

Maggot Debridement Therapy

Alternative Therapy for Hoof Infection and Necrosis

by Fran Jurga with Scott Morrison DVM

MAGGOTS AT WORK: This case of coffin bone osteomyelitis (bone infection) in an adult horse, as a complication of laminitis, was an ideal case for maggot debridement therapy (MDT). These mid-stage maggots are held in the resected hoof by bandages, and will be exchanged for fresh larvae when they reach maturity.

UNCONVENTIONAL THERAPY FOR EQUINE foot conditions zenithed in 2003, as a new buzz word—"maggots!"—began to attract attention. Kentucky hoof-specialist veterinarian Scott Morrison of Rood and Riddle Equine Hospital in Lexington, Kentucky is a frequent consultant on cases of complications of laminitis and other hoof diseases. He often travels with a vial of tiny, purpose-bred sterile maggots to be used in the therapy regimen. Dr. Morrison reports success and interesting results on about 100 cases to date.

Once the initial shock of deliberately adding maggots to a wound subsides, many people react to the idea of using maggots to debride infected or necrotic hoof tissue as a step backward to the Dark Ages. Indeed, before the introduction of antibiotics, in the 1940s, maggots were routinely used to clean wounds, since they will eat the diseased tissue and not touch healthy or healing tissue.

Researching the tradition and history of maggot therapy took *Hoofcare & Lameness* deep into the traditional medicine of the Mayan civilization in Central America, and the Aboriginal tribes of Australia. Maggot s were a traditional therapy in remote fishing villages of Newfoundland, Canada.

Western literature records the use of maggots as long ago as the 16th century in France. In the 19th century, a surgeon in the service of Napoleon observed that maggots on the wounds of soldiers attacked only the necrotic areas, and that wounds "infected" with maggots actually healed more quickly than wounds untouched by maggots.

The American Civil War, however, is credited as the official beginning of intentional maggot therapy; Confederate surgeons Jones and Zacharias treated wounds with maggots since they had few medical supplies. Zacharias noted, "In a single day (maggots) clean a wound much better than any agents we had at our command. I am sure I saved many lives by their use."

By the 1930s, hundreds of hospitals and doctors employed maggots routinely for therapy of wounds, burns, and cancerous tumors. The 1940s introduction of penicillin and sulfa drugs marked the decline in medical use of maggots.

Innovative surgeons and practitioners are now taking a second look at maggots, especially with regard to the prevalence of antibiotic resistance. The updated use of maggots in wound healing has been categorized as "biosurgery". Veterinary hospitals have excellent cases that might benefit from maggot debridement therapy (MDT).

Several criteria are relevant to maggot therapy. In addition to the idea of antibiotic resistance, cases that might benefit from maggot therapy are those where the blood supply to a region is compromised or in the process of regenerating; maggots can consume infected tissue since there is no blood to bring antibiotics to the area. Maggots require only a source of oxygen.



Successful maggot therapy at Rood and Riddle Equine Hospital in Lexington, KY: One of Dr Morrison's most interesting cases was a foal with vascular injuries to the foot, which lead to laminitis and tissue necrosis; he packed the tiny hoof cavity with sterile maggots.



Tissue "cleaned" by maggots; a portion of the tip of P-III was removed.



The healed foot (treatment stages shown above) after maggot therapy complete.



Another foal wears a glue-on extension shoe to correct an angular limb deformity. The foal was also recovering from osteomyelitis in P-III, caused by an infected abscess. The surgical site is packed with maggots which will be held in place by a foot wrap.

SEVEN QUICK FACTS ABOUT STERILE MAGGOT THERAPY

1. Maggots from the trash can are not suitable for medical therapy, since many common flies will devour live tissue.
2. Medical treatments require green or black bottle blow flies, which feed only on necrotic tissue.
3. The supplier laboratory sterilizes fresh fly eggs before shipping.
4. The tiny maggots, on arrival at a veterinary hospital, will be one to three millimeters long.
5. An average application of maggots can consume 10 to 15 grams of necrotic tissue per day.
6. Maggots are not affected by radiography and can be left in place when X-rays need to be taken.
7. Fiberglass hoof casting tape (above, left) can be keyholed with a window to remove and replace maggots.

Dr Morrison recommends maggot therapy for conditions such as

- osteomyelitis secondary to laminitis
- sub-solar abscesses leading to osteomyelitis
- post-surgical treatment of street-nail procedure for puncture wounds infecting the navicular bursa
- canker
- non-healing ulcers on the frog
- post-surgical site cleaning for keratoma removal

In 2002, a special BBC report chronicled the tremendous success of maggots in treating infections caused by the “superbug” methicillin-resistant *Staphylococcus aureus* (MRSA), which often affects hospital patients as a secondary infection. British doctors created a teabag-like pouch to hold the maggots in infected areas, and published their findings in international medical journals. “Medical maggots” received FDA approval in the USA in January of this year.

