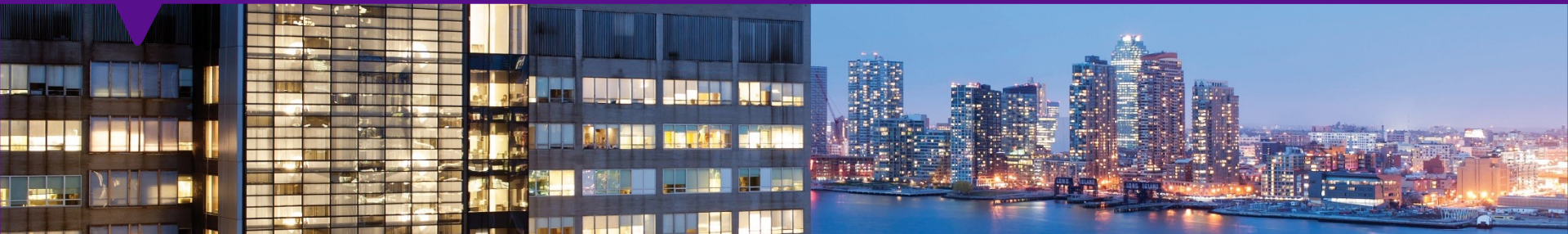


TREATMENT OF ACUTE ACHILLES TENDON RUPTURES: A SYSTEMATIC REVIEW OF OVERLAPPING META-ANALYSES

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Disclosures

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Background

- Acute Achilles tendon rupture (AATR) is a common injury of an incidence rate of up to 31 per 100,000 per year¹.
- Surgical intervention is the mainstay treatment modality, with lower reported rates of re-ruptures compared to conservative management².
- The current meta-analyses on the treatment of AATR have conflicted data that may, in part, be due to the differences in their methodologies.

Purpose

- The aim of this study is to systematically review and present the current meta-analyses for the treatment of AATR.

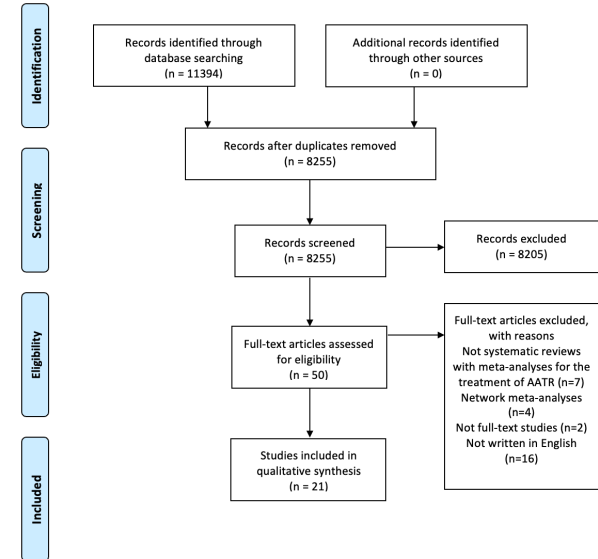
Methods

- Two independent reviewers searched PubMed and Embase on March 17, 2020 based on the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines.
- LoE was evaluated using published criteria by The Journal of Bone and Joint Surgery
- QoE by the Assessing the Methodological Quality of Systematic Reviews (AMSTAR) scale.
- Pooled complication rates were highlighted for significance in favor of 1 group or no significance.
- Statistical analysis was performed using a statistical software package (R version 3.5.1; R Foundation for Statistical Computing, Vienna, Austria). P-values < 0.05 was considered statistically significant.

Results

Literature Search

- 21 meta-analyses were included in the study.



