Influence of Xenogenous-based bovine-derived platelet gel embedded within a three-dimensional collagen implant on the healing and regeneration of the Achilles tendon defect

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Objective: It was designed a novel xenogeneic-based bovine platelet, embedded it within a tissue-engineered collagen implant (CI) and applied it in an experimentally induced large tendon defect model in rabbits to test whether bovine platelets could stimulate tendon healing and regeneration in vivo.

Design: Research experimental study

Animals: Sixty White New Zealand rabbits.

Procedures: The animals were randomly divided into three groups of control (no implant), treated with CI and treated with collagen-platelet implant. In all the animals, left Achilles tendon was surgically excised and the tendon edges were aligned by appropriate tendon suture. To study the tendon healing and its outcome, the experimental animals were evaluated clinically during the study and then euthanized at 60 DPI and their tendons were evaluated by gross pathologic, histopathologic, scanning electron microscopic, and biochemical methods.

Results: Bovine platelets embedded within CI increased inflammation and the rate of implant absorption and matrix replacement compared with the controls and CI alone. Treatment significantly increased diameter, density, amount, alignment and differentiation of the collagen fibrils and fibers (p < 0.05). Treatment also improved echogenicity and homogenicity of the tendons and reduced peritendinous adhesion, muscle fibrosis and atrophy. Treatment also increased the clinical scores and physical activity related to the injured limb when compared with the controls (p < 0.05).

Conclusion and clinical relevance: The bovine platelet gel embedded within the tissue-engineered CI was effective in healing and remodeling of the tendon. This strategy could be a valuable option in the clinical practice.
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