

## Meniscal Repair as a Solution in "Older" Patients: A Systematic Literature Review with Meta-analysis

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## Disclosures

#### Alan Getgood, MD, FRCS(Tr&Orth), DipSEM:

- Speaker for Smith & Nephew
- Paid consultant for Smith & Nephew, Precision OS
- Stock received from Spring Loaded Technology, Precision OS, LinkX Robotics
- Support received from Smith & Nephew, Ossur

#### Christopher Saunders, PhD:

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## Background

- Meniscectomy has traditionally been the treatment of choice for meniscal tears but leads to degeneration resulting in an increased risk of osteoarthritis<sup>1</sup>, total knee arthroplasty<sup>2</sup> and loss of function<sup>3</sup>
- Meniscal preservation can mitigate these negative effects<sup>3-6</sup>
- Despite the long-term benefits of meniscal repair, it appears to be less commonly adopted in older populations due to a concern that it is less likely to be successful





## Purpose

 To establish the success rates and patient outcomes of meniscal repair in "older" patients (≥40 years)

2. To compare the success rates and patient outcomes of meniscal repair in "older" and "younger" (<40 years) patients





## Study Design and Methods

#### Systematic literature review

- Two prior systematic literature reviews<sup>7,8</sup>
- Updated literature search using Embase and PubMed on 29 Sept 2021
  - ("meniscus repair" OR "meniscal repair") AND (age OR old OR older)
  - Filters: English language; 1 Jan 2017 29 Sept 2021

Inclusion Criteria						
<ul> <li>Population:</li> <li>All patients ≥40 years with a main body meniscal tear</li> <li>N ≥ 5 patients</li> </ul>	<ul> <li>Outcome:</li> <li>Meniscal repair failure rate, as defined by each individual study</li> <li>Revision procedure (meniscus repair or meniscectomy) rate</li> <li>Patient-reported outcome measures</li> </ul>					
Intervention:						
<ul> <li>Meniscal repair with or without concomitant anterior cruciate ligament reconstruction</li> </ul>	<ul> <li>Other:</li> <li>Primary empirical clinical study (i.e. reviews, systematic literature reviews, editorials, and meta-analyses were excluded)</li> </ul>					
<ul> <li>Comparator</li> <li>No comparator required</li> <li>Meniscal repair, with or without concomitant anterior cruciate ligament reconstruction, in patients aged &lt;40 years</li> </ul>	<ul> <li>Full-text publication (i.e. conference abstracts were excluded)</li> <li>English language</li> </ul>					





## **Results:** Overview

#### 16 articles representing 15 studies included<sup>a</sup> (Figure)

- 7 retrospective cohort studies<sup>b</sup>
- 5 retrospective case series studies<sup>c</sup>
- 3 prospective case series studies
- 1 retrospective case-control study<sup>d</sup>

a Two articles on same patient cohort

b One article considered older  $\geq$ 45 and younger <45 years of age

c All provided individual patient data allowing for an "older" and "younger" comparison

d Case study arm was meniscal repair, control study arm was meniscectomy



Study selection flow chart



Duplicates: 219

Excluded: 301 -Not full-text: 99 -Not original: 53 -Not meniscal tear: 12 -Not meniscal repair: 25 -Not "older": 35 -Low sample size: 26 -Not outcome: 41 -Not clinical: 10

Excluded: 107 -Not meniscal repair: 17 -Not "older": 77 -Low sample size: 4 -Not outcome: 8 -Full-text not available: 1

Identified from other: 1

### **Results: Failure Rate**

In "older" patients (Figure A)
12.5% (95% CI, 8.0 – 19.1)

# "Older" vs. "younger" patients (Figure B) RR 0.60 (95% CI, 0.44 – 0.83; p = 0.0020)

CI = confidence interval, <u>RR = risk ratio</u>



LATER I	III	1111	111
Study	Events	Total	
Ahn et al. 2004	0	9 ⊢	1
Barrett et al. 1998	5	37	
Brelin et al. 1998	6	132	-i
Buyukkuscu et al. 2018	11	33	3 -
Engler et al. 2021	5	28	
Everhart et al. 2020	10	61	
Hupperich et al. 2018	1	12 -	-
Johannsen et al. 1988	0	7 ⊢	
Noyes & Barber-Westin 2000	4	30	
Raza et al. 2011	2	6	
Ronnblad et al. 2020	12	72	
Steadman et al. 2015	2	38 -	+
Steenbrugge et al. 2004	0	14 -	
Steenbrugge et al. 2005	5	13	-
Fixed effect model Random effects model		492	-0
Heterogeneity: $I^2 = 62\%$ , $\tau^2 = 0$ .	4675, p =	0.01	0.1 0.

