Platelet rich plasma (PRP) injection and hydrokinesitherapy for achilles tendon sprain: our experience

A. Vetro [1], M. Di Gesù [1], F. Mantia [1], A. Iovane [2], G. Mazzola [3], R. Mantia [1]
[1]Centro Medico Mantia, Palermo, Italy
[2]"P. Giaccone" University Polyclinic, Radiology Institute, Palermo, Italy
[3]Transfusional Center, "P. Giaccone" University Polyclinic, Palermo, Italy

Overuse injury of the Achilles tendon is a frequent problem that often affects sport participants but also inactive middle-aged individuals.[1] An estimated 30% to 50% of all sports-related injuries are tendon disorders.[2] Achilles tendon injuries frequently lead to sport cessation for long periods and may interfere with activities of daily living.[3] Conservative treatment is disappointing and 25% to 45% of patients eventually require surgery.[3]There is a clear need for improved conservative therapy. Many factors in the etiology and pathogenesis have been reported, but no study has identified a direct cause-effect relationship.[1] Anti-inflammatory agents, previously used for chronic tendinopathies without appropriate efficacy,[4] have now been replaced by eccentric exercises as usual care [4] that provide some positive effects on tendon collagen synthesis and may result in a decrease of pain.[5] The recent introduction of platelet-rich plasma (PRP) injections in tendinopathy raised high expectations.[6-8] Platelets derived from whole blood using simple cell-separating systems provide a release of various growth factors that participate in tissue repair processes,[6-8] A recent paper written by Taylor DW *et al.*[9] evaluates through a systematic review of the current literature the evidence-based outcomes of the use of PRP for the treatment of tendon and ligament injuries. PRP use in tendon injuries has several potential advantages, such as faster recovery and, possibly, a reduction in recurrence, with no adverse reactions described. Our study aims to analyze the effectiveness of combined treatment with injections of PRP, hydrokinesitherapy [10, 11] and Resistive and Capacitive Energy Transfer Therapy.[12]

Materials and methods

We recruited 10 patients (9 male, 1 female) with Achilles Tendon (AT) sprain. We haven't carried out a statistical analysis because the sample size was too small (Figures 1, 2). Main exclusion criteria were previous surgical or rehabilitative treatment for AT, hemoglobin content of less than 11 grams/100 mL of blood and platelet count less than 150,000 per µL of blood. Patients submitted a clinical evaluation with an analysis of range of motion (ROM) of ankle, a Visual Analogic Scale and a Ankle Hindfoot Scale.[13] Then, a musculoskeletal ultrasound (MSUS), confirmed AT sprain at 48/72 hours after traumatic injury. Patients took a blood sampling of 300 cc, from which were isolated and frozen the platelet components (3 sacks) and thrombin (3 sacks). Patients then underwent to new MSUS, during which they were injected by activated platelets at the site of injury. In the recent years, there has been an increasing interest for the use of MSUS as guidance to perform intra-articular injections.[14] Use of the MSUS in the clinical practice may be useful to achieve a more accurate needle placement, potentially improving the therapeutic response to local injection.[15] Moreover, its application is quick, easy to use, repeatable, well accepted by patients and without secondary effects.[16] All patients gave informed consent prior to injection treatment. They underwent ultrasound-guided injection, after creating a sterile field, with a 20-Gauge spinal needle. Injections were always administered by the same experienced musculoskeletal physician. For each injection we used 10 to 20 mL of PRP and after that, patients were left prone on the examination table for 10 minutes; injections were repeated every 15 days for a total of three times. Patients underwent clinical and MSUS control every 15 days and followed-up at 15 days, 6 months and 12 months after last injection (Figure 3). All patients received detailed instructions on the standardized rehabilitation program. During the first 48 hours after the first injection, patients were only allowed to walk short distances indoors. During days 3 to 7 post-injection, walks up to 30 minutes were allowed. After the second infiltration, 20th day, all patients were initiated to the rehabilitation treatment by assisted exercises in hydrotherapy. During hydrotherapy (three times per week, 50 minutes per session) patients performed eccentric exercises in conjunction with active warm-up,[17] stretching,[17, 18] active motion,[18] isotonic concentric/eccentric exercises,[18] balancing exercises and proprioceptive exercises by a proprioceptive guide at the bottom

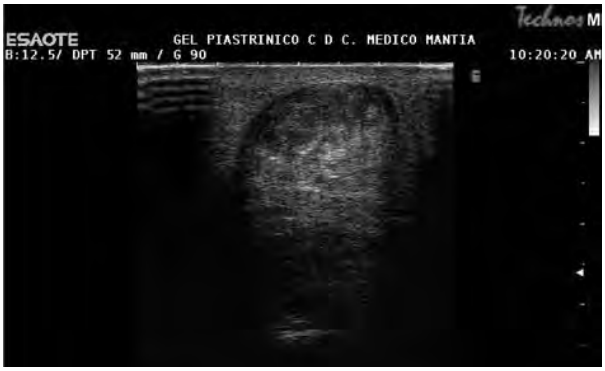

Figure 1. – Achilles Tendon: echography.

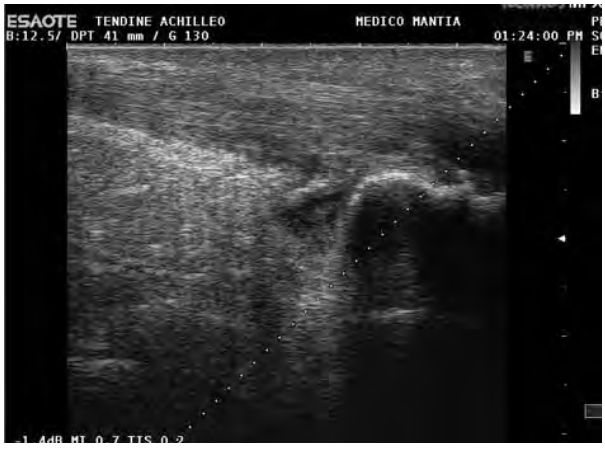

Figure 2. – Achilles Tendon: echography.

