

Treatment of Recalcitrant Intermetatarsal Neuroma With 4% Sclerosing Alcohol Injection: A Pilot Study

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The purpose of this investigation was to conduct a prospective trial to assess the effectiveness of a 4% sclerosing alcohol injection in a small group of patients with intermetatarsal neuromas who had failed previous conservative therapies including corticosteroid injections. Six patients with 8 neuromas were followed for a mean 346 days. A weekly series of 3–9 injections containing 1 mL of the 4% alcohol sclerosing solution were given based on patient response to treatment. Pre- and posttreatment surveys consisting of both objective and subjective findings including a visual analog pain scale were collected. The average pretreatment visual analog pain rating was 7.5 ± 1.14 . The average posttreatment visual analog pain rating was 1.38 ± 2.39 with an average reduction of 6.13. The average reported improvement in symptoms was 73%. Five of the 6 patients would recommend the treatment to a friend or family member. No complications were encountered. Two neuromas in 2 patients failed the sclerosing injection course: 1 ultimately responded to antiinflammatory use and the other underwent excision. (The Journal of Foot & Ankle Surgery 44(4):287-291, 2005)

Key words: neuroma, sclerosing, intermetatarsal, injection

Intermetatarsal neuroma, or Morton's neuroma, is one of the most frequently encountered pathologies in the foot and ankle practice. Patients often complain of intense pain in the forefoot with burning, tingling or numbness that radiates to the toes. Diagnosis of intermetatarsal neuroma is made principally by a thorough clinical examination, but magnetic resonance imaging and ultrasound have shown to be helpful (1, 2).

Treatment for Morton's neuroma first focuses on conservative therapies such as a change in shoe gear, padding, orthoses, physical therapy, and corticosteroid injections. The reported success rate for conservative treatment has ranged from 85% to as low as 30% (3–5). Corticosteroid injections are effective but have potential complications, including hyperpigmentation, skin atrophy, telangiectasias, and painful plantar fat pad atrophy (6, 7).

Typically, in patients with neuroma pain recalcitrant to conservative measures, the next step is surgery. Some authors suggest surgical excision as the primary treatment, but most practitioners wait until conservative means have been exhausted (4, 8). Many studies of surgical treatments have reported a 70%–85% clinical improvement rate (8–12). However, as with any surgery, complications such as deep wound infection, wound dehiscence, persistent erythema, hypertrophic scarring, recurrence, and a need for further surgery are possible (8–11, 14). Another disadvantage of surgery is the potential time lost from activities and work. Patients can return to their normal activities 2 months post-operatively, but may experience persistent swelling and pain for up to 6 months (8, 11).

Recently, chemical neurolysis using a 4% sclerosing alcohol injection has been reported as a possible alternative treatment for intermetatarsal neuromas (5, 13). One study yielded an 89% success rate using the 4% sclerosing alcohol injections in patients with previously untreated neuromas (5). The purpose of this study was to prospectively measure the success of the sclerosing injection for recalcitrant intermetatarsal neuromas in a small pilot group of patients who had failed previous conservative therapies including corticosteroid injection.

Materials and Methods

This pilot study consisted of 8 subjects from 3 clinic populations with 14 intermetatarsal neuromas. Patients were

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Pretreatment Survey

If multiple or B/L, please complete a separate survey for each diagnosed neuroma included in study

Patient Name: _____ **Date:** _____ **Office:** _____

Age: _____ **Gender:** _____ **Ht.:** _____ **Wt.:** _____ **Dr.:** _____

Subjective:

Type of symptoms: _____

Duration of Symptoms: 0-3 mos, 4-6 mos, 7-9 mos, 10-12 mos, 1-2 yrs, 2-3 yrs, > 3 yr.

