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Sahil Shah
DO, PGYI, Larkin
Community Hospital, Hialeah,
FL, USA

Neal Malhotra
OMSIII, Lake Erie College of
Osteopathic Medicine,
Bradenton, FL, USA

Alexander Blanca
OMSIII, Nova Southeastern
University Kiran C. Patel
College of Osteopathic
Medicine, Ft. Lauderdale, FL,
USA

Shauna Patel
OMSIII, Lake Erie College of
Osteopathic Medicine,
Bradenton, FL, USA

Richard J Rivera
MSII, USF Health Morsani
College of Medicine, Tampa,
FL, USA

Manuel Orozco
DO, PGY II Larkin
Community Hospital, Hialeah,
FL, USA

Corresponding Author:
Sahil Shah
DO, PGYI, Larkin
Community Hospital, Hialeah,
FL, USA

A case report of usage of luminex 500 in treatment of stump neuroma

Sahil Shah, Neal Malhotra, Alexander Blanca, Shauna Patel, Richard J Rivera and Manuel Orozco

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Abstract

Background: A stump neuroma is a possible sequelae of any surgery where a nerve is cut, or in this case specifically, when a neuroma is removed. It is due to the nerve's attempt to regenerate, however, without the Schwann cells intact, the nerve grows sporadically in a bulb like fashion causing significant localized pain.

Case Presentation: A 23-year-old male presented to the clinic with shooting pain in his right foot and was diagnosed with both a Morton and Hauser neuroma. Conservative treatment modalities and glucocorticoid injections were unable to resolve the pain in the neuromas, leading to surgical removal which provided temporary relief. Following the surgery, the patient presented with similar pain just proximal to the incision site, which was diagnosed as a stump neuroma. After an unsuccessful trial of conservative treatment, the patient was successfully treated with Luminex 500 laser therapy, and was able to return to normal activities of daily living.

Discussion: Treatment of nerve injuries such as a stump neuroma may be more adequately treated with the use of Low Level Laser Therapy such as the Luminex 500. However, more research is needed to determine which laser parameters must be set for optimal treatment of nerve injuries. It is important for clinicians to keep laser therapy in mind when determining treatment of a stump neuroma, or other nerve injuries.

Keywords: Morton's, stump, laser, luminex, plantar, neuroma

Introduction

A stump neuroma is a post-surgical complication of a neuroma removal. It is described as a non-neoplastic proliferation at the end of a cut nerve [1]. This growth forms as a bud-like structure and causes a tingling and painful sensation, especially upon percussion. After resection of a neuroma, the stump of the nerve will attempt to grow back, but without the Schwann cells, the nerve grows sporadically. There are treatments for nerve pain such as Gabapentin, Pregabalin, Tricyclic antidepressants, Steroid injections, physical therapy, and orthotics [2]. A newer treatment modality for stump neuroma is Low Level Laser Therapy, where a 10mW to 500mW laser with a wavelength within the visible red light spectrum is used to cause photochemical changes in the nerve, preventing further growth and pain. The Luminex 500, a laser with the power of 500 mW, is used because it is the strongest laser that can be used without burning skin. Over a period of time, the laser treatment will cause inhibition of the axonal action potentials, thus stopping the noxious stimulus the brain had been receiving [3]. The benefit of laser treatment is that there is no thermal or radiation damage to the surrounding tissue, thus, there will be no scar tissue formation. The current risks include potential ocular damage due to divergent beams, however, the risk diminishes with greater distance. Thus, in the case of treating a stump neuroma on the dorsal surface of the foot, the risk of ocular damage is minimal.

Case

A 23-year-old male with no past medical history presented with complaints of shooting pain in his right foot for three weeks. The patient complained of constant pain even while at rest. The patient does not wear heels and is a first-year medical student. In December, they were diagnosed with a right plantar foot injury. Even though the X-ray was negative for pertinent findings, they were placed in a cast for six weeks.

