Early Experience with Morton’s Neuroma

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Abstract

Background: When conservative treatment of a Morton neuroma is unsuccessful, surgical resection or a less invasive steroid injection is indicated. The purpose of the study was to evaluate the functional outcomes and patient satisfaction and complications, after surgical resection via dorsal approach or local steroid injection of an interdigital neuroma.

Methods: Thirty two consecutive patients who underwent surgical excision or local steroid injection of a Morton neuroma that had been unresponsive to conservative treatment were included in our study. Patients were selected based on The clinical diagnosis was confirmed by means of magnetic resonance imaging and histological analysis. Sixteen patients underwent excision of the neuroma through a dorsal approach; and sixteen patients were treated by local steroid injection, evaluation forms were handled to each patient and patient satisfaction scale was recorded to assess the results of both procedures.

Conclusions: Surgical resection in of interdigital neuromata, in properly selected cases demonstrating a positive Mulder sign, or with a neuroma delineated on MRI scans; provides a reasonably safe treatment option with minimal complications.

Key Words: Interdigital neuroma – Morton’s neuroma – Local steroid injection.

Introduction

MORTON’S neuroma is a benign lesion of an intermetatarsal plantar nerve, most commonly of the second and third intermetatarsal spaces, and although the name of Morton [1] is always associated with this lesion he was totally mistaken in explaining the symptoms as a painful affection of the fourth Metatarso-phalangeal joint articulation and in 1853 Civinii reported the clinical symptoms associated with it; patients complain of burning and/or numbness down the interspace of the involved toes; pain is usually made worse by walking in high-heeled shoes w/narrow toe box and is relieved by rest and by removing the shoe [3].

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Interdigital neuroma has a higher prevalence in women particularly in the fourth and the fifth decades, between 2nd-3rd (15-20%) interspace and 3rd-4th (80-85%) metatarsal heads [4].

Treatment modalities include conservative measures as Nsaids, the use of orthotics, local injection and surgical excision.

Pathoanatomy:

The common digital plantar nerve to the 3rd interspace is usually derived from the confluence of branches of the medial and lateral plantar nerves; the 3rd digital nerve may be predisposed to neuroma formation, since it is the largest digital nerve as it is formed by branches of both the medial and lateral plantar nerves and is a frequent site for development of interdigital neuromas the deep transverse ligament connects the plantar plates of the MTPjoints, and not the metatarsals themselves.

The second and third common digital branches of the medial plantar nerve are the most frequent sites for its development [8].

Despite the name, the condition was first correctly described by a chiropodist named Durlacher [6] and although it is labeled a "neuroma", many sources do not consider it a true neuroma, but rather a perineural fibroma or a type of nerve compression syndrome which involves the common digital nerves of the lesser toes [5].

Material and Methods

The study was conducted at Doha clinic Hospital, Doha, state of Qatar. Thirty two patients with treatment of 32 feet were included in the study between August 2007 and August 2010. There were 27 female patients and only 5 males with a mean age of 48 years, range (30-65).
Only patients who failed conservative treatment was included in the study all patients who showed improvement on conservative treatment and/or no recurrence of symptoms after 2 weeks of conservative management was excluded from the study. All patients were given NSAIDs, metatarsal pads, orthosis and proper footwear. patients who presenteded with bilateral symptoms due to affection of both feet was excluded from the study.

Clinical examination and investigations:
All patients presented with typical pain and burning, parthasias or numbness sensation among the forefoot with discretion to the toes, full neurological examination was done including SLR test. A positive Mulder sign was elicited in 27 patients Mulder sign is elicited when the forefoot is grasped with one hand to compress the transverse metatarsal arch the interspace is squeezed between the index finger and the thumb of other hand a palpable click is felt and recreate patient’s symptoms it’s probably due to the enlarged interdigital nerve as it moves under the transverse intermetatarsal ligament.

MRI scan was then performed for each patient in order to confirm the presence of a neuroma in the affected interdigital space a neuroma was seen in 19 of the 32 feet also MRI scans of the lumbar spine were performed to patients with positive SLR test and patients with related pathologies of the lumbar spine or the nerve roots were excluded from the study.

Injection technique:
Injections were all conducted in the operation room. The patient is placed in a supine position with the knee in a supported flexed position (with a pillow beneath it) and the foot in a neutral position. The area of tenderness and fullness on the dorsum of the foot between the affected metatarsal heads is palpated. The needle is inserted on the dorsal foot surface in a distal to proximal direction, at an angle of 45 degrees, and down to the area of fullness between the metatarsal heads. A total of 3-5ml is injected into the space via a 25 gauge needle 2ml of 0.5% bupivacaine and 0.5ml of solumedrol. Position is very important, because plantar fat pad atrophy can occur if the fat pad is injected.

Patients were kept in the supine position for 5 minutes after the injection. And discharged 30 minutes after the injection, patients were advised to avoid any strenuous activity involving the injected region for at least 48 hours, and was give NSAIDs for 3 days after the injection as well as a metatarsal pad. A first follow-up examination within three weeks was arranged.

Surgical technique:
We utilized the dorsal approach in our resections it same technique utilized by Mann and Reynolds after adequate sterilization, draping and tourniquet application. A small skin incision at the dorsal aspect is placed corresponding to the affected interdigital space dissection goes through till the intermetatarsal ligament is reached and identified. The ligament is then served after application of self-retaining retractor. The digital nerve distal to the bifurcation to common digital nerve are served and common digital nerve is dissected proximally and distally as far as possible a loop magnifier is used during the dissection.

Wound is then closed in layers and compression bandadage applied patient was instructed to elevate the leg for few hours then patient was allowed to weight bear using metatarsal pad and crutches for 2 weeks. Compression bandage was removed next day.

