Retrocalcaneal And Insertional Achilles Tendinopathy: A Retrospective Comparative Study of Surgical Treatment With or Without Perioperative Shockwave and/or Soundwave Therapies and proposed study protocol

Amol Saxena, DPM, MPH (cand), FAAPSM, FFPM RCPS(G), Ludger Gerdesmeyer, MD, PhD, AAPSM (Hon)

Problem / Question

Can shockwave speed up healing of Achilles tendon surgery?

Introduction

- Achilles insertional tendinopathy is often chronic. Approximately 10% of cases end up undergoing surgical treatment (1-3). Post-operative assessment and outcome includes “return to activity” (RTA) and the Roles and Maudsley (RM) scores. Typical RTA has been noted to be more than 6-12 months when adequately documented (1-4).

Materials

- Return to activity and functional outcomes in patients with calcific and retrocalcaneal and insertional Achilles tendinopathy who underwent surgery was compared with or without perioperative shockwave (ESWT)/ radial pressure soundwave (RPW) therapies. Seventy-two consecutive patients with insertional Achilles tendinopathy who underwent surgery with or without ESWT/RPW were reviewed from 2015-2020. IRB approval was obtained. Fifty-five patients (control group) underwent surgery alone**.** Seventeen patients underwent identical surgical procedures with perioperative ESWT/RPW therapies.
- ESWT and RPW therapy consisted of weekly treatment for three sessions, energy level of 0.15 mJ/mm² for 2500 pulses, 6 Hz and/or 2.4 bars for 2500 pulses, 11 Hz respectively, directed to the area of tenderness in the Achilles insertional region, as described by other authors (5,6). The therapy protocol was not always standardized as some patients had pre-operative treatment elsewhere. Surgery consisted of removing exostoses with tenodesis of the Achilles tendon, using suture anchors as described previously by similar authors (2-4). The same standardized post-operative protocol was used for all patients in regard to non-weightbearing (four weeks) and immobilization (ten weeks with a heel lift) (3,4).

Results

- Return to activity (RTA) was 7.3 ± 1.7 mos for the surgical group and 5.6 ± 1.1 mos for the surgical with ESWT/RPW. When compared to the surgery only group, the return to activity for the surgical plus ESWT/RPW group was faster by 1.7 mos. (CI 95%, 0.99 to 2.4, $P < 0.0001$).

- The Roles and Maudsley (RM) score was 1.9 ± 0.9 for the surgical group and 1.1 ± 0.2 for the surgical plus shockwave group. Thus, when compared to the surgical only group, the RM score for the surgical and shockwave group was better by 0.8 (CI 95%, 0.4 to 1.2, $P < 0.0001$).

Discussion

- The results revealed patients who underwent perioperative ESWT/RPW therapies had a faster RTA and better RM scores than those who underwent surgery alone in the setting of calcific and retrocalcaneal Achilles tendinopathy. This has been shown in two animal studies (7-8). Other authors have shown the benefit of early intervention with ESWT (9,10). Acute muscle injuries have also been shown to heal 8-55% faster using a radial device in elite football (soccer) players with good documentation and no adverse events (11). Based on the preliminary findings from our non-randomized, non-controlled study on patients with a standardized surgical protocol, along with prior research, we believe an investigation to improve surgical outcomes for Achilles insertional tendinopathy is worth pursuing.
- *Suggested Post-operative protocol for calcific and retrocalcaneal and insertional Achilles tendinopathy patients who undergo surgery*: we recommend at least one treatment of fESWT 0.15 mJ/mm² for 2500 pulses 6 Hz within two-four weeks post-operative directly on the surgical site. If possible one additional treatment of fESWT in the days immediately prior to surgery is recommended. If RPW is only available, 2.0-2.4 Bar, 2500 pulses at 8-11 Hz is recommended for better patient tolerance. This can also be administered at the same peri-operative intervals. A prospective, randomized trial with power level =.80, can help show potential therapeutic benefit with faster RTA, better RM score and also assess return to work time frame. Improvement in these parameters may help overall psycho-social-medical health status for insertional Achilles tendinopathy patients.

Disclosures

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References

1. Maffulli, N, Saxena A, Wagner E, Torre G. Achilles Insertional tendinopathy: state of the art. J ISAKOS. 2018 doi:10.1136/jisakos-2017-00144
2. Saxena A. Results of chronic Achilles tendinopathy surgery on elite and nonelite track athletes. Foot Ankle Int. 2003 Sep;24(9):712-20.
3. Saxena A, Maffulli N, Jin A, Isa E, Arthur W, Wahl A. Insertional Achilles Tendinopathy: analysis of 166 procedures and return to activity. Accepted J Foot Ankle Surg, 2021
4. Gaudin R, Saxena A. Musc Lig Tend 2022
5. Saxena A, Shou L. Musc Lig Tend 2019
6. Tenforde A. J Foot Ankle Surg
7. Uzun C, Erdal N, Gürgül S, et al. Comparison of the Effects of Pulsed Electromagnetic Field and Extracorporeal Shockwave Therapy in a Rabbit Model of Experimentally Induced Achilles Tendon Injury. *Bioelectromagnetics*. 2021;42(2):128-145. doi:10.1002/bem.22314
8. Orhan Z, Ozturan K, Guven A, Cam K. The effect of extracorporeal shock waves on a rat model of injury to tendo Achillis. A histological and biomechanical study. *J Bone Joint Surg Br*. 2004;86(4):613-618.
9. Wang L, Qin L, Lu HB, et al. Extracorporeal shock wave therapy in treatment of delayed bone-tendon healing. *Am J Sports Med*. 2008;36(2):340-347. doi:10.1177/0363546507307402 https://pubmed.ncbi.nlm.nih.gov/17885225/
10. Leone L, Vetrano M, Ranieri D, et al. Extracorporeal shock wave
- treatment (ESWT) improves in vitro functional activities of ruptured
- human tendon-derived tenocytes. Yue J, ed. PLoS ONE. 2012;7(11):e49759. doi:10.1371/journal.pone.0049759

1. Morgan JPM, Hamm M, Schmitz C, Brem MH. Return to play after treating acute muscle injuries in elite football players with radial extracorporeal shock wave therapy. *J Orthop Surg Res*. 2021;16(1):708. Published 2021 Dec 7. doi:10.1186/s13018-021-02853-0