Extrasynovial Palmar–Plantar Annular Ligament Desmotomy

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An approach for transection of the palmar–plantar annular ligament through a 2-cm skin incision directly on the palmar–plantar midline over the palmar–plantar annular ligament can be accomplished without entering the digital tendon sheath in most horses. Authors’ addresses: Dept. of Large Animal Clinical Sciences, P.O. Box 100136, College of Veterinary Medicine, University of Florida, Gainesville, FL 32610 (Hawkins) and 9122 Chatsworth Cascades, Boca Raton, FL 33434 (Churchill). © 1998AAEP.

1. Introduction
Palmar–plantar annular ligament (PAL) constriction is a well-recognized syndrome causing chronic lameness in performance horses. Clinically, the superficial digital flexor (SDF) and deep digital flexor (DDF) tendons may become constricted, resulting in pain and a decreased gliding function caused by thickening of the annular ligament (desmitis), tendinitis of the SDF or DDF tendons, or chronic synovitis of the digital sheath. A specific diagnosis of PAL constriction is sometimes difficult and is based on history, physical examination of the distal limb, diagnostic anesthesia, radiography, and ultrasonography. Diagnostic ultrasound helps establish the role of specific structures involved in constriction by the PAL. Regardless of the cause, transection of the PAL is the most effective treatment to relieve constriction by the PAL.

The surgical procedure to release PAL constriction was first described as using a skin incision that extended beyond the proximal and distal borders of the PAL, permitting complete, open transection of the ligament. Blind transection of the PAL through a 2-cm incision into the tendon sheath caudal to the neurovascular trunk over the proximal border of the PAL has been described for cases without complicating tenosynovial lesions. Recently, a tenoscopic evaluation and assisted transection of the PAL under direct vision by using a slotted intrasynovial cannula and knife were reported. Intrasynovial techniques increase the risk of adhesion formation, damage to tendons within the sheath, synovial fistula formation, and tendon sheath sepsis. Specific postoperative procedures have been recommended to prevent these complications.

No techniques have been described for the division of the PAL without entering the flexor tendon sheath. The objective of this report is to describe an extrasynovial approach for transection of the PAL and the relevant anatomy associated with this method.

2. Materials and Methods
The procedure can be done in a cooperative standing horse with local anesthesia (forelimbs only) or during a short period of general anesthesia with the horse in dorsal or lateral recumbency.

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horse is prepared for aseptic surgery, a 2-cm skin incision is made that is centered between the proximal border of the PAL and the ergot on the palmar–plantar midline. Sharp dissection is continued through the subcutaneous tissue down to the transverse fibers of the PAL with a #15 blade. Careful, sharp dissection is continued through the PAL until the division between the PAL and longitudinal fibers of the SDF tendon is identified through a 5-mm incision in the PAL. Curved Kelly forces are directed through the incision in the PAL and tunneled under the distal half of the annular ligament to verify the dissection plane and serve as a guide for transection. The Kelly forces are opened several millimeters, and a #15 blade is inserted between the jaws of the forces with the cutting edge toward the annular ligament and advanced to incise the ligament. The forces may have to be repositioned once more further distally to complete the distal transection. The forces are then redirected proximally, and the proximal half is transected in the same manner to complete the PAL release. In most cases, the attachment of the flexor sheath on either side of the midline can be seen in the surgical field. By placing a finger into the skin incision and palpating the incised PAL, one can verify the complete release of the PAL. The subcutaneous tissue is closed in a continuous pattern by using absorbable suture material, and the skin is closed by using nonabsorbable suture material in an interrupted pattern. Depending on the preoperative assessment, other procedures (e.g., superior check desmotomy or tendon splitting) may be done simultaneously.

Perioperative broad-spectrum systemic antibiotics and anti-inflammatory medication are routinely given and continued for 3–7 days. The leg is maintained for 3 weeks in a snug bandage, which is changed as necessary. A sterile dressing is placed on the incision under the bandage for the first 7 days. Hand walking is initiated in 5 days, with additional exercise prescribed based on the presence and severity of other lesions.

