Relevant Anatomy

The lateral and medial palmar digital nerves are continuations of the lateral and medial palmar nerves. The palmar digital nerve is identified just palmar to the digital artery approximately 0.5 cm below the skin surface and deep to the ligament of the ergot. At the fetlock, the medial and lateral palmar nerves each give rise to dorsal branches.

Indications

Palmar, or posterior, digital neurectomy is used to relieve chronic heel pain. The most common indication is navicular disease that is not responsive to corrective shoeing and medical therapy, but it is also used in horses with fracture of the navicular bone, selected lateral-wing fractures of the distal phalanx, and calcification of the collateral cartilages of the distal phalanx. A number of potential complications should be explained to the owner prior to surgery. In the hands of a good surgeon, however, palmar digital neurectomy is a form of long-term relief from the pain of those conditions just listed.

Anesthesia and Surgical Preparation

Neurectomy may be performed under local analgesia with the animal standing or under general anesthesia. If the surgery is performed with the animal standing, it is preferable to inject the local analgesic agent over the palmar nerves at the level of the abaxial surface of the sesamoid bones. The nerves can be palpated in this area, and the infiltration of this area avoids additional trauma and irritation at the surgery site. If neurectomy is performed in the field immediately following the use of a diagnostic block of the palmar digital nerve, this same block may be used for the surgical procedure. However, the author generally recommends waiting for 10 days after performing a palmar digital nerve block before performing a neurectomy in order to reduce in inflammation in the region. General anesthesia is convenient to use, and for the more involved technique of epineural capping, it is certainly indicated. The area of the surgical incision is clipped, shaved, and prepared for surgery in a routine manner. Plastic adhesive drapes are useful to exclude the hoof as a source of contamination.

Surgical Technique

In both the simple guillotine method and the technique of epineural capping, the approach to the nerve is the same. In the simple guillotine technique, an incision 2 cm long is made over the dorsal border of the flexor tendons. If epineural capping is to be performed, the incision is generally 3–4 cm long and is continued through the subcutaneous tissue. It is important that the tissues be subjected to minimal trauma. An incision over the dorsal border of the flexor tendons generally brings the operator close to the palmar digital nerve. Variation exists, but the relationship of vein, artery, nerve, and the ligament of the ergot assists the surgeon's orientation. At this stage of the dissection, the surgeon should look for accessory branches of the palmar digital nerve. These branches are commonly found near the ligament of the ergot. If an accessory branch is found, a 2-cm portion is removed using a scalpel.

Guillotine Technique

The nerve is identified and is dissected free of the subcutaneous tissue. The structure can be identified as nerve if it puckers after it is stretched, if scraping its surface reveals the longitudinal strands of the axons, or if a small incision into the nerve body reveals cut transverse sections of bundles of nerve fibers. The nerve is severed at the distal extremity of the incision. Then a hemostat is placed on the nerve, which is stretched while being cut with a scalpel or CO_2 laser at the proximal limit of the incision. This sharp incision is made in such a fashion that the proximal portion of the nerve springs up into the tissue planes and out of sight. It is believed that the severance of untraumatized nerve and its retraction up into the tissue planes helps reduce the problems of painful neuromas. The concept behind using the CO_2 laser is that it seals the nerve ending, even further reducing the possibility of a painful neuroma.

The skin is closed with interrupted sutures of nonabsorbable material.

