Case report

Traumatic Subcutaneous Rupture of the Plantar Fascia after Steroid Injections in 22-Year-Old Olympic Athlete. Implantation of Mesenchymal Cells Taken From Adipose Tissue over the Fascia at Rupture Insertion (Adipose Tissue-Derived Mesenchymal Stem Cells Admscs).

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Abstract:

Summary
This study examined We discuss about the case of a professional athlete with an acute lesion of the proximal plantar fascia after injections with corticosteroids; and the subsequent treatment with mesenchymal cells derived from adipose tissue. Is also discussed.

Keywords: plantar fascia rupture, corticosteroids, regenerative medicine, mesenchymal cells from adipose tissue

Introduction:
Painful foot, caused by pathology of the plantar fascia is often encountered by orthopedic specialists. In some cases there is an acute tear of the plantar fascia, and not always related to maximum effort, causing acute pain and temporary disability.

Often due to multiple etiology (biomechanical imbalances, obesity, tendinopathies associated with autoimmune diseases, etc.) and caused by a functional overload, plantar fascia break is not a rare event. It can even occur as a complication from corticosteroids injections1-2-3, though the correct right evaluation of the patient (BMI and functional requirements) makes this procedure rather safe if performed under ultrasound guidance, with a reclining fascia and without penetrating fascial fibers.

In this paper we report a case of plantar fasciitis in an Olympic athlete, treated with corticosteroid injections which it followed by an acute fascia rupture while training and the subsequent treatment with administratio of mesenchymal cells taken from adipose tissue (ADMSC)

Presentation of the case:
The patient was a 22- year old Olympic athlete in excellent health with a 2 month history of pain at the insertion of the plantar fascia. The pain was disabling and impeded training and the specific movements in her sport (fencing). The patient followed all the primary indications come ad esempioe. changing footwear and scrupulously carried out the appropriate physiokinesitherapy, consisting of manipulations of the fascia and Achilles tendon, tecar therapy and laser therapy both for the Achilles complex and plantar fascia. She was also administered 2 injections of corticosteroid at a 10 day interval as she neared performance benchmarks with improvement of symptoms.

However, during a workout the athlete felt what she described as the sensation of “tearing,” with very acute pain and immediate swelling, causing her to discontinue training for over 2 weeks. An MRI exam revealed
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an acute rupture of the plantar fascia insertion. After resting for 2 weeks, the patient nevertheless needed something that would help her with rapid functional recovery and allow her to train, return to competition and race in qualifications for the Paris Olympics in 2024.

Observation of the MRI image of the partial lesion shows thickening of the plantar aponeurosis prior to heel insertion with edema of the plantar fascia and with edema of the surrounding soft tissues, in the absence of signal alterations affecting the district skeletal elements (photo 1).

Partial lesion with thickening of the plantar aponeurosis at the anterior insertion with edema both of the plantar fascia and the surrounding soft tissues.

AtIn our Institute, an ultrasound examination was carried out (Ultrasound Philips Affiniti 50; Linear Probe L 12-5 50 [5 – 12 MHz; 256 elements, 50mm, fine pitch]) confirming the partial lesion of the plantar aponeurosis, in addition to the edematous thickening of the fascia, the edema of the district soft tissues in which some vascular signals are appreciated with the Color-Doppler evaluation (Pic. 2).
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Pic 2b: Examination US; Longitudinal scan: partial lesion of the plantar aponeurosis anterior to the heel insertion with focal interruption of the fibrillar structure (arrow); the plantar fascia is thickened and hypoechoic (arrowhead) in Fig. 2a; hyperechogenicity of the district loose tissue due to edematous imbibition is also highlighted with some scattered vascular spots at the ECD (Pic. 2b).

**Treatment:**
At the request of the patient, who required therapy to accelerate healing, the administration on site of mesenchymal stem cells taken from adipose tissue (Adipose tissue-derived mesenchymal stem cells ADMSCs) was proposed. The procedure was performed by introducing the ultrafiltrate with a dermal filler cannula (PPI technique) with about 4 ml of the finished product (Fig. 3 and 4). The preparation was diffused at the insertion of the fascia and along its fibers towards the arch, without penetrating them. This was possible thanks to the blunt tip of the filler cannula allowing it to slide on the fibers.

Pic 3: Adipose tissue rich in mesenchymal cells

Pic 4: implant with dermal filler cannula PPI (Piccinato’s Peritendinous Injection)
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The patient was immediately able to walk without limitations and no immobilization, wearing a good pair of sneakers. She abstained from physical activity and training with no load. She was allowed to swim and cautious manipulation of the fascia by the referred physiotherapist. Three weeks after the procedure, we observed the reduction of pain identified by the patient as discomfort (VAS3); at this point an increase in proprioceptive activity and reconditioning of both the fascia and the Achilles tendon was granted.

At day 35 from the administration, a control ultrasound examination was performed that showed the resolution of the partial lesion of the plantar aponeurosis with almost complete recovery of the fibrillar structure; the swollen appearance of the plantar fascia also appeared reduced; and the reactive phenomena associated with the regular representation of the surrounding loose tissue was without appreciation of contextual vascular signals. (Pic.5).

Pic. 5a

Pic. 5b

Pic. 5b; Longitudinal scanning; resolution of the lesion of the plantar aponeurosis (arrow; pic 5a); regular representation of the district loose tissue in the absence of vascular signals to the ECD (pic 6b). In this phase the algic symptoms disappeared and a very slight discomfort remained at load VAS 1-2.
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Comfirmed by the ultrasound images and the resolution of the symptoms, the patient was given exercises with progressively increased load, re-athletezation and recovery of the athletic movements specific to her sport, and at a distance of 55 days from the procedure the athlete was able to participate in her first competition.

**Discussion:**
The literature agrees that this is conservative treatment for an acute rupture of the proximal plantar fascia (heel insertion), with immobilization ranging from 3 to 6 weeks before proceeding onto functional recovery and granting increased load. Surgery is rarely used. In the case illustrated, the operative treatment with infiltration of mesenchymal cells from adipose tissue was agreed to by the patient and established in an attempt to accelerate functional recovery and regain an adequate level of athletic performance for professional competition. MSCs are believed to promote tissue regeneration through paracrine factors that bolster tissue regeneration by limiting scarring. The painful symptoms gradually decreased until their disappearance, with the resumption of normal daily activities immediately after the procedure followed by sports. Ultrasound evidence of the restoration of the fascia structure guided the subsequent rehabilitation steps, until the full recommencement of competitive activities.

**Conclusions:**
Infiltrative therapy with ADMSC appears to therefore be a valid treatment in the field of regenerative medicine for the acceleration of recovery and healing of injured tissue, in particular for both amateur and/or professional athletes who require a prompter recovery times to meet the commitments of their sporting lives.

**References:**


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