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CASE REPORT

Botulinum toxin as an adjunct for severe Dupuytren's contracture treated with collagenase injections

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ABSTRACT

Even with Dupuytren's proximal interphalangeal joint (PIPJ) contractures successfully released, volar flexor muscle memory can contribute to persistent contracture. We report using botulinum toxin (BoNTA) to the flexor digitorum superficialis muscle (FDS) to reduce flexor tone during recovery. **Case Description**. Two Collagenase clostridium histolyticum (CCH) injections were given to a patient with a -90° (PIPJ) contracture and a -35° degree distal interphalangeal joint (DIPJ) contracture. At the first CCH injection, 20 μ total of the Botulinum toxin was placed into the FDS muscle. Manipulation occurred at one week. A second injection of CCH followed by manipulation one week later occurred at two months, but no additional BoNTA was given. The final follow-up measurements at 53 months showed a PIPJ of -30° and a DIPJ of 0°. Total active motion improved from 140° to 240°. Outcomes of any treatment for severe Dupuytren's PIPJ contractures of the little finger are unpredictable and are often considered for staged external expansion or even salvage procedures. BoNTA injections weaken flexor tone in tendon repairs and for treating hypertonic muscles after strokes. **Conclusion**. We hypothesized that BoNTA injection could enhance the outcomes of DC treatment by inhibiting volar flexion forces during the recovery phase. The following case illustrates that using a BoNTA injection may have helped treat a severe PIPJ contracture. BoNTA injections need further research and controlled clinical trials to discover their proper role in Dupuytren's contractures treated via CCH injections, fasciotomies, and fasciectomies.

KEYWORDS: Dupuytren's contracture; Botulinum toxin; Severe proximal interphalangeal joint contracture

INTRODUCTION

Severe Dupuytren's contracture (DC) is the leading cause of elective finger amputation and often is treated with staged external expansion, complex proximal interphalangeal joint (PIPJ) releases, or salvage procedures [1,2]. Severe DCs treated with percutaneous needle fasciotomy (PNF), collagenase clostridium histolyticum (CCH) injections or fasciectomy are followed by therapy and serial splinting [3]. Barr et al. performed tenotomies of the flexor digitorum superficialis (FDS) for severe Dupuytren contractures to weaken flexor tone [4]. Botulinum toxin injections (BoNTA) result in a temporary dose-related paresis of skeletal muscle for approximately 12 to 16 weeks, and 25 μ (less in children) injected into muscles during flexor tendon repairs reduced flexor tone and improved results [5,6]. BoNTA injections have been used directly into Dupuytren's nodules and cords, improving hand function and relieving pain [7]. We hypothesized BoNTA injections could be an adjunct for treating severely contracted Dupuytren's PIPJ contractures, similar to its use for other upper extremity flexor problems. Direct Botulinum toxin injections into flexor muscles as an adjunct to reduce flexor tendon tone after treatment of DC contracture with PNF have already been presented [8]. This case report reports the use of BoNTA injection into the FDS muscle belly concurrent with a series of CCH injections and long-term follow-up.

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CASE DESCRIPTION

A previously untreated seventy-two-year-old male patient had right little finger DC extension/flexion measurements of 0/100 at the MCPJ, -90/100 at the PIPJ, and -35/65 at the DIPJ, total active motion TAM of 140 degrees; a Tubiana Stage III disease (Figures 1,2). FDS Tension could not be well-evaluated pre-treatment due to severe flexion contracture. The PIPJ cords were somewhat diffuse, and it was felt that CCH injections would achieve a better result than PNF treatment.

