ELSEVIER
SAUNDERS

Clinical Techniques in
Equine
Practice

Surgical Options for Treating Tendon and Ligament Injuries

Andris J. Kaneps, DVM, PhD, Dipl ACVS

A variety of surgical procedures are available to ameliorate the discomfort of tendonitis or desmitis, treat the original cause, or enhance healing. The following current techniques are described: neurectomy of the deep penetrating branch of the lateral plantar nerve, suspensory ligament fasciotomy, desmotomy of the palmar/plantar annular ligament via an extrasynovial approach and using arthroscopic guidance, desmotomy of the accessory ligament of the superficial digital flexor tendon (AL-SDFT, proximal check ligament) via the direct medial approach and via arthroscopic guidance, and desmotomy of the accessory ligament of the deep digital flexor tendon (AL-DDFT, distal check ligament).
Clin Tech Equine Pract 6:209-216

KEYWORDS equine, desmotomy, neurectomy, fasciotomy

A variety of surgical procedures are available to ameliorate the discomfort of tendonitis or desmitis, treat the original cause, or enhance healing. Following are current techniques that are widely accepted, and several that have only recently been utilized.

Neurectomy of the Deep Penetrating Branch of the Lateral Plantar Nerve

Indications

Neurectomy of the deep penetrating branch of the lateral plantar nerve at the level of the proximal metatarsus is used to reduce pain and swelling associated with suspensory ligament desmitis. The technique is most applicable to chronic, poorly healing suspensory desmitis or recurrent desmitis. Application of this technique should only be made following confirmation that the lameness is originating from the proximal suspensory ligament via diagnostic local anesthesia and ultrasound examination.

This procedure may be done concurrently with fasciotomy and/or injection of platelet-rich plasma, bone marrow, or regenerative cells into the affected ligament.

Pathophysiological Basis

Interrupting the nerve supply to the injured ligament would be expected to immediately resolve the lameness. This is not so in all cases, as resolution of the lameness may require some weeks.[1] Adair and colleagues have tracked over 60 cases of proximal suspensory desmitis that have undergone neurectomy of the deep branch of the lateral plantar nerve. Neurectomy may result in neurogenic atrophy of the muscle fibers within the suspensory ligament, causing reduction in cross-sectional area. They have found that cross-sectional area of the proximal suspensory ligament reduces by approximately 30% when evaluated 30 days following surgery (H.S. Adair, personal communication, 2007).

Anatomy

The deep penetrating branch originates from the lateral plantar nerve at the level of the tarsometatarsal joint. The deep branch divides into the lateral and medial plantar metatarsal nerves that innervate the suspensory ligament and portions of the fetlock joint.[2] There are two layers of fascia that must be incised to expose the lateral plantar nerve and its deep branch: a thin superficial layer and a heavier deep layer that is confluent with the plantar retinaculum of the distal tarsus.

Surgical Technique

The horse is positioned in lateral recumbency with the affected limb uppermost, if only one limb will be operated on. If both limbs are to be operated on, the horse is best positioned in dorsal recumbency with the limbs hanging in near full extension. Administration of perioperative antibacterial and anti-inflammatory medications is at the surgeon's discretion.

A 6-cm-long longitudinal incision is made immediately axial to, and centered on, the head of the fourth metatarsal bone (Fig. 1). Superficial plantar fascia is incised to expose the flexor tendons, which are retracted plantar (Fig. 2). The

New England Equine Medical and Surgical Center, Dover, NH.
Address reprint requests to: Andris J. Kaneps, New England Equine Medical and Surgical Center, 15 Members Way, Dover, NH 03820. E-mail: akaneps@newenglandequine.com

1534-7516/07/$-see front matter
doi:10.1053/j.ctep.2007.08.007

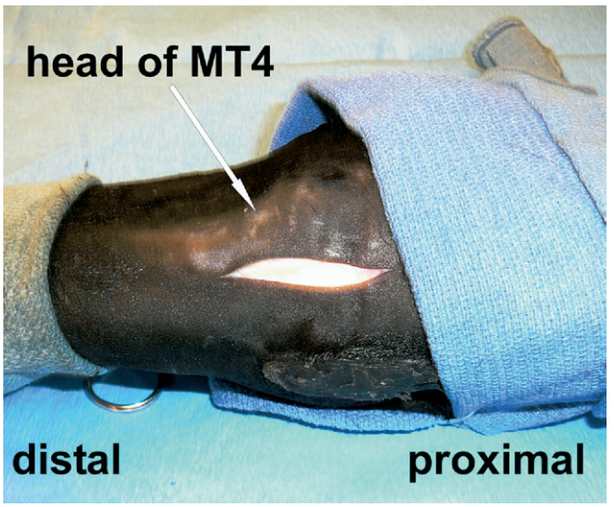

Figure 1 Left rear limb viewed from the plantar aspect. Distal is to the left and proximal is to the right. A 6-cm-long longitudinal skin incision has been made centered on, and immediately axial to, the head of the fourth metatarsal bone. (Color version of figure is available online.)

