

Analysis of Historic and Modern Treatment Outcomes in Primary Anterior Cruciate Ligament Repair: Systematic Review and Meta-analysis

Jaren LaGreca, MD; Marc Tompkins, MD

University of Minnesota Department of Orthopedics, TRIA Orthopedic Center
Research Institute

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Disclosures

- **Jaren LaGreca, MD**
 - No disclosures
- **Marc Tompkins, MD**
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Study Background and Objectives

- Historically, primary ACL repair was performed but subsequently abandoned (in favor of ACL reconstruction) due to unacceptably high rates of failure at mid- and long-term follow-up¹
- Recent advances in surgical technique and patient selection have resulted in a resurgence of interest in ACL repair^{2,3}

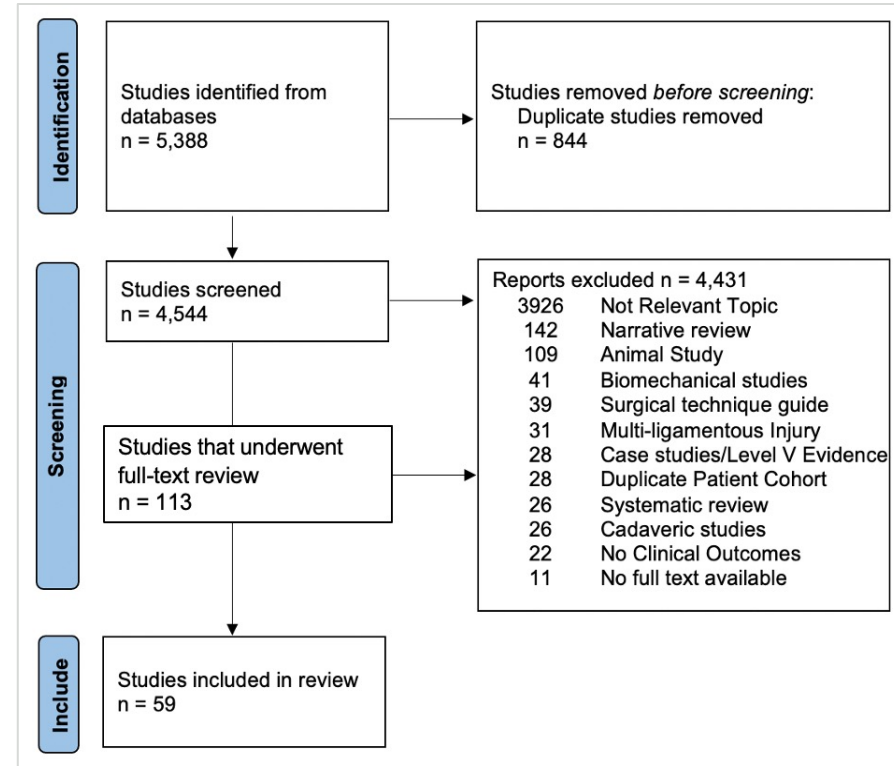
The purpose of this study was to compare historic and modern treatment outcomes of ACL repair



Methods

- Systematic review of Embase, Medline, and PubMed was performed utilizing PRISMA guidelines⁴
- Key variables collected:
 - Patient demographics
 - ACL tear location
 - Concomitant meniscus and chondral injuries
 - Timing to surgery
 - Open versus arthroscopic procedure
 - ACL repair technique
 - Recurrent knee instability

Figure 1: PRISMA guideline flow-diagram for study inclusion.



Analysis

- **Primary outcome of interest:** Rate of recurrent knee instability
 - Study quality assessed using the Modified Coleman Methodology Scoring (MCMS)⁵
 - Descriptive statistics and proportional meta-analysis were performed using Freeman- Tukey transformation to calculate the weighted summary of ACL repair outcomes
 - Study heterogeneity was assessed with I^2 statistic



Results

- Studies included in metanalysis (n=59):
 - 31 retrospective
 - 20 prospective
 - 8 RCTs
- The average MCMS was 69.2 (range: 30-95)
- The study population had a high rate of concomitant injury, with a majority of proximally based ACL tears

