Shock Wave Therapy – How Can it be Used in Dogs?

Presented by Brian Beale, DVM, DACVS,
Gulf Coast Veterinary Specialists, Houston TX.

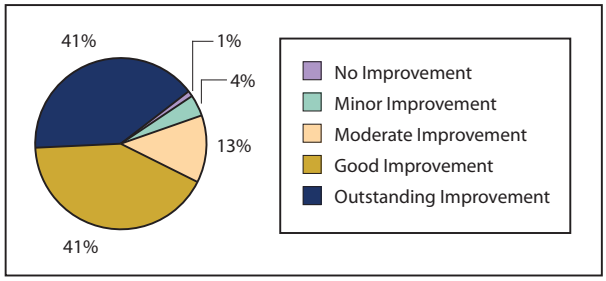
A shock wave is a very strong pressure wave in any elastic medium (such as air, water, or a solid), produced by supersonic craft, explosions, lightning, or other extreme phenomena that create sudden, huge changes in pressure. Shock waves are characterized by an extremely rapid rise time and a slight negative pressure dip causing cavitation. Shock waves are significantly different from other energy alternatives such as laser, ultrasound, electromagnetic therapy, and electrical stimulation. In comparison to an ultrasound wave, shock waves produce a substantial pressure front and a more potent cavitation, resulting in powerful tensile waves at the cellular level. Dr. Beale presented the variety of mechanisms in which ESWT works in the body. In summary, the mechanical stresses on the cells cause a biological response involving the upregualtion of specific proteins associated with a localized healing response, a reduction in inflammation, neovasularization and tissue proliferation.

In human studies, ESWT has been used extensively in soft tissue and bone healing indications. One study demonstrated an 80% long-term efficacy rate for the treatment of plantar fasciitis when other treatments failed. ESWT has been used extensively in equine medicine for the treatment of tendon and ligament injuries, back injuries and conditions of the foot.

The majority of Dr. Beale's presentation was focused on providing an overview of the applications for which ESWT is useful in canine patients. Dr. Beale also presented data from a retrospective survey study which provided information from users in the university, referral, and private practice settings about their experiences and success with ESWT for dogs. Users reported safely using ESWT in conjunction with other modalities including pharmacologic agents and rehabilitation modalities. They also reported the successful use of ESWT to replace or reduce treatment modalities such as NSAIDs, IA steroids, polysulfated glycosaminoglycan, surgery, stem cell therapy and other energy related rehab modalities. On average the practitioners have been using the technology for approximately one year and have treated conditions including the following:

- Osteoarthritis: Hip, Elbow, Stifle, Hock, Shoulder
- Tendinitis: Biceps, Achilles
- Calcaneal Tendon Tear
- Patellar Desmitis
- Back
- Chronic Wounds
- Delayed Union
- Hip Dysplasia
- FCP
- Additional uses for consideration: TPLO healing, bursitis, arthrodesis, edemas

Key advantages of the technology reported include efficacy, lack of side-effects, non-invasive nature and potential to replace NSAIDs or avoid surgery. Protocol information was presented. Most patients are treated 1-3 times, 2-3 weeks apart with 500-1000 shocks. Sedation is recommended. Total treatment time, including site preparation and sedation, is about 10 minutes.
Overall, the current users reported a very high rate of satisfaction with the device and ranked their satisfaction on average as a 4.75/5. Of the 174 total treatments reported on, over 80% of the patients experienced either Good or Outstanding Improvement.



Dr. Beale concluded by stating that reports of use of ESWT in canine patients to date have been very promising and the technology has the potential to meet a variety of unmet needs in companion animal veterinary medicine.

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VersaTron® 4 Paws Case Study:

Jackie, Shoulder and elbow OA
Courtesy of Deirdre Chiaramonte, DVM, ACVIM, Animal Medical Center, New York, NY

Background:

