ABSTRACT

Elite and recreational athletes commonly present with Achilles tendinopathy and partial tears. The tendon pathology demonstrates a failed healing response rather than an inflammatory response. The source of pain in tendinopathy is typically related to the mismatch of intratendinous forces that are greater than the tendon’s capacity to withstand. Conservative medical treatments include rest, bracing, eccentric strength training, low-energy shock wave therapy, topical glyceryl trinitrate 1. More recently, minimally invasive ultrasound-guided treatments such as tendon needling, tendon scraping, and hydrodissection of the paratenon have been reviewed. Surgical intervention is rarely indicated. We present the case of a 16-year-old girl who developed Achilles tendinopathy and partial tear that was non-responsive to conservative care. She was treated with ultrasound-guided lipoprep (Lipogems) injection. We report our significant improvement in pain and physical function at six-month follow-up. Future clinical trials of lipoprep for the treatment of chronic Achilles tendinopathy and tear are warranted.

INTRODUCTION

Chronic tendon injuries of tendinopathy frequently occur and are difficult to treat. Achilles injuries are often associated with significant physical dysfunction and disability, due to the limited self-repair capacity and propensity for scar formation 9. Non-insertional Achilles tendinopathy is a common cause of ankle pain and typically occurs 2-6 cm proximal to the tendon insertion on the calcaneus.

Athletes, whether elite or recreational, are the most common group to present with Achilles tendinopathy, but it is also found in people with advanced age, obesity, diabetes or hypertension. Other risk factors for Achilles tendinopathy include previous tendon injury, decreased muscle strength, altered gait kinematics, limited ankle dorsiflexion, training errors, and the use of steroids or non-steroidal anti-inflammatory drugs.

The degenerative process is essentially a failed healing response in the tendon 4. Fibromatous degeneration is the most frequent finding and is related to the relative hypovascularity of the critical zone. Macrophage degeneration is the second most common type of degeneration with large macrophage patches and vacuoles found within thinned degenerated tendon fibers. Early episodes are asymptomatic, however symptoms develop when the vacuoles and lacunae confluence to form an anechoic area. Histological degenerative changes include loss of the normal collagenous architecture, replacement with amorphous mucinous material, hypercellularity, increased glycosaminoglycan content and neovascularization. Loss commonly, tendinopathy or calcifying tendinopathy with tendon calcification may occur 10.

Patients often present with local swelling and tenderness to palpation on the posterior medial aspect of the tendon. Both ultrasound and magnetic resonance imaging (MRI) assist in the diagnosis of Achilles tendinopathy, but ultrasound has a higher degree of accuracy and is more cost-effective. Ultrasound imaging may reveal a fusiform tendon with peritendinous thickening, hypovascular core, intrasubstance tendon tears, decreased tendon gliding and intratendinous and peritendinous vascularity on color Doppler 4.

Conservative care of Achilles tendinopathy includes removal of precipitating factors, rest, routine medication modifications and the use of arches to correct foot or ankle malalignment. Decreased inflammatory lesions form. However, pain and swelling worsens if treated with progressive eccentric strengthening exercises twice a day for up to 12 weeks using either the Allendoerfer or Silbernagel protocol. Combining these protocols with low-energy shock wave therapy may improve outcomes 8.

The combination of autologous platelets and a fibrin matrix in a sheep tendinopathy model has demonstrated increased tenocyte proliferation, synthesis of type-I collagen and angiogenic factors (VEGF, HGF) promoting neovascularization 7. In a prospective clinical case series of 14 patients with chronic non-insertional Achilles tendinopathy, leukocyte-rich platelet rich plasma (LR-PRP) demonstrated significant improvement in the American Orthopedic Foot and Ankle Society (AOFAS) scale, the Victorian Institute of Sport Assessment – Achilles (VISA-A) scale and ultrasound imaging results at 18 months follow-up. A well-designed RCT study of chronic Achilles tendinopathy found no significant difference in pain or function at 24 weeks after receiving an ultrasound guided LR-PRP injection combined with an eccentric stretching program 3. Yet, in a systematic review and meta-analysis, LR-PRP demonstrated a strongly positive effect when compared with LR-PRP, suggesting what is injected and how it is injected may influence outcomes 8.

Up to 33% of patients will fail conservative care and consider surgical excision of the pathologic tissue with or without tendon transfer augmentation. Open surgery is associated with an overall complication rate of 11% and success rate ranging from 50-100%. Minimally-invasive percutaneous tendon scrapings have shown promise in relieving symptoms. Percutaneous tendon fenestration therapies designed to strip the paratenon from the tendon with high-volume fluid injection or ventral derangement have shown promise in relieving symptoms. However, these techniques carry a complication rate of 11% and success rate ranging from 50-100%. Minimally-invasive percutaneous tendon scraping have shown promise in relieving symptoms. Percutaneous tendon fenestration therapies designed to strip the paratenon from the tendon by high-volume fluid injection or ventral derangement with the paratenon sheath have been shown to be successful 2.

At six months follow-up, our patient noticed a significant reduction in pain at rest and with ambulating short distances. She was not compliant with physical therapy, choosing to stretch and ambulate on her own schedule. She had developed mild kinesiophobia due to the duration of her injury. On physical examination, the tendon swelling had reduced and the tendon was less tender to palpation. Ultrasound examination revealed an improvement in the hypechoic paratenon of the tendon, however the tendon thickening and hypoechoic defects remained. The patient was encouraged to initiate the formal physical therapy program.

At three month follow-up, our patient noticed substantial reduction in pain and improved physical activity. Her repeat FADI score was 97/100. Her average VAS was zero out of ten. She could walk, climb and perform heel raises with equal pain and swelling. On physical examination, she had full dorsiflexion and normal planar dorsi flexion strength. The tendon was not tender to palpation. Ultrasound examination revealed significant improvement in the hypechoic paratenon of the tendon with near complete resolution of the hypoechoic defects. She was compliant with an eccentric strengthening program in physical therapy twice a week at home twice a week.

At six month follow-up, our patient is able to walk 10-20 minutes and climb stairs pain-free. She can run up to 30 minutes at a time and perform all strengthening exercises without pain. Although not required, she elected to repeat her ankle MRI which revealed resolution of the high intensity linear band and diffuse speckled signal consistent with resolution of her tendinopathy and partial tears. The tendon thickness and Klein’s fat pad swelling was improved.

At this time, she takes no medication and does not wear a CAM walker boot. But she does have plans to attend her high school prom and wear high heels.

We were able to successfully treat a 16-year-old girl who had developed functionally limiting chronic Achilles tendinopathy and partial tear that were non-responsive to conservative care. She was treated with ultrasound-guided lipoprep (Lipogems) and LP-PRP injection combined with a progressive strengthening program. She achieved a resolution of her pain and restoration of physical function of the Achilles tendon at the six month follow-up. Ultrasound and MRI imaging revealed a diffuse fibrillar pattern consistent with resolution of the pathologic tendon. Achilles tendon engineering is an interesting challenge for the orthopedic medicine physician. Lipoprep and LP-PRP have the potential to stimulate tenocyte proliferation, matrix synthesis and angiogenesis which can lead to regeneration of a degenerated Achilles tendon. Future clinical trials using lipoprep for the treatment of chronic Achilles tendinopathy and partial tears are warranted.

References