Plantar Approach for a Morton Neuroma

Surgical Technique

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Introduction

The plantar approach for management of a Morton neuroma allows the transverse metatarsal ligament to be spared, decreases the risk of damage to the dorsal cutaneous nerve branches, and has a low rate of complications with results comparable with those of other approaches.

Many surgical approaches, usually longitudinal, dorsal, and plantar incisions, have been successfully utilized for the management of a Morton neuroma¹. Classically, the dorsal approach has been advocated as safe, with a complication rate lower than that associated with the plantar approach²⁻⁴. With a dorsal approach, wound complications are infrequent, and patients are able to bear weight immediately after the operation. However, at times, when the neuroma lies proximal to the transverse metatarsal ligament, excision may be difficult through the dorsal approach⁵, and we have found that an easier and safer exposure of these structures can be achieved through a transverse plantar approach. Also, the plantar approach allows us to perform either a release of the transverse metatarsal ligament or a neurolysis alone⁶⁻¹⁰. While the dorsal approach can increase the risk of damage to the dorsal cutaneous nerve branches, directly by cutting them or indirectly by applying excessive retraction pressure on them, with the plantar approach the nerve endings are exposed in a well-protected space, away from the weight-bearing area. Furthermore, by sparing the transverse metatarsal ligament, forefoot splaying can be avoided. In our experience, the distal transverse plantar exposure has a low rate of complications and provides results that are at least comparable with those reported with other surgical approaches.

The technique consists of four steps.

Step 1: Incision

Step 2: Exposure

Step 3: Resection

Step 4: Closure

Step 1: Incision

Make a transverse plantar skin incision distal to the metatarsal weight-bearing area.

- Under regional anesthesia, position the patient supine with a thigh tourniquet inflated to 300 mm Hg after limb exsanguination.
- Make a transverse plantar skin incision distal to the metatarsal weight-bearing area, 0.5 cm proximal to the skin crease at the base of the toes (Fig. 1).

Step 2: Exposure

Excise the connective tissues around the neuroma and expose the common digital nerve as far proximally as possible.

- Expose the subcutaneous tissues to visualize the submetatarsal fat pad, and excise the connective tissues surrounding the neuroma (Fig. 2).
- Gently dissect the tissues around the neuroma to better visualize and expose the common digital nerve as far proximally as possible (Fig. 3).

Step 3: Resection

Identify the resection point over the metatarsal neck and cut the neural branches as proximal and as distal as possible.

- Identify the resection point over the metatarsal neck and proceed to cut the neural branches as proximal and as distal as possible (Figs. 4

and 5), remembering to send the removed tissue for histological confirmation of the diagnosis (Fig. 6).

- Resect the neuroma without excision or transection of the deep transverse ligament, and explore the adjacent web spaces, medially and laterally, when clinically indicated.

Step 4: Closure

Suture the fat pad using inverting absorbable sutures and the skin using nonabsorbable monofilament sutures.

- Achieve careful hemostasis (Fig. 7), and suture the fat pad using inverting absorbable sutures (Fig. 8).
- Suture the skin using interrupted number-4.0 nonabsorbable monofilament sutures (Fig. 9), and apply a compressive bandage (Fig. 10).

Results

We assessed 160 of 168 patients who had undergone surgical excision of a Morton neuroma; the median duration of follow-up was 7.1 years¹¹. The right foot was affected in thirty-four patients (21.3%); the left foot, in eighty-two (51.3%); and both feet, in forty-four (27.5%). The diagnosis of Morton neuroma was confirmed with histological analysis in all of the patients. The second intermetatarsal space was involved in six patients; the third, in 136; both interspaces, in seventeen; and the second, third, and fourth spaces were involved in one patient. Multiple neuromas were found in eighteen patients. Return to regular activity was allowed at a median of forty days. A good result was reported for 143 patients (89.4%); a fair result, for eleven (6.9%); and a poor result, for six (3.8%). Of the eleven patients with a fair result, eight complained of scar-related symptoms, loss of sensation at the incision site, and discomfort wearing high-heel shoes. The remaining three patients complained of local paresthesias with no recurrence of the neuroma. Six patients (3.8%) had persistent pain and paresthesias (poor results) and underwent a reoperation; a recurrence of the neuroma was confirmed histologically in all six patients. At the last assessment, all six patients were asymptomatic. With the numbers studied, the outcomes found in the patients who had undergone excision of a single neuroma did not differ significantly from the outcomes for those in whom multiple neuromas had been excised ($p = 0.17$).

What to Watch For

Indications

The main indication for this procedure is the resection of a Morton neuroma in a patient with severe symptoms. However, it is possible to use this approach for the excision of an intermetatarsal bursa or to remove other soft-tissue masses in this area. The plantar approach allows preservation of the intermetatarsal ligament, as the neuroma lies plantar to this ligament. When two web spaces are involved, they can easily be accessed with use of only this one incision.

Contraindications

- Neuropathic foot
- Severe peripheral vascular disease
- Corticosteroid and immunosuppressor drug use
- Inability to cooperate with appropriate post-operative care

In all of the above conditions, skin healing could be compromised, with a higher rate of infection being possible. Also, patients with peripheral neuropathy or some vascular compromise are at risk for developing plantar ulcers.

Pitfalls & Challenges

- The incision should be centered over the intermetatarsal space in which the neuroma is located.
- During the skin incision, the scalpel blade should always be perpendicular to the skin.
- The neuroma is located between the metatarsal heads, and the fatty tissue just underneath the skin should not be mistaken for the neuroma; fatty tissue is yellow, and the neuroma has a pearl color.
- Take care not to transect the adjacent neural digital branches.
- To dissect deeper and as proximally as possible, flex the metatarsophalangeal joints and use an Army-Navy retractor to facilitate exposure.
- Protect the electrocautery blade with a plastic tube, leaving only its tip uncovered, to avoid burning the superficial tissues.
- At closure, use inverting stitches on the subcutaneous tissues.

- Following closure, check perfusion of the toes, especially when two web spaces have been explored. We release the tourniquet prior to closure, when the wound is still open.
- A limitation is that the approach is anterior to the weight-bearing area of the ball of the foot, at a point where, given the thickness of the plantar skin, a longer recovery period may be needed.

Clinical Comments

Complications

We believe that complications are more severe with

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the dorsal surgical approach (missed nerves, recurrences, or amputation neuromas).

Compared with the dorsal approach, the transverse plantar incision allows a complete neurectomy and minimizes the chances of removing an intermetatarsal bursa or perineural fatty tissues instead of the neuroma.

Suggestions

We propose using this approach to increase the chances of successful neuroma excision compared with the use of the dorsal approach.

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Figures

Fig. 1

The transverse plantar skin incision is distal to the metatarsal weight-bearing area, 0.5 cm proximal to the skin crease at the base of the toes.

Fig. 2

Dissection and complete removal of the surrounding connective tissues.

Fig. 3

Dissection exposes the common digital nerve as far proximally as possible.

Fig. 4

Identification of the resection point over the metatarsal neck.

Fig. 5

Resection of the neuroma proximal and distal to the lesion.

Fig. 6

Specimen of a neuroma to send for histological examination.

Fig. 7

Careful hemostasis of subcutaneous tissues is secured.

Fig. 8

Subcutaneous closure using absorbable monofilament sutures.

Fig. 9

Skin closure using number-4.0 nonabsorbable monofilament sutures.

Fig. 10

Application of a compressive bandage.

Fig. 1

Fig. 2

Fig. 3

Fig. 4

Fig. 5

Fig. 6

Fig. 7

Fig. 8

Fig. 9

Fig. 10