A

B

Study	Experin Events	nental Total	Co Events	ontrol Total
Ahn et al. 2004	0	9	1	30
Brelin et al. 1998	6	132	437	3127
Everhart et al. 2020	10	61	35	164
Hupperich et al. 2018	1	12	12	26
Johannsen et al. 1988	0	7	0	19
Raza et al. 2011	2	6	1	8
Ronnblad et al. 2020	12	72	195	846
Steadman et al. 2015	2	38	6	110
Steenbrugge et al. 2004	0	14	6	31
Steenbrugge et al. 2005	5	13	6	32
Fixed effect model		364		4393
Heterogeneity: $I^2 = 42\%$ . $\tau^2$	2 = 0.2014	p = 0	.09	

Meniscal failure rate in "older" patients (top) and relative risk of meniscal failure rate in "older" compared with "younger vatients (bottom). Failure as defined by individual studies.



2 0.3 0.4 0.5 0.6 0.7

Risk Ratio	RR	95%-CI	Weight (fixed)	Weight (random)
	1.07 0.33	[0.05; 24.15] [0.15 <sup>+</sup> 0.71]	0.7% 33.8%	2.4% 17.9%
	0.77	[0.41; 1.45]	18.1%	21.1%
	0.10	[0.00, 1.20]	0.0%	0.0%
	0.72	[0.31; 23.00] [0.43; 1.23]	0.8%	4.6% 23.6%
	0.96 0.17	[0.20; 4.58] [0.01; 2.77]	2.9% 4.0%	7.8% 2.9%
	2.05	[0.76; 5.56]	3.3%	14.1%
-00	0.60 0.72	[0.44; 0.83] [0.43: 1.18]	100.0%	 100.0%
0.51 2 10				

## **Results: Meniscus Revision Rate**

# In "older" patients (Figure A) 10.0% (95% CI, 7.4 – 13.4)

# "Older" vs. "younger" patients (Figure B) RR 0.60 (95% CI, 0.43 – 0.84; p = 0.0030)

CI = confidence interval, RR = risk ratio



	_	_	
Study	Events	Total	
Ahn et al. 2004	0	9 -	
Barrett et al. 1998	3	37	
Brelin et al. 1998	6	132	
Hupperich et al. 2018	1	12 -	
Noyes & Barber-Westin 2000	3	30	
Poland et al. 2019	10	56	
Ronnblad et al. 2020	12	72	- + -
Steadman et al. 2015	2	38 -	
Steenbrugge et al. 2015	3	13	+
Fixed effect model		399	$\Rightarrow$
Random effects model			$\dot{\frown}$
Heterogeneity: $I^2 = 43\%$ , $\tau^2 = 0.2$	2117, p =	0.10	
		0	0.1

A

B

Study	Experim Events	ental Total	Co Events	ontrol Total	Risk Ratio	RR	95%-CI	Weight (fixed)	Weight (random)
Ahn et al. 2004	0	9	1	30		1.07	[0.05; 24.15]	0.8%	2.7%
Brelin et al. 1998	6	132	437	3127		0.33	[0.15; 0.71]	36.8%	21.0%
Hupperich et al. 2018	1	12	12	26		0.18	[0.03; 1.23]	7.9%	6.3%
Poland et al. 2020	10	56	35	165		0.84	[0.45; 1.59]	18.4%	25.1%
Ronnblad et al. 2020	12	72	195	846		0.72	[0.43; 1.23]	31.8%	28.2%
Steadman et al. 2015	2	38	6	110		0.96	[0.20; 4.58]	3.2%	8.8%
Steenbrugge et al. 2005	3	13	2	32		3.69	[0.70; 19.60]	1.2%	7.9%
Fixed effect model Random effects model Heterogeneity: $I^2 = 42\%$ , $\tau$	<sup>2</sup> = 0.1819	<b>332</b>	11	4336		0.60 0.69	[0.43; 0.84] [0.41; 1.16]	100.0% 	 100.0%
J,					0.1 0.5 1 2 10				

Meniscus revision rate in "older" patients (top) and relation of meniscal revision in "older" compared with "younger" patients (bottom). Revision considered as second menisco repair or meniscectomy on the originally repaired menisco



0.00	[0.00; 0.34]
0.08	[0.02; 0.22]
0.05	[0.02; 0.10]
0.08	[0.00; 0.38]
0.10	[0.02; 0.27]
0.18	[0.09; 0.30]
0.17	[0.09; 0.27]
0.05	[0.01; 0.18]
0.23	[0.05; 0.54]
0.10	[0.07: 0.13]

95%-CI

0.10 [0.06; 0.15]

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## Patient-Reported Outcome Measures

Post-operative International Knee Documentation Committee (IKDC) score

• "Older" patients: 76.9 (95% CI, 69.2 – 84.5; 4 studies)

#### Post-operative Lysholm score

- "Older" patients: 86.7 (95% CI, 81.7 91.7; 4 studies)
- "Older" vs. "younger" patients: Mean difference 2.3 (95% CI, 4.7 – 9.2; p = 0.528; 3 studies).





## Conclusions

- Meniscal repair in patients aged ≥40 years shown to result in similar or better success rates and patient-reported outcome measures to those of patients aged <40 years</li>
  - Observations may be confounded by factors associated with age and a more stringent algorithm in place for patients ≥40 years (selection bias)
- Meniscal repairs can be performed in at least a specific portion of "older" patients, and age per se should not be a sole determining factor in the selection to perform a meniscal repair





## References

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