

TENDON LESION AND PLATELET-RICH PLASMA (PRP) INJECTION

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1. Body

Introduction: For a few years, the positive effects of platelets on the healing process of different tissues (skin, bones...) were demonstrated. In fact platelets contain lots of growth factors which can be release locally and enhance the healing process. Thus the aim of our experiment was to ascertain by an original mechanical measure whether the use of PRP was of interest for accelerating the healing process of rats' Achilles tendons after surgical induced lesion.

Methods: A 5mm defect was surgically induced in 90 rats' Achilles tendon. Rats were divided into 2 groups of 45: (A) control (no treatment) and (B) PRP treatment. Rats of group B received a PRP injection in situ after the surgery. Afterwards, rats of both groups were placed in their cages without immobilization. After 5, 15 and 30 days, 10 traumatized Achilles tendons of each group were dissected and removed. Immediately after sampling, tendons were submitted to a biomechanical tensile test up to rupture, using a "Cryo-jaw" (Video 1). After that, transcriptomic analyses were made on the tendon samples, to study the expression of type III collagen, matrix metalloproteases and tenomodulin. A hydroxyproline dosage was finally realised to quantify the collagen in the tendon during its healing process. Tendons of the 15 remaining rats of each group were subjected to a histological study, respectively at day 5, 15 and 30 (5 rats for each time).

Results: We demonstrated that (1) the stress (F) during biomechanical tensile test up to tendon rupture was significantly greater for tendons which had been submitted to an injection of PRP compared to the control group; (2) the surface (S) area of the section of the tendon was greater in the PRP group during the 15 first days, but this section was similar after 30 days in the 2 groups; (3) the ration F/weight of the rat was significantly greater in the PRP group at each time; (4) constrain was similar after the 15 first days but was significantly greater in the PRP group after 30 days. Histological study showed that PRP could enhance cells proliferation, angiogenesis and collagen organisation. Our biochemical analyses did not explain beneficial effects of PRP. Indeed, there was no significant difference neither between the expression of different studied genes.

Conclusion: Our animal study demonstrated that an injection of PRP could accelerate the tendons healing process and improve its quality.

Keywords: platelet-rich plasma, tendon, healing