CLINICAL NOTE

Serial Ultrasonographic Findings of Plantar Fasciitis After Treatment With Botulinum Toxin A: A Case Study

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ABSTRACT. Chou L-W, Hong C-Z, Wu E-S, Hsueh W-H, Kao M-J. Serial ultrasonographic findings of plantar fasciitis after treatment with botulinum toxin A: a case study. Arch Phys Med Rehabil 2011;92:316-9.

Plantar fasciitis is a common cause of heel pain and is the result of a degenerative process of the plantar fascia at its calcaneal attachment. A case study of a preliminary experience with local injections of botulinum toxin A (BTX-A) for the treatment of chronic plantar fasciitis in a 43-year-old woman is presented. We injected the patient with 70 units of BTX-A (0.7mL) in 2 divided doses: 40 units (0.4mL) in the tender region of the heel, and 30 units (0.3mL) in the most tender point of the foot arch. Visual analog scale (VAS) and pressure pain threshold (PPT) were measured to evaluate the efficacy of BTX-A injections. Real-time, high-resolution ultrasonographic findings of the plantar fascia after BTX-A injections were also used for serial follow-ups. After BTX-A injection, decreased VAS values were reported and increased PPT was observed. In ultrasonographic studies, the thickness of the plantar fascia and the hypoechogenicity of the fascia were reduced. Decreased plantar fascia thickness was observed on the first and third week after BTX-A injections. The findings were compatible with the changes in pain assessed by VAS and PPT. Ultrasonographic findings also indicated a progressive decrease in the thickness of the underlying muscle belly. Ultrasonography seems to be a valuable, noninvasive diagnostic tool for the evaluation of plantar fasciitis treated with BTX-A injections. It can offer objective measurements of therapeutic effects and is feasible for serial follow-ups.

Key Words: Botulinum toxin type A; Fasciitis; Plantar; Pain; Rehabilitation; Ultrasonography.

PLANTAR FASCIITIS[1-4] IS A common cause of heel pain and is the result of a degenerative process of the plantar fascia at its calcaneal attachment. Age, obesity, excessive weight-bearing, and tight Achilles' tendons are the common predisposing factors.[2,5] Plantar fasciitis presents in a most characteristic manner, including a gradual onset and worsening with time, pain in the morning on rising from rest, and localization over the medial slip of the origin of the fascia.[6] Methods for treatment are the use of insoles,[7] modification of shoes,[8] stretching,[9] physiotherapy, ice or cold, NSAIDs,[10] analgesics, night splints,[11-13] local steroid injections,[14] extracorporeal shock wave therapy,[15,16] and immobilization.[17]

The guidelines of the American College of Physicians summarize that there is level 1B evidence for the use of BTX-A in the treatment of plantar fasciitis.[18] Babcock et al[19] presented a randomized, double-blinded, placebo-controlled study and concluded that BTX-A injection for plantar fasciitis yields significant improvements in pain relief and overall foot function at both 3 and 8 weeks after treatment. This evidence has subsequently been reinforced by the preliminary results of a further study.[20] Outcome assessments including subjective pain intensity, Maryland Foot Score, and pain relief VAS were selected in previous studies, but no objective measurements were used to evaluate the efficacy of BTX-A injection for the treatment of plantar fasciitis.

Ultrasonography is a valuable, noninvasive diagnostic tool for the evaluation of plantar fasciitis.[21-23] For symptomatic feet, increased thickness of the fascia and reduced echogenicity were constant ultrasonographic findings.[24-26] To our knowledge, no ultrasonographic findings of the responses associated with BTX-A injection for plantar fasciitis have been evaluated and reported to date. Thus, the purpose of this case study was to prospectively evaluate the effect of BTX-A injections on the plantar fascia by performing serial ultrasonographic examinations.

