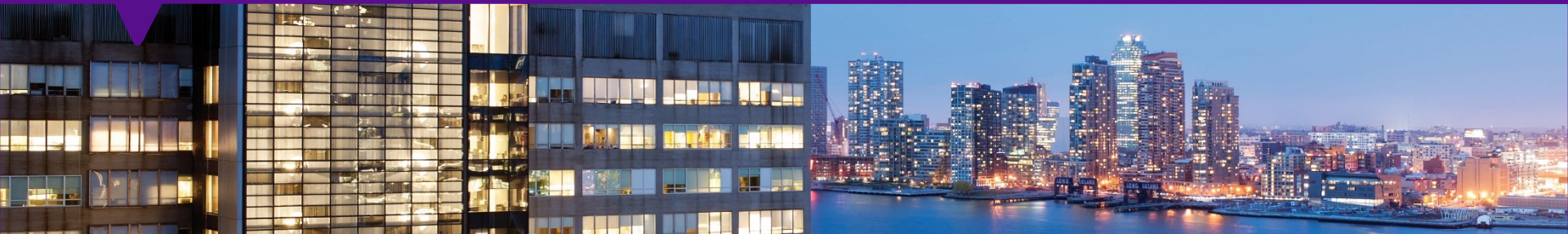


Favorable Outcomes Following Extracorporeal Shockwave Therapy for Chronic Non-Insertional Achilles Tendinopathy compared to Insertional Achilles Tendinopathy: A Retrospective Review

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Background

- Achilles tendinopathy (AT) is a common musculoskeletal injury, and accounts for up to 18% of all injuries in runners¹.
- Given the limitations of conservative management, other non-invasive modalities have gained interest.
- ESWT is a non-invasive treatment modality that is often indicated following failure of first line treatment modalities for AT². ESWT produces focused longitudinal sound waves which create a biological cascade via mechanotransduction, inducing local neovascularization, cell proliferation, calcific resorption, downregulation of metalloproteinases and inhibition of substance P^{3,4}.
- Many of these studies are limited by follow-up times of less than 6 months together with small patient cohorts¹⁵.

Purpose

The purpose of this retrospective review was to evaluate clinical outcomes following ESWT for AT at a minimum of 1 year follow-up. Furthermore, the current study subdivided IAT and NAT with regards to outcomes and predictors of success of treatment over one year. We hypothesize ESWT will lead to improved clinical outcomes in patients with AT.

Methods

Methods

- A retrospective study using chart review was carried out
- 112 patients from 2017 to 2021
- Patients were divided into insertional Achilles tendinopathy (IAT) and non-insertional Achilles tendinopathy (NAT)
- Subjective clinical outcomes of patients were evaluated via VISA-A and VAS scores
- Complications and failure rates were also recorded
- Linear and logistic regression analysis was conducted to assess for potential predictors of clinical outcomes
- Survival analysis via Kaplan Meier curves was performed

Results

Patient Demographics

- 86 patients
- Mean age NAT: 54.2 ± 15.0 years old
- Mean age IAT: 53.0 ± 14.4 years old
- Mean follow-up NAT: 22.3 ± 10.2 months
- Mean follow-up IAT: 26.8 ± 15.8 months
- MRI Severity NAT: G1 (n=23), G2 (n=6), G3 (n=5)
- MRI Severity IAT: G1 (n=17), G2 (n=14), G3 (n=21)

Table 1. Patient Demographics and Pathological Characteristics

	Non-insertional	Insertional Achilles
	Achilles Tendinopathy	Tendinopathy
Number of patients (n)	34	52
Mean age (years)	54.2 ± 15.0	53.0 ± 14.4
Sex (M/F)	23M/11F	33M/19F
Mean follow-up (months)	22.3 ± 10.2	26.8 ± 15.8
Mean BMI (kg/m ²)	25.9 ± 5.3	27.7 ± 4.4
Mean duration of symptoms (months)	12.5 ± 14.3	17.9 ± 15.1
Unilateral (R/L)	30 (17R/13L)	37 (21R/16L)
Bilateral	4	15
Cardiovascular risk factor (n)	13	23
Corticosteroid injection	1	7
MRI Grade 1	23	17
MRI Grade 2	6	14
MRI Grade 3	5	21
Haglund's deformity	n/a	20
Retrocalcaneal bursitis	n/a	11

n = number; kg/m² = kilogram per meter square

Improvement in Clinical Outcomes at Final Follow-Up

- Improvement in VISA-A and VAS scores at final follow-up in both cohorts
- Superior VISA-A and VAS scores at final follow-up in NAT cohort
- Higher failure rate in IAT cohort

