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LigaMend: Resorbable Magnesium Hardware for ACL and Rotator Cuff Repair ID: 2774, 3527

Featured Innovators: Savio Woo, PhD

Every year, Americans undergo about 200,000 rotator cuff repair surgeries and about 300,000 anterior cruciate ligament (ACL) reconstructions. Often, surgeons use metal or polymer anchors to reattach the tendon to the bone, but these materials both come with drawbacks. Current metal hardware can migrate, loosen, and interfere with postoperative imaging. Traditional metals can also necessitate subsequent revision surgeries, which are associated with early onset osteoarthritis. Polymer anchors, on the other hand, are prone to breakage, unpredictable degradation, and bone loss. Our magnesium-based surgical hardware avoids these pitfalls by virtue of its innate strength, biocompatibility, and controlled resorption.

Technology Description

When used for ACL repair, LigaMend consists of a bioresorbable magnesium ring, combined with FDA-approved extracellular bioscaffolds that encircle the torn ligament and promote regeneration of connective tissue. Then magnesium-based suture anchors affix the girdled ligament to the bone. The rotator cuff and other joint repairs are similar, except that they may involve only the suture anchors. In any case, the degradation profile of the magnesium alloy is engineered to match the healing timeline of native tissues. As the hardware gradually disappears, regenerating tissue takes over the function of the joint. In pre-clinical trials using a goat model, LigaMend treatment resulted in three fold greater ACL stability and strength compared to traditional sutures.

Advantages

- Biodegradable, so no need for a second removal surgery
- Higher ductility and tensile strength than polymers for superior fixation
- Biocompatible
- Osteoinductive, promotes tissue healing and growth
- No MRI interference

Applications

- ACL reconstruction
- Rotator cuff tears
- Femoral acetabular impingements
- Meniscus tears
- Achilles tendon ruptures
- Other soft tissue repairs in the musculoskeletal system

Stage of Development

Prototype

IP Status

US, Chinese, and European patent applications in prosecution

Notable Mentions

Coulter Translational Research Partners II Program

Relevant Publications

- Mau JR, et al. (2017). The Use of a Large Animal Model and Robotic Technology to Validate New Biotherapies for ACL Healing. In: *Bio-orthopaedics* (pp. 185-196). Springer, Berlin, Heidelberg.

- Farraro KF, et al. (2014). Revolutionizing orthopaedic biomaterials: The potential of biodegradable and bioresorbable magnesium-based materials for functional tissue engineering. *Journal of Biomechanics*, 47(9), 1979-1986.

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