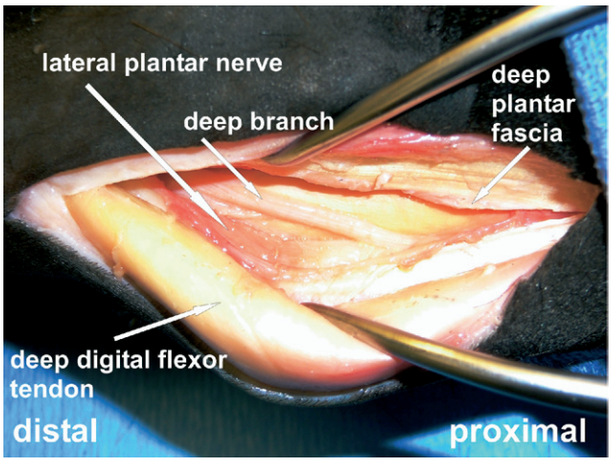

Figure 3 Same limb and orientation as for Figs. 1 and 2. Following incision of the superficial plantar fascia, the DDFT has been retracted plantar. The deep, heavy fascia has been incised exposing the lateral plantar nerve and its deep branch. The deep branch is separating from the parent nerve approximately 2 cm proximal to the head of metatarsal four. (Color version of figure is available online.)

heavier deep fascia is incised in the same plane to expose the lateral plantar nerve (Fig. 3). The lateral plantar nerve is followed proximally (more common), or distally, to expose the deep penetrating branch. Both nerves should be visualized by the surgeon to clearly identify the deep penetrating branch. A segment of the branch is transected and removed using a fresh surgical blade in guillotine fashion. At this point, the suspensory ligament is accessible and may be injected with regenerative healing products or the suspensory paratenon may be opened. The heavy, deeper fascia is left unclosed. Routine closure of the superficial fascia, subcutaneous tissues, and the skin is made in separate layers. A sterile bandage is applied before recovery.

Postoperative Management

Bandages are maintained to reduce swelling for 14 to 21 days. Stall confinement is maintained during the initial 60 to 90 days, or as necessitated by the ligament injury. Hand walking is started 30 days after surgery. A controlled exercise program is continued with modifications based on ultrasound evaluations and the level of soundness.

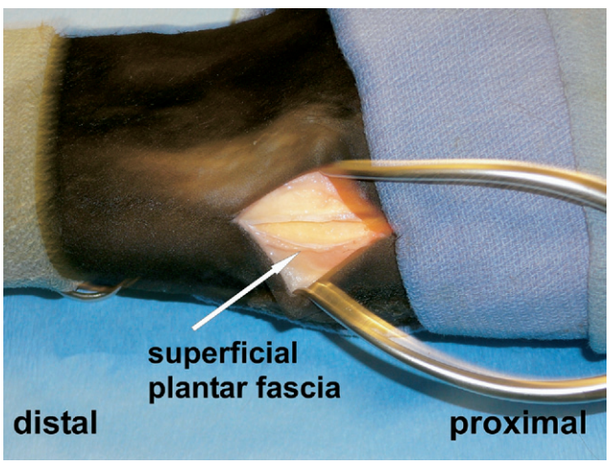

Figure 2 Same limb and orientation as for Fig. 1. The skin, subcutaneous tissues, and superficial plantar fascia have been incised immediately axial to the fourth metatarsal bone. (Color version of figure is available online.)

Suspensory Ligament Fasciotomy

Indications

Fasciotomy is indicated for treatment of chronic or recurrent suspensory desmitis that has not responded to other methods. It is also indicated in desmopathy that results in very large cross-sectional area of the affected ligament. It can be performed similarly in the hind or forelimbs.

Pathophysiologic Basis

Opening the potentially restrictive fascia that surrounds the suspensory ligament is thought to reduce compression of the uninjured ligament fasicles adjacent to the lesion, reduce compression of the regional nerves, and enhance gliding of the affected ligament and the overlying flexor tendons.[1]

Anatomy

A thin fascial layer encases the tendons and suspensory ligament and lies immediately deep to the subcutaneous tissues (Fig. 2). A heavy fascial layer that encompasses the suspensory ligament must be incised to access the paratenon that covers the suspensory ligament, just as for the approach described for neurectomy of the deep branch of the lateral plantar nerve (Fig. 3). The neurovascular tissues lie deep to the heavy fascia.

Surgical Technique

Fasciotomy may be performed via a medial or lateral approach. The lateral approach is identical to that previously

described for neurectomy of the deep penetrating branch of the lateral plantar nerve.

For the medial approach, the horse is placed in lateral recumbency with the affected limb down. The medial aspect of the proximal metatarsus/metacarpus and tarsus or carpus are prepared for aseptic surgery. A tourniquet is not necessary. A 6-cm-long longitudinal skin incision is made starting at the axial aspect of proximal metatarsus/metacarpus II. The superficial thin fascia and the heavy deep fascia are separately incised to expose the suspensory ligament (see Fig. 3 for the relationship of superficial and deep fascial layers). The thin paratenon directly surrounding the suspensory ligament is incised parallel to the skin incision. The deep fascia and suspensory paratenon are incised sufficiently to release those layers over the extent of the suspensory lesion. The superficial fascia, subcutaneous tissues, and the skin are closed routinely in separate layers. A sterile bandage is applied for recovery.

Postoperative Management

A firm pressure bandage is maintained for 14 to 21 days following surgery. Stall confinement is continued for 2 to 3 months or as dictated by the extent of the suspensory lesion. Hand walking for 10 to 15 minutes twice daily may begin 4 weeks after surgery. Repeat ultrasound examinations should be made every 4 to 8 weeks. Adjustments may be made in the controlled exercise protocol depending on changes in ultrasonographic appearance of the lesion and level of soundness.

