

The Use of Small Intestine Submucosa as a Scaffold in Flexor Tendon Repair

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A xenogeneic material that has shown promise in many practical and clinical applications is small intestine submucosa (SIS) derived from porcine. This acellular collagen matrix has been effectively used as a replacement graft for arteries, veins, skin, the urinary bladder, the anterior cruciate ligament (ACL), rotator cuff, Achilles tendon and lateral meniscus. The purpose of this study was to determine if SIS could be used to enhance the healing segmental defects of flexor tendons in a rabbit model. We predict that the SIS treated tendons will have: 1) improved mechanical and material properties, and 2) enhanced extracellular matrix organization.

In 20 female New Zealand White rabbits a 1 mm x 6 mm segmental defect was surgically created in the third digits of both the right and left flexor digitorum profundus (FDP) tendons. The right FDP tendons of each animal were sutured with SIS, while the left FDP tendons remained unrepaired. At 6 weeks post-operation the right and left FDP tendons were harvested. 6 tendons with no defects were also obtained to serve as negative controls. Tendons from 3 animals with surgical defects were prepared for histological testing. Tendons from 16 animals with defects as well as the 6 negative control tendons were biomechanically tested to determine maximum load, maximum deformation, stiffness, stress, strain, and elastic modulus.

Currently, work is being done to finish the statistical analysis of the biomechanically tested tendons and to evaluate the histological preparations. From this data it may be possible to determine if SIS may aid in the healing of FDP tendons with segmental defects.