CASE DESCRIPTION

The patient was a 43-year-old housewife who was seen in our clinic with a chief complaint of limited standing and walking tolerance because of right subcalcaneal heel pain. The onset of pain was insidious approximately 8 months before her initial visit. At the time of the first evaluation, the patient was unable to stand for more than 1 hour or walk for more than 15 minutes without heel pain. She reported a sharp shooting pain and tightness in her right heel and medial arch during weight-bearing. The patient verbally rated this pain as 8 on a scale of 0 to 10 (8/10), with 0 representing no pain and 10 representing the worst pain imaginable. Pain usually occurred first thing in the morning when rising from bed and stepping on the floor, with the pain intensity increasing to 10/10 after standing for 1 hour or walking for 15 minutes. The pain intensity would decrease to 6/10 after 20 minutes of non–weight-bearing ac-

List of Abbreviations

BTX-A	botulinum toxin A
MRI	magnetic resonance imaging
NSAIDs	nonsteroidal anti-inflammatory drugs
PPT	pressure pain threshold
VAS	visual analog scale

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tivity and then partially resolve to 5/10 after 2 hours of non–weight-bearing rest. She also reported night heel pain, difficulty sleeping, and occasional sensitivity to cold. She had received multiple therapies before this visit, including medications (analgesics), physical therapy modalities (ultrasound, transcutaneous electrical nerve stimulation, laser), and stretching exercise. After each therapy, the symptoms would decrease initially but would relapse shortly after treatment. The patient was not taking any medications at the time of the evaluation. A plain radiograph of her right foot and ankle was obtained and carefully reviewed. No evidence of calcaneal spurs, avulsion fractures, or tumors was found. Prior laboratory studies and the patient's medical history screening for systemic diseases related to heel pain were unremarkable. The patient reported no prior history of foot or ankle dysfunction.

An objective physical examination was performed during the initial visit. Palpation at the medial tubercle of the calcaneus reproduced the patient's right heel pain. There was also tenderness on palpation of the medial head of the gastrocnemius and the medial belly of the soleus (which may be related to compensatory gait posture with right leg muscle overuse, as the heel pain was not the refer pain of the gastrocnemius and soleus muscles). Passive ankle dorsiflexion with the knee extended was performed, and the same right subcalcaneous heel pain was induced. With the addition of dorsiflexion and eversion of the foot, a sharp shooting pain in the right heel and tightness in the right heel and calf were reproduced. The range of motion of the right knee and ankle, compared with the asymptomatic left side, was within normal limits. Sensation and lower extremity reflex testing were unremarkable. Manual muscle testing revealed fair to good (3/5 to 4/5) strength in the right ankle plantar flexors as a result of pain in the heel. Observational gait analysis revealed decreased stance times on the right leg, excessive midfoot pronation during midstance, lack of resupination during terminal stance, and an early heel rise at the right side. During single-leg balance testing, the patient was able to stand on the left leg for 25 seconds but could stand only for 11 seconds on the right leg. Based on subjective information and objective findings, a diagnosis of right plantar fasciitis was made.

A series of treatments for the patient's condition included a 4-week prescription of NSAIDs, 2 months of wearing orthotics, 2 cortisone injections into the plantar fascia at its insertion site on the calcaneus, and a 4-week exercise program of calf stretching and toe curls for arch strengthening. During the course of 4 months, these treatments were unsuccessful in decreasing her level of disability, so BTX-A injections were performed for further treatment of her right subcalcaneous heel pain.

The BTX-A solution was prepared by mixing 100 units with 1mL of normal saline. We injected the patient with 70 units of BTX-A (0.7mL) in 2 divided doses: 40 units (0.4mL) in the tender region of the heel medial to the base of the plantar fascia insertion, and 30 units (0.3mL) in the most tender point of the foot arch (between a point about 1in anterior to the heel and another point at the middle of the foot), following the protocol of Babcock et al.[19] A 27-gauge, .75-in needle was used for injections. The needle was inserted directly into the heel after the site of the inflammatory lesion was confirmed with ultrasound.

