

Acoustic and cavitation fields of three shock wave therapy devices

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Device and producing company:

Ossatron / Sanuwave, Evotron / Sanuwave, Swiss Dolorclast Vet / EMS

Introduction:

There are a large number of different shock wave devices on the market. We report on measurements of three shock wave therapy (SWT) devices: two electrohydraulic devices (Sanuwave Ossatron, Sanuwave Evotron) and a ballistic device (EMS Swiss Dolorclast Vet).

Methods:

Acoustic measurements were made using a fiber-optic probe hydrophone and a PVDF hydrophone. Cavitation was detected by passively listening to acoustic emissions. High-speed photography was used to image both the shock waves and cavitation activity.

Results:

The electrohydraulic devices both generated focused shock waves with peak pressures 40 MPa (Ossatron) and 20 MPa (Evotron). The ballistic device produced a unfocused wave with 8 MPa peak and no shock front. Cavitation was measured using the characteristic time (cavitation inception to bubble collapse) which were 460 μs (Ossatron), 400 μs (Dolorclast) and 160 μs (Evotron). The high-speed camera images show that cavitation activity for the electrohydraulic devices was located at the geometrical focus whereas for the ballistic device it was restricted to the surface of the applicator.

Discussion:

The electrohydraulic devices measured produced focused shock waves. The smaller Evotron did not result in strong cavitation. The ballistic device did not produce a shock wave and analysis of the physics indicated that it was not possible for a shock wave to evolve. The Dolorclast has a "Focus" applicator but measurements and analysis indicated that it did not produce a focused field.

Conclusion:

These data indicate that the SWT devices studied here vary in acoustic and cavitation output, and therefore mechanisms by which they generate therapeutic effects may be different.