

## **Bowed Tendons**

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Bowed tendons are an all-too common injury in athletic horses but today there are many advances in treatment, enabling most of these horses to continue their careers. Greg Andrews, DVM, at Moore & Company (a large equine veterinary practice in Calgary, Alberta) deals with many athletic injuries in horses. “There are some misconceptions concerning bowed tendons. My definition of a bowed tendon is an injury in which there is some tearing of the tendon fibers, either in the superficial flexor tendon or the deep digital flexor tendon, on either the front or hind leg (though most occur in the front leg), as opposed to a condition where the tissues around the tendon are merely swollen,” he says.

“The latter may sometimes be called a bandage bow. A bandage bow, however, will not cause tearing of the tendon. A lot of bowed tendons get blamed on bad bandaging but if they are true bowed tendons, with tearing of the tendon, it happened previously. The bandage was applied and the bandage is blamed for it., That being said, you can certainly get an inflamed, enlarged tendon from restrictive bandaging, but those are easily treated,” he explains.

### **Causes of Bowed Tendons**

There are various degrees of bowed tendons, from mild tearing that you can hardly detect, to completely torn (severed). The injury can be due to hyper extension of the fetlock joint (putting great stress on the tendons), usually during performance, and often associated with fatigue. When a horse gets tired, his legs have less muscle control; fatigued muscles are no longer working smoothly, and give less support to the leg. The fetlock joint may go clear to the ground as the horse is running.

Hyper extension of the joint can tear a tendon. “It more often causes a suspensory problem,” says Andrews, but both problems may occur together. Another scenario is when a tendon is hit by another leg or some other kind of blow, but this usually doesn’t cause tearing. There is bruising and swelling, so visually it looks the same, but is not a true bowed tendon, he says.

Sometimes the actual cause of bowed tendon is misunderstood. “A horse might damage a tendon during a workout yet come back to the barn sound, cool out sound, and be put back in the stall and his legs wrapped—and then turn up lame the next day or even the second day,” he says. The horse is left in the stall with no exercise afterward. The confusing thing is that people tend to think the horse was fine after the workout and bowed the tendon in his stall. It may take 24 to 48 hours to show the full effects of the lameness, especially in mild to moderate cases.

“A lot of grooms at the race track get blamed for bowing their horses (with bandaging) because they seemed fine after the workout but went lame 2 days later. It’s like playing basketball and spraining your ankle; you go ahead and finish playing the game and the next morning you can’t walk,” he explains.

### **Risk Factors**

Things that may make a horse more likely to suffer bowed tendon include long toes and low heels—which put more strain on the tendons to begin with. “This is a frequent cause of injury to the superficial flexor tendon. The long toe/low heel doesn’t load the deep digital as much as it does the superficial flexor. In some instances, where farriers have gone the other extreme, raising the heel too much (short toe, high heel), there can be strain and damage to the

deep digital flexor tendon,” explains Andrews. This has been an interesting result of the push for higher heels and shorter toes. Keeping a balanced floor is one of the best ways to avoid bowed tendons.

Inadequate conditioning is another risk factor. It is very important that the horse be in extremely good physical condition for the job he’s being asked to do. “The unfortunate thing is that bones, tendons and ligaments are the last tissues to get into condition during a fitness program. The easiest thing to condition is the horse’s wind, then his muscles, and last are tendons and bones. But there is no way a trainer or veterinarian can evaluate a horse and say that his tendons are great. That’s the guessing part. One of the reasons we have these injuries is that many horses are not given enough conditioning.”

It’s a delicate balance between under training and overtraining and it takes a lot of training before the horse can do maximum exertion. With the amount of power and speed the horse has, he can easily injure himself if he’s not fit. “This is a reason a lot of these horses will re-bow a tendon after recovery, because people are afraid to train the horses adequately after an injury. They are afraid they will re-injure them,” says Andrews. The horse is not quite fit enough again, before being stressed.

He tells his clients it is better to train a horse reasonably hard, and break down a little bit in training, than a whole lot during the performance event. “If a horse can’t stand a well developed, gradual but hard training program, he won’t be able to stand the performance event,” he says.

### **Diagnosis and Treatment**

“There are different stages of treatment for the injury—acute (right after the injury), medium, and long term. Because a bowed tendon is a significant inflammatory event, ice and cold water hosing, systemic anti-inflammatories such as bute, topical anti-inflammatories like DMSO or some of the new products like Surpass (a non-steroidal anti-inflammatory cream) are all helpful to control the initial inflammatory process. It is important to do this, because the inflammatory process throws out chemicals that cause more tissue damage,” explains Andrews. The horse may actually show lameness (or increased lameness) sometime during the first 24 to 48 hours after the actual injury. This is because the inflammatory event begins to exacerbate itself. So if you can minimize the inflammation and swelling, you may also help minimize the damage and speed the healing process.

