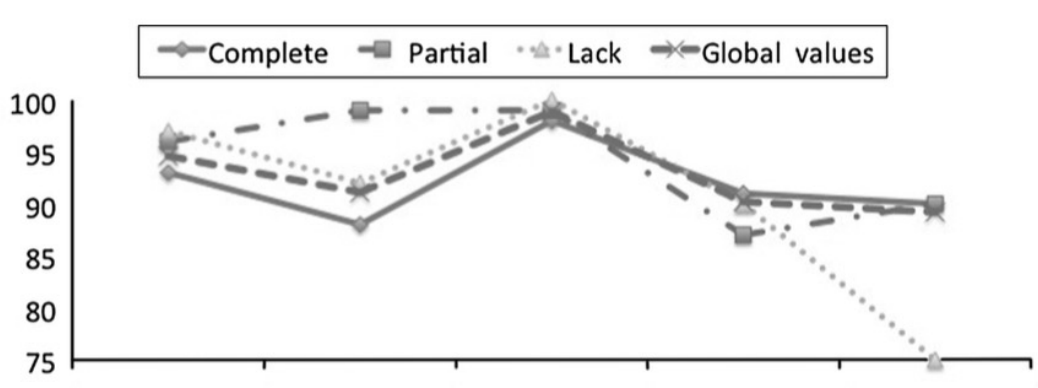
Long-term outcomes of all-inside meniscal repair

Nicolas Pujol · Nicolas Tardy · Philippe Boisrenoult · Philippe Beaufils

- 41 meniscal tears repaired
- All tears were **vertical**, located in the **red–red or red–white zone**
- At a median follow-up of **9.7 years**, a total of 31 patients were reviewed.

Mean age at surgery (years)	26 (9–40)
Male:female (no)	23:18
Right:left Knee (no)	29:12
Medial:lateral meniscus (%)	61:39
Mean time from injury to surgery (months)	114 ± 10
Stable:ACL reconstructed knee	25:16





There was no correlation between the initial healing rate and clinical outcomes at follow-up

Healing	KOOS pain	KOOS symptoms	KOOS QOL	KOOS Sports	KOOS DLA
complete	93	88	98	91	90
partial	96	99	99	87	90
lack	97	92	100	90	75
Global values	95	91	99	90	89

Suture if you can it works and protects

A long-term protective effect of the meniscus against degenerative joint disease might be preserved after repair, even if the initial healing is incomplete.

Influence of LOCATION'S TEAR

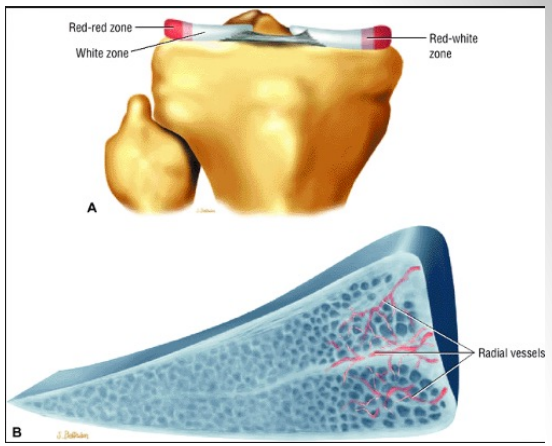


Table 1 Summary of outcomes for patients who underwent meniscal repair

	Number of meniscal repairs	Percentage success (%)	Failed repairs (%)	*p* Value
Zone of repair				
				0.75
R/W	66	86	14	
R/R	12	84	16	

Majeed et al. 2015

Results of repairs in the **red–red zone** are **equivalent** to those in the **red–white zone**

Pujol N, Panarella L, Ait Si Selmi T, Neyret P, Fithian D, Beau ls P (2008) Meniscal healing after meniscus repair: a CT arthrography assessment. Am J Sports Med 36(8):1489–1495

