By Dr. Nancy Loving And Christy West
Photos by Anne M. Eberhardt

AAEP 2009: The Latest on Lameness Treatments

If there's one thing Thoroughbred owners encounter at some point, it's a lameness scenario. Something's not right with your horse's gait, and you and your veterinarian tirelessly work to figure out the cause of the lameness. Once armed with a diagnosis, your veterinarian designs a treatment regimen.

Each year at the American Association of Equine Practitioners convention, veterinarians have a chance to brush up on their lameness knowledge and learn the latest about treatment techniques from other practitioners on the front lines of discovery—both at the research bench and in the clinics. Many times they apply what they learn to their practice back home, and your horses might benefit from these discoveries. Here are a few of the topics discussed at the 2009 convention, held Dec. 5-9 in Las Vegas, Nev.

SURVEY OF CURRENT JOINT THERAPIES IN EQUINE VETERINARY PRACTICE

Dr. Dora Ferris of the Orthopaedic Research Center at Colorado State University summarized the results of a veterinarian survey on joint therapies. In a 2009 survey of veterinarians, of 831 respondents, 80% practice exclusively on horses. Over half the respondents focus on lameness and performance practice at least half the time; most respondents have been in practice 10 to 20 years or longer.

Seventy percent of the respondents use corticosteroids in their intra-articular therapeutic strategy, usually combined with another medication, such as hyaluronic acid (HA) or the antibiotic amikacin. For 22%, personal experience is relevant as to which intra-articular corticosteroid they select. Scientific data on efficacy determine what medication 38% use. For high-motion joints (coffin, fetlock, carpus), the vets most commonly use triamcinolone (TCA). For low-motion joints (distal hocks), methylprednisolone acetate (MPA) is the

Lameness problems should be evaluated by a veterinarian who will then prescribe proper treatment

corticosteroid of choice. Because MPA is known to increase cartilage pathology (damage) at a 100-mg dose, most respondents inject far less.

Most practitioners (70%) do not use compounded medications in the joints, preferring FDA-approved and -tested products specifically formulated to target joint therapy. Only 4.1% rarely or never use corticosteroids for joint therapy.

For joints that are unresponsive to corticosteroid therapy, 38% of respondents turn to autologous conditioned serum treatment, which uses the horse's own blood to produce interleukin-1 receptor antagonist protein (IRAP) and other anti-inflammatory proteins to combat pro-inflammatory molecules. Reporting response to IRAP therapy, 37% feel the fetlock responds best, 22% feel the stifle responds best, and 20% are "encouraged by results" in coffin joints. English performance horse practitioners are most likely to use IRAP in their cases.

Also used by practitioners are noncorticosteroid joint therapies such as intravenous hyaluronic acid and/or polysulfated glycosaminoglycan (PSGAG) intramuscularly and/or in the joint. Eighty-four percent of survey respondents use IM Adequan (PSGAG), and 77% use Legend IV (an HA product), with these two products dominating preventive and prophylactic use.

A previous survey (1996) indicated practitioners perceived the efficacy of PSGAG to be similar to that of hyaluronic acid, and 77% used corticosteroids in joint injections.

NEW TREATMENT FOR EQUINE OSTEOARTHRITIS BEING STUDIED

Dr. David Frisbie of Colorado State University spoke to a large audience at the convention about treating joint disease with a novel formulation not yet approved by the FDA.

Frisbie stressed that you have to have an accurate diagnosis to treat the problem effectively. Treatment goals for osteoarthritis are to decrease pain (using a symptom-modifying osteoarthritic drug or SMOAD) and to minimize further deterioration (using a disease-modifying osteoarthritic drug or DMOAD).

Polyglycan, the novel formulation made up of hyaluronic acid, chondroitin sulfate, and N-acetyl-D-glucosamine (HACSAG), is labeled for intra-articular post-surgical lavage and replacement of synovial fluid. It is not currently marketed or approved as a drug in the United States, although it is manufactured here in an FDA-inspected and -approved facility.

Investigators created a surgically induced cartilage fragment on a joint of each horse in three study groups. The same joint on each horse's opposite limb served as a sham control.

