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High volume ultrasound-guided hydrodissection of the Achilles tendon and Kager's fat pad as a supplemental treatment option for Achilles tendinosis

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Introduction:

Achilles tendinopathy (AT) is a common complaint in the population. About 6% of the general population has Achilles tendon pain during their lifetime.¹ Achilles tendinopathy can be categorized by the underlying pathological process. Specifically, an acute inflammatory process of the Achilles tendon is called Achilles tendinitis and a chronic, non-inflammatory process is referred to as Achilles tendinosis. Achilles tendinosis is then further subcategorized as: insertional Achilles tendinosis and non-insertional (mid-portion) Achilles tendinosis.² Infrequently, Achilles tendon tears most commonly occur in the setting of underlying tendinosis or less commonly in an acute traumatic fashion in an otherwise normal tendon. Tears can be classified as partial or complete (a.k.a. rupture).

Initial conservative treatment for Achilles tendinosis is usually immobilization using braces, walking boots or even casts along with activity modification to avoid exacerbation of pain.³ However, prolonged immobilization is not recommended.¹⁴ There are multiple studies showing that eccentric strengthening exercises are beneficial in Achilles tendinosis.^{4, 5, 6} Therefore, one should aim to start therapeutic exercise as early as possible in the treatment plan. Besides therapeutic exercise, percutaneous needle tenotomy (PNT) +/- platelet-rich plasma (PRP) are also believed to be an appropriate treatment for patients with Achilles tendinosis.^{7, 8, 9}

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Another possible source of pain in the setting of chronic Achilles tendinosis is adhesion formation and inflammation of Kager's fat pad. A study conducted in 2015 by Pingel J. et al. showed inflammatory changes and altered lipid metabolism in Kager's fat pad in patients suffering from chronic Achilles tendinosis.¹⁰ High volume hydrodissection of Achilles tendon and Kager's fat pad proved to be beneficial for temporary pain relief in certain Achilles tendinosis patient populations.¹¹

This case report demonstrates the value of high volume hydrodissection of the Achilles tendon and Kager's fat pad as a supplemental treatment option while a patient with chronic insertional Achilles tendinosis was undergoing therapeutic exercise but unable to perform eccentric exercises due to exacerbation of pain.

Case:

A 35-year-old obese female consulted was seen in 06/2019 in a University affiliated Physical Medicine and Rehabilitation clinic for right Achilles tendon pain. She stated that her symptoms began insidiously approximately in 05/2018 and described her pain as extreme tightness/aching, 5/10 severity, worst in the mornings, working out on elliptical bike and going down stairs. Her pain was temporarily alleviated by stretching and going up stairs. She recalled an incident in 05/2019 when she slipped and skipped the last few steps while going down the stairs at her new house and fell into some boxes which broke her fall. Since that incident, her pain was exacerbated. She also stated that her left Achilles tendon was very tender to palpation and she was unable to wear any shoes that put pressure on her Achilles tendon. She was taking Advil 600mg once weekly to manage her pain with mild relief. She also tried icing her Achilles tendon but that only made the pain worse.

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She then underwent a right Achilles tendon diagnostic ultrasound which showed multiple enthesophytes at Achilles tendon insertion consistent with insertional Achilles tendinosis (**Figure 1**).

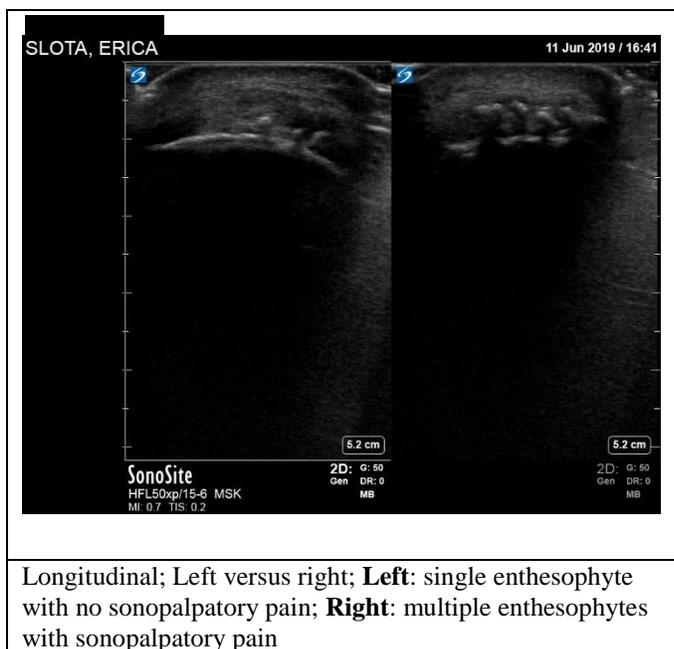


Figure 1. Left versus right Achilles tendon diagnostic ultrasound image

Detailed discussion then ensued regarding appropriate footwear and she was given bilateral heel lifts and a home exercise program (progressing from isometric to isotonic to eccentric exercises). A month later on 7-22-19, the patient returned with persistent pain and thus she underwent a high volume hydrodissection of the Achilles tendon and Kager's fat pad followed immediately by PNT/PRP of her Achilles tendon. The high volume hydrodissection was performed in an attempt to provide the patient with some immediate pain relief.

Patient was then given crutches (adjusted to her height and instructions given for proper usage of crutches) and a CAM walker boot for her right foot (advised to buy a shoe leveler for her left foot). She was then instructed to follow post-PNT/PRP protocol as follows.

