

# How to Perform a Mid-Metacarpal Deep Digital Flexor Tenotomy on a Standing Horse

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Mid-metacarpal deep digital flexor (DDF) tenotomy on a standing horse can be performed with less risk of transecting the neurovascular bundles and adjacent soft tissue with the use of specially designed broad-blade butter-knife retractors. Authors' address: Equine Health Studies Program, Department of Veterinary Clinic Sciences, School of Veterinary Medicine, Louisiana State University, Baton Rouge, LA 70803; e-mail: djburba@vetmed.lsu.edu (Burba). © 2006 AAEP.

## 1. Introduction

Deep digital flexor (DDF) tenotomy is commonly performed as part of treatment for refractory laminitis in horses. DDF tenotomy removes the predominant force responsible for the distopalmar migration of the distal phalanx, removes a source of pain, and reduces potential further rotation on the distal phalanx.<sup>1</sup> In my experience, there are two scenarios in which DDF tenotomy is indicated. One is when a horse is severely painful and showing radiographic indication of progressive rotation in a short period of time (days). The second is when the patient has chronic laminitis that is refractory to other treatment options, such as therapeutic shoeing, and is also showing radiographic signs of further rotation.

Two different surgical techniques have been described for performing a DDF tenotomy in the horse.<sup>2,3</sup> One technique is performed in the mid-pastern region and requires general anesthesia in most situations. Potential complications with this technique include flexor tendon sheath sepsis and

adhesions. The other technique is performed in the mid-metacarpal region and is relatively easy, quicker, and can be performed on a standing horse. The mid-metacarpal technique will be described along with the implementation of special surgical instruments (two specially designed broad-tip butter knives used as retractors).

## 2. Materials and Methods

Before surgery, an extended heel shoe is applied to the foot along with an aluminum pad with urethane plastic packing<sup>a</sup> on the sole. The patient is sedated with a combination of detomidine HCl<sup>b</sup> (0.01–0.02 mg/kg, IV) and butorphanol<sup>c</sup> (0.01–0.02 mg/kg, IV). The hair on the mid-metacarpus of the limb(s) is clipped, and the skin is surgically prepped. Local anesthesia is infiltrated over the medial and lateral palmar nerves in the proximal third metacarpal region above the proposed surgical site. The foot is aseptically draped, and a 3-cm skin incision is made over the DDF tendon (DDFT) on the lateral aspect of the metacarpus (Fig. 1).

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## NOTES



Fig. 1. A 3-cm incision is made over the DDFT on the lateral aspect of the metacarpus when performing a tenotomy on a standing horse.



Fig. 2. A hemostat is used to create a tunnel along the dorsal and palmar surface of the DDFT when performing a tenotomy through a skin incision on the forelimb. Notice that the hemostat tents the skin on the opposite side of entry. The photograph depicts the metacarpus being viewed from the palmar aspect.

The dorsal and palmar edges of the DDFT are palpated, and two tunnels are created with a curved hemostat. One tunnel is created between the deep and superficial digital flexor tendons, and the second tunnel is created between the DDFT and neurovascular bundle/suspensory ligament. It is important that the hemostat can be palpated subcutaneously on the medial aspect of the metacarpus (Fig. 2).

After the tunnels are created, two sterile broad-blade butter knives, with their tips curved, are inserted into the tunnels. The handles are then separated from each other to form a V shape (Fig. 3).

It is important that the curved tips are pointing toward each other. These tips essentially isolate that region of the DDFT from the surrounding structures. A #10 scalpel blade<sup>d</sup> is inserted between the blades of the retractor knives in a horizontal fashion. In a sweeping motion, the fibers of the DDFT are transected (Fig. 4).

The butter knives are removed, and the skin is closed in a routine fashion. A wound dressing and a firm support bandage is then placed on the limb(s). A bandage is maintained on the limb(s) for ~4 wk and is changed every other day.

### 3. Results

The broad-blade butter-knife retractors have been used at the Louisiana State University School of Veterinary Medicine equine hospital in 10 cases.

All cases were without incident of inadvertent laceration of the surrounding soft tissue structures or neurovascular bundle, which is a complication that has been reported.<sup>3</sup> The broad-blade butter knives allowed for isolation of the DDFT and easier visualization of the tendon during transaction. They provided a guide along which the cutting edge of the scalpel blade can be pressed against to get complete transaction of the tendon fibers. Subluxation of the distal interphalangeal joint and dorsal displacement of the toe of the foot occurred in two cases of horses that were not shod before surgery. Of the cases on which this technique has been performed in our hospital, there have been minimal post-operative complications, including dehiscence of the skin closure in three cases.

### 4. Discussion

The tips of the butter knives were curved by first heating the tip and then bending them on an anvil. This allows the tips to curve around the DDFT for better isolation and reflection of the surrounding soft tissue structures (Figure 3). Most of the cases that the procedure has been performed on were chronic refractory patients with distal rotation of the third phalanx (P3). DDF tenotomy should not be performed on horses with cellulitis surrounding

