
Application of Autologous Growth Factors on Skeletal Muscle Healing

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PURPOSE

Sports medicine is a potential field for autologous platelet therapies as their use can accelerate repair in clinical situations requiring rapid healing and tissue regeneration. Platelets secrete different Growth Factors essential in the healing process of tissue healing including IGF-I, TGF- β , HGF, VEGF, bFGF. Additional adhesive proteins forming part of the clot, such as fibrin provide an adhesive support for platelets confining the secretion to the chosen targeted site. As autologous preparations rich in growth factors (PRGF) contain proteins that accelerate and improve healing (reviewed in Anitua et al 2004), it is possible that by changing the platelet rich plasma preparations one may alter the biological effect. Some key factors when preparing the PRGF include the number of platelets, presence of white blood cells and the method of initiating PRP coagulation.

PRGF applied to muscle cells in vitro resulted in an increase in cell proliferation, satellite cells differentiation and the synthesis of angiogenic factors and its application in an animal model enhanced muscle repair. Our goal was to evaluate the clinical benefit of this application on muscle injuries related to professional sports activities.

METHODS AND RESULTS

PDGF-AB, TGF- β , VEGF, EGF, IGF-I and HGF were measured by ELISA in a group of sex and age-matched controls (n=25) studies.

Patients: A total of 20 professional athletes were included in this study; two out of the twenty athletes benefit from the same treatment; in two different occasions.

TREATMENT

The exact location and extent of the muscle injury was defined by ultrasound, injury severity was evaluated according to echo-graphic criteria. The haematoma was localized within the muscle and evacuated and the PRGF was injected into the injured area. The number of applications varied based on the size of the injury.

Physiotherapy included gentle muscular electro-stimulation, analgesic and anti-inflammatory medication, electrotherapy and isometric exercises. The number of PRGF injections depended on the severity: small tears progressed well with a single application of PRGF, while medium to large size tears required two or three applications of PRGF at one week intervals.

FUNCTIONAL RECOVERY AFTER PRGF TREATMENT

Application of PRGF to muscle injuries diminished swelling and reduced pain. Full recovery of functional capabilities was restored as early as half of the expected recovery time. Echo-graphic images showed full regenerated muscle tissue after PRGF treatment. Fibrosis did not appear in any of the treated cases. No re-injuries occurred, in any athlete, after resuming their normal activities.

CONCLUSIONS

We showed that ultrasound guided injection of an Autologous preparation rich in growth factors within the injured muscle enhances healing and thereby functional recovery. This simple procedure, of considerable economic importance, confirms that platelets have healing properties that extend beyond their known function in Hemostasis.

REFERENCES

E. Anitua, I. Andia, B. Ardanza, P. Nurden, A. T. Nurden, "Autologous platelets as a source for healing and tissue regeneration", *Thromb Haemost* 2004, 91: 4-15