Use of Platelet Rich Plasma for the Treatment of Bicipital Tendinopathy in Spinal Cord Injury: A Pilot Study

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The purpose of study is to explore the efficacy and safety of platelet rich plasma (PRP) in the nonoperative management of shoulder tendinopathy amongst individuals with spinal cord injury. This objective was met by completing a pilot study on the effectiveness and safety of a PRP injection into the biceps tendon demonstrating clinical and ultrasonagraphic pathology. Recent analysis of the preliminary pilot data has demonstrated remarkably convincing results demonstrating both the safety and efficacy of this novel intervention. **Key words:** *biceps tendonitis, platelet rich plasma, regenerative medicine, spinal cord injury, ultrasound*

Shoulder pain remains one of the most common complaints in the spinal cord injury (SCI) population. Several studies suggest that approximately 30% to 70% of community-dwelling people with SCI in the United States suffer from a debilitating level of shoulder pain.[1-3] Studies suggest that this pain is a consequence of shoulder tendinopathy resulting in impingement syndromes.[4] Current treatment strategies include both nonoperative and operative strategies, both of which have significant limitations. Given the obvious importance for shoulder health in the SCI population and increasing life expectancy, especially in paraplegics who primarily use manual wheelchairs,[2] alternative treatments for shoulder pathology are in high demand.

Recent studies of platelet rich plasma (PRP) suggest it to be a promising alternative treatment option of shoulder tendinopathies and various other musculoskeletal conditions. Series of both in vitro and clinical studies have demonstrated the safety and efficacy of PRP in the treatment of various tendinopathies, most notably in lateral epicondylitis.[5,6] PRP has been found to have several essential protein growth factors that initiate wound healing, including platelet-derived growth factors, vascular endothelial growth factor, and epithelial growth factor. Although the exact mechanism of action has not been detailed in the literature, there is mounting evidence that these growth factors play a primary role in tendon repair.[7] PRP has been successfully demonstrated to accelerate bone graft formation in mandibular surgeries,[8] improve fusion rates in spine surgery,[9] and increase efficacy of knee and ankle surgeries.[10,11] Emerging studies are now exploring the potential use of PRP in operative rotator cuff repair.[12] Nonoperative PRP studies have shown positive results in the treatment of lateral epicondylitis,[13] infra-patellar tendonitis,[14] and knee osteoarthritis.[15]

Methods and Design

This novel pilot study was designed to explore the efficacy of PRP injections in the wheelchair population with biceps tendon pathology. Validated study outcomes included the Ultrasound Shoulder Pathology Rating Scale (USPRS), the Physical Examination of the Shoulder Scale (PESS), and the Visual Analogue Scale (VAS).[16] Spinal cord injured athletes with chronic shoulder pain were recruited for this study. Members of the tetraplegic rugby and the wheelchair basketball teams at the National Rehabilitation Hospital were specifically targeted for recruitment because of the high prevalence (50%) of bicipital tendinopathy in this population.[17] Participants in the study

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demonstrated ASIA Impairment Scale (AIS) scores of A-D for at least 1 year, shoulder pain for at least 6 months, and required the use of a manual wheelchair for the preceding year. Each participant enrolled underwent baseline analysis including USPRS, PESS, VAS, and functional scores. Participants then underwent a unilateral biceps tendon sheath injection of PRP and were followed every 2 weeks to monitor VAS scores and adverse events. The study was concluded at 8 weeks, when participants returned for repeat assessment of baseline parameters. The hypothesis was that PRP injections would result in a significant change in USPRS, PESS, and VAS scores over the course of the 8-week study period.

Results and Discussion

The study analysis at this point includes 8 participants who have completed the full course of treatment and analysis. Despite this admittedly small sample size, there is remarkably convincing data on the effects of this intervention. Comparison of baseline and 8-week data using a non-parametric Wilcoxon signed ranks test demonstrated significant change in the noninjected shoulder on USPRS score ($Z = 2.207$, $P = .027$), in PESS score ($Z = 2.120$, $P = .034$), and in the VAS-pain score ($Z = 2.041$, $P = .41$). An interesting link between level of education and injected arm USPRS score assessed at baseline was noted. Repeated measure general linear model analysis revealed statistical trends in the change of pain score measured via VAS at 5 time points (0, 2, 4, 6, and 8 weeks) for injected arm ($F = 6.68$, $P = .061$) but not for the untreated arm. No adverse reactions were reported during the study period.

The initial pilot data from this study demonstrate a significant effect of PRP using relevant and standardized measures. Although the study sample is small, a nonparametric analysis demonstrates convincing data on the overall positive and safe effects of PRP in the treatment of biceps tendinopathy in the SCI population. Given the results found in this study, further investigation is warranted including a randomized control trial.

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