Figure 4 Lateral view of the distal rear limbs of a horse with tenosynovitis of the left rear digital sheath and constriction of the plantar annular ligament (arrows). Effusion within the sheath is evident proximal to the metatarsophalangeal joint and in the plantar pastern region. The arrows identify the proximal and distal extent of the plantar annular ligament. (Color version of figure is available online.)

Desmotomy of the Palmar/Plantar Annular Ligament

Indications

Desmotomy of the palmar/plantar annular ligament is done to relieve pain due to constriction of the ligament. Constriction of the palmar annular ligament may be a misnomer. The ligament has limited elasticity and inflammation of the structures within the digital sheath will cause swelling and result in "relative" constriction of the annular ligament (Fig. 4). Scar within the digital sheath associated with tenosynovitis may also lead to constriction of the annular ligament. The annular ligament itself may become inflamed and thickened,[3] but the thickening usually occurs secondary to intrathecal inflammation of the digital sheath.

With tenosynovitis of the digital sheath, the annular ligament appears constricted (Fig. 4). Complete evaluation of the structures within the sheath using radiographic and ultrasonographic imaging, physical examination, synovial fluid analysis, and response to intrathecal local anesthesia all may be used to support the decision to perform a desmotomy of the palmar/plantar annular ligament.

Anatomy

The palmar or plantar annular ligament originates on the abaxial surfaces of the medial and lateral proximal sesamoid bones and spans the axial space to confine the superficial digital flexor tendon (SDFT) and deep digital flexor tendon (DDFT) on the palmar/plantar aspect of the fetlock joint.[2] The ligament averages 38 mm in proximal to distal width, and its fibers are oriented transversely.[4]

Surgical Technique

Two surgical techniques will be described: the extrasynovial technique described by Churchill and Hawkins and the arthroscopically assisted technique described by Nixon and coworkers.

Extrasynovial Approach by Churchill and Hawkins[4]

The horse is positioned in either lateral or dorsal recumbency. An Esmarch's bandage and tourniquet may be applied to the mid-metacarpus/metatarsus, but is not necessary in most cases. Peri-operative antibacterial and anti-inflammatory medications should be administered.

The skin on the palmar/plantar aspect of the fetlock is prepared for aseptic surgery (Fig. 5). A 4-cm-long skin incision is made on the palmar/plantar midline from the proximal edge of the annular ligament to just proximal to the ergot. Subcutaneous tissues are separated to expose the transversely oriented fibers of the annular ligament. Exposure is enhanced by retracting superficial tissues with a Gelpi or Weitlaner retractor. A short incision into the annular ligament is made to permit placement of a Kelly forcep deep to the ligament. The Kelly forcep is opened and transection of the annular ligament is continued proximally and distally (Fig. 6). Because of poor exposure of the proximal and distal aspects of the ligament, Mayo scissors may be used to complete the transection, or the skin incision may be extended as needed.

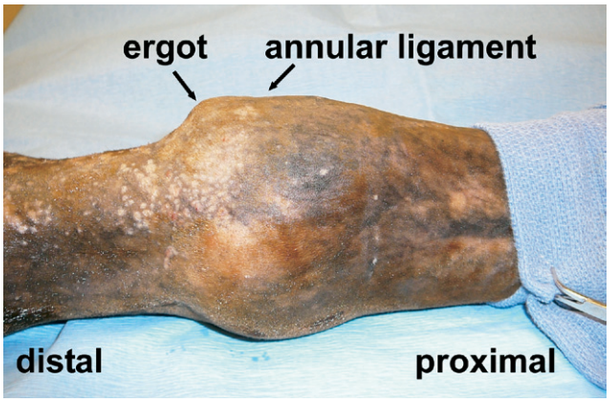

Figure 5 Right forelimb viewed from palmarolateral aspect. Distal is to the left and proximal is to the right. There is slight constriction of the palmar annular ligament evident as an indentation of the contour of the palmar fetlock region. (Color version of figure is available online.)

Verify that the entire annular ligament has been released by digital palpation.

In horses with chronic inflammation of this region, soft tissue swelling may make the exposure of the annular ligament challenging. If this is the case, extend the skin incision proximally and distally and obtain good retraction of the superficial tissues. The flexor tendon sheath is usually not invaded using this approach. If the synovial space is opened, parenteral antibiotics should be continued longer than the perioperative period.

Subcutaneous tissues and skin are closed in separate layers, and a sterile bandage is applied.

This is my preferred technique for transection of the annular ligament because it does not require use of specialized instruments and has little likelihood of penetrating the synovial space.

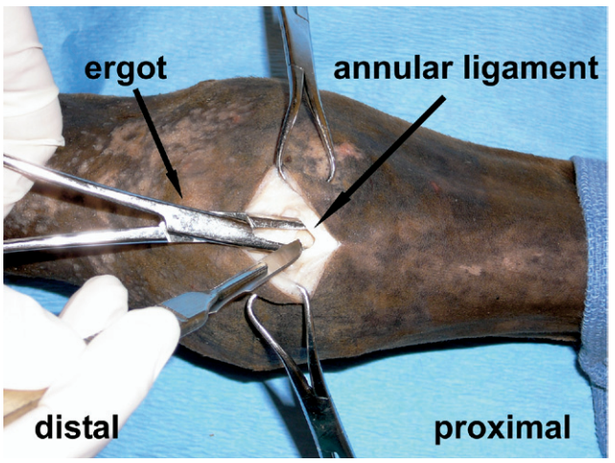

Figure 6 Right forelimb viewed from the palmar aspect. Orientation is as for Fig. 5. A forceps with tips open is placed within the annular ligament to facilitate the desmotomy. (Color version of figure is available online.)