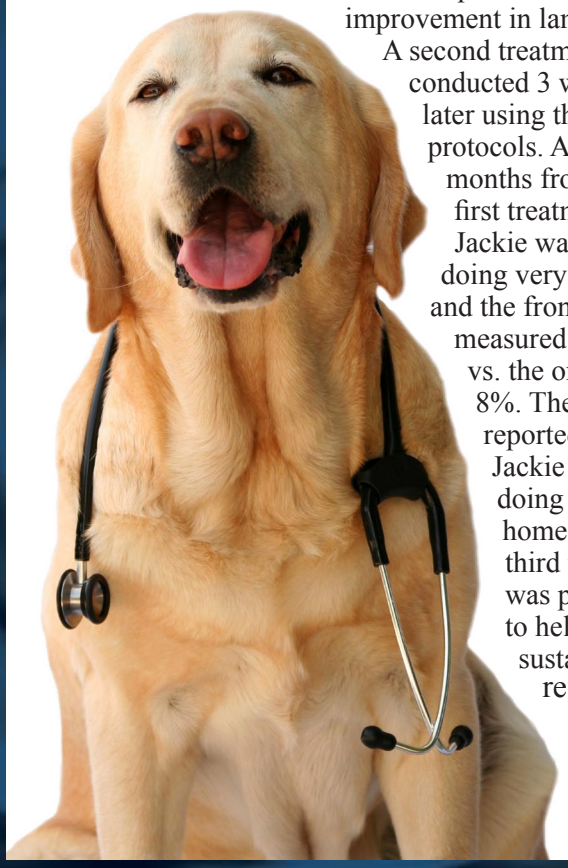
Jackie is a 6 yr. old yellow Labrador Retriever with osteoarthritis of the right shoulder and elbow. In addition to pain and lameness evaluations, the Quadruped Biofeedback System (QBS) was used to measure Jackie's degree of static weight distribution on her four limbs. Jackie's ability to bear weight on the right front limb was significantly compromised. QBS of the right front limb measured 8% of total body weight vs. the normal 30% for the front limb.

VersaTron 4 Paws ESWT Treatment:

Jackie was treated at both her shoulder and elbow joint with the VersaTron 4 Paws ESWT. 600 shocks were delivered to her elbow, (the dose was split medial and lateral), at E3 with the R05 trode. The shoulder was treated with 800 shocks using energy level E5 and with the R20 trode.

Outcome:

Immediately following the treatment, Jackie showed increased lameness, as is occasionally experienced, but then began improving. By 1 week following treatment, the owners reported a huge improvement in lameness. A second treatment was conducted 3 weeks later using the same protocols. At 2 months from the first treatment, Jackie was still doing very well and the front QBS measured at 19% vs. the original 8%. The owners reported that Jackie was doing well at home and a third treatment was planned to help to sustain the results.



ESWT News of Interest:

The following summarizes two abstracts presented at the International Society for Musculoskeletal Shockwave Therapy (ISMST) 11th International Congress, 2008.

Effect of ESWL on Osteochondrositis Dissecans of the Knee in a Rabbit Model. Roger Lyon, XC, et al.

Introduction: Goal: to determine the effects of ESWL on OCD lesion in the medical femoral epicondylar cartilage of New Zealand White (NZW) rabbits.
Method highlights: 20 skeletally immature female NZW. Two weeks post OCD model, each rabbit was sedated and their right knee was treated with OssaTron (4,000 impulses at a setting of 4 Hz and 18kV – SANUWAVE, GA. The left knee was the sham control.
Results highlights: Histologically, there was significantly more mature bone formation and healing articular cartilage of the plug margin on the treated side, resulting in pronounced differences of the healing scale (.71 vs 3.24) and density of the cartilage (60.2 vs 48.8) ($p<0.05$). Also showed significant increase of bony density (153.4 vs 138.2) ($P=0.002$).
Discussion: ESWL accelerated the healing rate and improved the quality of cartilage and subchondral bone in the OCD rabbit model.

Focused Extracorporeal Shock Waves Influence Migration, Proliferation and Growth of Human Mesenchymal Stem Cells. Helmut Garrelt Neuland, et al.

Introduction: For the first time we were able to prove that mechanical activation of stem cells is possible with the help of extracorporeal shock waves.
Method highlights: Mesenchymal stem cells (MSCs) were aspirated from the femur bone marrow, filtered and centrifugated. The differentiation potential of MSCs was controlled by culturing the cells under conditions that were favorable for adipogenic, osteogenic and chondrogenic differentiation. Shock waves were applied to adherent MSCs.
Results highlights: The study demonstrated that shock waves increase the migratory activity of MSCs when used under distinct conditions. MSC growth increased in the first passage after treatment and shock waves also increased MSC proliferation.
Conclusion: The results of shock wave treatment depend on number of applications, frequency and density of energy; it might be the first approach to mobilize stem cells non-invasively.