Follow-up:
Patients follow-up assessments and evaluation took place at Doha clinic Hospital.

All patients were evaluated in the outpatient clinic at presentation as well as after conservative treatment then after each modality of treatment (injection or surgery) two methods of evaluation was utilized Coughlin criteria including pain, foot wear restriction and activity restriction; The Numeric Rating Scale (NRS), Verbal Descriptor Scale (VDS), and Faces Pain Scale (FPS pain scale (Fig. 2). Patients where then classified at the final assessment which took place at least 6 months after treatment according to satisfaction into excel lent, good, fair, poor.

Evaluation forms were given to each patient and were filled by the patients in their final follow-up assessment data was evaluated accordingly.

Results
After evaluation of the forms handed to all of our patients, we were able to analyze the data at the time of final evaluation and the following results were obtained from all thirty two patients, sixteen patients underwent surgical resection for the neuromata while sixteen patients had local...
injection. Tables (3,4) summarizes the functional results from all the patients that underwent the two modalities of treatment. The overall patient satisfaction was assessed in our series and there were 7 patients of those who underwent local injection had excellent satisfaction (44%), when compared to 12 surgical resection patients who had excellent satisfaction (75%). With regards the complications 3 patients had superficial wound infection that responded to oral antibiotics, and 3 patients had toe numbness and 2 patients had scar tenderness.

![Intraoperative excision of neuroma.](image)

**Fig. (1): Intraoperative excision of neuroma.**

**Table (1): Evaluation form.**

<table>
<thead>
<tr>
<th>Pain</th>
<th>Mild</th>
<th>Moderate</th>
<th>Severe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pain scale</td>
<td>1,2,3</td>
<td>4,5,6</td>
<td>7,8,9,10</td>
</tr>
<tr>
<td>Physical activity</td>
<td>Mild or no restriction</td>
<td>Interferes with some activity (sports)</td>
<td>Interferes with every day activity</td>
</tr>
<tr>
<td>Footwear restriction</td>
<td>Can wear any type of footwear</td>
<td>Can’t wear narrow box shoes or high heels</td>
<td>No shoes is comfortable</td>
</tr>
</tbody>
</table>

**Table (2): Functional outcomes in injection patients.**

<table>
<thead>
<tr>
<th></th>
<th>Mild</th>
<th>Moderate</th>
<th>Severe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pain</td>
<td>7 (44%)</td>
<td>7 (44%)</td>
<td>2 (12%)</td>
</tr>
<tr>
<td>Physical activity restriction</td>
<td>11 (69%)</td>
<td>2 (12%)</td>
<td>3 (19%)</td>
</tr>
<tr>
<td>Footwear restriction</td>
<td>10 (63%)</td>
<td>4 (25%)</td>
<td>2 (12%)</td>
</tr>
</tbody>
</table>

**Table (3): Functional outcomes in surgical patients.**

<table>
<thead>
<tr>
<th></th>
<th>Mild</th>
<th>Moderate</th>
<th>Severe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pain</td>
<td>15 (94%)</td>
<td>1 (6%)</td>
<td>0</td>
</tr>
<tr>
<td>Physical activity restriction</td>
<td>14 (88%)</td>
<td>1 (6%)</td>
<td>1(6%)</td>
</tr>
<tr>
<td>Footwear restriction</td>
<td>14 (88%)</td>
<td>2 (12%)</td>
<td>0</td>
</tr>
</tbody>
</table>
Table (4): Complications.

<table>
<thead>
<tr>
<th>Complication</th>
<th>Number of cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wound Infection</td>
<td>3</td>
</tr>
<tr>
<td>Scar tenderness</td>
<td>2</td>
</tr>
<tr>
<td>Toe numbness</td>
<td>3</td>
</tr>
</tbody>
</table>

Discussion

Several studies have dealt with Morton’s neuroma [4,6,8] with only few neurosurgical publications. Our studies showed a female predominance as well as other studies. These lesions most commonly occur between the third and fourth metatarsals, and then between the second and third [10-12]. Morton neuromas are uncommon between the first and second metatarsals and rare between the fourth and fifth [1,11]. Because they have a marked female predilection, delineation of lesions in MRI is difficult and many and thus other causes of pain has to be excluded [13,14]. Zanetti et al. [15] suggested three imaging criteria for diagnosis of Morton neuroma: (a) the lesion is centered in the neurovascular bundle, within the intermetatarsal space, and on the plantar side of the transverse metatarsal ligament; (b) the lesion is well demarcated; and (c) the signal intensity of the lesion is similar to that of skeletal muscle on T1-weighted images and less than that of fat on T2-weighted images.

In our series we used both modalities of treatment, local steroid injection and surgical resection, 75% and 44% respectively; Coughlin reported a sixty one percent excellent satisfaction in his series of sixty six cases [8]. Postoperative toe numbness occurred in three patients which reduces the patient satisfaction considerably especially in persistent cases. Numbness occurred mainly in the toes as well as the sole corresponding to the operated web space.

We did not record any case of plantar keratosis occurring post-operative, probably because of the shorted duration of follow-up in this series.

Comfort orthosis was given to all cases regardless of the modality of treatment used. Sixty three percent of the local injection patients had mild foot-wear restriction compared to eighty eight percent in the surgical resection group. Only six percent of either group had a major severe restriction in the choice of foot-wear requiring a special custom made insole.

In view of these findings we believe that treatment of interdigital neuroma is easy and safe and the surgical resection in properly selected cases of interdigital neuromata, demonstrating a positive Mulder sign, or with a significant neuroma seen on the MRI provides a reasonably safe treatment option with minimal complications.

References

6- DURLACHER L.: A treatise on corns, bunions, the disease of nails, and the general management of the feet. Philadelphia: Lea and Blanchard, 1845: 52.