Table 1. Patient Demographics		
	n	Percentage
Total ACL Repair Patients	3365	100%
Average age (years)	28.1	
Sex		
Male (total reported)	1872	62.2%
Female (total reported)	1139	37.8%
Total	3011	100%
NR	354	10.5%
Tear Location		
Proximal	1490	70.1%
Mid-substance	606	28.5%
Distal	29	1.4%
NR	1240	36.9%
Concomitant Injuries		
Meniscus Tear	1211	51.9%
Chondral Injury	59	13.1%
Medial Collateral Ligament Injury	717	38.3%

Abbreviations: MCMS=Modified Coleman Methodology Scoring; NR=not reported



Results

- The majority of patients underwent primary ACL repair within 14 days of injury
- There was an equal distribution of patients treated with open and arthroscopic procedures
- ACL repair was performed via a variety of repair techniques

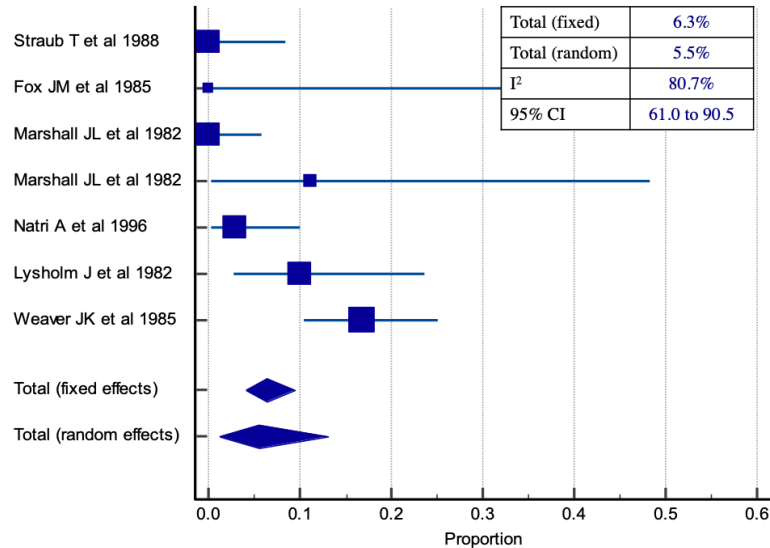
Table 2. Surgical Variables		
	n	Percentage
Average Time to ACL Repair Surgery		
<14 days	1578	57.9%
<4 weeks	903	33.1%
>4 weeks	246	9.0%
NR	638	19.0%
ACL Repair Approach		
Open Repair	1632	49.6%
Arthroscopic Repair	1656	50.4%
NR	77	2.3%
ACL Repair Technique		
BEAR	75	2.2%
DIS	1262	37.7%
DIS with biologic augment	23	0.7%
Suture Anchor Repair	70	2.1%
Suture Anchor Repair with synthetic Augment	102	3.1%
Suture Repair	803	24.0%
Suture Repair with biologic augment	661	19.8%
Suture Repair with synthetic augment	348	10.4%