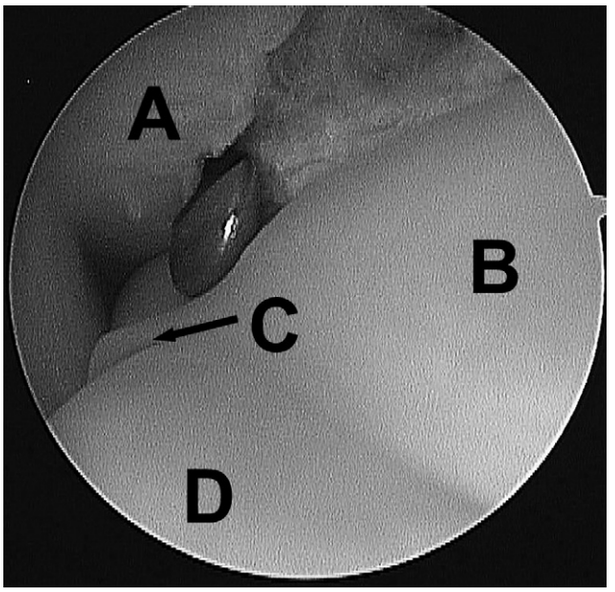

Figure 7 Arthroscopic view of the digital sheath. The view is from distal to proximal. A bistoury is being used to transect the palmar annular ligament (A). The SDFT (B) and its distal border, the manica flexoria (C), overlies the DDFT (D). Photo courtesy of Dr. Lisa A. Fortier.

Arthroscopically Visualized Desmotomy of the Annular Ligament

Arthroscopic evaluation of chronic tenosynovitis of the digital sheath is useful to identify previously unrecognized lesions of the DDFT or SDFT,[5] retrieve foreign bodies, debride restrictive scar tissue, permit access for lavage of the sheath in the case of sepsis, and for visualization of the annular ligament release using a slotted cannula and blade or a bistoury.[6,7]

The arthroscope is placed into the digital sheath via the portal just distal to the fetlock joint while the slotted cannula and blade or bistoury are placed from the proximal aspect of the digital sheath and directed distally.[6] Before performing the desmotomy, verify that the cutting instrument is superficial to the manica flexoria (Fig. 7).

Simple closure of the skin at the arthroscope and instrument portals is made and a sterile bandage is applied.

Postoperative Management

A firm support bandage is maintained for 3 to 4 weeks. Anti-inflammatory medication is continued for 2 weeks. The horse should be maintained in stall confinement consistent with the degree of tendon injury or synovitis. In most cases, particularly where scar tissue is present within the digital sheath, hand walking should start within 3 to 4 days of surgery.

Some degree of digital sheath swelling may persist following annular ligament desmotomy. Sixty percent of horses with tenosynovitis of the digital sheath and annular ligament constriction treated with arthroscopic debridement and annular ligament desmotomy had some degree of unresolved cosmetic blemish.[7]

Desmotomy of the Accessory Ligament of the SDFT (AL-SDFT, Proximal Check Ligament)

Indications

Transection of the accessory ligament of the SDFT (AL-SDFT) has been advocated for treatment of flexural contracture and for SDFT tendonitis.

Flexural contractures that involve the SDFT, resulting in knuckling of the fetlock, and have not responded to medical therapy are treated by desmotomy of the AL-SDFT and often concurrent desmotomy of the accessory ligament of the DDFT (AL-DDFT).

In cases of SDFT tendonitis, the desmotomy is performed to reduce stress on the healing tendon and prevent re-injury. Bramlage found that 66% of horses treated with AL-SDFT desmotomy made at least 5 starts and only 19% suffered re-injury.[8] Subsequent reports reduced the enthusiasm for the procedure because long-term outcomes were not as good as initially thought. In a group of 137 Thoroughbred racehorses with tendonitis, 71% raced, 51% made more than 5 starts, yet average earnings decreased in 58% of the horses.[9] In a report on Thoroughbred racehorses in Australia, superior check desmotomy resulted in no difference in prognosis compared with conservative therapy.[10] Horses that had desmotomy of the AL-SDFT were predisposed to suspensory desmitis.[10] Results following AL-SDFT desmotomy in Standardbred racehorses are superior to those in Thoroughbreds. In 38 Standardbreds treated with desmotomy by Hawkins and Ross, 92% returned to racing, 87% raced more than 5 times, yet mean earnings declined for the group.[11]

Pathophysiologic Basis

Desmotomy transfers stress from the relatively inelastic AL-SDFT to the more compliant superficial digital flexor muscle. In cases of tendonitis, the healed AL-SDFT has more length than before desmotomy and will cause less stress on the SDFT. In the case of flexural contracture of the SDFT, the muscle-tendon unit may stretch because the relatively inelastic restraint of the accessory ligament is removed. Unfortunately, in cases of complex flexural contracture, there are often many anatomical structures in addition to the SDFT that also must stretch for a successful outcome.[12]

Anatomy

The AL-SDFT originates on a bony ridge on the caudal medial aspect of the radius. The proximal extent of the AL-SDFT is approximately 4 to 6 cm proximal to the distal radial physis. The ligament joins the SDFT just proximal to the carpus. The distal portion of the AL-SDFT lies within the carpal canal. A nutrient artery of the SDFT is usually found near the most proximal aspect of the AL-SDFT.[13]

Surgical Technique

Two surgical techniques will be described: the direct surgical approach and the arthroscopic approach.

