A new wave in equine medicine

Shock-wave therapy shows early potential for treating some orthopedic problems

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Lithotripsy was a great discovery. Anyone who has suffered with kidney stones or bladder stones knows the intense pain associated with these conditions. The development of lithotripsy allowed doctors to focus pressure or shock waves on the stones to break them apart. The patient then passes much smaller stone particles, reducing or eliminating pain and avoiding surgery.

In the course of investigating the broader effects of shock-wave therapy, researchers have made a few other discoveries. In the early 1980s, researchers were concerned about the possible effects of lithotripsy on the surrounding tissue.

They knew the shock waves would gently break apart the stones in the kidney or bladder, but what would those pressure waves do to surrounding tissue such as blood vessels, kidney cells, and the bone of the pelvis?

The first experiments on shock-wave side effects, as they were then considered, were carried out on the pelvic bones of rabbits. Shock waves were applied as they would be for lithotripsy, and the pelvic bones were then examined under a microscope.

Researchers discovered small ruptures in the bone tissue. Bleeding and micro damage to the bone cells resembled, on a cellular level, what would occur in a fresh fracture. At first, this was of great concern. This new, wonderful procedure that could remove kidney stones without pain and surgery was also likely to cause blood-vessel damage and local micro fractures. Was this going to be another situation where the problems associated with a cure were as bad or worse than the original condition?

Stimulate repair

Researchers followed the progress of the damage to the bone tissue, however, and found that, after the shock-wave trauma occurred, the osteocytes and osteoblasts of the affected bone showed increased activity. These cells are responsible for repairing damage to bone and for producing new bone to heal the damage. It is exactly these cells that the body needs to heal fractures and to heal any type of stress to the bone.

Shock waves seem to stimulate these cells, and the result is increased growth. Researchers then began to think of ways to apply this new information to conditions where bone growth was desirable.

Studies began in Bulgaria in the mid-1980s on the effects of shock waves on pseudoarthrosis, a disorder in the fracture-healing process where the body forms only a cartilage-like link between the fractured bone ends, but real stable bone callus does not form. Nonunion fractures fall into this category as well.

The first medical paper reporting on the use of shock-wave therapy for the healing of pseudoarthrosis was published in 1991, and other researchers soon confirmed the results.

They found that shock waves provided an effect similar to a fresh fracture on a tissue level. The body then seemed to recognize that healing in this area was still required and in many cases a bony link was formed. These studies showed that 60%-to-80% of all pseudoarthrosis cases could be healed completely with shock-wave therapy.

This information in turn caused other human orthopedic researchers to investigate shock-wave therapy use for a number of other conditions. Researchers in Hamburg, Germany, discovered that shock waves caused a decrease in pain in areas associated with bone-tendon connections. Shock waves seemed to relieve pain associated with shoulder injuries, tennis elbow, and heel spurs.

Further research indicated that shock waves might actually reduce the bony growths that develop at the areas where tendons and ligaments are inserted onto bone. In conditions such as tennis elbow and heel spurs, repeated trauma causes the bone to produce small, irregular growths known as osteophytes.

The body produces this bone material in an attempt to deal with the stress at that particular location. The buildup of this bone tissue causes more pain in the tendon or ligament, which must now move over these irregularly shaped, often irritating bone spurs. Shock waves reduce the pain in these areas and seem to resolve some of the excessive bone growth.

Long, circular route

Many medical developments take a long, circular route back to veterinary medicine. Initial research on a new treatment, drug, or procedure is usually done using an animal model. Positive results then move that discovery into the human medical field first. This is usually because research funds flow to developments of value to humans.

But soon veterinary science picks up on the original animal studies done in much research and applies the findings to animals. By 1998, veterinarians in Europe were well on their way to proving the effectiveness of shock-wave therapy in treating many conditions of horses involving the musculoskeletal system.

Veterinarians applied these pressure waves to cases of navicular disease, saucer fractures, bucked shins, sesamoid fractures, stress fractures, vertebral spinal pain (kissing spine lesions), suspensory-ligament attachment problems, and a number of other similar conditions.

The results were encouraging, and in December a veterinary shock-wave lithotripter was offered for sale to veterinarians at the American Association of Equine Practitioners Convention in San Antonio. Amid much hype and slick marketing videos and brochures, EMS Electro Medical Systems of Switzerland now sells the Swiss DolorClast Vet radial shock-wave therapy unit.

This hand-held unit attaches to an energy source and is very portable and easily used in a barn. The horse is lightly sedated, and the area to be treated is shaved to provide for good contact. A coupling or contact gel is placed on the horse's skin, and the hand unit applied to the horse.

The treatment takes minutes, and only a low level clicking noise is heard. The horse does not experience pain and many seem to relax during treatment. Sedation is recommended to assure that the horse does not move much and that only the area of interest is treated. Areas on the head and the hoof should not be treated. Pregnant animals should not be treated either.

EMS Medical reported that in their studies, "59% of the treated horses were no longer lame, and distinct pain reduction was achieved in 80%. Significant osteogenesis (bone growth) was attained after bone treatment in 67% of the horses."

Some skepticism

Those results notwithstanding, shock waves are not regarded as a cure-all for the lame horse. While most veterinary researchers and clinicians feel that there may be significant benefits from shock-wave therapy for orthopedic conditions in horses, they remain somewhat skeptical.

EMS's studies involved only 88 horses. Some horses received only two treatments at up to two weeks apart. No significant control groups were used, and only summary information is available from the company even after repeated attempts to get complete study data.

This is not to say the shock-wave therapy is not effective for the conditions that have been mentioned; rather, more controlled testing is still needed.

Doug Herthel, D.V.M., of Alamo Pintado Equine Clinic in California, has never shied away from new procedures or technology, and he and others at his clinic have developed many innovative treatments for horses. Moreover, Herthel is quick to try any new advances that may help in the treatment of his patients.

Not surprisingly, he was one of the first to try shock wave therapy for orthopedic conditions. Herthel was interested in investigating shock-wave therapy for cases of suspensory-ligament damage and for specific types of sesamoid lesions. The Alamo Pintado clinic is equipped with a CAT-scan unit that allows veterinarians to image the lower legs of horses.

Herthel has identified cases of bone spurs located between the sesamoid bones and protruding into the ligaments surrounding these bones. These "nasty little hooks," as he refers to them, are not able to be seen by radiograph or by ultrasound because of their location between the sesamoid bones and within the ligaments, but they can be a significant source of lameness for the performance horse.

Shock-wave therapy seems to be efficient at improving these cases. "Some of these horses require 3-to-5 treatments before they become sound," Herthel said, "but shock-wave treatments have shown promise."

He said the companies associated with this new therapy initially wanted him to use it on every horse. This is not realistic because the current treatments used for healing of some injuries are both more proven and more effective than the use of shock waves. As more research is done and as more clinics investigate shock-wave therapy, there will be more confidence in the procedure and a better understanding of which cases will really benefit.

Use in the human field has clearly shown that shock-wave therapy is the new wave in orthopedic treatment and rehabilitation. Equine veterinarians will now have to apply this new technique and see just how far this wave will go. "I'm going to use it (shock-wave therapy) where it's called for and not just because we have it," said Herthel. "It's not a miracle, but it has potential."