After the removal of the cast the patient still had sharp and shooting pain, along with newly presenting numbness.

The patient was given a tapering Medrol dose pack for a potential pinched nerve. Still unresolved, the patient was fitted for custom orthotics, which provided minimal relief.

After two months, the patient returned, as the pain was still present. They were given three cortisone shots at the spaces between the first and second metatarsal, second and third metatarsal, and third and fourth metatarsal. The pain subsided for six weeks before it returned. On return to the clinic, the patient underwent an MRI that showed a second webspace and third webspace neuroma, along with intermetatarsal bursitis. The patient was then given a sclerosing injection of alcohol and lidocaine, followed with a steroid injection. These injections provided relief for two months before the pain returned. At this point, the decision was made to undergo surgery for removal of these neuromas. The second webspace neuroma was 8x6 mm and the third webspace neuroma was 3x2 mm in size. Following the procedure, the patient participated in outpatient physical therapy for four weeks and was able to resume normal activities without discomfort.

The patient returned four months later complaining of similar pain and symptoms, however, now located proximal to the incision site. The patient was given a cortisone injection, which provided relief for two months. After returning to the clinic, the patient was given another cortisone injection along with a new pair of custom orthotics. After having relief for only one month, the patient was diagnosed with stump neuroma, as the patient was having shooting and radiating neuropathic pain proximal to the surgical site of the neuromas. The patient started laser therapy with the Luminex 500 once a week for two and a half months. This treatment provided significant relief of the pain and the patient was able to return to their normal activities of daily living.



Image 1: T2-weighted MRI that shows a white ovoid enhanced lesion in the second intermetatarsal space, which is typical of a neuroma.



Image 2: T2-weighted MRI showing enhancement in the second and third intermetatarsal spaces, which is significant for neuromas.

Discussion

The significance of this case is in the innovative use of Low Level Laser Therapy to treat stump neuroma. Stump neuromas are seen to develop in about one-third of patients who undergo a neurectomy, a removal of the Morton's neuroma [4]. This case also displays the effectiveness, or lack thereof, of curative treatment modalities for metatarsal webspace neuroma and stump neuroma, while displaying the importance of further development of laser therapy, especially in the setting of neuropathic pain. Immediate treatment of the neuroma with laser therapy may prevent the stump neuroma from ever having the opportunity to develop. Laser therapy may be used for other forms of nerve injuries, such as after an amputation, as amputees typically suffer from neuropathic pain. Low Level Laser Therapy may also be used to reduce tenderness at muscle trigger points, reduce edema/inflammation at lymph nodes, and promote healing at sites of injury [5]. Low Level Laser Therapy has been deemed a useful therapeutic method with a high degree of capacity for progression in the future. However, there are still a lack of outlines on laser detail and energy density parameters for the treatment of neuropathic pain [6]. As John Stump stated, the "Luminex 500 laser may be an effective medical alternative for those searching for treatment options" for a Morton's neuroma [3]. Another potential treatment of a stump neuroma is nerve capping after neurectomy, a procedure that attempts to contain the nerve after it has been operated on [4]. While it has been shown to reduce the pain and sensitivity associated with a stump neuroma, nerve capping is invasive and may not be as effective in the long term as Laser therapy may be.

Conclusion

The patient's neuropathic pain was associated with stump neuroma after surgical resection of two neuromas. Although the patient underwent many treatments, the modalities did not target the root cause of the neuropathic pain but rather only treated the symptoms. It is important for clinicians to discuss Low Level Laser Therapy with patients that have neuropathic pain as it seems to target the root cause of the symptoms. There is a limited amount of literature on Low Level Laser Therapy and its use for treating neuropathic

pain and other neurological problems. Due to the significant hindrance neuropathic pain causes patients in their everyday lives, further research to explore the use of Low Level Laser Therapy for neuropathic pain should be conducted.

Conflict of Interest: The authors declare no conflict of interest.

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