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CORR Insights

CORR Insights®: Tendon Collagen Crosslinking Offers Potential to Improve Suture Pullout in Rotator Cuff Repair: An Ex Vivo Sheep Study

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Where Are We Now?

Rotator cuff disease in patients older than 50 years of age remains both common and therapeutically challenging. Various forms of treatment, both nonoperative and operative, have been extensively explored. No single solution has emerged as dominant, and none is curative. In the hope of changing that, biologics in rotator cuff surgery have become something of a hot topic, as surgical success may be more dependent upon biologic healing than on the technical aspects of tendon fixation. The current authors set out to use an exogenous collagen crosslinking agent, genipin, to augment tendon repairs. The use of this agent to augment tendon healing has not been explored before.

The study, conducted in a cadaveric (ex vivo) sheep model, allows us to make two conclusions pertaining to suture pullout strength: (1) Pullout strength is enhanced after tendon incubation in genipin for 24 hours when utilizing the simple suture configuration repair technique, and (2) incubation of the tendon in genipin for 4 or 24 hours did not make a difference in the pullout strength of tendons repaired using a modified Mason-Allen suture configuration. This suggests that the suture configuration may be the most important aspect of this repair model as opposed to the exposure to the exogenous crosslinking agent genipin.

Where Do We Need To Go?

What we really need to know is whether genipin has any real clinical utility. In other words, can we use genipin in humans with rotator cuff tears? Does its mode of activation lend itself to utilization in vivo at the time of surgery? Will its method of delivery allow for safe and effective clinical treatment in a timely fashion? Will this provide any clinically enhanced levels of healing after surgical repair? While this study does not allow us to answer any of these questions, as a proof-of-concept effort, it paves the way for future studies that should be able to do so.

How Do We Get There?

Future in-vivo rotator cuff animal studies in rats or sheep utilizing this

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agent should look to quantify the level of improved crosslinking demonstrated at the collagen level. Additionally, delivery vehicles such as liposomes or exosomes, which are anchor or suture based, may be designed to allow for local application in vivo of the genipin at the time of surgery.