



## PLATELET RICH PLASMA FOR ACHILLES TENDINOPATHY: A CASE SERIES

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**ABSTRACT** Achilles tendinopathy (AT) is a common condition in patients visiting in pain clinics. These conditions are treated commonly by conservative means. PRP, which are increasingly used in clinical practice, are platelet concentrates that is processed after series of centrifugation processes which contains numerous growth factor concentrates. So here we have discussed three cases of Achilles tendinopathy in which we have used Multiple injections of Ultrasound guided intrasubstance Autologous PRP was used as a treatment modality and we found significant improvement in pain and tendon echotexture when used along with physiotherapy in 3-4 weeks. Conclusion Achilles tendinopathy is common problem in household women's as well as heavy duty workers along with sports persons and Ultrasound guided Multiple injections of Autologous platelet rich plasma can improve the degenerative changes as well as pain associated with Achilles tendinopathy

**KEYWORDS :** Achilles Tendinopathy, Platelet Rich Plasma

### INTRODUCTION

Achilles tendinopathy (AT) is a common condition in patients visiting in pain clinics. These conditions are treated commonly by conservative means. But, conservative treatment is sometimes less effective and can lead to recurrence<sup>[1]</sup>

The reason is excessive maladaptive exercise, which leads to repeated injuries or overstretching of the Achilles tendon and its surrounding tissues beyond the repair capacity of its strength, lead to inflammation. Chronic inflammation leads to the tendon's collagen fibres and fatty tissue degeneration<sup>[2]</sup>. Due to poor blood supply to the distal most part of Achilles tendon, its regeneration is significantly lower than other connective tissues<sup>[3]</sup>. Achilles tendinopathy commonly treated with non-surgical or minimally invasive interventions, which included non-steroidal anti-inflammatory drugs (NSAIDs), Steroid and lidocaine injections which lead to excellent anti-inflammatory and analgesic results but, collagen necrosis and aggravation of degeneration of tendon can occur in long term<sup>[4-6]</sup>. Growth factors from Platelet rich plasma have been identified to play a vital role in Achilles tendon repair, Therefore use of platelet-rich plasma (PRP) as a potential treatment for conditions affecting the Achilles tendon is gaining popularity world-wide<sup>[7,8]</sup>.

PRP, which are increasingly used in clinical practice, are platelet concentrates that is processed after series of centrifugation processes which contains numerous growth factor concentrates.

Several studies have demonstrated that Platelet Rich Plasma is useful for the treatment of musculoskeletal injuries, like carpal tunnel<sup>[19-21]</sup>, Rotator cuff<sup>[22-24]</sup>, Achilles Tendinopathy<sup>[25,26]</sup>, Achilles tendon injury<sup>[27]</sup>, etc. Animal experimentation has demonstrated that PRP injections improves the histopathological cell proliferation of the Achilles tendon, boost the overall strength of the tendon, decrease the inflammatory response, and facilitate tendon regeneration<sup>[28,29]</sup>

So here we are presenting three cases of Achilles tendinopathy in which Ultrasound guided intrasubstance Autologous PRP was used as a treatment modality.

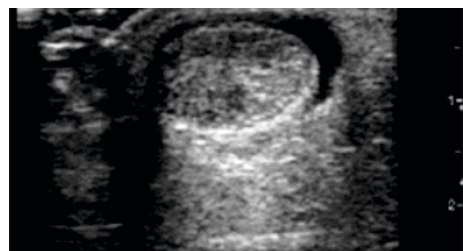
### Case No.1

A 43-year-old female housewife visited pain clinic complaining of pain in bilateral lower limb just above heel of Numerical Rating Scale(NRS) 7. Pain was aggravated on walking and relieved on rest in early days but later pain was persistent. Pain was interfering with day-to-day activities. On examination, tenderness was present in peritendinous and insertion part of Achilles tendon. Dorsiflexion of foot aggravated the pain. Ultrasound examination revealed bilateral disturbed echotexture of Achilles tendon with peri-tendinous hypoechoic shadow suggesting oedema. Patient was on oral analgesics since few months but there was no symptomatic relief. After investigating for basic blood investigations like Complete Blood Count, C-Reactive Protein. Under all aseptic precautions, 16 ml venous blood withdrawn from antecubital vein in ACD containing

bulb, it was placed into centrifuge machine for centrifugation. Single hard spin of 3500 RPM for 15 min was given to prepare autologous PRP. The three layers were obtained, of which supernatant platelet poor plasma and basal RBC layer was discarded and middle layer of 2 ml of platelet rich plasma was taken into syringe.