Are Outcomes After Meniscal Repair Age Dependent? A Systematic Review

Table 3. Association of Outcome Measure Relative to Age

Author	Outcomes in Patients Younger Than Defined Age: Healed/Pre Score	Outcomes in Patients Younger Than Defined Age: Failure/Post Score	Outcomes in Patients Older Than Defined Age: Healed/Pre Score	Outcomes in Patients Older Than Defined Age: Failure/Post Score	*P* Value
Age 25					
Ahn et al. (2004)	15	2	17	5	.438
Erggelet et al. (1998)	NR	95.00	NR	92.00	
Haklar et al. (2008)	60 ± 25.41	93 ± 38.12	63 ± 17.39	95 ± 7.45	.557
Kubiak et al. (2010)	14	3	8	0	.527
Majeed et al. (2015)	72	11	45	8	.803
Perdue et al. (1996)	NR	85.5	NR	84.7	
Rubman et al. (1998)	13	31	10	37	.604
Age 30					
Ahn et al. (2004)					.234
Cannon et al. (19					.500
Eggli et al. (199					.068
Fok et al. (2013)					.680
Fok et al. (2013)					.426
Haklar et al. (200					.557
Kotsovolos et al. (					1.000
Kubiak et al. (2010)	16	3	6	0	.554
Raza et al. (2011)	1	1	5	7	1.000
Age 35					
Ahn et al. (2004)	22	3	10	4	.112
Cannon et al. (1992)	35	35	8	12	.053
Kalliakmanis et al. (2008)	108	11	129	17	.118
Kubiak et al. (2010)	18	3	4	0	1.000
Raza et al. (2011)	4	2	2	6	.035
Steenbrugge et al. (2002)	1	6	1	5	.090
Age 40					
Ahn et al. (2004)	25	5	7	2	.157
Kubiak et al. (2010)	20	3	2	0	1.000
Raza et al. (2011)	5	3	1	5	.035
Steadman et al. (2015)	31	6	5	2	.200
Steenbrugge et al. (2002)	1	8	1	3	.144

NOTE. The score refers to Lysholm score if recorded. Otherwise, the numerical values represent either healed repairs or failed repairs for the given study less than or greater than the age threshold for that study.

*Clinical failures.

†Magnetic resonance imaging failures.

Age is forgiving …

No significant difference *exists when evaluating* ***meniscal repair failure rate as a function of age*** *above or below the given age thresholds*

TIME TO SURGERY *(controversial)*

Most Authors reported **no effect of time from injury to repair** for meniscal tear healing, some did report **an effect of tear chronicity**.

	Number of meniscal repairs	Percentage success (%)	Failed repairs (%)	*p* Value
Time of repair				
Early (<6 weeks)	82	91	9	0.49
Late (>6 weeks)	50	87	13	

Majeed H et al. All-inside meniscal repair surgery: factors affecting the outcome. J Orthopaed Traumatol 2015

	Meniscal Repairs, n (%)	Successful Repairs, n (%)	Failed Repairs, n (%)	*P* Value[b]
Time of repair, wk				.008
<8	35 (43.8)	35 (100)	0 (0)	
≥8	45 (56.3)	33 (73.4)	12 (26.6)	

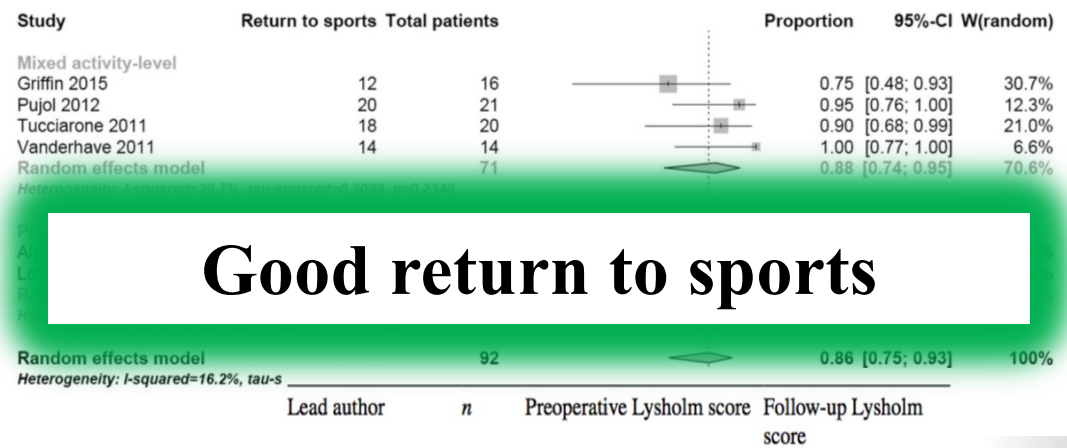
Uzun E et al. Factors Affecting the Outcomes of Arthroscopically Repaired Traumatic Vertical Longitudinal Medial Meniscal Tears. The Orthopaedic Journal of Sports Medicine 2017.

Recent tears (less than 12 weeks) may have a better prognosis.

Sport-specific outcomes after isolated meniscal repair: a systematic review

Helge Eberbach[1] · Jörn Zwingmann[1] · Lisa Hohloch[1] · Gerrit Bode[1] · Dirk Maier[1] · Philipp Niemeyer[1,2] · Norbert P. Südkamp[1] · Matthias J. Feucht[1]

- **Return to sports** on the preinjury level was achieved in **89%**.
- Preinjury activity level was achieved in 90% of mixed-level populations and in 86% of professional athletes wit comparable preinjury and postoperative Tegner scores (6.3±1.1 vs. 5.7±0.8).
- Mean **delay of return** to sports varied between **4.3 and 6.5 months**.
- The pooled failure rate was 21%: professional athletes (9%), mixed-level athletes (22%).