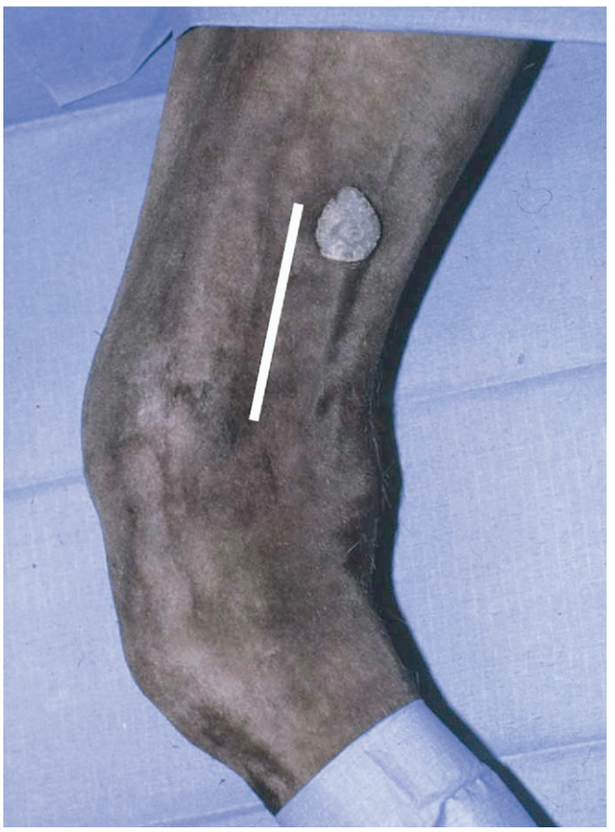

Figure 8 Medial aspect of the right forearm prepared for the direct approach for desmotomy of the accessory ligament of the SDFT. The skin incision (white line) should be made between the caudal aspect of the radius and the cephalic vein and extend from the distal radial physis to the chestnut. (Color version of figure is available online.)

Direct Approach

The horse is positioned in lateral recumbency with the affected limb down. If both limbs will be operated on, the horse may be positioned in dorsal recumbency with both limbs extended.

The medial distal fore arm is prepared for aseptic surgery. A 10-cm-long skin incision is made between the cephalic vein and the caudal radius with the distal extent of the incision starting just proximal to the distal radial physis (Fig. 8).

Exposure of the AL-SDFT may be made through the sheath of the flexor carpi radialis muscle[14] or between that sheath and the caudal radius.[8] In either case, the cephalic vein is retracted caudally and the medial carpal fascia is incised. A branch of the cephalic vein may need to be ligated to allow unimpeded access to deeper tissues. Access via the sheath of the flexor carpi radialis muscle is made by incising the medial aspect of the sheath and retracting the muscle belly caudally to expose the lateral aspect of the sheath. The lateral aspect of the sheath is incised to expose the fan-shaped AL-SDFT, which is closely associated with the lateral portion of the flexor carpi radialis sheath. The alternate exposure is by retracting the entire sheath of the flexor carpi radialis muscle caudally and identifying the fan-shaped AL-SDFT (Fig. 9).

The AL-SDFT is transected. Care must be taken at the proximal aspect of the desmotomy to avoid the nutrient vessels of the SDFT. If significant hemorrhage occurs and cannot

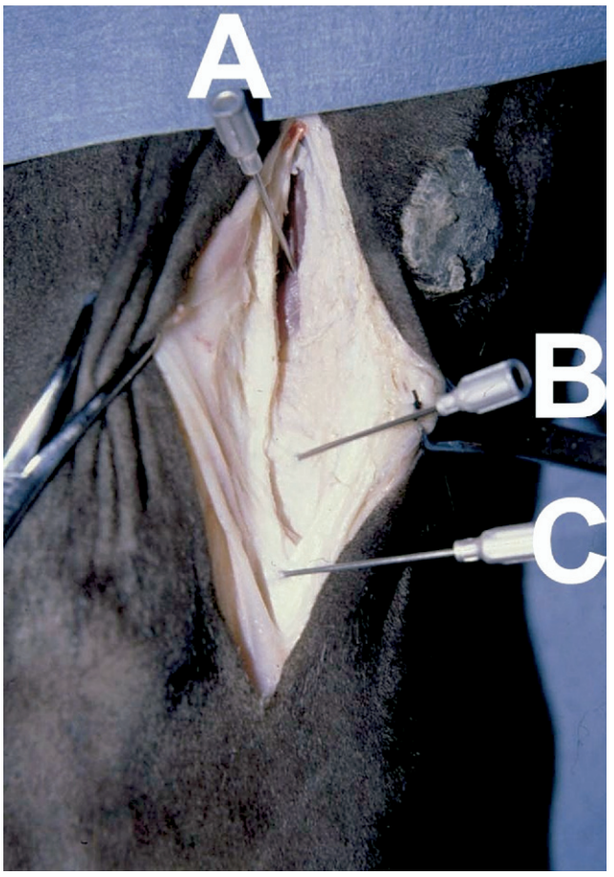

Figure 9 Direct approach to the AL-SDFT via the medial aspect of the forearm. The medial head of the deep digital flexor muscle (A) is exposed proximal to the AL-SDFT (B). The medial wall of the flexor carpi radialis sheath (C) has been incised to expose the AL-SDFT, which is confluent with the lateral wall of the flexor carpi radialis sheath. (Color version of figure is available online.)

be controlled by routine techniques, the surgical wound should be packed for several minutes before closure. At times, the desmotomy must be continued distally into the carpal sheath. Following desmotomy, the radial head of the deep digital flexor muscle is visualized.