Previous treatment (by pt. or Dr.): Steroid injections (#), NSAIDS, Orthotics, Physical therapy, Padding, Taping, Shoe Changes, Previous Surgery

Visual Analog Pain Scale:

0-----1-----2-----3-----4-----5-----6-----7-----8-----9-----10

No pain

Moderate

Worst

Objective:

Location of Neuroma:

R: IM 1-2, IM 2-3, IM 3-4, IM 4-5 **L:** IM 1-2, IM 2-3, IM 3-4, IM 4-5

Point of Maximal Tenderness (PMT): _____ (cm. Proximal to webspace)

Mulder's Click: + - **Sullivan's Sign:** + - **Compression Test:** + -

FIGURE 1 Pretreatment survey.

often treated by the resident staff with the supervision of 2 attending physicians (A.J.B., R.J.V.). Only adult subjects were used. All subjects completed an appropriate consent specifying that a minimum of 3 and a maximum of 9 weekly injections might be needed. Subjects for inclusion were those with a clinical diagnosis of intermetatarsal neuroma in any intermetatarsal space who had undergone previous conservative treatment. Exclusion criteria included patients with metatarsal stress fracture, tarsal tunnel syndrome, lesser metatarsophalangeal joint instability, or new onset neuroma determined by clinical exam.

All enrolled subjects completed a pretreatment survey

consisting of both subjective and objective data (Fig 1). Subjective data included demographic information, the duration and type of symptoms, previous treatments that were either self- or professionally administered, and a pain rating using a visual analog scale (VAS). Objective data included an indication of the intermetatarsal space involved and the point of maximal tenderness (PMT) measured on the involved webspace. A positive or negative Mulder's click found on palpation of the webspace and pain upon lateral compression of the forefoot during palpation of the webspace was also documented. A similar survey was completed at each weekly visit prior to the next injection. The

12 Month Follow-Up Survey

If multiple or B/L, please complete a separate survey for each neuroma included in study

Patient Name: _____ Date: _____ Office: _____

Age: _____ Gender: _____ Ht.: _____ Wt.: _____ Dr.: _____

Subjective:

What is the percentage of improvement in symptoms from start of treatment until now? Circle one please

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

How long did you experience symptomatic relief after final sclerosing injection treatment of your neuroma?

0-1 month, 1-3 months, 3-6 months, 6-9 months, 9-12 months

Visual Analog Pain Scale (Today)

0-----1-----2-----3-----4-----5-----6-----7-----8-----9-----10

No pain

Moderate

Worst

Would you recommend this treatment to a friend or family member?

Yes No

FIGURE 2 Twelve-month follow-up survey.

end point of the treatment was determined when the patient indicated either a 0 or 1 on the VAS pain scale or when a patient had received a maximum of 9 injections.

A final survey was completed at a minimum of 10 months and a maximum of 12 months following initiation of treatment. The survey was conducted via mail and relied on the patient's memory for recall. It consisted of subjective questions including a VAS pain rating, percent improvement, duration of relief, and whether the patient would recommend the treatment (Fig 2). Success on the final survey was determined as a 90% or better improvement in symptoms from the start of treatment until follow-up.

Statistical analysis was performed using Excel (Microsoft, Redmond, WA). Analysis included improvement of VAS pain score from pretreatment survey to final follow-up. The mean VAS score and mean percent improvement was compared for each patient pre and post treatment. The

duration of symptoms and mean duration of relief was also determined. The distribution of the affected intermetatarsal spaces was tabulated. All demographic data were tabulated.

Technique

The 4% sclerosing alcohol solution was prepared using 2 mL of dehydrated alcohol diluted with 48 mL of 0.5% bupivacaine HCl with epinephrine (1:200,000). All injections were given after a sterile surgical preparation of the skin. 1 mL of sclerosing solution was given using a 1¼-inch, 27-gauge needle at a distance 2 cm proximal to the point of maximum tenderness in the affected intermetatarsal space. Injections were discontinued once a patient related clinical resolution of symptoms or the maximum number was reached.

TABLE 1 Study population

Neuroma	Right Vs. Left Side	Intermetatarsal Space	# of Injections	% Improvement
1	L	2	7	0
2	R	2	3	90
3	R	3	3	90
4	L	2	3	100
5	R	2	6	90
6	R	3	5	90
7	L	3	6	90
8	R	2	9	30

Abbreviations: L, left; R, right.

Results

Of the initial 8 patients eligible for this study, 2 patients (6 neuromas) were lost to final follow-up. This left a final study group of 6 patients with 8 neuromas. There were 2 men and 4 women at the completion of the survey year. These patients were tracked through completion of the sclerosing injections including the final follow-up survey.