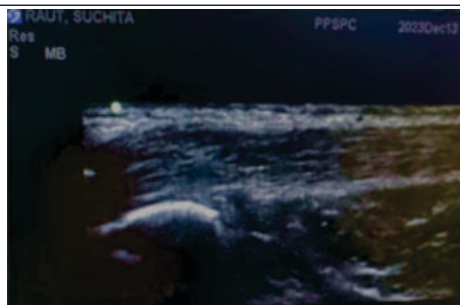
Under ultrasound guidance autologous PRP was injected by fenestration technique into substance of Achilles tendon and peritendinous area. Same procedure repeated after 2 weeks. Patient was followed up on 1,2 & 4 weeks along with physical therapy.

On first week follow up pain was reduced to NRS 4. On second and 4<sup>th</sup> week follow up Pain was completely abolished and ultrasound evaluation revealed complete restoration of normal echotexture of Achilles tendon with no oedema around.



**Image No.1 Axial & Transverse US Image Showing Peritendinous Collection**

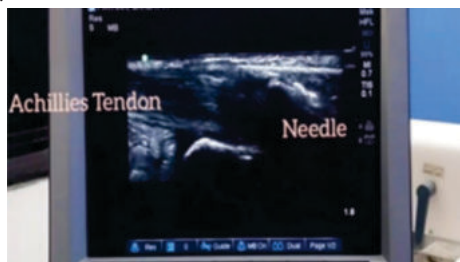




**Image 2 Transverse &longitudinal Scanning Image At 4<sup>th</sup> Week After PRP**

### Case No. 2

A 50-year-old female teacher by profession visited clinic complaining of pain in left heel for 6 months. Pain was dull aching; initially nocturnal and early morning episodes were present making her difficulty in early steps in walking and also aggravated on prolonged standing. Patient was known type II diabetic and was well controlled on oral hypoglycaemics agents. Pain was of moderate severity with interfering with her professional life. Ultrasound examination revealed oedematous hypoechoic areas within the Achilles tendon at distal part with disturbed echotexture. After Normal basic blood investigations and Fasting Post-prandial sugars, she was planned for PRP intervention. 1 PRP was extracted from plasma prepared using aseptic precautions from 8 ml of venous blood which was injected using fenestration technique in and around substance of the Achilles tendon near its insertion under ultrasound guidance. Similar, Subsequent 2 sessions were performed 15 days apart and patient was assessed at 1,2 & 4 weeks after the third session of PRP followed by physical therapy. Pain and NRS score was gradually decreased. At the end of 2<sup>nd</sup> week NRS was 3 with no pain at rest. US Examination shown decreased Oedema and Restoration of Near normal echotexture of the tendon.



**Image No. 3 Showing Achilles Tendon And Needle During Intervention And PRP Syringe**

### Case No.3

56-year-old Male farmer visited to opd complaining of pain and swelling in left foot just above heel near insertion of Achilles tendon. Patient was having continuous dull aching pain of NRS 7 severity. Also associated with difficulty in walking and working in fields. Pain was not relieved on conservative medications. On examination, Tenderness and swelling was present with palpable nodular structure around achilles insertion. Xray heel revealed spur like growth at tendo-achilles insertion. On ultrasound examination, there was oedema and disturbed echotexture of Achilles tendon along with bursitis around heel. It was diagnosed as Achilles tendinopathy with Haglund deformity. After routine haematological investigations. Autologously prepared Platelet rich plasma injection was given with fenestration technique into substance of Achilles tendon with 4 mg of dexamethasone in peritendinous bursa to decrease inflammatory

bursitis. Subsequent Three injections of Platelet rich plasma were conducted and assessment was done on 1,2 and 4<sup>th</sup> week after third injection along with Physical therapy. Pain as well as bursitis completely abolished after 4 weeks.

### DISCUSSION

The Achilles tendon is a continuation of the gastrocnemius and soleus muscles. The soleus muscle lies deep to the gastrocnemius muscle, which arises from the posterior surface of the upper tibia. The tendon is inserted on the posterior surface of the calcaneum distal to the calcaneal tuberosity. Distal 5-6 cm tendon shows more curved insertion also the number of intra-tendinous vessels are lowest in this area before calcaneal insertion.<sup>30</sup>

Tendon injuries can be acute or chronic. In Acute injuries, trauma & extrinsic factors predominate, but in chronic disorders intrinsic and extrinsic both factors play an important role.<sup>31,32</sup>

Intrinsic factors like tendon vascularity, gastrocnemius–soleus dysfunction, age, gender, body weight and height, pes cavus, and lateral ankle instability can cause tendinopathy.

Extrinsic factors like changes in training pattern, poor technique, previous injuries, footwear and training on hard, slippery or slanting surfaces which may predispose to Achilles tendinopathy in athletes<sup>33,34</sup>

Insertional Achilles tendonitis is damage that occurs in the spot where the tendon meets the heel bone. It's often associated with a bone growth, or spur, known as Haglund's deformity, which irritates the tendon.