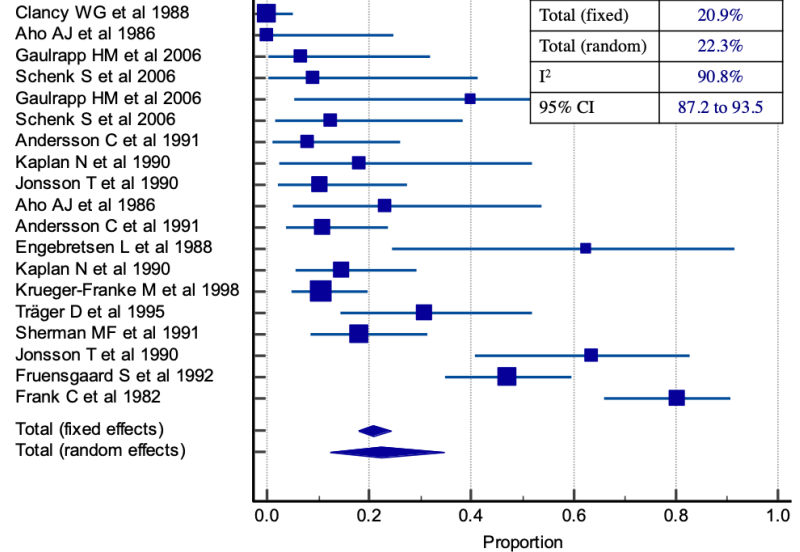
Results

Historic

Short-term Follow-up



Mid-term Follow-up



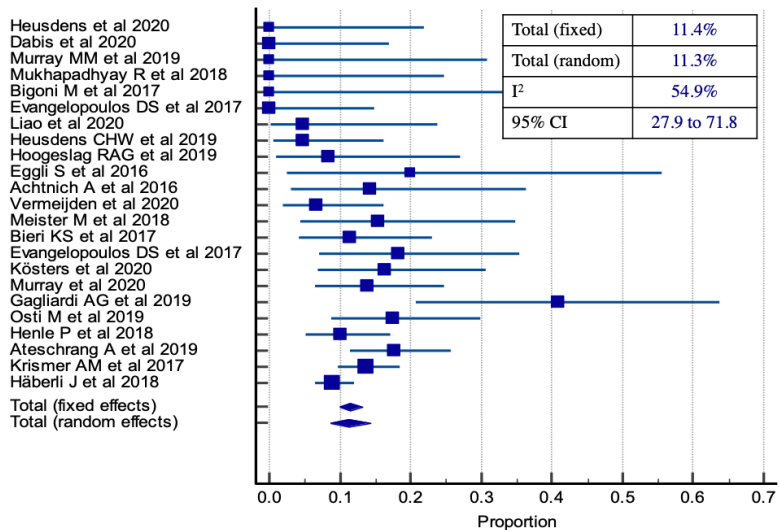
The weighted rate of recurrent knee instability for combined historic techniques at short- and mid-term follow-up were 5.5% and 22.3%.



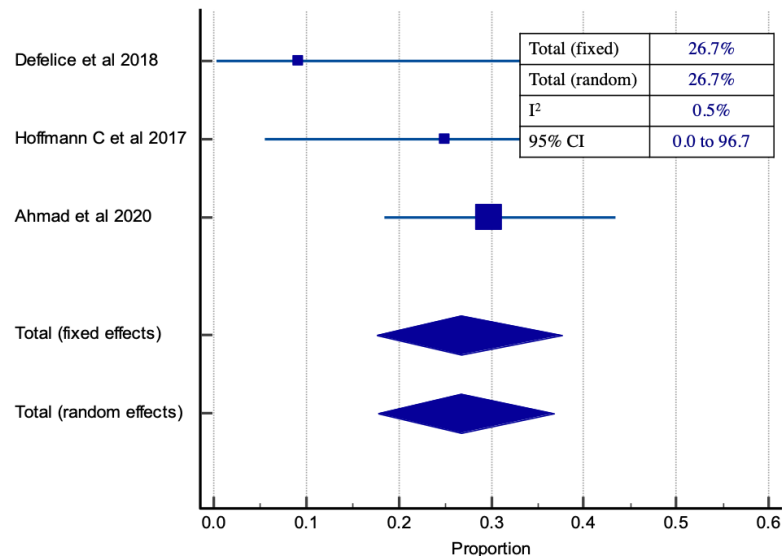
Results

Modern

Short-term Follow-up



Mid-term Follow-up



The weighted rate of recurrent knee instability for combined modern techniques at short- & mid-term follow-up were 11.3% and 26.7%.



Results

- The rate of recurrent instability for patients age <25 was 16.4% versus 14.4% age >25
- The rates of recurrent knee instability based on type of ACL repair technique:
 - Suture anchor repair with synthetic augmentation: 6.7%
 - Suture repair with biologic augmentation: 8.1%
 - Bridge-enhanced ACL repair: 9.4%
 - Suture anchor repair: 12.7%
 - Dynamic intraligamentary stabilization: 14.4%
 - Suture repair with synthetic augment: 21.5%
 - Suture repair alone: 23.9%



Conclusion

- The literature assessing the clinical outcomes of primary ACL repair is heterogeneous and limited
- Despite advances with modern treatment, the current available evidence does not support improvements in the rate of recurrent knee instability after ACL repair as compared to historic treatment



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