Lower Extremity PRP / Tenotomy PT Protocol

s/p Ultrasound-Guided Tenotomy + s/p Ultrasound-Guided Platelet Rich Plasma Inj:

- **Days 0-2**
 -don't let your leg touch the ground for the next 2 days
 -bend your hip several times per day while laying on your back
- **Days 3-14**
 -walk with the crutches, but do not put much weight on the right foot
 -Continue using CAM walker on right foot with shoe leveler on left foot.
 -Continue bending your hip several times per day

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Per study conducted by Schippinger, G, et al., NSAID's limits the therapeutic effects of PRP.¹⁷ Therefore, patient was also advised to avoid taking NSAID and icing the affected region in order to maximize the effects of the PRP injection. Upon her 2 week post-procedure follow-up visit, the patient states that her pain was significantly reduced. Formal physical therapy (3 times weekly x an initial 4 weeks) was ordered and the patient was counseled on weight loss. The orders included detailed instructions on progressive rehabilitation stages as follows.

Formal therapeutic exercise program: 2-3 times per week on non-consecutive days

- **Weeks 1-2 (i.e. Weeks 3-4 post-procedure)**
 - Multiplanar isometric strengthening exercises
 - Passive stretching: daily
- **Weeks 3-4 (i.e. Weeks 4-6 post-procedure)**
 - Isotonic strengthening exercises
- **FOLLOW-UP PHYSICIAN VISIT** to coincide with completion of 4 weeks of physical therapy (approximately 6 weeks post-procedure)
- **Weeks 5-8 (i.e. Weeks 7-10 post-procedure) – to be incorporated into home exercise program**
 - Eccentric strengthening exercises
- ***Additional therapeutic exercise program: Optional – to be incorporated into home exercise program if warranted***
 - ***Weeks 9-12 (i.e. Weeks 11-14 post-procedure)***
 - *Plyometrics and sports-specific training (if applicable)*

The patient then returned to the office 3 weeks into physical therapy complaining of persistent pain along the lateral aspect of her tendon but 80% resolution of pain she previously had in the medial aspect of the tendon. (Figure



Figure 2 – Sites of tenderness

2) She also reported that she lost 30 pounds. She also stated that the lateral Achilles pain on average was 7.5/10 intensity, and would worsen after every physical therapy session. A repeat high volume hydrodissection of the Achilles tendon and Kager's fat pad was performed and it decreased her pain Visual Analogue Scale (VAS) score from a 75mm to 0mm immediately post-procedure.

Her physical therapy orders were also modified to stop soft tissue manipulations due to her report that this aspect of her physical therapy

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program was particularly uncomfortable, and to start eccentric exercises as soon as possible. As of the time of this writing, the patient reported a 1-week post-procedure sustained 25% pain reduction, was able to initiate eccentric strengthening and is due to follow-up upon completion of this portion of her physical therapy program.

Discussion:

This patient clearly had insertional Achilles tendinosis based on her clinical symptoms and her right Achilles tendon diagnostic ultrasound, which in general can be used to accurately assess for Achilles tendinopathy.^{12, 13} In a study by Finnoff, J et al., PNT followed by PRP was shown to be beneficial in patients suffering from chronic tendinopathy.^{15, 16} In our patient, we opted to perform a high volume hydrodissection of Achilles tendon and Kager's fat pad with the initial PNT/PRP procedures and once again while patient is undergoing physical therapy.

The patient was initially treated with a PNT and PRP along with a high volume hydrodissection of Achilles tendon and Kager's fat pad to help relieve her pain before sending her to physical therapy with emphasis on eventually starting eccentric exercises as this form of therapeutic exercise has been proven beneficial in multiple studies.^{4, 5, 6} Although the PNT/PRP and the high volume hydrodissection of Achilles tendon and Kager's fat pad were effective at reducing her pain^{7, 8, 9, 10} initially, her pain in part of her Achilles tendon was exacerbated after 5 sessions of physical therapy.

In order to allow patient progress to eccentric exercises as part of physical therapy, a repeat high volume hydrodissection of Achilles tendon and Kager's fat pad was performed. After an immediate full pain reduction, she was contacted and reported 1 week later that her pain remained 25% reduced and that she was able to initiate eccentric strengthening exercises.

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Kager's fat pad inflammation and adhesions to the undersurface of the Achilles tendon paratendon in patients suffering from Achilles tendinosis was shown in a study by Pingel J., et al.¹⁰ and it is believed that this could be the primary or secondary pain generator. A study involving 94 athletes with chronic tendinopathy of the Achilles tendon conducted by Maffulli N, et al. demonstrated that ultrasound-guided high volume hydrodissection was proven effective at reducing pain and improving function.¹⁸

Another proposed pathophysiology and pain generator of Achilles tendinosis is neovascularization of the tendon.^{14, 19} Multiple studies showed temporary reduction of pain after high-volume hydrodissection Achilles tendon and Kager's fat pad.^{19, 20}

Since the patient was unable to advance to eccentric exercises due to pain, we elected to use high volume hydrodissection of the Achilles tendon and Kager's fat pad as a supplement treatment during the initial PNT/PRP procedure and once again midway through her physical therapy which successfully relieve patient of her pain and allow her to resume her rehabilitation exercises and to perhaps lose more weight in the process.

There is no prior reports in the literature regarding using hydrodissection of the Achilles tendon and Kager's fat pad as an adjuvant treatment. In this case report, the patient was able to tolerate the PNT/PRP procedures and resume physical therapy status/post this procedure.

Therefore, we advocate for the use of high volume hydrodissection of the Achilles tendon and Kager's fat pad as a secondary supplemental treatment option with Achilles tendinosis patients going through painful post PNT/PRP procedures and rehabilitation phase.

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