Novel Use of Botulinum Toxin Injection for Treatment of Chronic Regional Pain Syndrome: A Case Report

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CASE DESCRIPTION

A 62-year-old female with a history of severe pain, pins and needles sensation, and allodynia in the left (L) distal posterior thigh extending into the lateral leg and ankle presented after a tenosynovectomy of the peroneal tendon. Pain significantly limited her mobility and ability to complete ADLs. After extensive imaging and examination, she was diagnosed with a peripheral nerve injury of the peroneal portion of the sciatic nerve believed to be secondary to tourniquet effect during her tenosynovectomy. For pain relief, she followed up with regenerative medicine physicians who tried platelet rich plasma injections (lysate included), cortisone injections, stem cell injections, Synvisc injections without relief. Other interventions for pain control included a microfracture procedure of an osteochondral lesion, hydro-dissection of the peroneal nerve within the popliteal fossa, peroneal tendon debridement, peroneal groove deepening, and bone marrow aspirate injection. Trialed medications included clonidine patch, Cymbalta, amitriptyline, and high dose gabapentin. None provided benefit or were not tolerable.

MANAGEMENT

The patient has undergone two visits where she received subcutaneous Xeomin injections of the L foot/ankle with injection sites guided by the patient's localization of areas of maximum discomfort. After the first visit, she noted significant improvement in cramps in medial leg, but continued sensitivity in lateral leg and foot. The second session focused on these areas with noted improvement in her discomfort as well as improvement in ability to dorsiflex previously contracted toes; however, she now notes increased pain in posterior thigh proximal to the popliteal fossa. She denied any weakness, falls, foot drop, or other adverse effects after each injection. The patient reports that she is happy with the results so far and would like to continue with this regimen. Alongside injections, the patient underwent a short course of physical therapy for desensitization program after injections and Carbamazepine 100mg twice a day to manage positive neuropathic symptoms.

REFERENCES

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Timeline	Visit Summary
Baseline – Week 0 Symptoms	○ Hypersensitivity, tightness and pain in L lower extremity with radiation from distal posterior thigh down lateral lower leg to L ankle ○ Pulling sensation in L ankle with walking
1st Visit – Week 0 Physical Exam	• Hypersensitivity on the anterior shin and dorsum of the L foot • Tenderness to palpation over the L posterior tibial tendon • Pain with L ankle inversion
1st Visit – Week 0 Intervention	Patient given 50 units in 10 divided doses at 5 units/0.1ml of Xeomin per injection ➢ 8 injections (40 units) at medial ankle and foot ➢ 2 injections (10 units) at lateral ankle
Follow Up – Week 12 Symptoms	○ Return of medial foot cramping ○ Increased sensitivity in web of L 1st and 2nd toes, L lateral lower leg, and dorsum of L foot ○ Overall decreased pain than baseline
2nd Visit – Week 20 Physical Exam (5 months)	• Tenderness to palpation at tarsal tunnel • Positive Tinnel's with tapping at superior popliteal fossa with radiation of symptoms down L lower leg • Positive Tinnel's with tapping at fibular head with radiation of symptoms down L lower leg into 1st toe
2nd Visit – Week 20 Intervention	Patient given 65 units in 13 divided doses at 5units/0.1ml of Xeomin per injection ➢ 8 injections (40 units) at medial ankle and foot ➢ 4 injections (20 units) at lateral ankle ➢ 1 injection (5 units) at 1st and 2nd interdigital web of L foot
Follow Up – Week 24 Symptoms	○ Mild ankle weakness improved with L lower extremity AFO ○ Continued pain in lateral lower leg ○ Increased pain in posterior thigh ○ Improvement in pain along medial LLE ○ Improvement in ability to dorsiflex 3rd-5th digits of L foot

Table 1. Summary of patient's clinical progression with botulinum injection intervention