Good return to sports

Lead author	*n*	Preoperative Lysholm score	Follow-up Lysholm score
Martin-Fuentes [38]	19	62.5	88.6
Lucas [36]	17	55.9	85.4
Ahn [2]	32	48.0	92.0
Ahn [1]	13	78.5	94.6
Chiang [14]	18	65.0	95.0

Better if high level

Summary	**228**[a]	**58.8±9.6**[b]	**84.5±8.1**[b]
Lead author	*n*	Preoperative IKDC score	Follow-up IKDC score
Tucciarone [59]	20	37.6	81.2
Krych [32]	44	65.1	89.4
Summary	**64**[a]	**56.4±12.8**[b]	**86.8±3.8**[b]

Eberbach H. et al. Sport-specific outcomes after isolated meniscal repair: a systematic rev

All-inside meniscal repair surgery: factors affecting the outcome

Table 1 Summary of outcomes for patients who underwent meniscal repair

	Number of meniscal repairs	Percentage success (%)	Failed repairs (%)	*p* Value
Side				
Medial	50	81	19	1.00
Lateral	86	88	12	

Tuckman et al. found a **superior healing rate** for the **lateral meniscus** compared to the medial meniscus (80 vs. 56% complete healing)

Tuckman DV, Bravman JT, Lee SS, Rosen JE, Sherman OH (2006)
Outcomes of meniscal repair: minimum of 2-year follow-up.

In the study of the [illegible] **subsequent medial meniscectomies** and **11% subse[illegible]ectomies** were required after repair

Beaufils P, Cassard X (2[illegible] repair.
Rev Chir Orthop Reparatrice Appar Mot 90:3S49–3S75

Lateral meniscus ++++

Due to highly vascularized areas, lateral tears may heal better than medial tears.

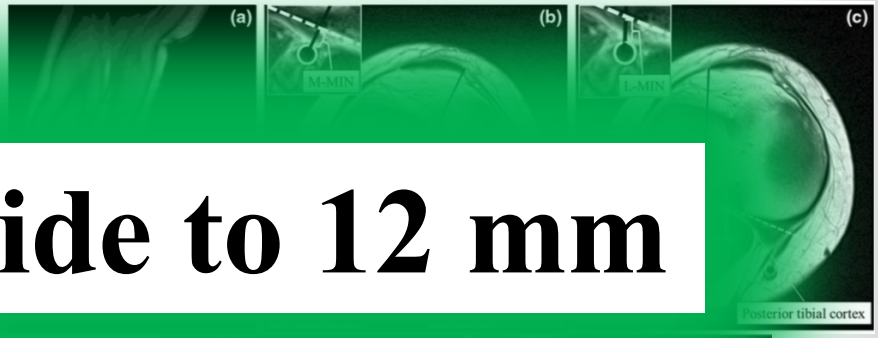
Vascular safety during arthroscopic all-inside meniscus suture

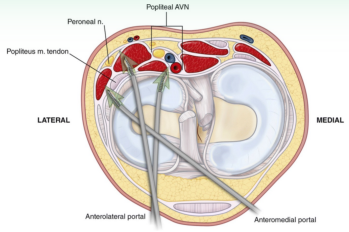
MRI study aimed to determine the position of the poplitel artery and the distance from both the AM and AL portals to define safe zones for meniscus suture.

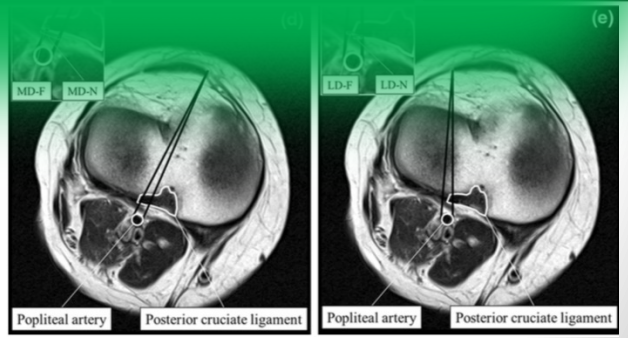
- **All-inside meniscus suture of the lateral posterior horn is much safer from the AM** than the AL po

Set the Suture guide to 12 mm

- All-inside
of the lateral meniscus inserted through the AM portal is safer when the knee is in the **figure-of-four position** than fully extended.