Results

Study	LOE	QOE	Population (n)	Included Studies (n)	Re-rupture rates (%)	Complication rates other than re-rupture rates (%)	Minor complication rates (%)	Major complication rates (%)	Total infection rates (%)	Superficial infection rates (%)	Deep infection rates (%)	DVT rates (%)	Sural nerve injury rates (%)
Zhou et al. <i>J Foot Ankle Surg.</i> 2018	1	11	463; 471	10	4.2%*; 11.0%	28.5%; 6.9%*	NR	NR	NR	4.3%; 3.8%	2.8%; 0%*	0.8%; 2.9%	10.0%; 0.7%*
Zhao et al. <i>Chin Med J (Engl)</i> . 2011	1	10	777 total	8	4.4%*; 10.9%	NR	15.3%; 0.6%*	6.3%; 7.0%	NR	NR	NR	NR	NR
Deng et al. <i>J Foot Ankle Surg.</i> 2017	1	10	383; 379	8	3.7%*; 9.8%	NR	NR	NR	5.0%; NR	NR	NR	0.7%; 2.6%	NR
van der Eng et al. <i>J Foot Ankle Surg.</i> 2013	1	10	290; 286	7	4.8%*; 11.2%	16.9%; 7.7%	11.4%; 5.2%	5.5%; 3.2%	NR	NR	NR	NR	NR
Wilkins et al. <i>Am J Sports Med.</i> 2012 ^a	1	10	677 total	7	3.6%*; 8.8%	NR	NR	NR	NR	NR	2.4%; 0%*	7.1%; 10.2%	8.8%; 0.9%*
Khan & Smith. <i>Cochrane Database Syst. Rev.</i> 2010a	1	10	536 total	6	5.0%*; 12.0%	29.2%; 8.0%	NR	NR	3.6%; 0%*	0.5%; 0%	2.5%; 0%*	0%; 1.8%	9.9%; 1.0%*
Ochen et al. <i>BMJ.</i> 2019	3	10	9375; 6487	29	2.3%*; 3.9%	4.9%; 1.6%*	NR	NR	2.8%; 0.02%	NR	NR	1.0%; 1.2%	NR
Jiang et al. <i>Int Orthop.</i> 2012	1	9	443; 455	10	4.3%*; 9.7%	26.6%; 7.2%*	NR	NR	NR	3.2%; 0%*	NS	NR	NR
Sorocceanu et al. <i>J Bone Joint Surg Am.</i> 2012	1	9	418; 408	10	NS	Conservative treatment*	NR	NR	NR	NR	NR	NR	NR
Jones et al. <i>J Bone Joint Surg Am.</i> 2012a	1	9	730 total	8	4.4%*; 10.6%	27%; 6%*	NR	NR	NR	3.9%; 0%	NR	NR	Conservative treatment*
Reda et al. <i>Foot Ankle Surg.</i> 2019	1	8	415; 407	9	3.6%*; 10.1%	NR	NR	NR	NR	4.5%; 0%*	2.2%; 0%	0.7%; 2.6%	4.3%; 0.7%
Khan et al. <i>J Bone Joint Surg Am.</i> 2005a ^a	1	8	356 total	4	3.5%*; 12.6%	34.1%; 2.7%*	NR	NR	4.0%; 0%*	NR	NR	NR	NR
Bhandari et al. <i>Clin Orthop Relat. Res.</i> 2002	1	6	448 total	6	3.1%*; 13%	NR	NR	NR	4.7%; 0%*	NR	NR	NR	NR

Pooled rates of outcomes reported as (surgical treatment; conservative treatment). Surgical treatment includes both open repair or minimally invasive surgery. LOE = level of evidence; QOE = quality of evidence; NR = outcome not reported; NS = outcome not statistically significant and pooled rates not reported; (*) = treatment arm significantly favored; (°) = study defines surgical treatment as open repair only.

Results

Table 2. Meta-analyses comparing open repair versus percutaneous repair

Study	LoE	QoE	Population (n)	Included studies (n)	Re-rupture rates (%)	Complication rates other than re-rupture rates (%)	Total infection rates (%)	Superficial infection rates (%)	Deep infection rates (%)	DVT rates (%)
Khan & Smith. <i>Cochrane Database Syst Rev.</i> 2010b	1	10	180 total	4	2.3%; 1.1%	NR	18.2%; 0%*	16.7%; 0%*	6.5%; 0%	3.0%; 0%
Jones et al. <i>J Bone Joint Surg Am.</i> 2012b	1	9	174 total	4	NS	NR	NR	18.2%; 0%*	NR	NS
Khan et al. <i>J Bone Joint Surg Am.</i> 2005b	1	8	94 total	2	4.3%; 2.1%	26.1%; 8.3%*	19.6%; 0%*	NR	NR	NR

Pooled rates of outcomes reported as (open repair; percutaneous repair). LoE = level of evidence; QoE = quality of evidence; NR = outcome not reported; NS = outcome not statistically significant and pooled rates not reported; (*) = treatment arm significantly favored