Pull-Through Technique

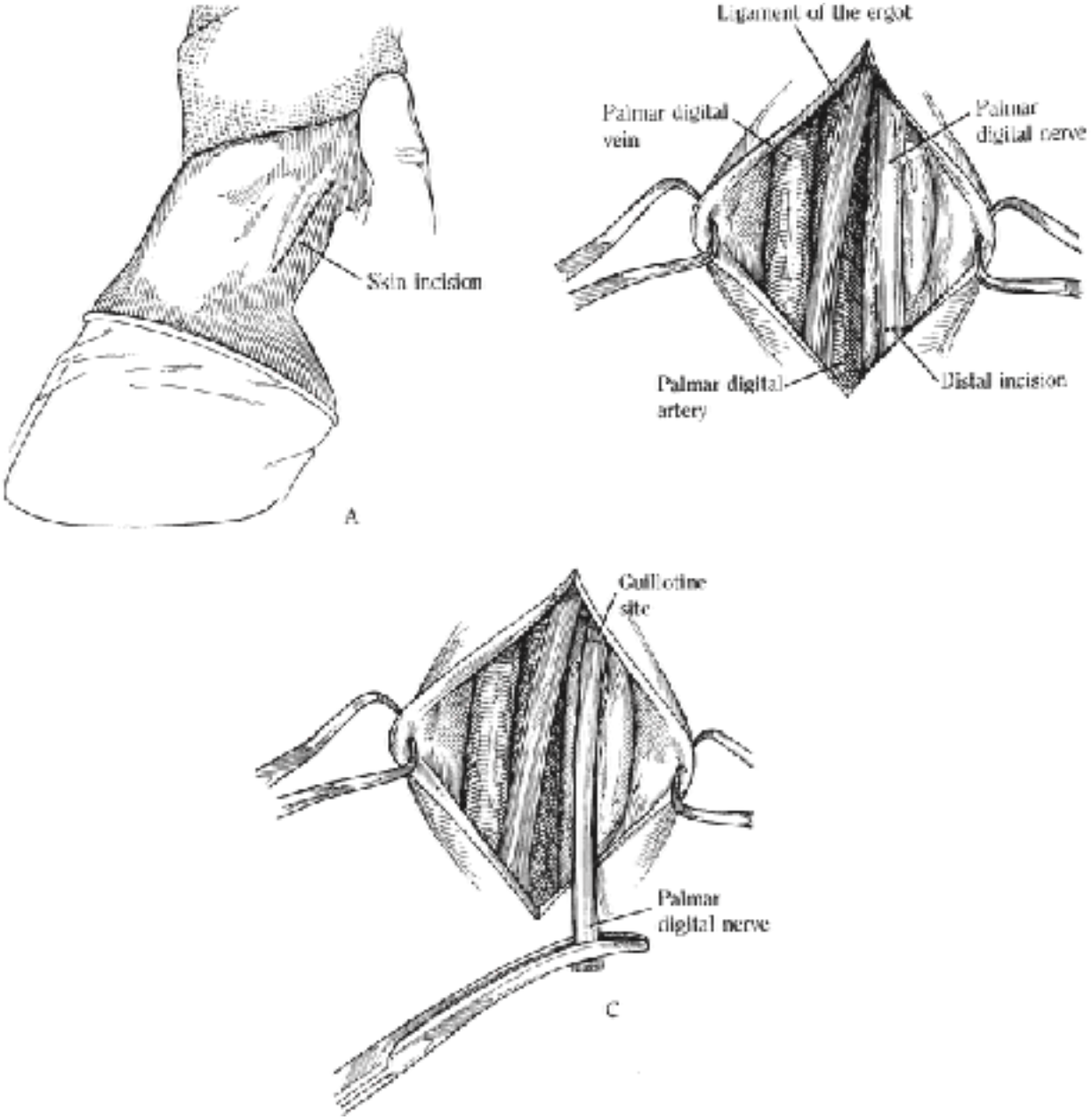
The pull-through technique is an extension of the Guillotine technique. The rst part of the procedure is per- formed as previously described. The main difference is that, instead of transecting the nerve at the proximal site of the incision as in the guillotine technique, traction is placed on the distal nerve, and a second incision of 1 cm is made over the nerve at the base of the proximal sesa- moid bone. The digital nerve is then pulled through the proximal incision and a guillotine technique is used to transect the nerve.[46]

Postoperative Management

Antibiotics are not used routinely. A sterile dressing is placed on the incision, and a pressure bandage is maintained on the leg for at least 21 days. To minimize postoperative inflammation, 2g of phenylbutazone are administered daily following surgery for 5–7 days. Sutures are removed 10 days after the operation, and the horse is rested for 60 days.

Complications and Prognosis

Complications of neurectomy include painful neuroma formation, rupture of the deep digital flexor tendon, re-innervation, persistence of sensation because of failure to identify and sever accessory branches of the nerve, and loss of the hoof wall. Neuromas are the most common complications and can arise when the axons in the proximal stump regenerate axon sprouts, which cause pain and hypersensitivity. One retrospective study of 50 horses that received palmar digital neurectomies, the majority by transection and electrocoagulation, reported that 17 horses (34%) had complications, with recurrence of heel pain being the most common. In 2 years, 63% of all the horses that received neurectomies were still sound. More recently, a study of 24 horses that received neurectomies using the guillotine technique reported no postoperative complications.



Summary diagrammatic representation of the steps involved in the Digital Palmar Neurectomy Surgery

Sample video of the Digital Palmar Neurectomy performed in a field setting

https://www.youtube.com/watch?v=Nz9rQRNkX_w