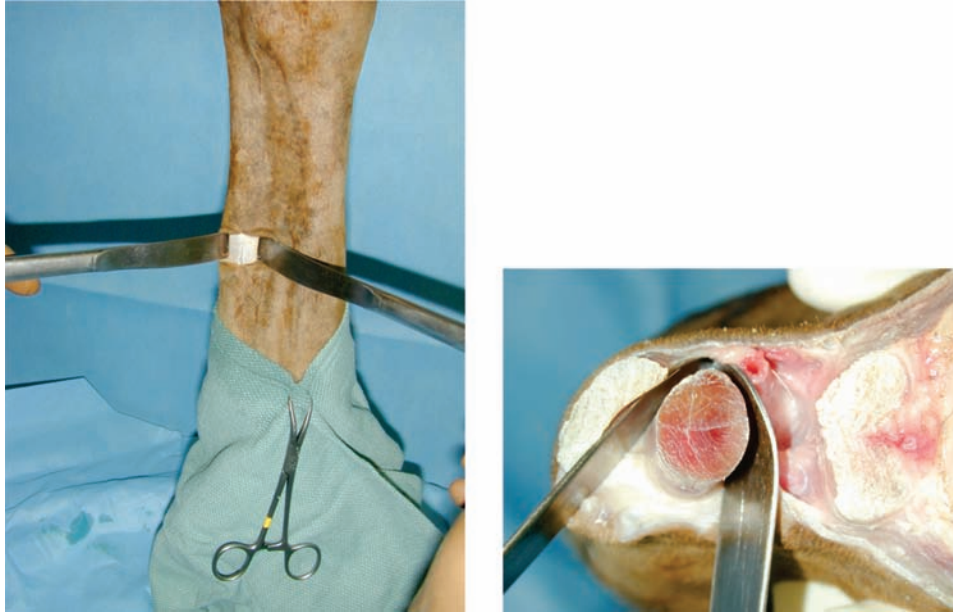


Fig. 3. The modified broad-blade butter knives with the tips curved are inserted dorsal and palmar to the DDFT when performing a tenotomy.

the flexor tendons. This may create problems with healing of the surgical wound. I believe it is important that the horse be properly shod before performing the tenotomy. An extended heel shoe is routinely used in our hospital. This will prevent possible subluxation of the distal interphalangeal joint and dorsal displacement of the toe of the foot.

One of the potential complications reported with mid-metacarpal DDF tenotomy is laceration of the medial palmar artery.<sup>3</sup> This has occurred when using hemostats instead of the broad-blade butter knives as retractors. The flat design of the butter knives allows them to easily slide along the DDFT. They are more rigid than conventional surgical malleable retractors, and therefore, allow for bet-

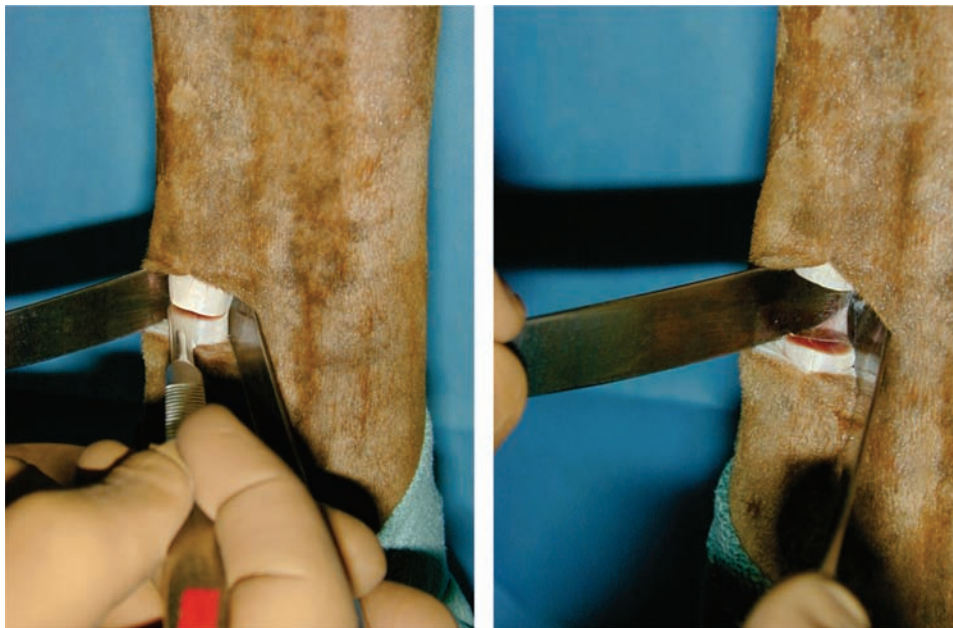


Fig. 4. Modified broad-blade butter knives are positioned to protect the adjacent soft tissue structures and neurovascular bundle from inadvertent trauma with a scalpel as a tenotomy is performed on the DDFT.

ter reflection of the surrounding tissues. Their long handles allow for better visibility in the surgical field. The butter knives have proven an effective tool in performing a DDF tenotomy more safely.

Thickening of the DDFT occurred because of extensive fibrosis at the tenotomy site several weeks post-surgery. This is not uncommon, even with other techniques.<sup>2,3</sup> It must be stressed that this procedure is performed to try to get parallel alignment of the solar surface of the third phalanx with the ground surface. It has been our experience that very few of the horses that have had a DDF tenotomy become immediately more comfortable standing post-surgery. Only with aggressive corrective shoeing did horses show improvement.

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#### References and Footnotes

1. Coffman JR, Johnson JH, Finocchio, EJ, et al. Biomechanics of pedal rotation in equine laminitis. *J Am Vet Med Assoc* 1970;156:219–221.
2. Allen D, White NA, Foerner JF, et al. Surgical management of chronic laminitis in horses: thirteen cases. *J Am Vet Med Assoc* 1986;189:1604–1606.
3. Hunt RJ, Allen D, Baxter GM, et al. Mid-metacarpal deep digital flexor tenotomy in the management of refractory laminitis in horses. *Vet Surg* 1991;20:15–20.

<sup>a</sup>Equi-Pack Instant Pad Material, Vettec, Oxnard, CA 93033.

<sup>b</sup>Dormosedan, Orion Corporation, FI-02200 Espoo, Finland.

<sup>c</sup>Torbugesic, Fort Dodge Animal Health, Fort Dodge, IA 50501.

<sup>d</sup>Bard-Parker, BD Medical, Franklin Lakes, NJ 07417.