Group A: Placebo group, in which both joints were treated with saline and the antibiotic amikacin.

Group B: Intra-articular (IA) treatment with Polyglycan injected weekly for four treatments.

Group C: Intravenous (IV) treatment with Polyglycan injected every five days along with saline and antibiotic in both joints.

All horses were exercised five days per week on a high-speed treadmill beginning day 14 and ending day 70.

In summary, lameness in the IA-treated limbs was significantly reduced. Frisbie pointed out that this favorable result, along with reduction in gross articular changes and signs of bone growth as seen on radiographs, suggested both SMOAD and DMOAD effects. The IV-treated group showed DMOAD effects, including a significant decrease in the amount of gross pathology (disease) of full-thickness articular cartilage erosion.

Yet, investigators aren't sure why the IV-treated joints were more flexible and had fewer abnormal radiographic changes;

TRADE ZONE

they did not expect these results to coincide with the reported DMOAD effects. Frisbie believes it is possible that the drug's effects on soft tissues and on radiographic changes are different from its effects on articular cartilage. He noted that there are ongoing studies on IV Polyglycan therapy based on the assumption of biologic activity with this treatment approach.

HYALURONIC ACID AND STEROIDS: EFFECTS ON EQUINE CARTILAGE CELLS

Osteoarthritis (OA) is a major cause of wastage in the equine industry, especially considering that an estimated 81% of the 9.3 million horses in America are involved in equitation and performance. A mainstay treatment for OA is the use of intra-articular (IA) injection of hyaluronic acid and corticosteroids. Dr. Elysia Schaefer, a surgery resident at the University of Illinois College of Veterinary Medicine, presented on the *in vitro* (outside the live animal's body) effects of hyaluronic acid and corticosteroids on cartilage cells subjected to inflammatory conditions.

Molecules called glycosaminoglycans (GAGs) in cartilage help it resist compressive forces in the joint as a horse bears weight and, thus, help protect against osteoarthritis. When GAGs bind to proteins, they're called proteoglycans. She began by reviewing that corticosteroids exert anti-inflammatory effects, while hyaluronic acid (HA) plays a role in joint lubrication and is a key component of articular cartilage as the backbone of proteoglycans (GAGs) within the joint.

The study proceeded with the hypothesis that administering HA (Hylartin-V) alone or in combination with the steroid betamethasone could mitigate osteoarthritis. Investigators collected normal cartilage cells from fetlock joints, grew them in culture, and on day 7 they added interleukin-1 (a deleterious protein) to induce inflammation, along with treatment medications.

Investigators analyzed inflamed cartilage cells 24 hours later, determining that high molecular weight HA at a high dose is beneficial for GAG synthesis and retention of proteoglycans in the extracellular matrix to maintain hydrostatic pressure. This resistance to compression forces mitigates the progression of osteoarthritis.

Betamethasone also demonstrated anti-inflammatory and chondroprotective effects, but only at the lower dose of 0.06 mg/mL; the high dose (0.6 mgl/mL) of betamethasone was detrimental to articular cartilage cells. Interestingly, HA combined with betamethasone did not demonstrate synergistic effects, whereas previous studies indicated that HA combined with another corticosteroid, triamcinolone, does.

Schaefer noted researchers are unable to assess physiologic joint clearance of drugs or inflammatory agents in such an *in vitro* study, nor are they able to assess resolution of clinical lameness or pain. Therefore, she recommends further studies be conducted in live horses.

MAGGOTS IMPROVE CHRONIC HOOF PUNCTURE WOUND HEALING

You might have heard about the value of using medical maggots to clean in-

fected, nonhealing wounds in horses and humans, but did you know they can also help clean up infection in structures deep within the hoof?

One presenter described improved success with treating certain difficult deep hoof puncture wounds using maggots. Specifically, Dr. Raul Bras of Rood & Riddle Equine Hospital near Lexington reported increased success with using maggots to treat punctures of the navicular bursa compared to previous studies.

