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Botulinum toxin A for treatment of chronic exertional compartment syndrome in a collegiate lacrosse player in context of a failed compartment release

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Background

- Chronic exertional compartment syndrome (CECS) is a painful condition that is often underdiagnosed and can be difficult to treat.
- CECS can occur in both the upper and lower extremities, but more commonly in the lower extremity.
- Evaluation of CECS requires a thorough history and physical with diagnostic confirmation using needle manometry to assess for high intramuscular pressures.

Clinical Case

- A 19-year-old female collegiate lacrosse player with history of injury to the right ACL and chronic right knee pain presented for evaluation of worsening burning bilateral calf pain, limiting her ability to participate in her sport.
- Compartment testing revealed elevated post-exercise pressures in all four compartments of each lower leg and the patient was diagnosed with CECS.
- The patient elected for bilateral four compartment release followed by a course of physical therapy.
- Six months later, she returned to clinic with continued bilateral lower leg pain on exertion.
- At this time, using sonographic guidance, 200 total units of botulinum toxin A were injected in both legs (medial and lateral heads of the gastrocnemius, soleus, posterior tibialis, and flexor digitorum longus) one month apart with significant improvement in her symptoms 2 months after botulinum toxin injection.
- This improvement is sustained at 14 months.

Clinical Features/Imaging

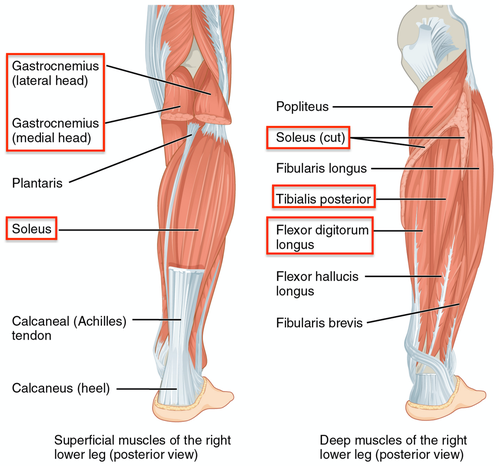

Figure 1. Muscles selected for injection with botulinum toxin A
Given the patient was experiencing higher pressures in her posterior compartments, muscles from the superficial and deep posterior compartments were selected for injection, highlighted in image.
Source: Wikimedia Commons

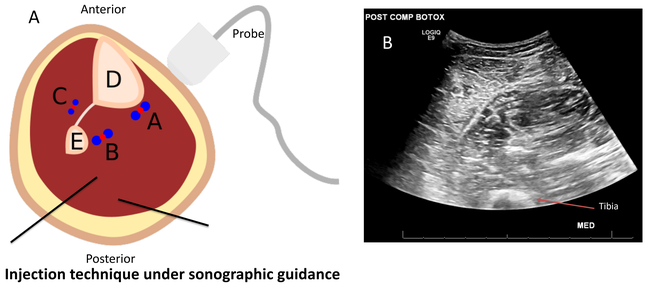

Figure 2. Injection technique under sonographic guidance
(A) Gross anatomical approach to posterior compartment injection (black solid lines). Under ultrasound guidance, careful attention should be taken to avoid vascular structures, depicted above. (A. Posterior tibial artery/vein, B: Fibular artery/vein, C: Anterior tibial artery/vein, D: Tibia, E: Fibula)
(B) With the patient in prone position, a 9-2 MHz curve linear array transducer was used to localize the left gastrocnemius and soleus muscles in anatomic transverse view (depicted above). 20U of botulinum toxin were delivered to 5 areas in the proximal aspect and 5 areas of the distal aspect of of the medial and lateral heads of the gastrocnemius, soleus, posterior tibialis, and flexor digitorum longus.

Discussion

- Fasciotomy or fasciectomy are considered the gold standard surgical treatments for CECS; however, postoperative recurrence rates can be as high as 19% in both adult and pediatric patients
- In cases of CECS refractory to surgical release, botulinum toxin A injection can provide extended periods of symptomatic relief.
- The exact mechanism is unknown but can be postulated to be due to denervation-induced atrophy of the muscles within the compartment.

Conclusion

- Although operative intervention is considered to be the curative treatment for CECS, recurrence is common.
- Botulinum toxin A was helpful as a salvage and can be consider in cases of failed compartment release.

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