Fixation Device for Achilles Tendon Repair

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CLINICAL NEED:
- Most frequently ruptured tendon (18 in 100,000 people) [ref. 1]

EXISTING SOLUTION:
Surgical Reconstruction
- High risk for suture tear through
- Re-rupture rate: 5-10% [ref. 2]

Objective: Produce a fixation device that can maintain a minimum gap between tendon ends during the healing process while in a walking boot.

APPROACH:
- Math Model
- Select Material
- Braid
- Fabrication
- Req. 1 > 369N
- Req. 2 < 5mm Gap
- Valid
- Tensile Load Test
- Constant Load Test
- Cyclic Load Test

RESULTS & IMPACT:

SOLUTION:

\[ F_f = \mu F_N = \mu A P \]

\[ F_f = \mu \left( \frac{C_t - C_b}{C_t C_b} \right) \left( \frac{C_t - C_b}{2\pi E w} \right) \]

Material Braid Load Failure


Additional optimization of this design could serve as an alternative approach for Achilles tendon repair in sports medicine & worker’s compensation.