Dr. Scott Morrison credits his use of maggots to a medical documentary he saw on television; he became intrigued with the idea of using maggots in the hoof capsule, particularly for complications of laminitis such as osteomyelitis. He orders sterilized eggs of the green bottle fly from a laboratory in California at a cost of about \$70 per vial, noting that some horses’ conditions require a vial of fresh maggots per week. “For a case of chronic laminitis with poor blood supply, therapy could take months,” he advised. “We use drains to keep the wound tract open so that granulation tissue won’t grow in and trap the infection—and the maggots—inside the hoof.”

Cases that were not successful were often complicated by catastrophic conditions such as ruptured tendons, severe abscesses or digital instability, all unrelated to the use of the maggots.

A favorite technique of Dr. Morrison is to “cast” the hoof, and then cut a “window” into the

cast to access the hoof wall. Maggots are applied, removed, and replaced through the window.

How do horses react to maggot therapy? “They get painful after a few days,” Morrison warned. “The maggots grow in size, they’re moving around, and you’ll notice an ammonia smell—the smell of maggot excretion—which may be irritating to the horse as well.”

Morrison follows maggot therapy advances closely and reports that one theory for the success of this form of therapy is that the saliva of the maggots may have a growth-factor-like substance in it.

To Learn More....

Dr Ron Sherman’s Maggot Therapy Project:
http://www.ucihs.uci.edu/com/pathology/sherman/home_pg.htm

November 2003 *Worldwide Wounds* article
 “Treatment of a deep injection abscess using sterile maggots in a donkey” by A. Thiemann
 BBC Online News, “Maggot Medicine Gains Popularity”; www.bbc.co.uk

Maggot Therapy: An Alternative for Wound Infection, in *The Lancet*: 30 September 2000; 356:1174-1178.

Far from Rood and Riddle’s equine podiatry center, Dr Donald Walsh has a barn aisle of laminitis cases in varying stages of recovery and therapy at his Homestead Equine Hospital in Pacific, Missouri. He writes:

“Maggot therapy has been ongoing at our hospital for about a month. We have used four loads of maggots from the University of California in a horse named Danny.

“Danny had a grain overload two nights in a row, and foundered in all four feet, penetrating all four soles, in June 2003. He has made a nice recovery and had a tenotomy of both front legs.

“After all this therapy, we noticed a delayed closure in his right front foot; x-rays and chronic draining confirmed osteomyelitis on the medial side of the coffin bone.

“Maggots debrided all the dead tissue in the tract, which is still draining...and they’re still working.

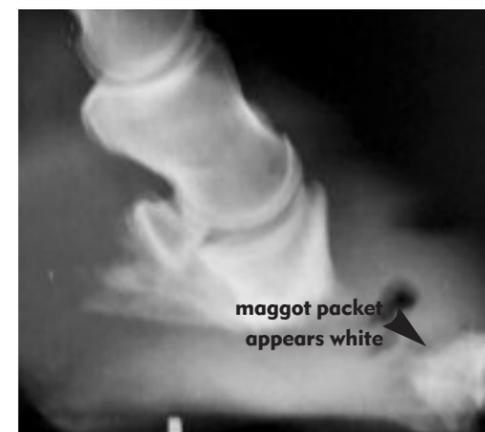
“In the first two weeks, the horse seemed a little sore on the foot but for the last two weeks he has been moving the best he has since he foundered.

“I think the use of sterile maggots will help save many horses that have ‘incurable’ bone infections as the result of severe laminitis. I am very excited to have this new therapy available for my cases.

“The best part is how much good they do while I sleep...they are working away!”



Canker ulcer “eaten” by sterile maggots. Before (left) and after (right) maggot therapy, note epithelial healing as the ulcer closes.



maggot packet appears white



LEFT: a white “pocket” of maggots and gauze (see arrow) at toe of radiograph on an osteomyelitis case. RIGHT: a wall pocket of maggots helping a laminitis case with bone infection in the apex of P-III.



LEFT: maggots at work on osteomyelitis caused by an infected heel corn. RIGHT, sterile maggots placed inside the sole help with osteomyelitis caused by a puncture wound. Note that the shoes in both these cases are drilled for hospital plates; it is important for the maggots to be able to move around but they need to be protected from being crushed by the horse’s weight.

THEORIES TO EXPLAIN THE BENEFICIAL AFFECTS OF MAGGOT DEBRIDEMENT THERAPY INCLUDE:

- larvae secretion of proteolytic enzymes which liquefy the necrotic tissue;
- actual ingestion of the tissue by larvae
- physical presence of the larvae decreases the exudate from the host, which washes out the bacteria;
- secretions from the larvae change the wound’s pH
- bacteria are destroyed in the larval alimentary tract due to antibacterial substances;
- larval secretions promote healing
- the crawling action of the larvae stimulates granulation tissue production.

The exact mechanism of successful maggot healing is unknown; studies indicate a combination of these factors may be at work.

Excerpted from “Larval Therapy: A Review of Clinical Human and Veterinary Studies” by Janet Hinshaw DVM in the October 2000 edition of *Worldwide Wounds*.