Journal of Animal and Veterinary Advances 14 (9): 260-262, 2015
ISSN: 1680-5593

Effects of Platelet Rich Plasma for the Treatment of Left Superficial Digital Flexor Tendon Injury in Thoroughbred Horse

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Abstract: A 5 year old male, Thoroughbred horse with the left Superficial Digital Flexor Tendon (SDFT) injury was presented to veterinary center, Korea Racing Authority. The horse had been previously treated with rest, pharmacological and non-pharmacological (rehabilitation protocols) therapies without improvement. In initial physical examination, left SDFT was diagnosed with edema or swelling including lameness grade 2 and pain by an ultrasound system and veterinarian. Horse treated with autologous platelet-rich plasma into core lesion 3 times. After a 6 month follow-up, the horse has shown normal condition the left SDFT injury without lameness and pain.

Key words: Platelet-rich plasma, SDFT, Thoroughbred horse, superficial, Korea

INTRODUCTION

At present, about 30,400 domestic horses were raised including 14,000 improved breed (Thoroughbred) horses and 16,400 native horses breed including 2,100 herds (Jeju horse) which was designated as a natural monument No. 347 by government in Korea. The number of horses are steadily increasing in Korea.

Injury of the skeletal system in racing horses is serious and can cause a fatal wound that may occur in any environment including before or after the race. In the case of the Japan Racing Association, in the period 1987~2000, a total of 10,203 fractures were diagnosed in 556,705 race horses, resulting in an overall incidence of 1.83%. The annual incidence of fractures in flat racing during the 14 year period fluctuated between 1.44% and 2.19% (Ueda *et al*., 1993). This data is similar the musculoskeletal injury of racing horses occurred in Korea.

Platelet-Rich Plasma (PRP) an autologous concentrate of platelets, rich in growth factors, has been shown to enhance the repair process of injuried tendons (Bosch *et al*., 2011).

One of the main functions of PRP is coagulatinated by activating the collagen, thrombin, thromboxane A2. Growth factors including Platelet-Derived Growth Factor (PDGF), Transforming Growth Factor-β (TGF-β), Vascular Endothelial Growth Factor (VEGF) are essential for regulating the cellular events involved in wound healing and promotes healing of normal tissues and impaired wounds (Molloy *et al*., 2003; Eppley *et al*., 2004).

This study describes the effects of treatment using the PRP in Thoroughbred racehorse with left Superficial Digital Flexor Tendon (SDFT) injury.

MATERIALS AND METHODS

History and clinical examination: A 5 year old, male, TBH with the left Superficial Digital Flexor Tendon (SDFT) injury was presented to veterinary center, Korea Racing Authority. The horse had been previously treated with rest, pharmacological and non-pharmacological (rehabilitation protocols) therapies without improvement. In initial physical examination, left SDFT was diagnosed with edema or swelling including lameness grade 2 and pain by an ultrasound system and veterinarian.

PRP preparation: Equine whole venous blood was collected with sodium citrate. PRP was obtained by two sequential centrifugations (5 min at 200 g and 15 min at 1000 g). For activation a sterile 10% calcium chloride was added to PRP immediately before transplanting to initiate clot formation. Platelets were counted on whole blood and PRP. The platelet concentration factor was calculated by dividing the number of platelets in the PRP and the number of platelets in the whole blood (Torricelli *et al*., 2011).

RESULTS

The affected area of the limb of horse was shaved and disinfected. The horse was locally sedated (lidocaine Hcl, Huons, Korea). After ultrasonographic localization of the lesion site, the autologous PRP (range 4-7 mL) was slowly injected directly into core lesion. Horse was treated with their own PRP 3 times. After 1st injection, cool massage performed with ice pack for 15 min per day and was stall rested for 2 weeks. The horse was clinically

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Fig. 1: Ultrasound evaluation before (top) and after (bottom) the treatment with PRP in Thoroughbred horse at 6 months follow-up

evaluated after 2nd and 3rd injection and tendon ultrasound scans performed before and during this treatment period. The horse was maintained at a very low-level of exercise activity (hand walking) for a one-month period. Then, when symptom-free, after a warm-up walk they trotted for 5 min, increasing intensity every week until entering a complete training protocol including walking. The horse was re-examined lameness and ultrasound after a 6 months follow-up. The lameness and pain were no longer persistent. The left SDFT injury of horse has shown normal condition (Fig. 1).

DISCUSSION

Autologous platelet regeneration treatment involves drawing blood from the sick animal, centrifuging it to separate the platelets and infusing the concentrated platelets to the torn ligaments and cartilage. PRP is an autologous blood fraction rich in platelets and their associated growth factors that is injected at the site of a muscle or tendon injury as an adjuvant to the natural healing process. While PRP was introduced in the 1970s, clinical application of bone healing and soft tissue repair in orthopaedics, plastic surgery and neurosurgery (Foster *et al*., 2009).

PRP is more concentrated than the normal blood platelet (90-350 K μL^{-1}). PRP was first successfully used in 1997 in the field of soft-and hard-tissue surgeries. It is regarded to promote local healing and regeneration and can gradually extend its effects to the surrounding surgical areas (Margolis *et al*., 2001; Marx *et al*., 1998).

The concentrated platelets in the PRP has been reported to play an important role in wound healing and aggregate promptly to the damaged area where they then release growth factors and cytokines involved in the healing process (Margolis *et al*., 2001). When growth factors released upon platelet activation include PDGF, TGF-β1 and EGF which facilitate the injured bone area and promote the healing of damaged soft tissues (Kevy and Jacobson, 2004; Kim *et al*., 2001). Thus, PRP is effective when injected at the site of a muscular or tendon injury as an adjuvant to the natural healing process (Foster *et al*., 2009).

CONCLUSION

In conclusion this study describes the effects of treatment using the PRP in Thoroughbred racehorse with left Superficial Digital Flexor Tendon (SDFT) injury and suggests that PRP may be useful for tendon repair or regeneration.

ACKNOWLEDGEMENTS

This research was supported by the Technology Development Program for Agriculture and Forestry (312062-05-1-SB020), Ministry for Agriculture, Forestry and Fisheries, Republic of Korea.

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