

Shock Wave Therapy for Lower Limb Spasticity in Hereditary Spastic Paraplegia: A Case Report

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INTRODUCTION

Hereditary spastic paraplegia (HSP) is characterized by progressive spasticity of the lower extremities due to corticospinal tract and dorsal column axonal degeneration. It presents with diverse patterns of inheritance and a global prevalence ranging from 0.1 to 9.6 per 100,000 individuals. Radial extracorporeal shock wave therapy (rESWT), recently gaining attention for spasticity treatment in conditions such as stroke and cerebral palsy, has demonstrated favorable outcomes with minimal adverse effects. This study reports a case of HSP in which rESWT effectively reduced spasticity.

CASE

A 47-year-old female with genetically confirmed HSP presented with bilateral lower limb spasticity. Initial examination revealed a Modified Ashworth Scale (MAS) grade of 1 and Tardieu R2-R1 angle of 130° bilaterally. Neuroimaging and electrodiagnostic studies-including brain and lumbar spine MRI, and CT angiography of both lower extremities-were unremarkable.

Despite 3 months of conventional exercise therapy, the patient continued to report gait discomfort. Consequently, radial extracorporeal shock wave therapy(rESWT) was applied to both quadriceps (5 sessions; 0.5-2 bar; 3000 shots per session per leg).

Post-treatment, the patient reported subjective improvement, with Tardieu R2-R1 reduced to 100° (right) and 95° (left). Ultrasound evaluation of the rectus femoris demonstrated decreased echo intensity (from 93.53 to 73.70 on the right; 117.72 to 91.40 on the left) (Fig. 1) and reduced shear wave speed (from 3.94 to 2.64 m/s on the right; 3.53 to 2.54 m/s on the left) (Fig. 2).

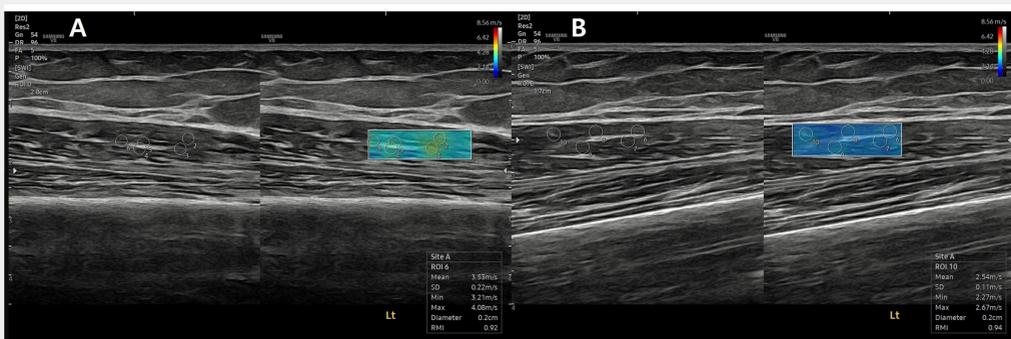


Fig. 1 Shear wave ultrasound elastography images of the right quadriceps muscle before(A) and after(B) rESWT application. The shear wave speed improved from 3.53 m/s to 2.54 m/s after five sessions of rESWT.

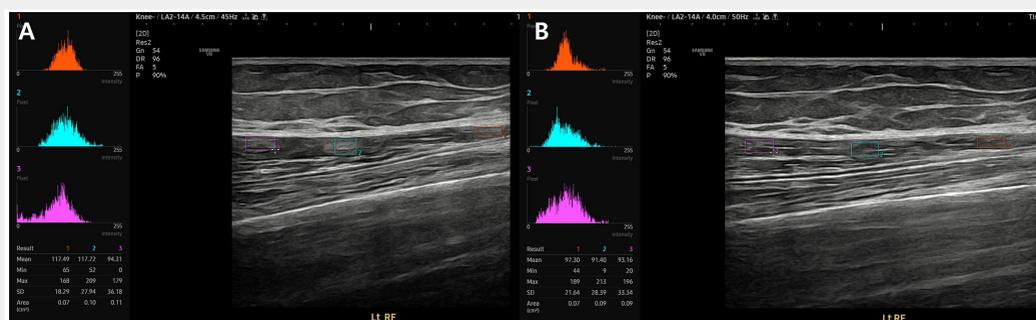


Fig. 2 B-mode ultrasound images of the right quadriceps muscle before(A) and after(B) rESWT application. The histogram represents echo intensity, where black pixels have a value of 0, and bright white pixels have a value of 255. Higher echo intensity corresponds to a whiter pixel appearance. The echo intensity improved from 117.72 to 91.40 after 5 sessions of rESWT.

DISCUSSION

To the best of our knowledge, this is the first reported case of low dose rESWT application for lower limb spasticity treatment in a patient with HSP. While the precise mechanism of ESWT in spasticity reduction remains to be fully elucidated, proposed mechanisms include modulation of neuromuscular junctions, enhancement of tissue elasticity, and promotion of local nitric oxide production. These effects may contribute to improved microcirculation, growth factor expression, and reduced fibrosis. The combination of rESWT and exercise therapy in this case suggests a potential role for this modality in maintaining function and mitigating spasticity symptoms in HSP patients, particularly as an adjunct therapy pending the development of definitive genetic treatments.

This case study suggests that rESWT may be a promising non-invasive intervention for managing spasticity in HSP patients.