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Is Percutaneous Radiofrequency Coblation for Treatment of Achilles Tendinosis Safe and Effective?

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ABSTRACT

Insertional Achilles tendinosis results in isolated pain at the Achilles tendon insertion site due to intratendinous degeneration. When conservative measures fail, surgical treatment may be necessary. Radiofrequency coblation has been suggested to be an effective procedure for treatment of tendon pathologies. Percutaneous execution of this procedure is very simple as well as minimally invasive, and thus if effective, would be an excellent alternative to an open treatment of insertional Achilles tendinopathy. A review of 47 cases with this percutaneous technique was conducted. In our relatively short-term follow-up (mean = 8.6 months, SD = 9.71, range 1 to 40), the incidence of reoperation was 14.9% (7/47). Rupture of the Achilles tendon was identified in 3 (6.4%) patients. Our cohort had a relatively high body mass index (mean = 37.1, SD = 6.96, range 24.3 to 52.8). We recommend surgeons to be cautious about selecting this procedure in similar, high body mass index patient cohorts for treatment of Achilles tendinosis.

Insertional Achilles tendinosis results in isolated pain at the Achilles tendon insertion due to intratendinous degeneration. A patient may complain of gradual onset of pain, which may be aggravated by standing, walking, or exercising. Unlike Haglund's deformity, which is a painful "bump" against the heel counter of the shoes, this is a tendon pathology that is painful regardless of shoe gear.

Achilles tendon issues are very common. As many as 66% of joggers have reported Achilles pain, 23% of whom are found to have insertional tendinosis (1). Many theories have been postulated as to the cause of the tendinosis; however, the exact etiology remains unclear (2). Besides a high level of activity, some have reported associated factors including diabetes, hypertension, obesity, hormone replacement, and oral contraceptives (3). Some have suggested that pes cavus is also an associated factor (4,5), but others have shown no clinically significant association between a high calcaneal inclination angle and the tendinosis (6).

The treatment of Achilles tendinosis is highly dependent on the experience of the treating physician (7). Conservative measures include heel lifts and various types of stretching exercises (5). Some have suggested injection of cortisone or platelet-rich plasma and shockwave therapy at the Achilles insertion site (8–10). However, scientific evidence regarding these modalities is inconsistent (11–13). When conservative measures fail, surgical treatment may be necessary. Surgical measures include debridement of the diseased tendon, radiocoblation, resection of the retrocalcaneal exostosis, resection of the dorso-superior edge of the posterior tuberosity of the calcaneus, and calcaneal osteotomy (5,14).

Compared with an open treatment of insertional Achilles tendinopathy, percutaneous execution of coblation is very simple as well as minimally invasive, and thus if effective, would be an excellent alternative. Bipolar radiofrequency coblation is used to create a localized plasma layer that dissolves molecular bonds of soft tissue without excessive heat production (15). Coblation is theorized to stimulate angiogenesis and healing within the degenerative tendon. In a study of 17 pairs of rabbit Achilles tendons, coblation was

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compared with the contralateral control, treated with a sham device. In the coblation group, an increase in neovascularization was observed histologically (16). In another animal study conducted in a rat model, authors found rapid degeneration of sensory nerve fibers followed by regeneration noted at 90 days (17). This sensory nerve degeneration may account in part for reduction in pain.

The aim of this study was to determine the efficacy and safety of percutaneous radiofrequency coblation for treatment of chronic Achilles tendinosis, by reviewing the series of cases performed at our institution.

Patients and Methods

The study was approved by our internal review board. We enrolled patients who underwent percutaneous radiofrequency coblation of the Achilles tendon. Patients with Achilles tendon radiofrequency coblation procedures were identified in the medical records from Scott and White Memorial Hospital and Clinics (Temple, TX). Specifically, patients with CPT codes 27605 and 27606 were screened for enrollment and their charts reviewed for inclusion and exclusion criteria, as described in Table 1. The variables listed in Table 2 were then obtained from patients who met the inclusion and exclusion criteria. Body mass index (BMI = mass (kg) / height $(m)^2$) was calculated from the preoperative height and weight measurements recorded by an anesthesiologist.

Operative Technique

While the patient was still alert, the symptomatic area was identified and marked. The patient was placed in a prone position after administration of either general anesthesia or intravenous sedation. Local infiltrative anesthesia was placed proximal to the operative site. The agent used for local anesthesia varied between the surgeons. No surgeon used a vasoconstrictive agent or intraoperative cortisone. The operative extremity was then prepped in an aseptic manner, and the tourniquet was inflated to an appropriate level. Using a marking pen, a grid was made over the posterior aspect of the Achilles tendon, covering the point of maximum tenderness (Fig. 1). Approximately 20 points were mapped out, and an 18-gauge needle was used to make small holes through the skin. The radiofrequency probe (Topaz microdebrider; ArthroCare, Sunnyvale, CA, USA) was then used to perform the procedure, hole by hole, via a controlled plasma-mediated radiofrequency-based process. The probe was activated for 0.5 seconds while light axial pressure was applied to puncture the tendon perpendicularly.

