Platelet Rich Plasma – Evidence for use in tendinopathy

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Introduction

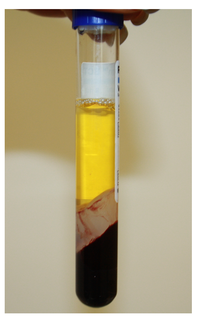
The use of autologus blood and platelet preparations has previously been described in many fields of medicine, including cardiothoracic, cosmetic and dental surgery as well as dermatology and opthalmology[1]. In recent years there has been an increasing focus on the use of platelet rich plasma (PRP) in musculoskeletal disorders. Basic science and animal model studies support the theoretical benefits of autologus platelet preparations on tissue healing. The clinical use of PRP, however, has expanded quicker than the clinical evidence to support it[2]. Only in the last two years have randomized controlled trials been published, with the literature prior to this comprising of case reports, pilot studies, and case-series.

Tendinopathy

The pathology in tendinopathy is now well recognised to be a process of degeneration and failed healing, as opposed to inflammation[7]. Given the relatively poor blood supply of tendons, their slow healing rates and the high prevalence of these injuries in sports medicine, the use of autologus growth factors for these conditions has therefore seemed promising. In recent years there have been several clinical studies published, focusing on Achilles, Patella and Lateral elbow tendinopathy.

What is PRP?

PRP is derived from autologus blood. A variety of methods to spin and fraction the blood exist, resulting in an array of preparations that differ slightly in leucocyte and platelet concentrations. PRP by definition contains a higher concentration of platelets, however this ranges between 2x and 8x that of whole blood depending on the method of collection[3]. Platelets contain a number of growth factors within their α-granules, that when released play a central role in tissue healing and regeneration. Several have been identified, including PDGF (platelet derived growth factor), EGF (endothelial growth factor), VEGF (vascular endothelial growth factor), FGF (fibroblast growth factor), IGF (insulin-like growth factor) and TGF-β1 (transforming growth factor beta 1)[4]. They promote many changes in the target tissue, including mesenchymal stem cell activation, stimulation of angiogenesis and regulation of cellular migration and proliferation[5]. In tendons they have been shown to cause tenocyte proliferation and increased collagen production[6].

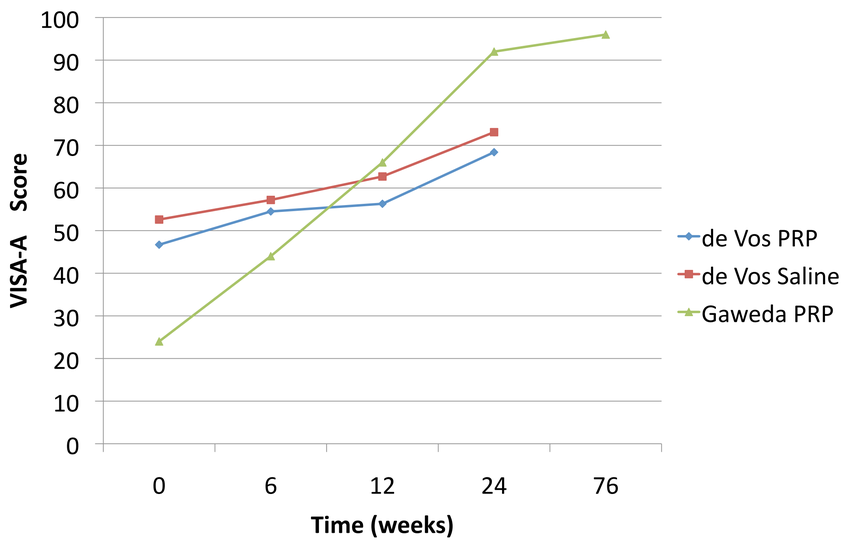


ACHILLES

Table 1. A summary of the studies assessing the use of PRP in chronic **Achilles tendinopathy**

Paper	Study Design	Sample size	PRP technique	Conclusion
de Vos et al. JAMA 2010	Double blinded RCT Eccentric exercises plus one injection PRP or saline	PRP (n=27) Placebo (n=27)	4 mls PRP from 54 mls venous blood, buffered with Sodium Bicarbonate. US guided.	Improvement in both groups. No significant difference in mean VISA-A scores between treatment groups after 24 weeks
de Jonge et al. BJSM 2011.	One year follow up of above study.			Both groups improved, but no difference between groups at 1 year.
de Vos et al. BJSM Nov 2010.	As above. Outcome was US tissue characterization and neovascularisation			Increased amount of organized tendon in both groups, but no significant difference between groups at 24 weeks or 1 year.
Gaweda et al. Int J Sports Med 2010.	Uncontrolled prospective cohort study. No eccentric program.	n=15	One injection (2 injections in 6 cases) of 3mls PRP under US guidance.	Significant improvement in VISA-A and AOFAS scores over 18 months follow up.

