

New Treatment Options for Dupuytren's Surgery: Collagenase and Percutaneous Aponeurotomy

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DUPUYTREN'S DISEASE WAS first characterized as a disease of the palmar fascia by Henry Cline.^{1,2} Multiple treatment options have been described, including fasciectomy, which was first performed by Guillaume Dupuytren in 1831.^{1,2} Although effective, fasciectomy results in considerable pain and a prolonged postoperative course requiring therapy, limitation in activities of daily living, and time off work.³ Owing to the high incidence of surgical complications and recurrence,^{4–6} there has been interest in developing less invasive treatment options. Recently, enzymatic fasciotomy with collagenase and percutaneous aponeurotomy have shown promising results.^{7–22}

COLLAGENASE INJECTION

Collagenase is an enzyme derived from *Clostridium histolyticum*. It is purified by column chromatography and reconstituted with a sterile diluent of calcium chloride in saline. Historically, collagenase has been used in debridement of burns or ulcers, and in treatment of Peyronie's disease. Starkweather et al., Badalamente et al., and Hurst et al. have been instrumental in investigating collagenase as a potential therapeutic agent for Dupuytren's disease. Their work includes an *in vitro* trial as well as 4 *in vivo* trials testing the efficacy and safety of collagenase in humans.^{9–13}

Recently, these authors published a multicenter, double-blind, randomized, placebo-controlled trial involving 308 patients in the *New England Journal of Medicine*.¹³ Collagenase was injected directly

into cords isolated by palpation during physical examination. Patients received up to 3 injections at 30-day intervals. The investigators found that 76.7% of patients with metacarpophalangeal (MCP) joint disease and 40.0% of patients with proximal interphalangeal (PIP) joint disease reached the primary endpoint (5° extension deficit or less). Range of motion improved on average 41° for MCP joints and 29° for PIP joints. Overall, 94.0% of MCP joints and 67.1% of PIP joints showed some clinical improvement. The results were also stratified by severity of the initial joint disease. A total of 88.9% of collagenase-injected MCP joints with a baseline contracture 50° or less met the primary end point, compared with 57.7% of MCP joints with a contracture 50° or greater. Similarly, 80.9% of injected PIP joints with a contracture 40° or less met the primary end point compared with 22.4% of PIP joints with a contracture 40° or greater.

The most common complications of collagenase injection were peripheral edema, swelling, injection site ecchymosis/contusion, pain/tenderness, pruritus, skin laceration, and lymphadenopathy. Most of these side effects were self-limited, resolving within 21 days of injection. Although most patients (85.8%) tested positive for antibodies against collagenase, no notable allergic reactions or deaths occurred. There were neither iatrogenic nerve injuries nor changes in grip strength for any patient. Major complications included one report of complex regional pain syndrome and 2 flexor tendon ruptures requiring surgical treatment. The *New England Journal of Medicine* study did not provide recurrence data.

Collagenase does appear to be an effective short-term treatment for patients with mild to moderate MCP and/or PIP joint disease. Although most side effects are self-limited in nature, care must be taken to avoid the flexor tendons during injection. Long-term recurrence rates remain unknown. The difficulty of surgical release performed after injection has not been studied.

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BioSpecifics Technologies Corporation (Lynbrook, NY) currently controls the patent for *Xiaflex*. No price has been set for an individual injection.

PERCUTANEOUS APONEUROTOMY

Percutaneous aponeurotomy (PA) was first proposed by the French rheumatologist Debeyre.¹⁵ In recent years, an increasing number of surgeons have reported success with this technique.^{16–22} Indication for treatment includes mild contractures (total passive extension deficit [TPED] 0° to 90°) in patients interested in short recovery time. PA is performed using a small-gauge (19- to 25-gauge) needle. After skin infiltration with local anesthesia, the needle is used to cut the digital and palmar cords at multiple levels. The digit is then passively extended. Postoperatively, the patient performs range of motion exercises independently. Formal physical therapy is required infrequently.

Multiple authors have reported considerable reduction in flexion contracture using this technique. MCP joints show the greatest improvement (79% to 100%), whereas PIP joints improve to a lesser extent (46% to 76%).^{16–22} Similar to the results of collagenase treatment, PA is most effective for joints with smaller contractures (92.6% improvement with preoperative TPED of 0° to 45°, compared with 56.6% for preoperative TPED 135° or greater).²² The most common complications reported are skin fissures and transient nerve paresthesias. Nerve injury and flexor tendon ruptures have been reported but are rare.^{16–22} Van Rijssen et al. reported a 65% recurrence rate at average follow-up of 32 months after PA.¹⁹

A prospective, randomized, controlled trial comparing PA with open limited fasciectomy (LF) in 117 hands was published in 2006.²¹ The authors showed TPED improvement of 63% (MCP joint, 75%, PIP joint, 33%, distal interphalangeal joint, 61%) in the PA group, compared with 79% (MCP joint, 87%, PIP joint, 49%, distal interphalangeal joint, 83%) in the LF group. There was a 38% minor complication rate (33 of 88 rays; 29 skin fissures and 4 transient paresthesias) for the PA group compared with a 17% minor complication

rate (13 of 78 rays; all paresthesias) for the LF group. However, the LF group experienced a 5% major complication rate (3 of 57 hands: one instance each of infection, hematoma, and nerve injury). There were no major complications in the PA group. Pain scores and patient satisfaction with hand function were better for the PA group at 6 weeks.

If performed by experienced practitioners, PA appears to be a safe and effective procedure for the treatment of Dupuytren's disease. Careful patient selection is critical because contractures recur more rapidly and more frequently in patients treated with this technique compared with patients treated with open fasciectomy. This treatment is most effective for elderly low-demand patients and

individuals with small contractures who are interested in a short postoperative recovery.

EDUCATIONAL OBJECTIVES

- State the conditions treated with collagenase.
- Discuss the efficacy of collagenase on metacarpophalangeal and proximal interphalangeal contractures secondary to Dupuytren's disease.
- List the potential complications of collagenase.
- Describe the technique of percutaneous aponeurotomy.
- Summarize the current results of metal percutaneous aponeurotomy.
- Compare and contrast collagenase and percutaneous aponeurotomy in the treatment of Dupuytren's disease.

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JOURNAL CME QUESTIONS

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Dupuytren's treatment with collagenase is most effective at what joint?

- a. Distal interphalangeal joint
- b. Proximal interphalangeal joint
- c. Metacarpophalangeal joint
- d. All have similar efficacy
- e. Not effective at any joint

Percutaneous aponeurotomy is most effective for what patient population?

- a. Low-demand patients with small contractures
- b. High-demand patients with small contractures
- c. Low-demand patients with large contractures
- d. High-demand patients with large contractures
- e. All are equally effective

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