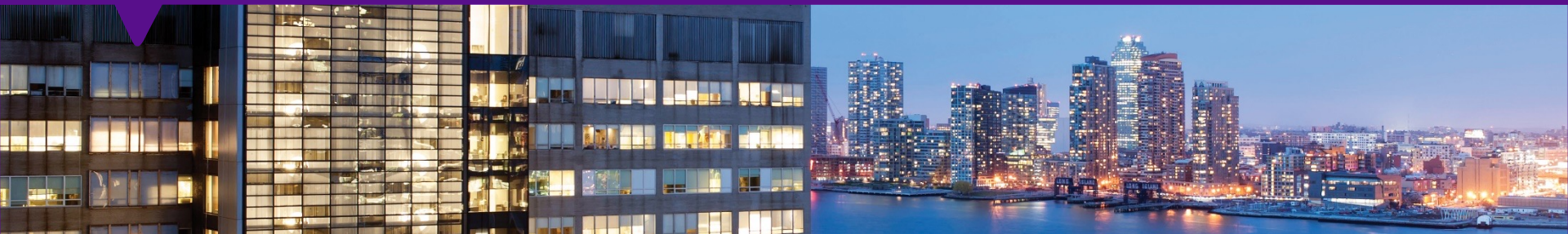
NYU Langone Health

Department of Orthopedic Surgery

A SYSTEMATIC REVIEW OF EXTRACORPOREAL SHOCK WAVE THERAPY FOR INSERTIONAL AND NON-INSERTIONAL ACHILLES TENDINOPATHY

Mohammad T. Azam BS, Matthew B. Weiss BS, Nathan Jia MD, Mehreen Pasha BS, George Jejelava, John G. Kennedy MD



Disclosures

- JGK is a paid consultant for Arthrex, in2bones and Isto Biologics
- JGK receives research supports form the Levitt and Ohnel family.

Background

- Achilles tendinopathy is a progressive, debilitating pathology[1]
- Can affect approximately 5% of professional athletes over the course of their career
- Subclassified into insertional Achilles tendinopathy (IAT) and non-insertional Achilles tendinopathy (NAT)[2]
- IAT occurs at the insertion of the Achilles tendon into the calcaneus, and NAT occurs approximately 2-6cm proximal to the insertion site.
- Predominantly NAT (66%)
- More recently, extracorporeal shockwave therapy (ESWT) has emerged as an appealing treatment option.[3]
- However, there is a relative paucity of literature looking at the ideal treatment candidates based on chronicity as well as treatment of IAT vs. NAT.

Purpose

- The purpose of this systematic review was to examine clinical outcomes following ESWT in patients with Achilles tendinopathy and if significant differences in outcomes existed between patients with IAT and NAT

Hypothesis

- We hypothesize that IAT will be more responsive to ESWT in comparison to NAT

Methods

Literature Search

- Two independent reviewers searched EMBASE, PubMed, and Cochrane library in January 2022
- Search Terms
  - Achilles AND (tendon OR tendinitis OR tendinopathy) AND (shockwave OR shock wave OR extracorporeal shockwave OR ESWT)

Inclusion Criteria	Exclusion criteria
	Less than 20 patients
Clinical studies related to insertional and non-insertional Achilles tendinopathy	Studies that don't differentiate between insertional and non-insertional Achilles tendinopathy
Studies reporting both pre-operative and post-operative subjective outcomes	Case reports
Published in a peer review journal	Cadaver studies
Written in English	Animal studies

Methods

Outcomes Measured

- Levels of Evidence
  - Level 1 Randomized controlled trial
  - Level 2 Prospective cohort
  - Level 3 Retrospective cohort, Case-control study
  - Level 4 Case series
  - Level 5 Mechanism based reasoning
- Quality of Evidence and Risk of Bias
  - ROBINS 1 and ROB 2 tools
- Clinical Data
  - Patient Demographics
  - Characteristic of ESWT
  - Clinical outcomes
  - Neovascularization
  - Failure/Complications of treatment
  - Return to Sport/Work