No skin closure was performed. Sterile dressings were placed over the operative site. The patient was placed in an immobilization boot and allowed full weightbearing immediately.

Postoperative Care and Rehabilitation

The patients were encouraged to ice and elevate the operated extremity for the first 2 to 3 days. Nonsteroidal anti-inflammatory medications were not allowed for the first 48 hours. The first postoperative visit was 3 to 5 days from the surgery, and a surgical dressing change was performed during the visit. Although this varied slightly between the surgeons, the second postoperative visit was at approximately 2 weeks, at which point the patients began range-of-motion exercises and eccentric stretching exercises, but remained in the immobilization boot for weightbearing. At the 1-month follow-up visit, the patient was transitioned to regular shoe gear and continued the exercises. After approximately 3 months, the patient was generally released to return to full activities as tolerated.

Analysis of Data

Incidence of reoperation and complications were calculated for patients undergoing Achilles tendon radiofrequency coblation. All the enrolled patients and those with greater than 3 months of follow-up were analyzed separately. A simple comparison was then made with historical open procedures. When major complications, such as Achilles tendon rupture, deep vein thrombosis, or infection were identified, each case was further reviewed. Each surgeon who discovered and charted the complication was contacted to confirm the accuracy of the medical records.

Table 1
Inclusion and exclusion criteria

Inclusion Criteria	Exclusion Criteria
1. Clinical diagnosis of Achilles tendinosis. 2. Patients have undergone percutaneous radiofrequency coblation for chronic Achilles tendinosis. 3. Age of 18 to 80 years (to exclude immature, young tendons and fragile tendons in the elderly). 4. Presented to Scott and White Memorial Hospital from January 1, 2005 to December 31, 2011.	1. Having a history of trauma or surgery to the rearfoot or Achilles tendon other than the procedure of interest. 2. Previous invasive procedures to the Achilles tendon (such as corticosteroid injection, platelet-rich plasma, or similar procedures). 3. Having adjunct procedures related to treatment of Achilles tendinosis at the time of percutaneous coblation.

Table 2
Variables collected from review of coblation cases

Data	Data Type
Age	Continuous
Gender	Male/Female
Procedure date	Date
Procedure side	Right/Left
Additional procedure(s)	Exostostectomy, Achilles tendon debridement, reattachment of Achilles, tendon lengthening, other rearfoot, other forefoot
Body mass index	Continuous
Last follow-up date	Date
Infection	Yes/No
Wound dehiscence	Yes/No
Deep venous thrombosis/ pulmonary embolism	Yes/No
Documented weakness	Yes/No
Achilles tendon tears	Yes/No
Achilles tendon rupture	Yes/No
Reoperation	Yes/No
Reoperation date	Date
Reoperation Procedure	Exostostectomy, Achilles tendon debridement, reattachment of Achilles, tendon lengthening, other rearfoot, other forefoot

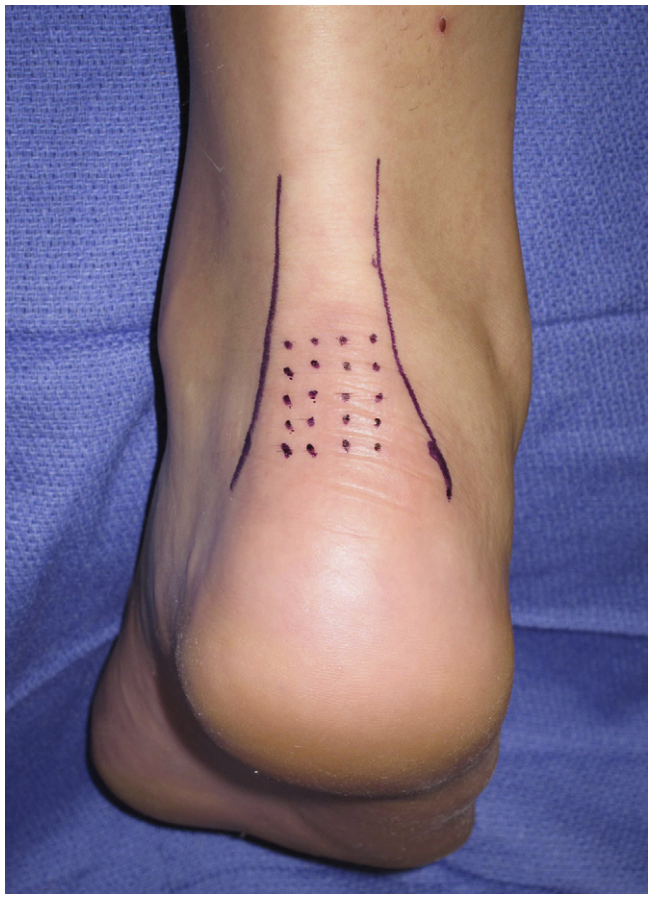

Fig. 1. A typical grid used to map out the area of maximum tenderness and to guide the coblation therapy.