Fig.1 Summary of Primary Outcome Measures - Achilles Tendinopathy

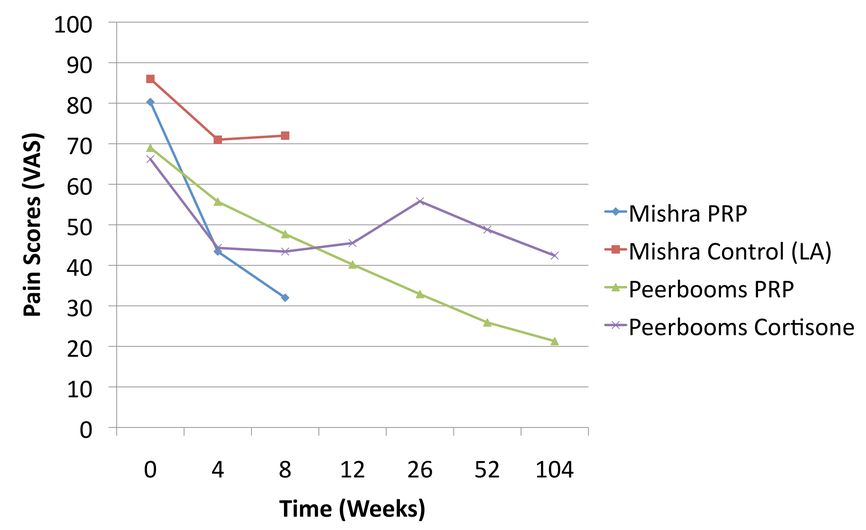


LATERAL ELBOW

Table 2. A summary of the studies assessing the use of PRP in **lateral epicondylosis**

Paper	Study design	Sample size	PRP technique	Conclusion
Peerbooms et al. Am J Sports Med 2010.	Double blinded, RCT. One injection of PRP v Cortisone, with eccentric program	PRP (n=51) CSI (n=49)	3ml PRP harvested from 27mls venous blood, buffered with sodium bicarbonate. 3ml PRP or corticosteroid plus bupivicaine injected into area of maximal tenderness.	Significantly improved pain and function (VAS + DASH scores) in PRP group at 1 year vs CSI
Gosens et al. Am J Sports Med 2011.	As above, follow up at 2 years			Significantly improved scores at 2 years. No complications in PRP group.
Mischra et al. Am J Sports Med 2006.	Controlled cohort study. One injection of PRP vs Bupivicane. Standard exercise program.	PRP (n=15) Bupivicaine (n=5)	5ml of PRP from 55ml whole blood. 2-3ml of PRP or bupivicaine injected, no US guidance.	Significant improvement in mean VAS score in PRP group vs control group at 8 weeks and at final follow up (mean 25 months)

Fig.2 Summary of Primary Outcome Measures - Lateral Epicondylosis



PATELLA

Table 3. A summary of the studies assessing the use of PRP in **patellar tendinopathy**

Paper	Study design	Sample size	PRP technique	Conclusions
Filardo et al. International Orthopaedics 2010.	Controlled prospective cohort study. PRP & physiotherapy vs physiotherapy alone.	PRP & physio (n=15) Physio alone (n=16)	20mls PRP from 150ml venous blood. PRP stored at -30°. 3 injections of 5ml PRP every 15 days.	Improvement in all scores, but no significant difference between PRP and control group in pain scores, recovery time or satisfaction.
Kon et al. Injury 2009.	Prospective Cohort study No control. Preliminary results from above study.	n=20	3 injections 5ml PRP every 15 days	Statistically significant improvement in all scores at 6 months.

FOOT

Table 4. A summary of the studies assessing the use of PRP in **chronic plantar fasciitis**

Paper	Study design	Sample size	PRP technique	Conclusions
Barret & Erredge. Podiatry Today 2004.	Uncontrolled prospective cohort study. Pilot study – incomplete statistical analysis	n=9	3 mls PRP harvested from 20 mls venous blood. One injection under US guidance (one patient had a second injection)	Improvement in medial and central band thickness on US at follow up – 1,2,3 months. 77.8% success (resolution of pain) at 1 year

Conclusion

The healing properties of autologus growth factors provide a promising adjunct to tendinopathy treatment. There is still much to learn, however, with regards to PRP preparation, frequency of injection and efficacy of treatment for different locations. The level 1 evidence that has been published to date demonstrates improvement in pain/function scores and tendon architecture after PRP. In the case of Achilles tendinopathy, however, this was not statistically different to the control group. This may represent differences in methodology or suggest that the healing response between weight bearing and non-weight bearing tendons is different[8]. Whilst the research on PRP has been promising, further robust clinical trials are required for clinicians to recommend it as first-line treatment in tendinopathies. Until then, the authors recommend to consider PRP in recalcitrant cases and to "proceed with caution"[2].

References

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