Table 2. Summary of Clinical Outcomes

	Non-insertional Achilles Tendinopathy	Insertional Achilles Tendinopathy	Significance
Pre-ESWT VISA-A	49.6 ± 14.9	46.6 ± 14.9	<i>P</i> = .4831
Post-ESWT VISA-A at 6 months follow-up	76.2 ± 21.6	63.9 ± 23.2	<i>P</i> = .014
Post-ESWT VISA-A at final follow-up	74.7 ± 23.3	54.7 ± 26.5	<i>P</i> = .001
Pre-ESWT VAS	5.9 ± 1.6	6.1 ± 1.5	<i>P</i> = .5913
Post-ESWT VAS at 6 months follow-up	2.4 ± 2.3	3.8 ± 3.1	<i>P</i> = .0143
Post-ESWT VAS at final follow-up	2.8 ± 2.5	4.9 ± 2.9	<i>P</i> = .0009
Failures at 6 month follow-up (%)	4 (11.8%)	17 (32.7%)	<i>P</i> = .0391
Failures at final follow- up (%)	10 (29.4%)	31 (59.6%)	<i>P</i> = .0081

ESWT = extracorporeal shockwave therapy; VISA-A = Victorian Institute of Sports Assessment-Achilles; VAS = visual analog scale

Predictors of Clinical Outcomes

- Predictors of outcomes for NAT:
 - Pre-ESWT subjective clinical outcomes score
 - Male
 - Cardiovascular RF
 - Increasing MRI severity
- Predictors of outcomes for IAT:
 - Pre-ESWT subjective clinical outcomes score
 - Increasing MRI severity

Table 4. Correlation analysis for insertional Achilles tendinopathy

	Post-ESWT VISA-A score	Post-ESWT VAS	Failure
Pre-ESWT VISA-A score	R² = 0.4105 <i>P</i> < .0001	n/a	n/a
Pre-ESWT VAS score	n/a	R² = 0.09701 <i>P</i> = .0246	n/a
Age	<i>R</i> ² = 0.04075 <i>P</i> = .1512	<i>R</i> ² = 0.02119 <i>P</i> = .3032	<i>R</i> ² = 0.03414 <i>P</i> = .1897
Male sex	<i>R</i> ² = 0.06124 <i>P</i> = .0769	<i>R</i> ² = 0.04389 <i>P</i> = .136	<i>R</i> ² = 0.04733 <i>P</i> = .1213
BMI	<i>R</i> ² = 0.00945 <i>P</i> = .8875	<i>R</i> ² = 0.000152 <i>P</i> = .9244	<i>R</i> ² = 0.01178 <i>P</i> = .4678
Smoking	<i>R</i> ² = 0.009698 <i>P</i> = .4873	<i>R</i> ² = 0.008775 <i>P</i> = .3089	<i>R</i> ² = 0.004608 <i>P</i> = .6325
Cardiovascular risk factor	<i>R</i> ² = 0.02237 <i>P</i> = .2899	<i>R</i> ² = 0.001194 <i>P</i> = .8079	<i>R</i> ² = 0.01034 <i>P</i> = .04732
Corticosteroid injection	<i>R</i> ² = 0.000631 <i>P</i> = .8597	<i>R</i> ² = 0.000002 <i>P</i> = .9914	<i>R</i> ² = 0.000395 <i>P</i> = .8888
MRI grading of tendinopathy	R² = 0.4599 <i>P</i> < .0001	R² = 0.4278 <i>P</i> < .0001	R² = 0.5825 <i>P</i> < .0001