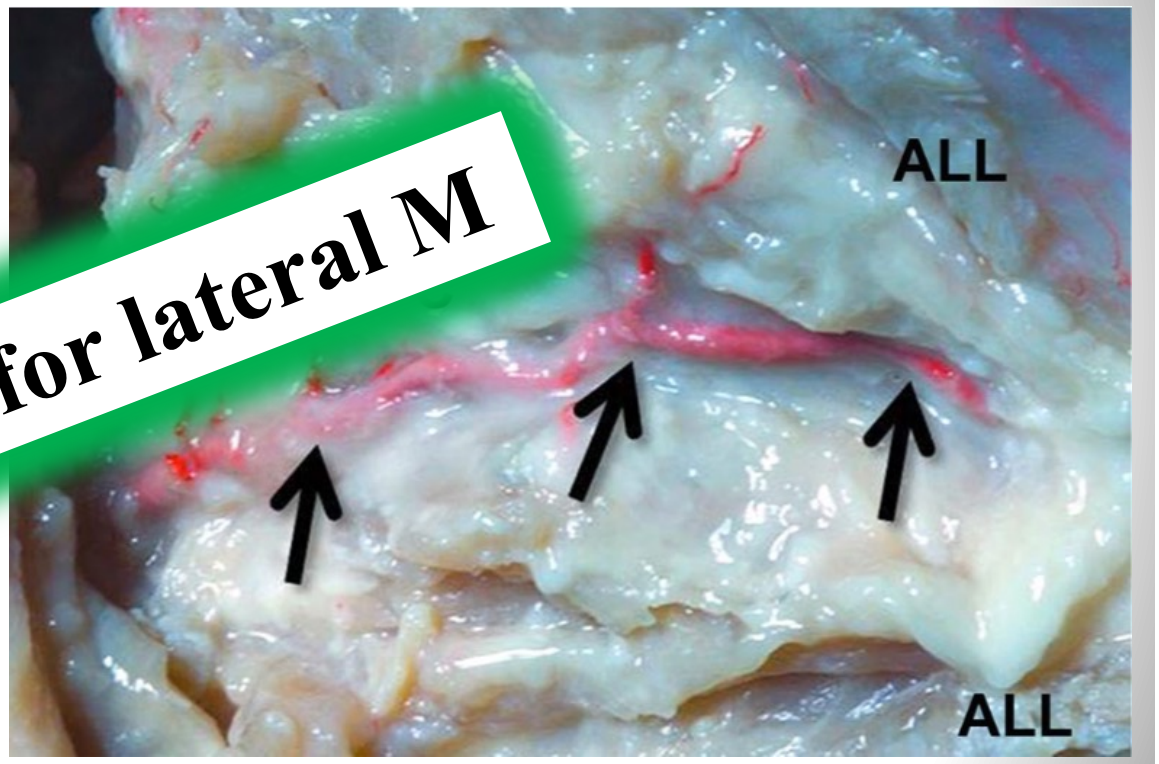


Nishimura A. Vascular safety during arthroscopic all-inside meniscus suture. KSSTA 2015

The all-inside meniscal repair technique has less risk of injury to the lateral geniculate artery than the inside-out repair technique when suturing the lateral meniscus

- Cadaveric study 8 knees
- Aim: to evaluate the risk of injury [illegible] inferior lateral geniculate [illegible] different techniques [illegible] repair (in-[illegible]

ALL Inside is safer for lateral M



Cuéllar A et al. The all-inside meniscal repair technique has less risk of injury to the lateral geniculate artery than the inside-out repair technique when suturing the lateral meniscus. KSSKA 2018

TAKE HOME MESSAGE ALL-INSIDE Suture

OUTCOMES

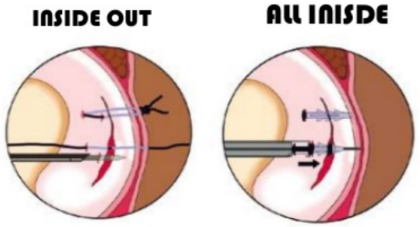
- SIMULTANEUS ACL RECONSTRUCTION
- R\R + R\W ZONE
- LATERAL MENISCUS

AGE: *Not a contra-indication*

TIME TO SURGERY: *Controversial : MAYBE RECENT MENISCAL LESION REPAIR (<12 WEEKS)MAY HAVE BETTER RESULTS*

- BMI > 25
- BUCKET-HANDLE LESION

Conclusion In-Out Vs. All-inside



No differences in:

1. Failure rates
2. Functional outcome scores

Inside-Out Versus All-Inside Repair of Isolated Meniscal Tears: An Updated Systematic Review

Yale A Fillingham [1], Jonathan C Riboh [1], Brandon J Erickson [1], Bernard R Bach Jr [1], Adam B Yanke [1]

A Meta-Analysis of Arthroscopic Meniscal Repair: Inside-Out versus Outside-In versus All-Inside Techniques

Randa Elmallah [1], LaRita C Jones [1], Lacy Malloch [2], Gene R Barrett [1]

BUT:

- Mean operating time:

Higher in Inside-out versus All-inside.

- Nerve injuries:

more common after Inside-out than All-Inside

All-inside versus inside-out meniscal repair: A systematic review and meta-analysis

Helen Vint [1], Megan Quartley [2], James R Robinson [3]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