The Significance of Inflammatory Tendon Hypervascularization for the Treatment Results with ESWT: Are the Actual Recommendations Still Valid?

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Device and producing company: Orthogold 100 (MTS) with a planar applicator, Storz Duolith with a focused applicator

Introduction:

Although ESWT of chronic tendinopathies is judged as efficient and is partly considered as a standard indication according to the ISMST/DIGEST guidelines, results vary according to the indications. Former personal results with Power Doppler examinations in radial epicondylopathia (ISMST 2013) have shown that chronic tendinopathies develop variable amounts of a secondary tendon hypervascularization that is decisive for the pain sensation and for the reliability of good treatment results.

Methods:

In a retrospective study of 160 patients with chronic tendinopathies (> 3 months: radial epicondylopathy of the elbow, Achilles tendinopathy, patella tendinopathy, plantar fasciitis), ultrasound examinations including grey-scale changes and Power Doppler were performed (1 examiner, not blinded) before and every 3 months after 3 ESWT sessions, up to 24 months. Power Doppler changes were quantified according to the percentage of surface of neovessels within the tendon insertion area. Treatment results were evaluated using the Visual Analogue Scale (VAS in mm, 0-100) during function. The correlation between pre-treatment ultrasonographic changes and the treatment pain as well as the VAS during function 3 months after ESWT was calculated.

Results:

The amount of neovessels in the different tendons and fasciae varied significantly at the beginning of the treatment and it correlated with the treatment pain during ESWT ($r=0.72$, $p<0.05$) and the length of the symptoms after ESWT ($r=0.68$, $p<0.05$). The VAS during function 3 months after ESWT was significantly higher ($r=0.77$, $p<0.05$) in patients with an increased amount of neovessels before ESWT. No correlation was found between the amount of neovascularity and the duration of symptoms before ESWT and the amount of neovascularity and the mean pain VAS before ESWT.

The highest neovascularity was found in radial epicondylopathia, Achilles and patella tendinopathy, followed by the plantar fasciitis, which has the best clinical results.

The amount of neovascularity determined the length of the healing period. The typical 3 months interval showed to be an inappropriate time span, as highly vascularized tissues need 6-12 months to heal, even without surgery.

Discussion:

Hypervascularity is considered to be associated with an active inflammatory response and is highly correlated with pain intensity. Neovascularity in Power Doppler seems to be a valid parameter for the estimation of pain during ESWT and for the prediction of treatment results. The classical time span of 3 months after ESWT is not a valid parameter to clinically decide about the final treatment results.

The unknown presence of neovessels might be the reason for the heterogeneous study results in the literature, as this parameter has never been considered in the highly ranked studies that are usually taken as a reference.

Conclusion:

Pre-treatment tissue conditions of the different tendinopathies vary and determine the time span for treatment results: The classical 3 months are no longer valid. For this reason ultrasound examinations using grey-scale pictures and Power Doppler should be performed as a routine before and after ESWT.