Methods

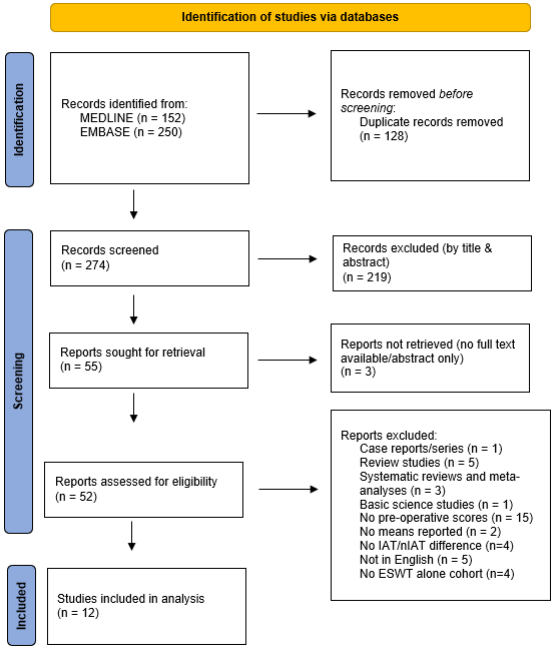
Statistical Analysis

- All other statistical analyses were performed using SAS software version 9.3 (SAS Institute, Inc., Cary NC).
- Descriptive statistics were calculated for all continuous and categorical variables.
- Continuous variables were reported as weighted mean and estimated standard deviation, whereas categorical variables were reported as frequencies with percentages.
- A value of $p < 0.05$ was considered statistically significant.

Results

Literature Search

- Initial search
  - 402 studies
- Included Studies
  - 12 studies
- 7 Studies LOE I, 3 Studies LOE II, 5 Studies LOE III, 1 Study LOE IV
- ROBINS 1
  - 8 moderate, 1 serious and 1 critical risk of bias
- ROB 2
  - 2 some concerns of bias



Results

Demographic Data

- 369 patients, with 381 tendons
- 43.1% males
- 248 IAT and 121 NAT
- f/u IAT 8.07mon, NAT 11.56mon
- Weighted mean age for IAT 46.8yrs
- Weighted mean age for NAT 50.2yrs
- Weighted mean BMI for IAT 23.3 kg/m^2
- Weighted mean BMI for NAT 23.4 kg/m^2

Results

Characteristic of ESWT

- Weighted mean number of shockwave sessions for IAT 3.6 and 2.6 for NAT
- Most used ESWT was focused, IAT (66.7%) and NAT (60%)
- Weighted mean shocks delivered was 2108.9 for IAT and 2440.0 for NAT

Results
Clinical Outcomes

- 5 different scoring systems used. Most common was VISA-A

	Pre-ESWT	Post-ESWT
IAT	51.3 ± 4.1	81.7 ± 5.7
NAT	45.2 ± 10.2	70.2 ± 7.2

- Reported as Significant

Results

Neovascularization

- 2 studies reported, using oximetry to assess microcirculation
  - 1 found neovascularization in 73.8% of patients in IAT
  - 1 study reported neovascularization in 8.3% of patients in NAT

Results

Return to sport/work

- Reported in 2 studies
  - 90.9% RTS and 75% RTW in IAT
  - 77.8% RTS and 66.7% RTW in NAT

Results

Failure/Complication of treatment

- 3 studies reported failure in a Likert scale
  - Compiled a success rate of 80.6% for the IAT cohort, and 52% for the NIAT cohort
- 5 studies reported complications
  - The most common was transitory redness during the procedure, where there were 90 cases: 64 of in the IAT cohort and 26 in the NIAT cohort
  - Four patients had pain during treatment, two with IAT and two with NIAT
  - One occurrence of transitory numbness during treatment which resolved after 24 hours for the IAT cohort

Limitations

- Search criteria were limited to PUBMED, EMBASE and the Cochrane Library
- Varied sample sizes to calculate weighted means, more IAT vs NAT
- Variation in f/u time
- Utilization of different outcome scales
- Unknown severity of tendinosis

Conclusion

- The main finding of our study is that ESWT showed improvement in both IAT and NAT cohort
- Currently, it is difficult to conclude if ESWT is more effective for IAT vs NAT
- However, WM improvement in VAS and VISA-A was greater in IAT

References

1. Abdelkader NA, Helmy MNK, Fayaz NA, Saweeres ESB. Short- and Intermediate-Term Results of Extracorporeal Shockwave Therapy for Noninsertional Achilles Tendinopathy. *Foot Ankle Int*. 2021;42(6):788-797.
2. Longo UG, Ronga M, Maffulli N. Achilles Tendinopathy. *Sports Med Arthrosc Rev*. 2018;26(1):16-30.
3. Stania M, Juras G, Chmielewska D, Polak A, Kucio C, Król P. Extracorporeal Shock Wave Therapy for Achilles Tendinopathy. *Biomed Res Int*. 2019;2019:3086910.

NYU Langone Health

NYU Langone Health

NYU Langone Orthopedics

Thank You