Traumatic Neuroma of the Median Nerve: A Case Report

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ABSTRACT

Peripheral nerve neuromas are growths that develop after nerve trauma, which can result in enlarged and painful nerve ends when severed. Treatment of neuromas that form within a continuous nerve is controversial; however, success has been reported after general neurolysis with decompression of the nerve after its isolation from the surrounding scar bed. We describe a 21-year-old man who presented with symptoms of pain and intermittent numbness in his left elbow. Findings of high-resolution magnetic resonance imaging and ultrasound confirmed the diagnosis of median nerve neuroma at the level of the forearm. He subsequently underwent neurolysis with protective nerve wrap, with complete resolution of symptoms at 6 weeks postoperatively. Surgeons may consider this surgical option in treating patients with neuromas that form within a continuous nerve.

Keywords: Traumatic Neuroma, Median Nerve, Nerve Wrap, Neuroma Surgery

INTRODUCTION

Peripheral nerve neuromas develop as a result of nerve trauma. If severed, the traumatically injured nerve will continue to grow, resulting in an enlarged nerve end that can cause pain after light stimulation. The distal nerve segment undergoes Wallerian degeneration, in which the nerve axon dies and the nerve epineurium remains. Unfortunately, treatment of neuromas is challenging. One treatment option is excising the neuroma and rerouting both the nerve ends and burying them in tissue (eg, muscle or bone); however, this form of treatment has a high failure rate. Newer forms of treatment such as targeted muscle reinnervation and allograft nerve reconstructions have shown success in preventing recurrence.

Neuromas in continuity are a more difficult problem. In this situation, the nerve is damaged but not severed. The neuroma forms within a continuous nerve.[1,2] This injury does have the potential to heal, particularly in young children. The management is controversial, but improved outcomes have been noted after low-risk neurolysis with decompression of the nerve followed by isolation of the nerve from the surrounding scar bed.[3] We describe the case of median nerve neuroma at the level of the forearm. Diagnosis was ultimately confirmed by findings of high-resolution magnetic resonance imaging (MRI) and ultrasound.

CASE REPORT

A 21-year-old man was referred to our clinic with elbow pain that had been gradually increasing for years. The patient was employed as a mechanic and had a palpable, extremely tender, left anterior elbow mass that had grown in size during the previous 5 years. The patient had multiple congenital issues, most notably left-sided fibular hemimelia with a congenital short femur. He underwent previous amputation on the left lower extremity and proximal tibial epiphysiodesis. Other notable history included gastroschisis and a previous hernia. At 24 weeks of age, the patient underwent venous cutdown of symptomatic upper extremity in the neonatal intensive care unit. He had no history of schwannomas or peripheral nerve disease.

Upper extremity evaluation findings revealed palpable fullness in the left anterior antecubital fossa mass. He had a positive Tinel sign and reported considerable tenderness in the region. His nerve injury was classified as Seddon class II-III and Sunderland class V with complete sensation and motor function but chronic neuropathic pain. The patient had full range of motion; however, he had concerns of pain with elbow extension. Findings of low-resolution MRI found

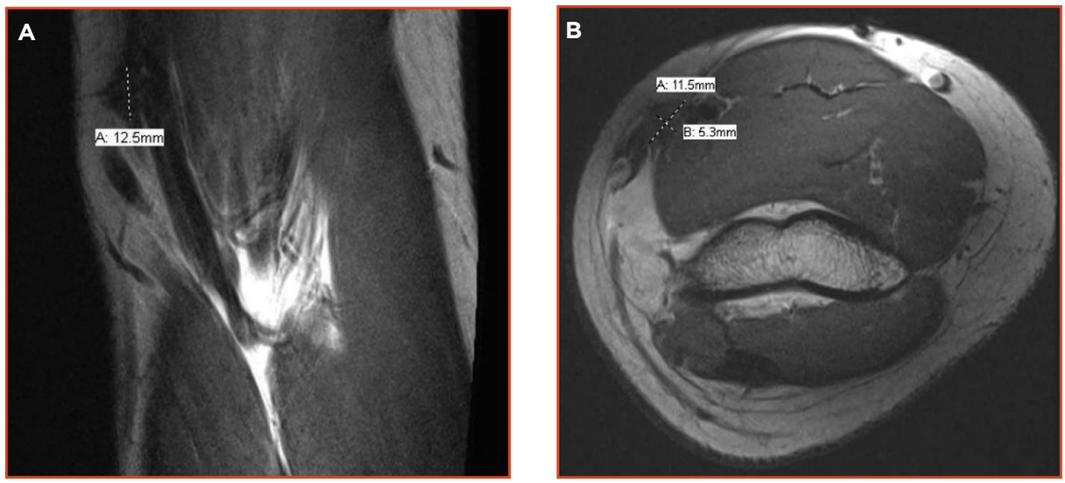

Figure 1. *High-definition 3 Tesla magnetic resonance imaging shows median nerve enlarged and surrounded by abnormal tissue. A) Sagittal view. B) Axial view.*

no abnormalities. An electromyography with nerve conduction study was performed, in which findings were normal. The patient described constant pain at the elbow aggravated by lifting. Nonoperative measures to eliminate symptoms such as bracing, activity modifications, therapy, and avoidance of bothersome activities had all failed.