Separate closure of the sheath of the flexor carpi radialis muscle (if incised) and the carpal fascia is made using 2-0 absorbable suture in a simple continuous pattern. Subcutaneous tissues and skin are closed routinely in separate layers. A sterile bandage is applied, usually as a stacked carpal wrap from the upper forearm to the coronary band.

Arthroscopic Approach

The arthroscopic approach is as described by Southwood and coworkers with additional techniques reported by Kretzschmar and Desjardins.[15,16] The horse is positioned in dorsal recumbency with the limb(s) suspended at near extension. The distal forearm and carpus are prepared for aseptic surgery.

With the limb at or near full extension, a needle is placed from lateral to medial into the carpal sheath between the tendon of the ulnaris lateralis muscle and the lateral digital extensor muscle approximately 1 cm proximal to the distal radial physis. Distend the sheath with 60 to 120 mL of sterile lactated Ringer's solution. The arthroscopic portal is made 2 cm proximal to the distal radial physis between the ulnaris lateralis and lateral digital extensor muscles. Direct the arthroscope sleeve with blunt obturator distomedially at a 60-degree angle to the long axis of the limb. The instrument portal is made approximately 2 cm distal to the arthroscopic portal. When the arthroscope and instrument portals are established, the limb is flexed from 60 to 90 degrees.[15,16] This degree of flexion permits better visualization of the proximal aspect of the AL-SDFT. A curved Beaver blade, meniscectomy knife, or bistoury on an 8- to 9-inch-long handle is used to perform the desmotomy. The transection is started distally and continues proximally. The most proximal aspect of the AL-SDFT may not be visualized as it lies proximal to the carpal sheath. The DDFT must often be retracted caudally to expose the AL-SDFT completely. Following a completed desmotomy, you will visualize separation of the cut fibers of the AL-SDFT and the flexor carpi radialis muscle.

The arthroscope and instrument portals are closed with nonabsorbable suture, and the limb is bandaged as for the direct approach.

Postoperative Management

Bandages are maintained for 3 weeks for the direct approach. The initial heavy bandage may be substituted for a light carpal bandage in cases where the arthroscopic technique was used. Bandaging in these cases may be continued for 2 to 3 weeks. When desmotomy is performed for flexural contracture, an extended toe shoe will help provide leverage and stretching of flexural structures for 10 to 12 weeks. In cases of severe SDFT contracture, the distal limb may need to be placed in a palmar splint to help stretch soft tissues that are further restricting normal position of the distal limb.

Desmotomy of the Accessory Ligament of the DDFT (AL-DDFT, Distal Check Ligament)

Indications

Flexural contracture of the DDFT and chronic or recurring desmitis of the AL-DDFT are indications for desmotomy of the AL-DDFT. Foals with DDFT contractures that result in a dorsal hoof-to-ground angle of 90° or less (Type I) respond favorably to AL-DDFT desmotomy.[12] Desmotomy has been effective for treatment of chronic nonresponsive or recurring desmitis of the AL-DDFT.[17] The ligament heals with sufficient strength to not restrict athletic use.[18]

Pathophysiologic Basis

The AL-DDFT is the most inelastic component of the deep digital flexor muscle/tendon unit. Transecting the check ligament allows the muscle to stretch, helping to resolve the contracture. The initial lengthening of the DDF muscle/tendon unit allows for gradual improvement of foot confirmation and return to normal biomechanical stresses on the lower limb.[19]

Desmotomy used to treat chronic/recurring desmitis of the ligament relieves the strain on the AL-DDFT, allowing the

potential for healing unimpeded by repeated distractive forces. The cut ends of the AL-DDFT heal and are ultimately strong enough for vigorous athletic use. In an experimental study where the AL-DDFT was evaluated 6 months following desmotomy, the healed ligament was 1 cm longer than controls and had approximately 80% of the tensile strength and stiffness of nonresected ligaments.[18]

Anatomy

The AL-DDFT originates from the thick fibrous tissue on the palmar aspect of the carpus and joins the DDFT at the junction of the proximal one-third and distal two-thirds of the metacarpus.[2] On ultrasonographic examination, the AL-DDFT inserts into the DDFT between 14 and 18 cm distal to the accessory carpal bone (Zone 3A).[20]

Surgical Technique

Perioperative antibacterial drugs may be administered at the surgeon's discretion, but anti-inflammatory medication is necessary in all cases. The horse is positioned in lateral recumbency with the affected limb uppermost. If bilateral desmotomy is required, the horse should be positioned in dorsal recumbency with both forelimbs in near extension. The proximal metacarpal region is prepared for aseptic surgery. A tourniquet is not required.