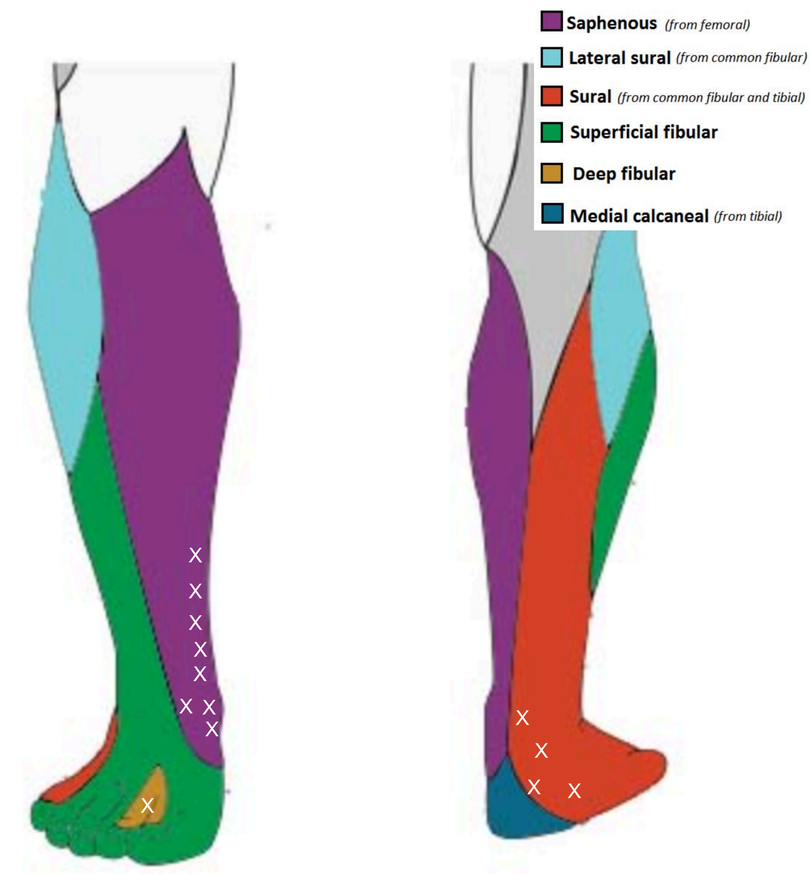

Figure 1. Sensory innervation of lower leg with injection locations marked

DISCUSSION

Botulinum toxin is a neuromuscular blocking agent that inhibits the formation of the SNARE protein complex, which coordinates vesicle fusion at the presynaptic membrane and subsequent neurotransmitter release. While widely used for spasticity, it is also understood to be beneficial for pain and is FDA approved for migraines. In regards to chronic pain symptoms, it is currently widely used for diseases such as myofascial syndrome, headaches, cervical dystonia, cerebral palsy, and spasticity through the reduction of aberrant muscle contraction. Animal models have demonstrated that botulinum toxin can also relieve pain through decrease of peripheral and central sensitization. After tissue injury, inflammatory mediators present induce the expression of transient receptor potential channels that causes sensitization of the peripheral nociceptor. Botox is capable of blocking the fusion of vesicles containing TRP channels to reduce this sensitization. It may also be transported in retrograde to the spinal cord where it blocks the release of pain-modulating neurotransmitters such as glutamate, substance P, and calcitonin related peptide allowing for a decrease in central pain production. These mechanisms point to the possibility of using botulinum toxin as an effective treatment for neuropathic pain and other pain syndromes not induced by an underlying muscular etiology.

CONCLUSION

This case shows the effectiveness of botulinum injections in the treatment of neuropathic pain in chronic regional pain syndrome. The injections used were placed subcutaneously to minimize the risk of muscle weakness as well as to target the sensitized sensory nerves contributing to the patient's neuropathic pain. Although safety and efficacy of botulinum injection for chronic pain requires more investigation, it should be considered for those with refractory pain.