In above all cases, Standing for long time was important contributory factor such as in Household female, teachers, farmers etc are more commonly involved.

Excessive loading of tendons during vigorous physical training is the main pathophysiological stimulus for degeneration.<sup>35</sup> Tendons respond to repetitive overload beyond physiological threshold by causing sheath inflammation, degeneration of its body, or a combination.<sup>35</sup>

Failure to adapt to recurrent excessive loads results in the release of inflammatory mediators, leading to further degeneration and incomplete healing of micro-injuries<sup>36,33</sup>

The aetiology of tendinopathy contributed by many processes which include free radical damage occurring on reperfusion after ischaemia, hypoxia, hyperthermia and impaired tenocyte apoptosis<sup>37</sup>

The pathological label 'tendinosis' is used because of its degenerative aetiology in chronic cases rather than tendinitis, but 'tendinopathy' as a generic descriptor of the clinical conditions of tendons arising from overuse, with tendinosis and tendinitis being applied only after histopathological examination.<sup>9</sup>

The cardinal symptom of Achilles tendinopathy is pain. As the pathological process progresses, pain may occur during exercise, and, in severe cases, it can interfere with activities of daily living. In the acute phase, the tendon is diffusely swollen and oedematous, and on palpation tenderness is usually greatest 2–6 cm proximal to the tendon insertion.

Fibrin precipitated from the fibrinogen-rich fluid around the tendon can result in palpable fluid accumulation<sup>10,11,12</sup> In chronic cases, pain on activity still remains as the cardinal symptom, while crepitations and effusions diminish replacing it with tender nodule<sup>11,12</sup>. The diagnosis of Achilles tendinopathy is based mainly on history and detailed clinical examination. However, diagnostic imaging is necessary to verify a clinical suspicion.<sup>11</sup>

Ultrasound is commonly employed to examine tendon in Musculoskeletal cases nowadays, being readily available, quick, safe and inexpensive. However, it is operator-dependent, and is less sensitive than MRI.<sup>11,13</sup> In acute conditions, ultrasound may reveals fluid accumulation around the tendon. In chronic cases, adhesions may be shown around tendon but MRI provides extensive information on the internal morphology of tendon and the surrounding structures, and is useful in accurate diagnosis but cost is always the limitation. So, MSK ultrasound study has been indicated in mild-to moderate conditions.

PRP is prepared from whole blood by a cell centrifugation system. Supraphysiological concentration of Platelets can secrete growth factors that are required for the repair of various tissues. These factors play an important role in tendon regeneration by increasing tendon cell proliferation, collagen synthesis and angiogenesis.

Various Growth Factor's like epidermal growth factor, platelet-derived growth factor (PDGF), transforming growth factor- $\beta$ 1(TGF- $\beta$ 1), fibroblast growth factor(FGF), vascular endothelial growth factor(VEGF), insulin-like growth factor(IGF) and hepatocyte growth factor are produced in supra-physiological concentrations<sup>14</sup>. Therefore, platelet-rich plasma has attracted the curiosity of various researchers as well as clinicians as a regenerative modality<sup>15-18</sup>.

Murawski<sup>38</sup> studies have shown that PRP provides good pain relief and satisfaction among patients with tendon diseases. But various studies with single injection of PRP didn't get results superior to placebo like Chen et al,<sup>41</sup> which found that PRP treatment couldn't find significantly improvement in VAS scores compared with alternative treatments in patients.

But in our study, we have administered 2 to 3 session of Ultrasound Guided PRP every 2 weeks with repetitive fenestration technique apart so that concentration of Growth factor was provided adequately which was supported by the study conducted by Charouset C, Zaoui A, Bellaiche L, et al which demonstrated Repeated injection prolongs the time of exposure of the Achilles tendon to growth factors. This effect promotes the recovery of Achilles tendon tissue.<sup>39</sup>

Also method of preparation implicated for preparation of PRP, Precise injection using ultrasound imaging also contributed to our success.

Along with the sessions of PRP, we have provided extensive 4 weeks of physical therapy training which included Eccentric training as an integral part of treatment as multi-disciplinary approach always beneficial which was supported by study conducted by O'Neill S, Watson PJ, Barry S et al who proved that Eccentric training, which can relieve pain and accelerate tendon remodelling and tissue repair, is effective in the treatment of chronic tendinitis.<sup>40</sup>

Still, further detailed studies are needed for establishing the evidences of success of Platelet rich plasma for Achilles tendinopathy considering all above mentioned factors.

## CONCLUSION

Achilles tendinopathy is common problem in household women's as well as heavy duty workers along with sports persons and Ultrasound guided Multiple injections of Autologous platelet rich plasma can improve the degenerative changes as well as pain associated with Achilles tendinopathy

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