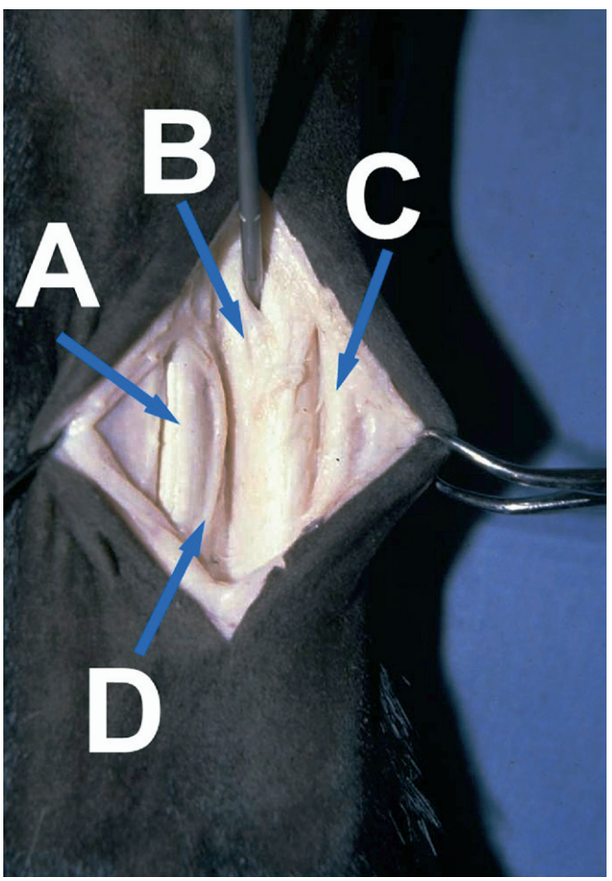

Figure 10 Approach for desmotomy of the AL-DDFT viewed from the lateral aspect of the left metacarpal region with dorsal to the left and palmar to the right. For illustrative purposes, the exposure is more extensive than is necessary. Anatomic structures that are visible include: suspensory ligament (A), AL-DDFT (B) with forcep separating it from the DDFT, SDFT (C), and lateral palmar nerve (D). (Color version of figure is available online.)

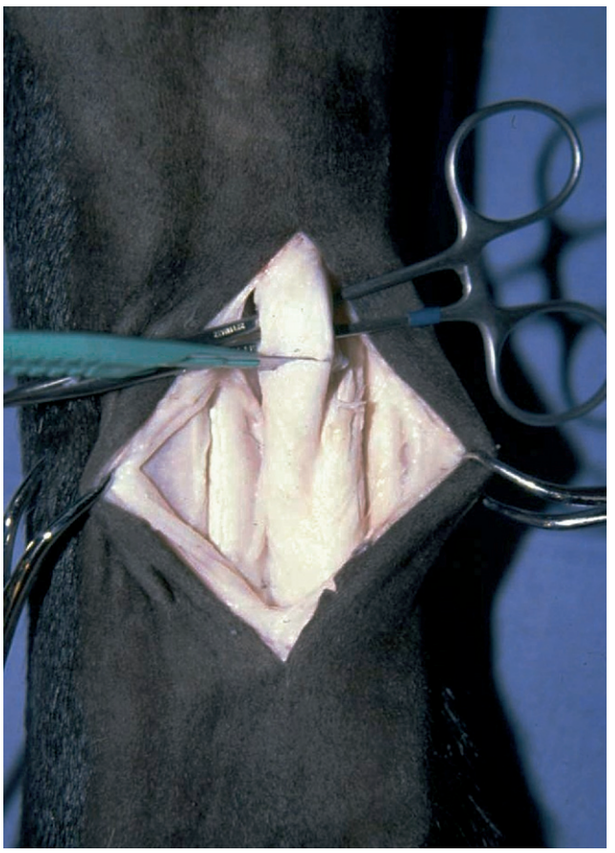

Figure 11 Forceps placed between the DDFT and the AL-DDFT. The forceps are helpful in exposing the AL-DDFT to facilitate desmotomy. (Color version of figure is available online.)

A 4- to 6-cm-long longitudinal skin incision is made over the palpable dorsal border of the DDFT. The incision is centered at the point where the suspensory ligament becomes obscured by metacarpal IV. The subcutaneous tissues and thin paratenon are incised parallel to the skin incision to expose the DDFT. A thin separation between the DDFT and the AL-DDFT is found, and a curved Kelly forceps is used to separate the two structures (Fig. 10). If the separation is not evident, the incisions should be extended proximally. The Kelly forceps is advanced through the medial side of the separation with the tips pointed toward the metacarpus, bringing the AL-DDFT out of the surgical wound. The forceps are inserted sufficiently far to stretch the AL-DDFT over the forcep handles. The structure is positively identified by verifying the position of the SDFT, DDFT, and the suspensory ligament. The AL-DDFT is transected with a surgical blade cutting over the forcep handles (Fig. 11). The foot is extended and the gap between the cut ends of the AL-DDFT is inspected. Any remaining fibers are cut. On cut surface, the AL-DDFT is white and has more densely packed fibrils than the more yellow DDFT.

The subcutaneous tissues and skin are closed in separate layers. A sterile bandage is applied.

Postoperative Management

Bandages are maintained for 3 to 4 weeks. Anti-inflammatory medication is continued for approximately 2 weeks to reduce discomfort as the flexural contracture stretches.

