

Visualization of Shock-Wave/Vortex Interactions in Soap Film(Part I);The Effect of Extracorporeal Shock Waves Therapy on

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ABSTRACT

This thesis consists of two parts. Part I of this thesis is visualization of shock-wave/vortex interactions in soap film. Part II contains the effect of extracorporeal shock waves therapy on hypertrophic cartilage. Part I used low cost “ soap film shock tube ’ ’ to study visualization of shock-wave/vortex interactions. The experiment was designed to create vortex flows using a vortex mechanism with different levels of soap concentration. Shock wave/vortex interactions for visualization were examined using a single-shot high-speed flash photography technique. Part II is an experimental prospective animal study that investigated the effects of shock waves on the recovery of rabbit cartilage after extracorporeal shock waves therapy. Sixteen New Zealand rabbits were randomly assigned to four groups to simulate osteoarthritis by making multiple drill holes in the subchondral bone in both legs. Shock waves were applied to the right leg (treatment) and no treatment was received in the left leg (control) in each studied group. Groups of rabbits were killed at 4, 8, 12 and 24 weeks, respectively. Cartilage collected from dead rabbits was used to compare the differences between treated and control legs among groups. Macroscopic findings showed that there was a significantly better recovery of osteoarthritis in the treated legs than in the control legs. This indicated that extracorporeal shock waves therapy improved the recovery of osteoarthritis. However, in histological findings, there were no significant changes in the treated legs compared to control legs among groups. Ossification found in the treated legs needs further investigation

Keywords : soap film, shock wave, vortex, extracorporeal soap film ; shock wave ; vortex ; extracorporeal shock wave ; interaction ; cartilage ; repair

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