Ten normal cadaver forelimbs from ten adult horses of various breeds were obtained from our necropsy service. Measurements of the PAL width on the midline and extrasynovial space between attachments of the flexor tendon sheath to the superficial digital flexor tendon at the proximal border, middle, and distal border of the PAL were recorded from gross dissections of the ten limbs.

3. Results

The mean measurement and 95% confidence intervals between the attachments of the flexor tendon sheath in normal adult cadaver forelimbs were 14.7 mm (13.3–16.1 mm) at the proximal border, 11.9 mm (10.5–13.3 mm) at the middle, and 9.6 mm (8.0–11.2 mm) at the distal border of the PAL. The mean width of the PAL on the midline was 38 mm (35.1–40.9 mm).

4. Discussion

Landmarks for percutaneous transection of the PAL are generally reliable and readily palpable, except for those cases that are complicated by extensive subcutaneous edema or fibrosis associated with trauma. While identification of the dissection plane between the SDF tendon and the PAL can be accomplished by careful, sharp dissection through the PAL in most cases, the identification of this plane may be more problematic in cases that have a greatly thickened PAL (>8 mm) with adhesions or severe, chronic tendon sheath changes. A knowledge of the preoperative ultrasonographic assessment of the PAL thickness will help guide dissection through the PAL in more complicated cases. Care should be taken to avoid cutting into the palmar–plantar surface of the SDF tendon. However, a superficial incision (<1 mm deep) of the SDF tendon is of no consequence.

Bleeding from a small subcutaneous vessel is frequently observed during the skin incision and may interfere with visualization. With experience, this is not a problem; however, optimal visualization is ensured by using an Esmarch bandage and tourniquet for cases under general anesthesia. The maintenance of a snug bandage as described for postoperative care will control subcutaneous hematomas that may result without other treatment.

The PAL desmotomy can be accomplished as described without entering the flexor tendon sheath in most horses. However, the tendon sheath is more commonly entered in chronic, complicated cases or those with severe flexor sheath effusion. No additional treatment has been necessary in these cases, compared with those in which the tendon sheath was not disturbed.

The surgeon should inform the client that there will be a small scar and change in the lateral profile of the fetlock associated with the release of the PAL as compared with the horse’s opposite normal fetlock. When the PAL constriction is associated with tendinitis and synovitis of the tendon sheath, there will be a dramatic improvement in soundness immediately or within the initial 2–5 days and in the tendon profile in 5–7 days postoperatively. As with other methods of PAL desmotomy, this procedure is done for return to function and not for cosmesis.

The space between the attachments of the flexor tendon sheath in normal cadaver limbs correlated well with observations in student surgical dissection labs of normal forelimbs over a 6-year period and the author’s (DLH) observations during PAL desmotomy surgery in front and rear limbs. The width of the extrasynovial space along the palmar–plantar aspect of the SDF tendon facilitates successful completion of the PAL desmotomy without entering the flexor tendon sheath. While flexor tendon sheath attachments and the extrasynovial space associated
with the PAL have been mentioned,1,4,7,9 to our knowledge the dimensions of the extrasynovial space or its potential surgical application for PAL desmotomy have not been reported.

This approach for PAL desmotomy was developed by one of us (EAC) in the early 1960’s and has been the technique of choice of the other (DLH) for 20 years. Our experience with the approach has been mostly on Thoroughbred and Standardbred racehorses and event horses, but it has also been used for other breeds and types of horses in the more diverse case load of a university hospital in recent years with good results. In this population, a high percentage of horses treated with the approach have returned to their normal use with a minimal incidence of complications and postoperative care.

The extrasynovial approach presented is an additional, practical option for PAL desmotomy that can be performed with the horse standing or under general anesthesia, without special instrumentation. Studies are planned regarding a more extensive description of the relevant surgical anatomy and case studies.

References