The mean age for the female patients was 63 ± 12 years (range, 50–81) while the mean age for males was 59 ± 1.4 years (range, 58–60). Symptoms consistent with neuroma were present for an average 21.9 months prior to presentation. The left foot was affected in 3 cases and the right foot in 5 cases. The second intermetatarsal space was involved in 62.5% of cases while the third intermetatarsal was involved in 37.5% of cases (Table 1). Three of the neuromas required 3 injections, 1 neuroma required 5 injections, 2 neuromas required 6 injections, 1 neuroma required 7 injections, and 1 required 9. Of these treatments, the 2 neuromas requiring 7 or more injections were not clinically successful at relieving symptoms. There were no reported adverse events with the injections.

The average time from start of treatment until final survey was 346 ± 50.3 days. The average improvement from the start to finish of treatment was 72.5% ± 36.6%. The average pretreatment VAS pain rating was 7.5 ± 1.14. The average post-treatment VAS pain rating was 1.38 ± 2.39. This translated to average pain reduction of 6.13 ± 3.2. Five of 6 patients stated that they would recommend the treatment to a friend or family member. Of the 2 neuromas in the final survey that did not respond to this therapy, 1 patient's pain completely resolved with nonsteroidal antiinflammatory drug use, and the other underwent surgical intervention for resection of the neuroma.

Discussion

Neurolytic injections are used in the treatment of chronic pain, to denervate the bladder, in treatment of trigeminal

neuralgia, and to prevent of stump neuroma formation following crush injuries (15–18). Chemical neurolysis for neuroma has been attempted in the past using multiple agents, including alcohol, formaldehyde, phenol, tannic acid, and iodine (14). More recently, the use of a 4% sclerosing alcohol injection has been reported as a possible alternative treatment for intermetatarsal neuroma (5, 13). Dockery examined 100 adult patients with previously untreated intermetatarsal neuroma, giving 3 to 7 injections of a 4% sclerosing alcohol solution every 5–10 days (5). The numbers of injections was based on patient response to treatment. Patients were asked to rate their symptoms at the initial visit, and were asked again as the treatment protocol proceeded. Thirteen patients had 3 injections, 19 patients had 4 injections, 18 patients had 5 injections, 11 patients had 6 injections, and 39 received 7 injections. Eighty-two of the 100 hundred patients studied reported 100% improvement from their pretreatment state, 7 reported improvement from 60%–85%, and 11 patients had no improvement (5). The 11 patients who failed the sclerosis therapy subsequently underwent neuroma excision. However, this study was limited to previously untreated neuromas, which may be inherently more responsive to the treatment.

The current study prospectively followed a small pilot group of subjects receiving sclerosing alcohol therapy with a minimum 10-month follow-up. This patient population was followed in a prospective manner to correlate pre- and posttreatment pain levels, duration of symptoms, amount of therapeutic relief obtained, and overall patient satisfaction. The average reported improvement was 73% at final follow-up. This high success rate was achieved on recalcitrant neuromas that had failed other conservative measures. This rate is comparable to open resection and/or neurolysis of Morton's neuroma but with less risk, cost, and time to recovery.

A weakness of this study is the small number of patients. However, this was intended to be a limited pilot study to determine the efficacy of this treatment before proceeding with a larger number of patients. The small number of patients also resulted from a finding that some prospective subjects were unwilling to complete a dictated possible regimen of 9 weekly injections.

Had our patient population been larger, the distribution of the intermetatarsal neuroma may have been more consistent with the expected prevalence of a third intermetatarsal space location. Nevertheless, the location of each neuroma was based on a thorough clinical examination. Another limitation of this study was the use of multiple evaluators. This increases the subjectivity of the clinical examination and establishment of the diagnosis. Each examiner was careful to differentiate intermetatarsal neuroma from joint capsulitis or nonspecific metatarsalgia. It would have been optimal to narrow the diagnostic criteria to some interdigital sensory deficit, yet this finding is not uniformly present in patients

with intermetatarsal neuroma. Even though some degree of error is possible in a clinical examination, these techniques are commonly practiced to establish the clinical diagnosis.

This study suggests that sclerosing alcohol injections may be just as effective for previously treated neuromas as in "virgin" nerve tissue (5). Future prospective, controlled double-blinded studies are needed to obtain credible results and increase the strength and confidence of the statistical outcomes of a potentially useful treatment.

Conclusion

The current pilot study showed a mean subjective success rate of 73% at an average follow-up of 11 months with a series of weekly 4% sclerosing alcohol injections for treatment of recalcitrant intermetatarsal neuromas.

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