“Aggressive cold water therapy and anti-inflammatory treatment (systemic and topical) are really important during the acute stage, along with an appropriate amount of hand walking, depending on the degree of injury. Usually hand walking is in order, to keep the circulation going (which also speeds healing),” he says.

It is important to have a good diagnosis, for an accurate prognosis. “At that point in time, what you can tell by feeling the tendon gives only about 50 percent of the accuracy needed to make a proper diagnosis. Obviously, with a horse that’s very lame and swollen, you can fairly safely say it’s a significant tear. But not always; sometimes it may be more bruising than tearing. This is where ultrasound evaluation is helpful. Newer ultrasound techniques, which can give 3D images if required, are much more accurate than we used to have. There are machines now that have very specific heads (the part that goes on the tendon) that can give us a much better idea of the amount of damage,” he says.

Having the examination done by someone who has experience in doing this is also helpful. If there’s a big black hole, this is easy to determine, but the more subtle injuries are the

important ones to get properly diagnosed. An accurate diagnosis is crucial for picking the appropriate treatment.

“You can’t pick your therapy properly until you have a very good diagnosis. Then you can discuss with the client what the chances are, for this horse. Back in the days when I started, we could only examine a horse with our fingers, and this was not as accurate as we would like,” he says.

Even before the evaluation was performed, initial therapy with cold water and anti-inflammatories should be started. “Bandaging is also in order, done properly by someone who has experience in bandaging legs. You can put too much pressure on them (and do more harm than good) but some support is helpful because it does keep the swelling down and reduces some of the pain. As with human ankles, it feels better when properly wrapped,” he explains.

“Once you’ve made your diagnosis to pinpoint the area involved (superficial or deep flexor tendon, and whether it’s high or low), and amount of damage to the tendon, you can proceed to treatment. The percentage of damaged surface area can be measured with the good ultrasound machines, and this gives you a lot better idea of what the prognosis will be,” says Andrews.

There can be two different processes going on—a specific area of tearing that shows up as a black hole (usually a tearing of 25-75 percent of the fibers of the surface area, which constitutes a significant bow), or you may have multiple small dark spots. The latter are small fiber tears throughout the whole tendon, but not in one specific spot. “Those two different types of injuries are treated differently, with different options for each,” he says.

“If there is a distinct area of tearing (showing on ultrasound as a black area—which indicates fluid in the tendon rather than tendon fibers, and is what we call a core lesion) you’d be looking at types of therapy that might include stem cells. The traditional treatment during the first 2 weeks (acute and sub-acute stage) was injecting these lesions with hyaluronic acid, which has been shown to decrease the amount of scar tissue that occurs during the healing process. Another traditional treatment was injection with an anti-inflammatory and cortisone. In my opinion that would be contraindicated and would delay the healing process,” he says.

“There used to be a product called Baptin that pioneered the intra-lesion injection protocol. It is no longer on the market and it’s hard to know how good that product would have been if it had continued. It was the first thing we tried- and then came the stem cell therapy,” says Andrews.

There are two kinds of stem-cell products. One is the bone marrow transplant, which contains stem cells and growth factors, but not very many stem cells. Most people are no longer using the bone marrow. Another treatment uses pure stem cells, harvested from the horse’s own fat. “Theoretically this is superior to ACell treatment, because you are injecting the body’s own material back into itself. It is also a very expensive option, and I’m not sure there’s been enough time to determine whether it will be the treatment of choice 10 years from now,” says Andrews. There have been some good results, but we don’t yet know how well these horses will do on down the road,” he says.

“I am very excited about stem cells but I have seen many ‘wonder drugs’ in the past 30 years that didn’t endure. There’s been some good research done with stem cells, but it’s not standard practice yet, in this point in time. One of the advantages of having done the bone marrow transplants for awhile and getting some reasonable response, is that when they found out they weren’t putting very many actual stem cells in, they realized that the growth factors may have been as important or even more important than the stem cells themselves,” says Andrews.

“This is where Acell technology came from. The term itself means ‘no cells’. This product is a derivative of pig bladder matrix extract. What they’ve identified and purified are the growth factors- which combine with the cells that are in the tendons already, to start to develop more normal tendon fiber. The goal of these new therapies is to produce a tissue that is as close as possible to the original tendon structure, rather than scar tissue. Scar tissue is a type 2 collagen, as opposed to the tendon which is type 1 collagen. The scar tissue is not as stretchy and resilient,” he explains.