The navicular bursa is a small, fluid-filled sac between the navicular bone (behind the coffin bone) and the deep digital flexor tendon that runs over it. Puncture wounds that compromise the navicular bursa can be especially problematic because the navicular bursa is a deep structure that's hard to evaluate, clean, and medicate. Bras advised that puncture wounds affecting this structure often go unnoticed until the horse becomes severely lame within hours or a few days. Complications such as osteomyelitis (bone infection) and damage to the deep digital flexor tendon sheath and/or coffin bone are not unusual if the infection can't be eradicated quickly.

Some procedures commonly used to clean and treat these wounds might help resolve the infection, but they can damage nearby tissues to gain access to the bursa (such as the "street nail" procedure used for cases with complications, which cuts away significant amounts of tissue to leave a window for treatment).

In contrast, medical maggots (disinfected greenbottle fly larvae) can debride (remove) dead, nonhealing tissue without causing trauma to healthy tissues. Bras explained that they work in four ways:

1) Debride wounds by dissolving the necrotic, infected tissue (using enzymes);

2) Disinfect the wound by killing bacteria (maggot-derived proteins appear to be responsible);

3) Stimulate wound healing (also a property of maggot-derived proteins); and

4) Break down and inhibit the formation of biofilm (masses of bacteria stuck together).

"The aim in treating septic bursitis is eradication of bacterial load, removal of any foreign material, debridement of necrotic tissue, elimination of inflammatory mediators and free radicals, pain relief, and restoration of the normal synovial (joint fluid) environment to promote tissue healing," explained Bras.

He described 20 navicular bursa puncture cases treated with maggots, among other procedures that included lavage (cleaning by flushing out), debridement (light surgical removal of superficial dead tissue), endoscopic lavage (done to visualize the bursa), Penrose drain placement, and/or street nail procedure. All wounds were at least three days old before presentation. Bras noted that antibiotics can be given systemically or via regional limb perfusion along with the maggot therapy, as antibiotics do not damage larvae.

Maggots were placed on gauze covering the wound and covered with a treatment plate for protection. Bras reported that they cleaned the wound for five to seven days before slowing down, at which time a second batch of maggots was placed if needed. The clinicians used elevated-heel shoes such as wedge shoes, rail shoes, or adjustable-height (Patten) shoes to reduce the deep digital flexor tendon's pressure on the bursa.

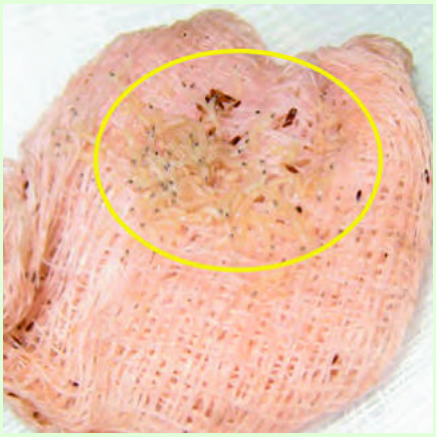
Navicular bursa infection resolved in 18 of 20 cases for a 90% success rate (70% of the cases returned to their previous jobs). This stacks up favorably against previous studies, which found at best a 75% infection resolution rate without maggot treatment (sometimes even with "fresher" wounds that were less than three days old, compared to this study where wounds were three to 31 days old).

The maggot option isn't inexpensive; Bras estimated the cost of this treatment at around $2,500 including three to five days in the hospital, diagnostic procedures, surgical debridement, lavage, maggots, bandaging, local and regional antibiotics, anti-inflammatory medications, and therapeutic shoes. The maggots themselves cost approximately $100-$200 per case.

"The use of maggot debridement treatment is effective as adjunctive treatment for navicular bursa puncture wounds," he concluded. "The ability of horses in this series to return to work was better than previously reported."

AAEP CONVENTION PROCEEDINGS/DRS. RAUL BRAS AND SCOTT MORRISON

Maggots are used to treat certain difficult deep puncture wounds



Maggots are placed on gauze and applied to the wound

Growing maggots debride necrotic tissue in the wound without harming healthy tissue

ARTHRODESIS OF THE HOCK JOINT

Osteoarthritis of the distal (lower) hock joints (bone spavin) is a common performance problem in sport horses. Dr. Chris Bell discussed fusion of the tarsometarsal (TMT) joint by injection with ethyl alcohol.

