Proposed Mechanisms of Erectile Function Improvement with Low Intensity Shock Wave Therapy: Vascular and Erectile Tissue Health Changes Pre- and Post-Treatment (Yih et al., 2020. 21st Annual Fall Scientific Meeting of Sexual Medicine Society of Nort America (SMSNA), Abstract No.092)

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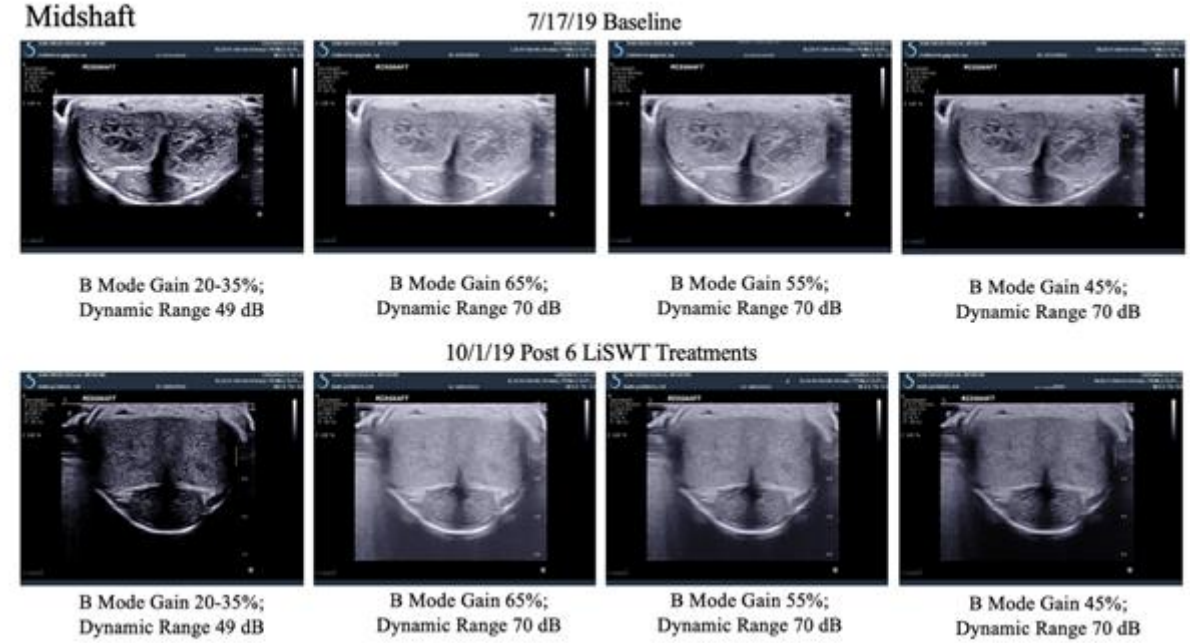
Introduction: Although Low Intensity Shockwave Therapy (LiSWT) for erectile dysfunction (ED) has been widely used as a non-invasive disease modification strategy, the mechanisms for erectile function (EF) improvement need further elucidation.

Objective: The goal was to enhance understanding of proposed vascular mechanisms of EF improvement by objectively examining blood flow and erectile tissue health parameters in ED patients prior to and following LiSWT.

Methods: This was a retrospective chart review of men with ED who underwent ≥ 6 LiSWT treatments (Urogold 100 MTS) over a 12 month period, underwent baseline and post-treatment grayscale and Doppler ultrasound (GDUS), and completed a patient global impression of improvement (PGI-I) after treatment. Typical LiSWT treatment parameters involved 600 shocks each to dorsal, ventral, right/left lateral penile shaft, right/left crura during erection using the parabolic reflector probe (OP-155), energy flux density 0.13mJ/mm2, 3 Hz, membrane pressure 3. A pharmacologic erection with erection hardness score sustained at 3-4 /4 was achieved for the GDUS. B-mode ultrasound (Aixplorer 15.4 MHz transducer) was performed with predetermined settings to avoid reader bias. Four images were captured in the axial plane from the dorsal penile surface at the proximal penile shaft at a fixed dynamic range of 70 dB with three B-mode gain values of increased brightness: 45%, 55% and 65%. Then the dynamic range was lowered to 49 dB and B-mode gain identified (25% - 35%) that provided the best black/white grayscale discrimination. This was repeated at the midshaft and distal penile shaft, yielding 12 cross sectional images/patient. Erectile tissue homogeneity/inhomogeneity of proximal, midshaft and distal cross-sectional areas were determined as follows: normal grayscale had no inhomogeneity (hypo- or hyper-echoic regions); mild inhomogeneity <25%, moderate inhomogeneity 25% - 50%, and severe inhomogeneity >50% hypo- or hyper-echoic regions respectively. De-identified images were read by two experienced readers reaching consensus regarding degree of absent or present hypo- or hyper-echoic regions. Measurements of right/left cavernosal artery peak systolic velocity (PSV) and cavernosal artery right/left end-diastolic velocity (EDV) values were recorded.

Results: 31 patients met inclusion criteria. 18/31 (58%) patients had improved erectile tissue homogeneity post-LiSWT from baseline, 4/31 (13%) remained the same and 9/31 (29%) worsened. 12/31 had improved erectile tissue homogeneity in the proximal section, 12/31 in the distal section although not the same 12, and 14/31 in the midshaft. 22/31 patients (71%) rated PGI-I as improved and 11/18 (61%) of patients who expressed improvement on PGI-I had GDUS evidence of erectile tissue improvement. Of those with baseline pre- and post- PSV and EDV measurements, 19/27 (70%) patients had an increase in PSV measurement and 8/27 (30%) had a decrease in EDV measurement. Mean PSV increase was 13.06 cm/s and mean EDV decrease was 2.48 cm/s. 9 patients with EDV of 0 cm/s pretreatment remained unchanged. The figure below shows improved erectile tissue homogeneity in the midshaft comparing baseline severe inhomogeneity to post-treatment mild inhomogeneity.



Conclusion: This study shows that the mechanisms by which LiSWT for ED improves, in part, erectile function involve enhanced erectile tissue health, increased cavernosal arterial peak systolic velocity and decreased end-diastolic velocity.