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Radiofrequency Ablation of Palmar Digital Branches of Ulnar Nerve in a Patient with Ulnar Neuropathy

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Abstract

Ulnar Tunnel Syndrome (UTS) is ulnar neuropathy at the wrist or hand typically caused by ganglion cysts, lipomas, wrist or hand compression, carpal bone fractures, carpal tunnel syndrome, or anything else that can impinge on the nerve. The symptoms of UTS can be uncomfortable and debilitating, with numbness and tingling of the 4th and 5th digits being the most common. Weakness of the ulnar portion of the hand can lead to decreased grip strength. UTS is typically managed with conservative treatment including anti-inflammatory oral medications, splinting, physical therapy, activity modification, acupuncture, and stretching. Second line treatment includes corticosteroid injections, although these have shown to have little efficacy. Surgery is also an option but may lead to iatrogenic ramifications. Radiofrequency ablation (RFA) is a treatment modality used for chronic pain, which utilizes heat to target nociceptive fibers. Traditionally, RFA is used in treating cervical and lumbar radiculopathy, but it is less studied in peripheral nerve areas.

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This case report examines a patient who had clinically significant pain relief after RFA to the palmar digital branches of the ulnar nerve. The patient was 63-year-old male who presented with left ulnar neuropathy that had been ongoing for 3 years. Despite conservative management, his symptoms of pain, paresthesia, and weakness persisted. The patient then elected to have a left cubital tunnel release at the elbow with anterior subcutaneous transposition. The surgery provided relief for three months but then led to worsening contractures and pain in the 4th and 5th digits of the left hand. Due to persistent symptoms after conservative management and surgical intervention, he was referred to interventional pain clinic. A decision was made to trial a digital nerve block of the left medial and lateral digital palmar nerves. Following the nerve block, the patient reported 100% improvement in pain and increased range of motion and function. Four weeks later, the patient returned for a radiofrequency ablation of the same nerves. In the week following the procedure,

Seigel C | Volume 1; Issue 3 (2023) | Mapsci- JRPM-1(3)-016 | Case Report **Citation:** Salingaros S, Potturi S, BandaruS, Suri P, Chhatre A. Radiofrequency Ablation of Palmar Digital Branches of Ulnar Nerve in a Patient with Ulnar Neuropathy. J Rehab Pain Med. 2023;1(2):141-147 **DOI:** https://doi.org/10.37191/Mapsci-JRPM-1(3)-016 the patient reported that the pain in the little finger was entirely resolved. While radiofrequency ablation has become increasingly popular for the treatment of chronic back pain, its use in peripheral nerve pain has been limited to case reports and few randomized control trials. This case report highlights the successful use of radiofrequency ablation in the treatment of little finger pain and ulnar neuropathy by targeting the median and lateral branches of the palmar digital nerve.

Keywords: Radiofrequency; Ulnar neuropathy; Weakness; Chronic pain; Ulnar tunnel syndrome.

Introduction

Ulnar Tunnel Syndrome (UTS) is ulnar neuropathy at the wrist or hand typically caused by ganglion cysts, lipomas, wrist or hand compression, carpal bone fractures, carpal tunnel syndrome, or anything else that can impinge on the nerve [1]. Disruption of the nerve can lead to inflammation, microvascular alteration, fibrosis, and eventually demyelination [2].

The ulnar nerve arises from the brachial plexus at C8 and T1 with both sensory and motor components [2]. It traverses through the cubital tunnel at the medial epicondyle of the humerus and through Guyon's canal at the wrist [2]. At Guyon's canal, the nerve will split into sensory and deep motor components [3]. Distal to the pisiform bone, the superficial cutaneous branch gives off two palmar digital branches [3].

The medial branch is the proper palmar digital nerve which provides sensation to the medial side of the little finger [4]. The lateral branch is the common palmar digital branch which splits and provides sensation to the lateral side of the little finger and medial side of the ring finger [4]. Damage to these branches may not correlate with clinical symptoms due to the arrangement of the nerve as it traverses throughout the hand and the discrepancy of fascicle involvement, which can make localizing and treating the lesion a challenge [3,5].

The symptoms of UTS can be uncomfortable and debilitating [2]. Numbness and tingling of the 4th and 5th digits are the most common symptoms [3]. Patients can also experience decreased grip strength due to the resulting weakness from the intrinsic hand muscles [1]. Although not necessary for diagnosis, electrodiagnostic studies can be used to assess severity of neuropathy and can help guide provider decision making for treatment plans [2]. Imaging with MRI and Ultrasound can also be used to detect ulnar lesions leading to symptoms [2].

UTS is typically managed with conservative treatment first [4]. This may include antiinflammatory oral medications, splinting, physical therapy, activity modification, acupuncture, and stretching [2]. Second line treatment includes corticosteroid injections, but studies show no beneficial effects with the use of steroid injections in Guyon's canal [1]. Surgery is also an option but may lead to iatrogenic ramifications [6]. Radiofrequency ablation (RFA) is a treatment modality used for chronic pain [7]. The technique uses heat to target nociceptive fibers [8].

There are many reports examining RFA use in treating cervical and lumbar radiculopathy, but it is less studied in peripheral nerve areas [9]. This case report examines a patient who had clinically significant pain relief after RFA to the palmar digital branches of the ulnar nerve.