Results

Table 3. Meta-analyses comparing percutaneous repair/MIS versus open repair

Study	LoE	QoE	Population (n)	Included studies (n)	Re-rupture rates (%)	Complication rates other than re-rupture rates (%)	Total infection rates (%)	Superficial infection rates (%)	Deep infection rates (%)	DVT rates (%)	Sural nerve injury rates (%)
McMahon et al. <i>Foot Ankle Surg.</i> 2011	1	11	136; 141	6	1.4%; 2.2%	NR	NR	0%*; 16.7%	NS	NS	NS
Alcelik et al. <i>Acta Orthop Belg.</i> 2017	2	11	426; 451	13	2.4%; 2.6%	7.5%*; 24.2%	NR	NR	NR	NR	2.6%; 1.4%
Grassi et al. <i>J Bone Joint Surg Am.</i> 2018	1	10	182; 176	8	NS	Pc repair/MIS*	Pc repair/MIS*	Pc repair/MIS*	NS	NS	NS
Yang et al. <i>Int J Surg.</i> 2017	3	10	815 total	12	3.1%; 2.7%	NR	NR	NR	0.6%*; 3.6%	1.6%; 0.5%	5.5%; 1.2%*

Pooled rates of outcomes reported as (percutaneous repair/MIS; open repair). LoE = level of evidence; QoE = quality of evidence; NR = outcome not reported; NS = outcome not statistically significant and pooled rates not reported; Pc = percutaneous (*) = treatment arm significantly favored

Results

Table 4. Meta-analyses comparing open repair earlier versus later rehabilitation

Study	LoE	QoE	Population (n)	Included studies (n)	Re-rupture rates (%)	Complication rates other than re-rupture rates (%)	Minor complication rates	Major complication rates	Total infection rates (%)
Huang et al. <i>Am J Sports Med.</i> 2015a (EWB versus LWB)	1	10	279 total	6	3.0%; 2.1%	NR	EWB*	NS	NR
Huang et al. <i>Am J Sports Med.</i> 2015b (earlier ROM versus later ROM)	1	10	123 total	3	NS	NR	NS	NS	NR
Suchak et al. <i>Clin Orthop Relat Res.</i> 2006	1	7	159; 156	6	2.5%; 3.8%	5.8%*; 13.5%	NR	NR	2.6%; 3.9%

Pooled rates of outcomes reported as (open repair earlier rehabilitation; open repair later rehabilitation). LoE = level of evidence; QoE = quality of evidence; EWB = earlier weight bearing; LWB = later weight bearing; ROM = range of motion; NR = outcome not reported; NS = outcome not statistically significant and pooled rates not reported; (*) = treatment arm significantly favored

Results

Table 6. Meta-analyses comparing conservative treatment with earlier versus later rehabilitation

Study	LoE	QoE	Population (n)	Included studies (n)	Re-rupture rates (%)	Complication rates other than re-rupture rates (%)	Major complication rates	Total infection rates (%)
El-Akkawi et al. <i>J Foot Ankle Surg.</i> 2018 (EWB 1 versus LWB)	1	10	136; 140	5	7.8%; 7.0%	NR	NR	NR
McCormack & Bovard. <i>Br J Sports Med.</i> 2015 (orthosis versus cast)	1	9	289; 281	10	NR	NR	4.4%; 6.7%	NR
Khan et al. <i>J Bone Joint Surg Am.</i> 2005c (cast + orthosis versus cast)	1	8	273 total	5	2.3%; 5.0%	19.5%*; 35.7%	NR	3.0%; 3.5%
Khan et al. <i>J Bone Joint Surg Am.</i> 2005d (orthosis versus cast)	1	8	90 total	2	2.4%; 12.2%	NR	NR	NR

Pooled rates of outcomes reported as (conservative treatment with earlier rehabilitation; conservative treatment with later rehabilitation). LoE = level of evidence; QoE = quality of evidence; EWB = earlier weight bearing; LWB = later weight bearing; NR = outcome not reported; NS = outcome not statistically significant and pooled rates not reported; (*) = treatment arm significantly favored

Results

- Re-rupture rates:
 - Open repair/MIS 2.3%-5.0%
 - Conservative Tx 3.9%-13.0%
 - Conservative Tx earlier rehab 2.3%-7.8%
 - Conservative Tx later rehab 5.0%-12.2%
 - Open repair earlier rehab 2.5%
 - Open repair later rehab 3.8%
 - Percutaneous/MIS 1.4%-3.1%
 - Open 2.2%-2.7%

Results

- Infection rates:
 - Open repair/MIS 2.8%-5.0%
 - Conservative 0%-0.02%

Limitations

- Search criteria were limited to PUBMED, EMBASE and the Cochrane Library
- Varied sample sizes to calculate weighted means
- Variation in f/u time

Conclusion

- Operative repair reduced the rate of re-rupture when compared to conservative treatment.
- Conflicting information on whether early functional rehabilitation reduces the difference between the two treatments.
- Operative treatment has been shown to have a higher rate of wound complications, although the rates of deep wound infections remains to be determined.
- Percutaneous repair resulted in similar re-rupture rates when compared to open surgery but for the rates of other complications including wound infections, this was diminished.

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