The patient's hand and forearm were prepped with alcohol chlorhexidine. A digital block was given to the little finger using three ccs of lidocaine with epinephrine 2% 1: 000,000, followed by five ccs of bupivacaine 0.5%. The collagenase was reconstituted with .4 cc of diluent, and five injection sites were placed along the ulnar aspect of the little

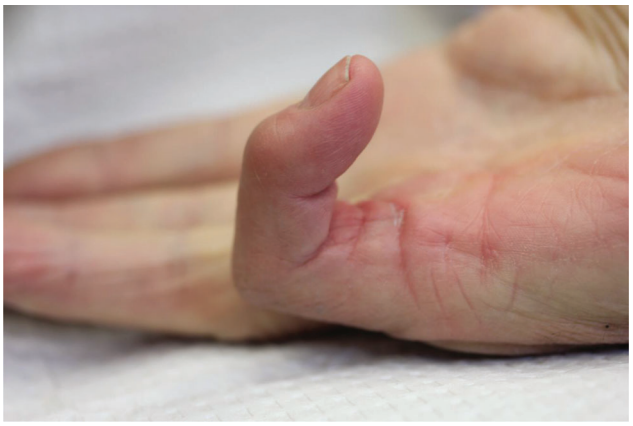

Fig. 1. Presentation with Dupuytren's contracture measuring -90° PIPJ and -35° DIPJ loss of extension.

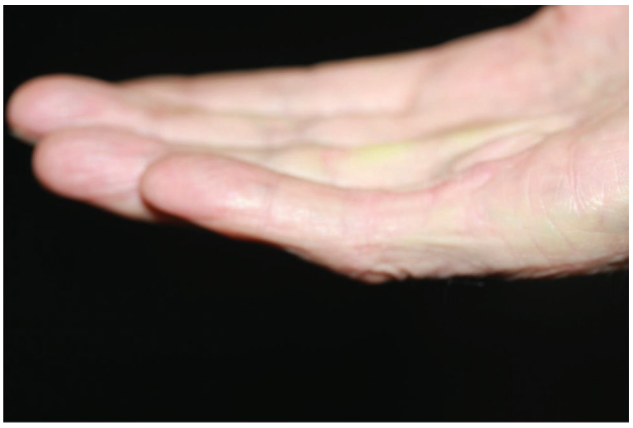

Fig. 3. Lateral view at 53 months showing -30° PIPJ contracture with full extension of the DIPJ and MCPJ.

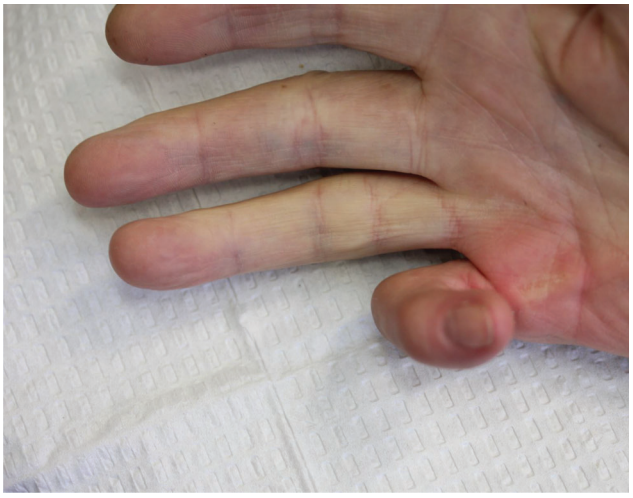

Fig. 2. A palmar view of a severe PIPJ and DIPJ Dupuytren's contracture.

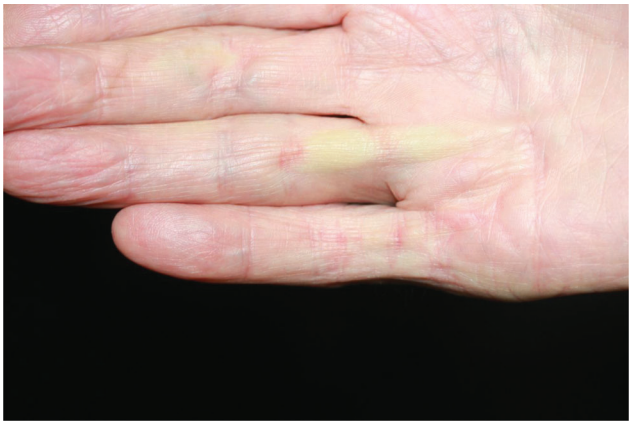

Fig. 4. The appearance of full extension with a residual -30° PIPJ contracture. He maintained full flexion at 53 months.

finger. Up to the PIPJ, 0.1 ccs was injected into three areas, and distal to the PIPJ, 0.05 cc was injected into two sites. A bulky dressing was applied.