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Case Report

We report a case of a 63-year-old male with a past medical history of diabetes mellitus, hypertension, and metastatic pancreatic cancer with left ulnar neuropathy that developed three years ago in the ICU for COVID treatment. Symptoms included pain in the proximal left forearm, left palm, and left ring/small fingers. Mostly notably, the patient reported left ring and small finger paresthesia associated with weakness with finger abduction. Despite bracing, occupational therapy, and trialing oral medications such as Cymbalta, Gabapentin, and nonsteroidal anti-inflammatories, the symptoms persisted. After two months of conservative treatment, the patient received a left cubital tunnel release at the elbow with anterior subcutaneous transposition. The surgery provided relief for three months but then led to worsening contractures and pain in the 4th and 5th digits of the left hand.

After three years of intractable pain interfering with activities of daily living and refractory to conservative and surgical management, the patient was referred to the interventional pain clinic. At time of evaluation, he noted severe, burning, 9/10 pain in the left palmar 5th digit described as "fire" and "pins and needles". He was unable to make a fist or move his hand without increasing the discomfort.

Physical exam revealed a flexion contracture of left 4th and 5th digits, positive Tinel at the left elbow, and hypersensitivity to light touch on the palmar aspect of the 5th digit. The 5th digit was unable to flex or extend due to pain. A recent EMG was significant for left ulnar neuropathy at the left elbow. A decision was

made to trial a digital nerve block of the left medial and lateral digital palmar nerves using 1 mL of 0.5% bupivacaine and 1% lidocaine. Following the nerve block, the patient reported 100% improvement in pain and increased range of motion and function, being able to hold a grip and make a fist with the hand. Four weeks later, the patient returned for a radiofrequency ablation of the same nerves. The first 20-gauge 100 mm radiofrequency cannula was placed in the interdigitary space of the 4th and 5th digits of the left hand. The second 20-gauge 100 mm radiofrequency cannula was placed proximal to the metacarpophalangeal joints of the lateral aspect of the left 5th digit. Radiofrequency probes were then inserted into the cannulas. Then, 1 mL of 1% lidocaine was injected. Next, a continuous lesion was applied for 90 seconds at variable temperatures maintained above 70 degrees Celsius. The procedure was well-tolerated with no complications and the patient was discharged home after reporting significant pain relief. In the week following the procedure, the patient reported that the pain in the little finger was entirely resolved.

Discussion

Radiofrequency ablation (RFA) was developed for the treatment of chronic pain in the lumbar facet joints [10]. Using RFA is a minimally invasive and relatively safe way to symptomatically reduce nerve pain in the spinal areas [7].

This treatment modality utilizes heat to target C and A-delta nociceptive fibers to interrupt axon potentials and hopefully desensitize nerve fibers to pain [11]. Conventional thermal radiofrequency at 60-

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Despite increasing utilization of RFA for treatment of peripheral neuropathy, there is a lack of literature on its use for digital palmar nerve pain. However, there are few reports of its use in the treatment of digital plantar nerves. In the treatment of Morton's neuroma with RFA, significant pain reduction was noted with pulsed or continuous treatment into the neuroma [13]. Connors et al. demonstrated overall pain reduction and high success score after one procedure of ultrasound RFA for treatment of interdigital neuromas [14]. However, the use of large, randomized control trials for the use of RFA in plantar digital nerves is necessary as many reports have short follow up (less than one year) and post-intervention complications [15]. Ulnar tunnel syndrome is a cause of wrist pain, numbness, and weakness that can be due to compression of the nerve at three different zones [1]. Zone one compression occurs proximally or at Guyon's canal [1]. At Guyon's canal, the ulnar nerve has not been bifurcated yet, so there are both motor and sensory fibers. Zone two and three compressions occur distally to the bifurcation and affect the motor and sensory fibers, respectively [1]. Symptoms of UTS can be difficult to localize and treat. Non-operative treatment of UTS has little evidence of its effectiveness, although, activity modification has been shown to be clinically beneficial if the syndrome is related to repetitive movement [2]. Surgery can be useful if there is a lesion causing compression, but it can lead to iatrogenic consequences such as injury to surrounding structures, wound infections, edema, pain, and persisting symptoms [6]. This case report presents a patient with severe ulnar neuropathy refractory to multiple treatment modalities. After nerve blocks and ablations of the lateral and medial digital nerves of the fifth digit, the patient had full symptomatic relief without side effects. The use of RFA in peripheral ulnar neuropathy may be a safe and beneficial alternative to other treatments [16] and should be considered when discussing different treatment options with patients.

Conclusion

Ulnar neuropathy at the elbow and wrist results in mixed clinical presentations that often include painful neuropathy of the 4th and 5th fingers, as well as hand weakness. While radiofrequency ablation has become increasingly popular for the treatment of chronic back pain, its use in peripheral nerve pain has been limited to case reports and few randomized control trials. In fact, to our knowledge, there exists nearly no report of peripheral neurolysis of the digital sensory nerves for the hand. This case report successful highlights the use of radiofrequency ablation in the treatment of little finger pain and ulnar neuropathy by targeting the median and lateral branches of the palmar digital nerve.

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