Ultrasonographic examination was performed by using a 10-MHz linear array transducer.[a] Evaluation was made bilaterally with the patient prone and her feet hanging over the edge of the examination table. Longitudinal sonograms of the plantar heel and underlying muscle belly on the midportion of the plantar fascia were obtained, and the thickness was measured (fig 1). Qualitative changes in local or diffuse hypoechogenicity at the calcaneal insertion of the plantar fascia were assessed. The same physiatrist performed the examination before and after BTX-A injections. The patient's subjective VAS, the PPT measured with a pressure algometer, and ultrasonographic study were assessed before and 1, 3, 5, and 7 weeks after treatment with BTX-A injections to determine their effectiveness.

Our results revealed a remarkable decrease of the VAS from 8 to 2.2 at 1 week posttreatment, and a further decrease to 1.5 at 3 weeks posttreatment. The PPT increased from 8.1 to 10.4 at 3 weeks posttreatment (fig 2). Unfortunately, the pain symptoms recurred, with the PPT decreasing slowly after the seventh week posttreatment; however, the PPT value was still higher than at baseline. The thickness of the plantar fascia in both feet decreased progressively during the entire follow-up period after BTX-A injections. The thickness ratio of the

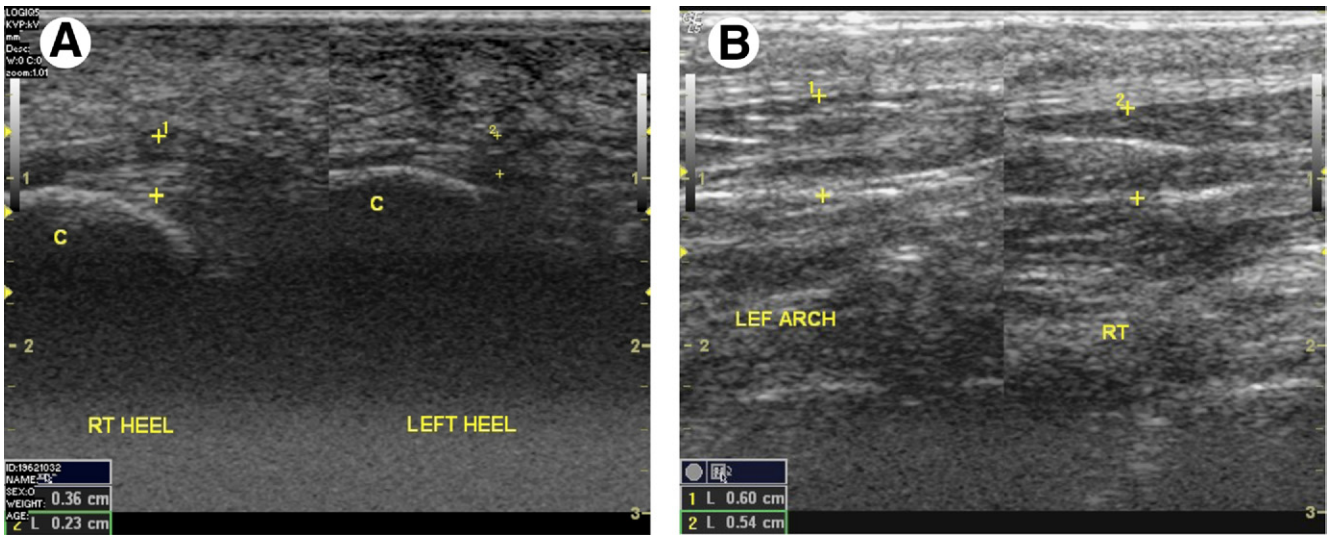

Fig 1. Longitudinal ultrasonography of the plantar heel (A) and underlying muscle belly on the midportion of the plantar fascia (B) was obtained before BTX-A injection, and the thickness was measured.