The BoNTA was reconstituted in 2.5 ccs of bacteriostatic saline. 0.5 cc or 20 µ was drawn into a 1cc syringe, and 0.5 ccs of 2% plain lidocaine were added to make one cc total. This BoNTA was injected into the FDS proximal and mid-muscle belly, guided by anatomical landmarks and muscle palpation during flexion. The dose selected was similar to that used for protecting flexor tendon repairs [5,6].

One week later, the patient returned for manipulation. The hand was cleansed, and a digital block was performed with eight ccs of lidocaine 2% with epinephrine diluted to 1: 200,000. Manual manipulation was performed to straighten the finger, and a small 0.5 cm skin tear occurred just proximal to the PIPJ, and further manipulation was stopped. He was discharged with splinting and a home exercise program for all CCH patients. The patient returned at two months for a repeat CCH injection with the subsequent loss of extension measurements: 0° MCPJ, -65° PIPJ, and -15° DIPJ. Unfortunately, flexion, TAM, or muscle strength was not measured.

For the second round, it was considered that the BoNTA was still effective, no further BoNTA was injected, and unfortunately, FDS tension was not evaluated [9]. The patient himself noted no weakness. The hand was cleansed, numbed, and injected with CCH as before. One week later, local anesthetic manipulation achieved full clinical extension under anesthesia without skin tears. Again a splint was applied, and he was discharged with a home exercise program and nighttime splinting. At the eight-month follow-up from the first injection, the following measurements were noted: 0/100 MCPJ -30/105 PIPJ, a 66.7% improvement, and 0/65 DIPJ, a 100% improvement. TAM was 240, a 71.4% improvement. The following measurements were noted at four years and five months of follow-up; MCPJ 0/100, PIPJ -30/105, a 66.7% improvement, 0/60 DIPJ, a 100% improvement, and a TAM of 240, a 71.4% improvement (Figures 3 and 4).

CONCLUSION

It is felt but not proven that this additional BoNTA aided in extension during recovery and helped with the long-lasting CCH result in this patient. Generally, recurrences and poorer outcomes are expected with severe PIPJ contractures

after CCH [10,11]. BoNTA maximizes around two weeks and can be injected optimally before or during PNF, CCH, or fasciectomy procedures. With CCH, it can be administered at the time of the injections as it will take partial effect at the one-week follow-up and manipulation. De Aguiar, G. et al. injected flexor tendon lacerations muscles with BoNTA injections 1-2 days after surgery using 25 μ and showed improved results [5]. For repeat Dupuytren's contracture CCH injections at one or two months, the BoNTA effects would still be present. BoNTA FDS injections inhibit flexor forces and enhance digital extension over several months. Further research and controlled clinical trials are indicated. Distraction, manipulation, and splinting are the recommended treatments for CCH injections. This case report suggests that weakening flexor tone may assist in an improved and lasting result for severe PIPJ contractures. Off-label insurance coverage would not be expected for BoNTA, but CCH injections often need pre-approval. Further research is indicated. Optimally patients with exact measurement bilateral disease having BoNTA injections on one side could be compared to the other. Otherwise, a randomized controlled trial could be performed with BoNTA versus no BoNTA treatment for PNF, CCH injections, or fasciectomies.

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Conflicts of interest

The authors of this study declare no conflict. Dr. Denkler KA has performed clinical chart reviews for Endo Pharmaceuticals in 2021 and he also served on an advisory board for Endo Pharmaceuticals in 2022.

This paper was originated and completed in its entirety without any help or support from Endo Pharmaceuticals.

All authors have nothing to declare from Allergan.

Consent

Written voluntary procedural, off-label use of BoNTA, and photographic consent were obtained. This study conformed to the Helsinki Declaration.

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