At this point, a high-resolution 3 Tesla MRI was obtained. Findings showed subtle abnormality of the median nerve (Figures 1A and 1B). Owing to persistent and worsening pain that failed nonoperative management, surgical nerve decompression was recommended.

Preoperatively, the anesthesia team localized the mass using ultrasound before the administration of nerve block. The median nerve was identified in the upper arm, proximal to the antecubital fossa, and traced to the distal forearm. A 15-MHz linear probe was used to image these structures. The median nerve appeared to be in continuity under ultrasound; however, there was evidence of hyperechoic tissues surrounding the median nerve at the level of the antecubital fossa, which was suggestive of dense scar formation (Figure 2).

The median nerve was explored at the antecubital fossa by an oblique incision extending distally from the transverse venous cutdown scar. When the scar was encountered, the median nerve was identified distal and proximal to the zone of injury. Outside the zone of injury, the nerve was normal in turgor, color, and girth. Careful dissection was performed through the zone of injury (Figure 3). The nerve was abnormal, encased in scar, and adherent to surrounding tissue. It did not have any glide capacity owing to the severe scarring. Neurolysis was then performed, in which the median nerve was wrapped with a nerve wrap made of decellularized porcine gut mucosa. This was done to protect the nerve from the surrounding scar bed using an AxoGuard (Axogen, Alachua, FL) to promote nerve gliding.

At 2 weeks postoperatively, he reported considerably diminished intensity of shooting pains and frequency. A negative Tinel sign was observed at the surgical incision site. At 8 weeks postoperatively, he had complete resolution of symptoms and planned to resume his automotive technician training.

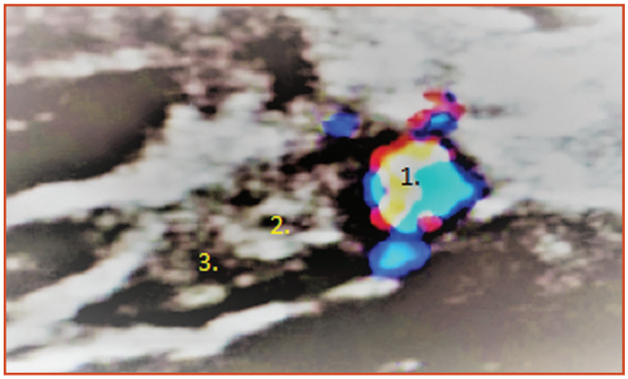

Figure 2. *Ultrasound scan identifying 1) brachial artery lateral to the median nerve, 2) median nerve at the antecubital fossa, and 3) abnormal tissue partially circumscribing median nerve.*

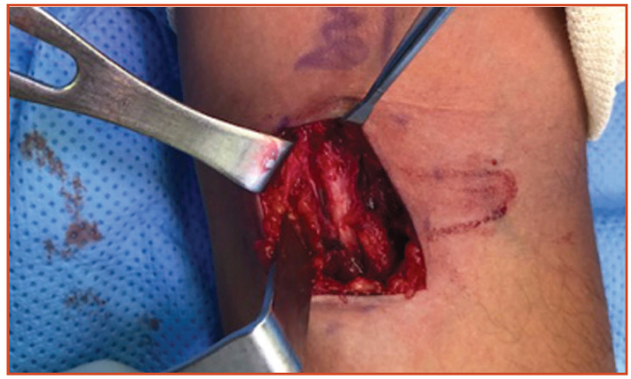

Figure 3. *Intraoperative exploration of the median nerve.*

DISCUSSION

Traumatic neuromas form as a result of nerve regeneration after an injury.[4] Neuromas typically form within months of surgical procedure and have the potential to grow indefinitely.[5] Both MRI and ultrasound findings are important to confirm diagnosis. Because a low-resolution MRI may not show the cause, it is best to utilize high-resolution MRI for evaluation of nerve injury. Treatment options include nerve stabilizing medication, therapy for desensitization of the nerve, protection of the area, and surgical decompression from the surrounding scar bed.[6]

Surgical treatment includes neurolysis with isolation of the nerve from the surrounding scar bed. This can be accomplished with a nerve protector that surrounds the damaged nerve and minimizes nerve rescarring.[7] Souza et al[8] showed that this method significantly affected patient outcomes with a decreased mean ordinal pain score of 2.6. Before nerve wraps were available, autograft vein was utilized to protect the nerve from the surrounding scar bed and to prevent nerve adherence to surrounding tissues. This method is still utilized. Both vein wraps and conduit wraps provide isolation of the nerve from the surrounding scar bed.[9] The conduit graft has the advantage of not requiring a second surgical procedure. In the current case, findings from patient history, MRI, and ultrasound scans all led to the diagnosis of traumatic neuroma after venous cutdown at age 24 weeks. Surgical decompression and nerve wrapping successfully eliminated pain.[10,11] Notably, the problem in this case was most likely the inability of the nerve to glide due to adherence to surrounding scar tissue. The symptoms were most severe with elbow extension.

In patients with neuropathic pain yet fully functioning nerves, early decompression of the nerve with isolation from surrounding scar tissue may lead to resolution of the pain. In the current case, the patient had symptoms since age 7 years (per the patient's recollection) and was finally treated for this problem at age 21. Once treated, he had complete resolution of symptoms by 8 weeks postoperatively. Surgeons should consider the benefits of high-resolution MRI and this technique in treating patients with traumatic neuroma.

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