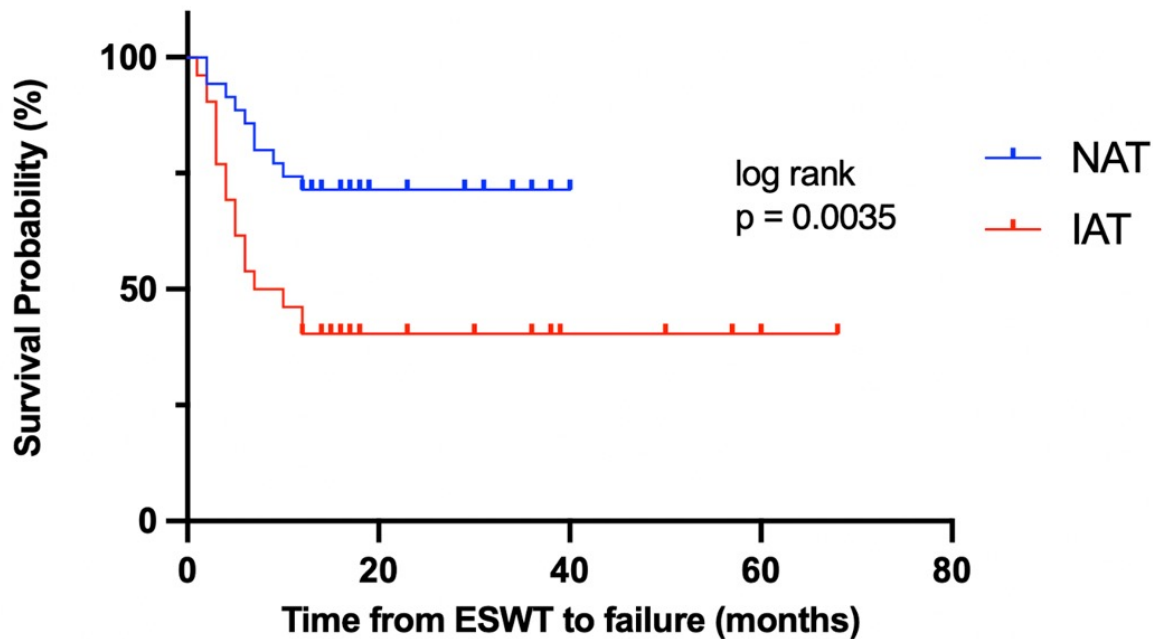
ESWT = extracorporeal shockwave therapy; VISA-A = Victorian Institute of Sports Assessment-Achilles; VAS = visual analog scale; BMI = body mass index; MRI = magnetic resonance imaging; R² = square of correlation coefficient

	Post-ESWT VISA-A score	Post-ESWT VAS	Failure
Pre-ESWT VISA-A score	R² = 0.2926 <i>P</i> = .0008	n/a	n/a
Pre-ESWT VAS score	n/a	R² = 0.1952 <i>P</i> = .0075	n/a
Age	<i>R</i> ² = 0.05911 <i>P</i> = .1593	<i>R</i> ² = 0.08766 <i>P</i> = .0842	<i>R</i> ² = 0.004114 <i>P</i> = .7143
Male sex	R² = 0.138 <i>P</i> = .028	<i>R</i> ² = 0.06484 <i>P</i> = .1399	R² = 0.2045 <i>P</i> = .0064
BMI	<i>R</i> ² = 0.02264 <i>P</i> = .4631	<i>R</i> ² = 0.03056 <i>P</i> = .3931	<i>R</i> ² = 0.02045 <i>P</i> = .4859
Smoking	<i>R</i> ² = 0.03766 <i>P</i> = .264	<i>R</i> ² = 0.09701 <i>P</i> = .0686	<i>R</i> ² = 0.000139 <i>P</i> = .9463
Cardiovascular risk factor	R² = 0.1855 <i>P</i> = .0098	R² = 0.2287 <i>P</i> = .0037	<i>R</i> ² = 0.05027 <i>P</i> = .1954
Corticosteroid injection	<i>R</i> ² = 0.003704 <i>P</i> = .6663	<i>R</i> ² = 0.003227 <i>P</i> = .7458	<i>R</i> ² = 0.01018 <i>P</i> = .5641
Increasing MRI grading of tendinopathy	R² = 0.354 <i>P</i> = .0002	R² = 0.29 <i>P</i> = .0008	<i>R</i> ² = 0.0935 <i>P</i> = .074

ESWT = extracorporeal shockwave therapy; VISA-A = Victorian Institute of Sports Assessment-Achilles; VAS = visual analog scale; BMI = body mass index; MRI = magnetic resonance imaging; R² = square of correlation coefficient

Superior Survival in the NAT cohort vs IAT cohort

Survival of NAT vs IAT



Limitations

- Short term f/u
- No imaging at final f/u
- No control group
- Retrospective nature of review

- This study found that ESWT for patients with both NAT and IAT led to improved subjective clinical outcomes at short-term follow-up.
- Superior subjective clinical outcomes together with a lower failure rate was maintained over 1 year in the NAT cohort compared to the IAT cohort.
- Therefore, ESWT may be more beneficial in the long term treatment of NAT whereas it may be considered a temporising treatment for IAT.
- These findings will help in establishing treatment protocols as well as patient expectations for patients with chronic AT.



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