A corrective shoe with toe extension should be applied for treatment of flexural contracture. The toe extension provides a lever arm to help stretch the affected tendon. In foals less than 4 to 6 months of age, a simple thin metal plate may be attached to the foot using soft acrylic such as Equilox (Equilox International, Pine Island, MN) or Equi-Thane (Vettec, Inc., Oxnard, CA). The acrylic is also applied to the dorsal hoof capsule to form a more normal contour and distribute the stresses of the corrective shoe over the entire dorsal hoof capsule. In foals with a sufficiently strong foot and adult horses, the shoe may be nailed on. The toe extension may be as short as 3/8 inches (15 mm) in young foals and as long as 3/4 inches (20 mm) in adults. Shoes need to be maintained for 12 weeks.

Hand walking exercise should begin 2 days after surgery in horses being treated for flexural contracture. Ten to 15 minutes of walking twice daily is usually sufficient to help stretch the flexor tendon. Small paddock turnout may commence when the foal or horse is relatively comfortable on the operated limb, usually in 5 to 7 days.

In all cases, mild to moderate swelling is present at the desmotomy site for 4 to 6 months. When the procedure is done in young foals, the swelling is usually not noticeable by 1 year of age. Adults may always have some residual thickening at the surgery site.

References

1. Ross MW: Surgical management of tendon and ligament injuries. Proceedings of the American College of Veterinary Surgeons 163-166, 2006
2. Dyce KM, Sack WO, Wensing CJG (eds): Text Book of Veterinary Anatomy. Philadelphia, PA, Saunders, 1996
3. McGhee JD, White NA, Goodrich LR: Primary desmitis of the palmar and plantar annular ligaments in horses: 25 cases (1990-2003). J Am Vet Med Assoc 226:83-86, 2005
4. Hawkins DL, Churchill EA: Extrasynovial palmar-plantar annular ligament desmotomy. Proceedings of the 44th Annual Meeting Am Assoc Equine Pract, 1998, pp 210-212
5. Wilderjans H, Boussauw B, Madder K, et al: Tenosynovitis of the digital flexor tendon sheath and annular ligament constriction syndrome caused by longitudinal tears in the deep digital flexor tendon: a clinical and surgical report of 17 cases in warmblood horses. Equine Vet J 35:270-275, 2003
6. Nixon AJ, Sams AE, Ducharme NG: Endoscopically assisted annular ligament release in horses. Vet Surg 22:501-507, 1993
7. Fortier LA, Nixon AJ, Ducharme NG, et al: Tenoscopic examination and proximal annular ligament desmotomy for treatment of equine "complex" digital sheath synovitis. Vet Surg 28:429-435, 1999
8. Bramlage LR: Superior check desmotomy as a treatment for superficial digital flexor tendonitis: initial report. Proceedings of the 32nd Annual Meeting Am Assoc Equine Pract, 1986, pp 365-369
9. Bramlage LR, Hogan P: Career results of 137 thoroughbred racehorses that have undergone superior check ligament desmotomy for treatment of tendonitis. Proceedings of the 42nd Annual Meeting Proc Am Assoc Equine Pract, 1996, pp 162-163
10. Gibson KT, Burbidge HM, Pfeiffer DU: Superficial digital flexor tendonitis in thoroughbred race horses: outcome following non-surgical treatment and superior check desmotomy. Aust Vet J 75:631-635, 1997
11. Hawkins JF, Ross MW: Transection of the accessory ligament of the superficial digital flexor muscle for treatment of digital flexor tendonitis in standardbreds: 40 cases (1988-1992). J Am Vet Med Assoc 206:674-678, 1995
12. Adams SB, Santschi EM: Management of congenital and acquired flexural limb deformities. Proceedings of the 46th Annual Meeting Am Assoc Equine Pract, 2000, pp 117-125
13. Getty R (ed): The Anatomy of the Domestic Animals (vol 1, ed 5). Philadelphia, PA, Saunders, 1975
14. Wagner PC, Shires GM, Watrous BJ, et al: Management of acquired flexural deformity of the metacarpophalangeal joint in Equidae. J Am Vet Med Assoc 187:915-918, 1985
15. Southwood LL, Stashak TS, Kainer RA, et al: Desmotomy of the accessory ligament of the superficial digital flexor tendon in the horse with use of a tenoscopic approach to the carpal sheath. Vet Surg 28:99-105, 1999
16. Kretzschmar BH, Desjardins MR: Clinical evaluation of 49 tenoscopically assisted check ligament desmotomies in 27 horses. Proceedings of the 47th Annual Meeting Proc Am Assoc Equine Pract, 2001, pp 484-487
17. Todhunter PG, Schumacher J, Finn-Bodner ST: Desmotomy for treatment of chronic desmitis of the accessory ligament of the deep digital flexor tendon in a horse. Can Vet J 38:637-639, 1997
18. Becker CK, Savelberg HH, Buchner HH, et al: Effects of experimental desmotomy on material properties and histomorphologic and ultrasonographic features of the accessory ligament of the deep digital flexor tendon in clinically normal horses. Am J Vet Res 59:352-358, 1998
19. Wagner PC, Grant BD, Kaneps AJ, et al: Long-term results of desmotomy of the accessory ligament of the deep digital flexor tendon (distal check ligament) in horses. J Am Vet Med Assoc 187:1351-1353, 1985
20. Rantanen NW, Jorgensen JS, Genovese RL: Ultrasonographic evaluation of the equine limb: technique, in Ross MW, Dyson SJ (eds): Lameness in the Horse. Philadelphia, PA, Saunders, 2003, pp 166-188