Historical attempts to fuse these small joints using mono-iodoacetate resulted in severe soft tissue damage, progression of

arthritis in more proximal (higher up) hock joints, and persistent pain. Bell, who is a resident in large animal surgery at the Western College of Veterinary Medicine at the University of Saskatchewan noted that ethyl alcohol creates effective cartilage destruction and fusion within four months with limited complications.

He stressed that a full lameness exam with radiographs and intra-articular anesthesia should be conducted prior to considering this technique. Injection of radiopaque dye into the TMT joint ensures there is no communication upward with the proximal intertarsal and tarsocrural joints. Dye confined only to the TMT joint can then be aspirated out and replaced with ethyl alcohol.

The clinical trial Bell described involved 16 horses. At three to six months post-treatment, some horses became a little sore, and rebounded as the joints fused. At six to 12 months after treatment, all had their hock-associated lameness resolved, along with radiographic evidence of fusion. At one year all were pain-free, with 12 returning to their intended athletic use.

Bell explained the advantages of this procedure: It takes less than 90 minutes, involves inexpensive materials, and can be done on site in the field using a simple technique that is well-tolerated by most horses. A treated horse can return to work immediately due to the pain-blockading effect that alcohol creates on local nerves.

Disadvantages include the need for contrast radiography that could diffuse into undesirable areas (a vein, other joints), thereby confounding radiographic interpretation. Careful positioning is necessary to obtain useful radiographic results. And, cases of advanced OA might limit needle access into a joint. Veterinary follow-up for years following is critical, since OA can develop in higher hock joints as joint morphology changes with fusion.

Bell reports this technique is not applicable to a young horse or those with only mild to moderate osteoarthritis.

ELECTROTHERAPY DEVICES FOR EQUINE VETERINARY USE

Rehabilitation therapy in veterinary medicine often includes the use of electrotherapy devices, which Dr. Sheila Schils described.

Electrotherapy technology, available since the 1960s, is useful to manage pain, improve range of motion, decrease edema (fluid swelling), improve motor control and strength, reverse muscle wasting, deliver blood flow, and serve as a vehicle for iontophoresis (the use of electrostimulation to drive a drug through intact skin).

Schils, currently a principal of EquiNew, an equine therapy company, explained that a veterinary electrical stimulation modality must be correctly designed to produce the desired results, because animals will not necessarily accept a system that may be well-tolerated by humans. She reviewed and compared the major categories of devices available to help equine veterinarians understand better the attributes of each system.

The first device Schils described uses transcutaneous electrical nerve stimulation (TENS) for producing sensory stimulation to "gate" the pain signal, while stimulating release of endogenous endorphins. A TENS device is often used for electroacupuncture, its action visible as continuous muscle twitches.

Next she described interferential electrotherapy as an alternative to TENS for suppressing pain. This device combines two higher frequency wave forms to create an interference pattern for sensory stimulation, but without visible twitching.

Schils then mentioned the high-voltage, pulsed-current stimulators that produce unidirectional continuous movement of ions, which can result in skin irritation and discomfort. But the user can reverse polarity with a switch, decreasing ion accumulation to improve discomfort, blood vessel dilation, and pain modulation through a rolling action of the muscles.

Other devices discussed were neuromuscular electrical stimulators (NMES), to provide a therapy also called functional electrical stimulation (FES). A computer-generated signal replicates the normal motor neuron response, so it is tolerated well by the horse. The signal obtains benefits in superficial and deep tissues (up to 3-4 inches) and produces controlled muscle contractions with evident "on" and "off" muscle movements. Schils noted that FES activates both motor and sensory nerves to improve strength, manage spasms, improve range of motion, decrease edema, and increase blood and lymphatic flow.

Finally, she mentioned microcurrents that mimic weak electrical currents produced by the body to stimulate tissue healing. This electrotherapy does not activate nerve or muscle tissue and creates no visible muscle response.

Schils said that for most equine applications, NMES are the most appropriate devices, because of a high compliance level by the horse during treatment.

More summaries of convention presentations will appear in upcoming issues of *The Blood-Horse*.