The growth factors seem to help tendon fibers align themselves properly as they heal. But if you don’t have normal stresses put on the tendon during this healing process, you don’t get the proper fiber pattern alignment. This is why proper rehab is important, because if the horse is standing still the healing is more apt to produce scar tissue (an unorganized mass) rather than proper tendon tissue. “This is one area where human medicine is ahead of us. If you’ve ever had a torn Achilles tendon or torn ligament, you know about the aggressiveness of physical therapy!” he says.

“We used to use shock wave treatment on all cases, before the other two modalities were available, and had some nice successes with it. But at this point at time, we use it mainly for the areas that are more diffuse in the tendons, or more chronic in nature (an older injury). After 4 to 8 weeks, depending on degree of tearing, is when you’d consider doing shock wave treatment,” he says.

“There are two general types of shock wave therapy: focused and radial. For superficial flexor tendons, which is usually what we are looking at, either one of those methods are acceptable forms of treatment. Shock wave therapy uses an energy source to create a fluid wave in the tissues. By doing that, it stimulates the normal growth factors and healing response that’s already there. There has been some good research in human medicine behind this modality,” says Andrews. For bowed tendons, usually 3 treatments are given, 10 days to 2 weeks apart.

“I tell my clients that shock wave therapy does what we’ve been trying to do for centuries by firing and blistering- to stimulate the body’s own healing response. Firing and blistering merely treated the skin and the tissue directly beneath it (and is now obsolete), whereas shock wave therapy actually penetrates deep into the tissue. It’s a spin-off of the same technology that is used to break up human kidney stones, so we know it penetrates.”

“We no longer stand them in a stall for 6 months, like we used to. Even though they heal up really well with rest, scar tissue forms and it’s solid as a rock. The horse won’t be able to exert again because the tendon will tear somewhere else. It won’t tear in the area of the original bow, because the scar tissue is very tough, but it tears somewhere else due to lack of flexibility of the tendon,” he explains.

“During the clinical research on Baptin, it was found that the recovery protocol was most beneficial, rather than the actual drug injection. This consisted of a very gradual controlled exercise program that obviously must vary from horse to horse, depending on the degree of injury, type of horse (hunter/jumper, Standardbred, Thoroughbred) and other individual factors. The important thing is to get them back into light exercise relatively quickly. This helps the fiber alignment within the tendon,” says Andrews.

“The exercise protocol can start as early as one month after injury—starting with hand walking, then trotting, and riding, doing more exercise over a period of months. It’s a very gradual, controlled increase in stress that’s put on the tendon. There is no one protocol that fits all horses. The type and temperament of the horse, and its use, must be considered. The veterinarian and the owner must figure out how this general idea and process will best be

incorporated into the rehab for that particular horse with that particular lesion,” he explains. Dr. Virginia Reef (New Bolton Center, Pennsylvania) has put out some general guidelines in one of her textbooks, and veterinarians can use them.

“The timing, and customs issues (shipping live tissue across the border) are a hindrance to using this technology, as opposed to the ACell therapy. The latter product is something we keep on hand all the time,” says Andrews.

The timing for both therapies is important. Depending on the amount of inflammation and damage, you usually need to do them within 2-4 weeks after the injury. “The treatment can be given once the initial inflammatory process has died down, and before the body starts to fill the void with scar tissue. Putting stem cells or using the ACell product in an old bow that’s 2 or 3 months old has questionable benefit. I’ve tried it, and have not been very happy with the response,” he says.

“The likelihood of having a reaction to the product is higher with ACell therapy than with stem cells, mainly because it is a foreign protein. I’ve used a lot of the ACell product, and probably 5 percent of the horses do have an inflammatory event, but it’s quite controllable. We treat horses pro actively with anti-inflammatories, etc. right after we do them, to prevent any adverse reaction. The company itself recommends this. There is a definite protocol for treating the horse in and around the injection site.”

He feels that if the timing is such or the availability of pure stem cell treatment is not available, using the ACell is a very reasonable option. “During the first 1 to 5 weeks (usually 2-4) after the injury, using either stem cell or ACell therapy would be the treatment of choice for best results in a bowed tendon injury,” he says. It may be years before we find out which one of these products are the best, or if either of them are really what we are hoping they will be. It’s not until there are thousands of horses that have been treated, that you can see all the positives and negatives, and fully evaluate the treatment.

Most of the injections (such as stem cells or ACell product) can be done with the horse standing, except in the hind legs in some horses. “But in most front legs, in most horses, you can do it with them standing. Some must be under anesthesia, especially if you are doing other things as well, such as suspensories. It takes a bit of time, is guided by ultrasound and is reasonably technical. After identifying the core lesion, you watch your needle go in, directing it into the lesion before you inject. You are working with ultrasound in one hand and a needle in the other, I do most of them standing and don’t have any problems, but it’s trickier than the old treatments that were just aimed at the area in general and not so specific (not guided by ultrasound). These new treatments must be injected with a great degree of care and expertise,” explains Andrews.