COMPARISON OF ACHILLES REPAIR STRENGTH WITH ALLOGENIC & XENOGENIC AUGMENTATION GRAFTS

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Comparison of Achilles Repair Strength with Allogenic & Xenogenic Augmentation grafts

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Presenter

My disclosure is in the Final AOFAS Program Book

I have a potential conflict with this presentation due to

This clinical study was funded by Biomet Orthopedics
I am the Primary Investigator
I am a surgeon consultant for Biomet Orthopedics
I am on the Speakers Bureau for Biomet Orthopedics
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Tendon augmentation grafts have been shown to be successful in achieving enhanced stability in the repair of Achilles ruptures.

Biomechanical testing has shown allogenic and porcine dermis to be the strongest soft tissue repair matrices, providing as much as a two-fold increase in load to failure compared to suture alone.

The purpose of this trial is to compare load to failure of various supplemental graft materials in the repair of the Achilles applied posteriorly and attached to the Achilles with a running locking suture technique.
Testing was set up on the Instron 8511 mechanical test system. The calcaneal block was potted in poly methylmethacrylate bone cement ensuring the insertion point of the Achilles tendon was exposed. The proximal end of the Achilles tendon was placed in a custom gripping fixture and additional sutures were added to ensure the tendon did not slip.

- **Thirty-five** human cadaver legs were utilized.
- The Achilles tendons were isolated from cadaver legs at the musculotendinous proximally, and distally with its native insertion attached to a portion of the calcaneus.
- Specimens were placed on an Instron 8511 (Instron, Norwood, MA)
  - Tendons were pre-loaded to 5N.
  - Constructs were cyclically loaded for 10 cycles from 5N to 30N at 12.5N/sec.
Achilles tendon ruptures were created 6cm proximal to the calcaneal insertion.

Tendons were repaired with a modified Krackow stitch.

Repairs were evenly segregated into 7 groups (1 nonaugmented repair group and 6 augmented repair groups)

Repair materials tested
- ArthroFlex (Arthrex, Naples, FL)
- Conexa (Tornier Edina, MN)
- DermaSpan (Biomet, Warsaw, IN)
- GraftJacket (Wright Medical, Memphis, TN)
- Orthodapt (Synovis, Irvine, CA)
- TissueMend (Stryker, Mahwah, NJ)

Repair patches in the augmented repair groups were placed posteriorly on the tendon and sutured with a lateral trap running locking suture technique.

Each construct was subsequently cyclically loaded for 10 cycles from 5N to 30N at a rate of 12.5N/sec
Tensile testing to failure at a displacement rate of 2.54mm/sec was performed.

Repair load to failure was determined by the location at which the tendon repair failed as noted as the point the load-displacement curve deviated from the linear progression.

Dunnett’s post-hoc analysis (80% confidence) was performed between repair groups and Student’s t-tests were performed to compare the repairs with allogenic grafts, repairs with xenogenic grafts, and unaugmented repairs.

Statistical significance was set at p<0.05.
The repair load to failure by technology type is reported as:
- The control group
  - 141.25N±23.00
- The group augmented with the allogenic dermis
  - 371.89N±28.63
- The group augmented with xenograft
  - 253.50N±24.93
- Statistical significance
  - p<0.03

Allograft Acelluar Dermis is superior to Xenograft
The repair load to failure by graft type is reported as:

- The control group: 141.25N±23.00
- The DermaSpan group: 466.14N±50.20
- The GraftJacket group: 296.11N ±38.23
- The Conexa group: 216.63N±33.45
- The ArthorFlex group: 353.42N±29.70
- The Orthodapt group: 211.15N±33.50
- The TissueMend group: 332.73N±43.88

Dunnett’s post-hoc analysis at 80% confidence shows DermaSpan to be superior to all others, with p<0.00001.

DermaSpan provided the strongest repair load to failure.
Addition of an allogenic repair patch with a running locking suture technique shows
- A statistically significant biomechanical advantage over a Krakow repair
- A statistically significant biomechanical advantage over xenograft repair patch

The increase in repair strength provided by the allogenic repair patches suggests the possibility for earlier and more aggressive rehabilitation when utilized clinically to augment Achilles tendon ruptures.

References