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Tendon lesion and VEGF-111 injection

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1. Body

Introduction: Tendon lesion is one of the most frequent pathology in sports and by physical workers. This pathology often becomes chronic. For this reason, it is of interest to develop new treatments. Injection of platelet-rich plasma (PRP) seems to be a promising one by releasing growth factors (GF) locally. Among all the GF released by activated platelets, the vascular endothelial growth factor-A (VEGF-A) is known to induce positive effects on vascular function and angiogenesis, and could be implicated in the healing process of tendons. Recently, a novel VEGF-A isoform was identified, the VEGF-111, a biologically active and proteolysis-resistant VEGF-A isoform, also known to present beneficial effects on ischemic diseases. This prompted us to evaluate whether VEGF-111 would have a therapeutic interest within the framework of the tendon pathology.

Methods: 60 Rats were divided into 2 groups: A: control (no injection), B: VEGF-111 treatment. A 5mm defect was surgically induced in rat Achilles tendon after resection of plantaris tendon. Rats received a local injection of VEGF-111 (100ng) in situ after the surgery and were placed in their cages without immobilization. After 5, 15 and 30 days, the traumatized Achilles tendons of 10 rats of both groups were removed and dissected during their healing process. Immediately after sampling, tendons were submitted to a biomechanical tensile test up to rupture, using a “Cryo-jaw”. Rats were then euthanized.

Statistical analyses were made with an ANOVA. Values are significant when p-value is below 0.05.

Results: Our results showed that the developed force necessary to induce tendon rupture during biomechanical tensile test was greater for tendons which had received an injection of 100ng of VEGF-111. These results were already noticed from day 5 onwards. The ratio between force and weight increased with time in both groups, but this ratio was greater for tendons which had been submitted to an injection of VEGF111. The surface area of the section of the tendons increased between 5 and 15 days followed by a stabilization. After 30 days, sections in both groups were similar. Thus, the constraint was similar after 5 and 15 days but was better for VEGF111 group after one month.

Discussion - Conclusion: This experimentation has shown that a 100ng injection of VEGF-111 stimulated tendon healing process as suggested by the increased force needed to break tendons during its healing process and the increased of constraint in comparison with the control group. Other experimentations with different concentration of VEGF111 are now in process.

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