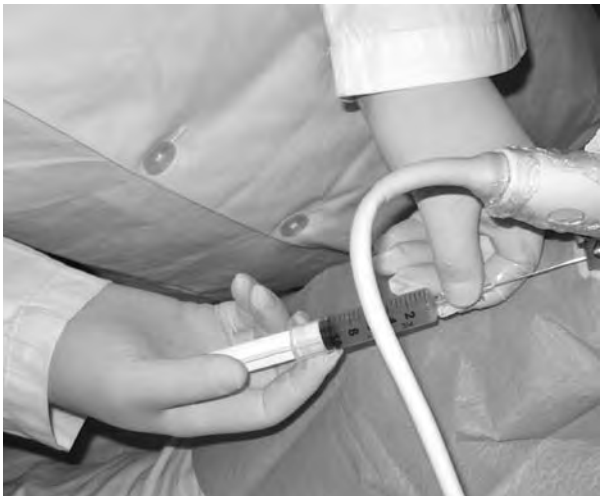

Figure 3. – PRP injection.

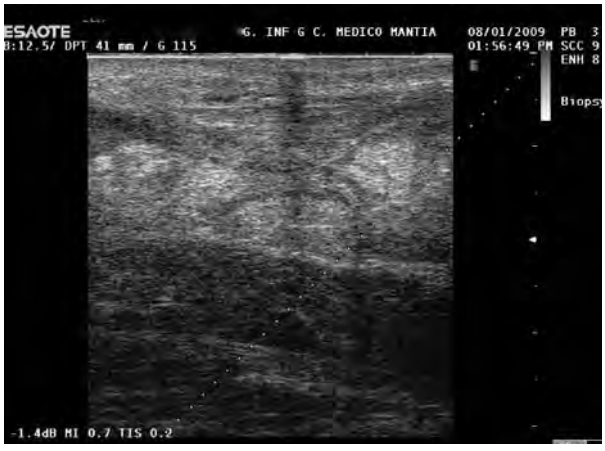

Figure 4. – Complete resolution of the tendon injury at the end of treatment.

of the pool. Eccentric exercises were done by performing "heel drops" on a step. The specific action of this eccentric exercise movement is the stretch of the Achilles tendon with concurrently contraction of the calf muscle. All patients attended a total of 20 sessions. After third injection (45th day) we combined hydrotherapy with Resistive and Capacitive Energy Transfer Therapy (3 times per week, for a total of 10 sessions) alternating capacitive and resistive treatment which intensity related to last ultrasound evaluation performed. Patients were instructed to avoid the use of co-interventions within the follow-up period except to acetaminophen (1000 mg).

Results

All patients reported complete resolution of the tendon injury at the end of treatment (Figure 4). The primary outcome measure was the Visual Analogical Scale which quantifies the pain. The average values of pain at the beginning of treatment (T0) were equal to 6.7 (SD=0.9) and there has been an almost total regression of the painful symptoms at the 30th day (VAS Average=1,7, SD=0.9). Secondary outcome measure was the Ankle Hindfoot Scale, adopted as a functional rating scale for Ankle and Hindfoot related to activity of daily living. The scale is divided into three parts: pain, function and alignment with a maximum total score of 100 at baseline patient reported a average value of 46,2 (T0, SD=12.4). At 30th day average was 68,3 (T2, SD=11.3); at second follow up (180th day) average was 98,2 (SD=0.6). Another outcome measure was subjective patient satisfaction, rated as poor, fair, good, or excellent. Our aim was to get a patient satifsaction as good or excellent: 7 patient reported a good satisfaction, 2 patient reported excellent satisfaction and one patient reported fair satisfaction (due to inability to get back volleyball). The values of the scales used for pain and function reported a gradual improvement during treatment and MSUS controls at follow up showed an anatomical repair of the sprain.

Discussion

These findings are important and clinically relevant for demostrating that PRP is rightly growing in popularity as recent reviews support its use for chronic tendon disorders.[7-9] These conclusions were drawn based on laboratory studies and small clinical studies. Some of the released growth factors, such as vascular endothelial growth factor, platelet-derived growth factor, and transforming growth factor β, have the potential to play a role in regeneration of tendon tissue through increased tendon cell proliferation, collagen synthesis, and vascularization. In in vitro and animal studies, positive effects on tendon collagen tissue and vascularization were reported.[19-22] However, studies using healthy tendons or traumatically induced lesions as a good experimental model for tendinopathy are lacking, and it is unknown whether the results of these studies also apply to degenerative tendon disorders. The two small clinical studies on PRP in tendinopathy showed a good effect on pain scores and patient satisfaction but had important limitations, such as the lack of a proper control group, disease-specific and validated outcome measurements, and blinding procedure.[23, 24]

There's still a little evidence about support of hydrotherapy and physical therapy on tendon injuries. These findings, in our opinion, should be implemented with randomized clinical trials because this association gives clinical evidences of increasing the therapeutic results obtained with the PRP alone. Any type of rehabilitation therapy, in particular regenerative therapy, cannot leave aside an appropriate physical therapy treatment that restores the functionality of the affected district in the context of proper body scheme.

Conclusions

The results reported in this study are certainly exciting, but we must consider the small sample size observed (N.=10). It is considered appropriate to continue with a larger sample and wait for the follow up to two years to assess the presence of any complication (calcification, adhesions and new lesions).

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