



Flexor Tendon Morphology a Pre-requisite for Triggering

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Objectives

- Triggering at A1 pulley extremely common
- Pathogenesis incompletely described
- Tenosynovitis not consistent with histopathology
- Likely that forces of flexor tendons cause cartilaginous irregularities leading to stenosis
- Size mismatch between pulley & tendon
- This is a combined anatomic & mechanical evaluation performed to better understand triggering phenomena
- Why is triggering almost universally at A1?
- Can we induce triggering at other pulleys?

Materials & Methods

- 4 Fresh frozen cadaveric hands
- Previously developed triggering model
- Arm with cable to inserted amount
 - A1, A2, A3 & Oblique (thumb) pulleys
- Hand mounted in tensile testing machine
- The minimal force required to initiate triggering applied & recorded
- FDS tendon was removed and forces required for triggering were recorded at the A1 pulley

Materials & Methods



Materials & Methods: Volume Analysis of Tendons

- All FDP/FDS tendons
- Measured at 3 points
 - Proximal A1
 - Distal A2
 - Distal A3
- FPL
- Measured at 3 points
 - Proximal A1
 - Distal A1
 - Distal to Oblique



Material & Methods: Volume

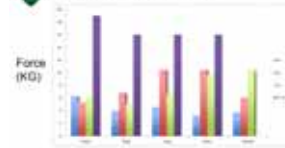


- Imaged software used to measure area
- $A = \pi r^2$, $V = \pi r^2(h)$ used to calculate volume

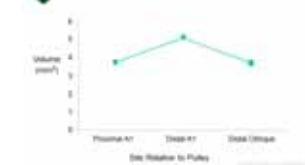
Results: Triggering

- Triggering at A1 pulley require smallest compressive force in all fingers but the small
- Triggering occurred A2, A3 & oblique pulleys with a significantly increased force compared to A1
- Removal of FDS triggering occurred when force on cable to was increased to at least three times the force required at A1 with FDS intact

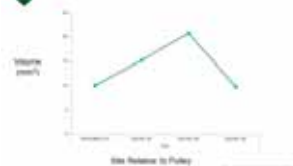
Results: Triggering



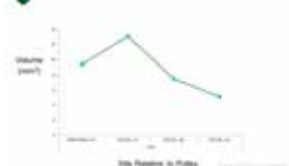
Results: FPL Volume



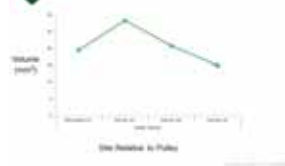
Results: FDP Volume



Results: FDS Volume



Results: Volume FDS & FDP



Conclusions

- Triggering is consistently reproduced at A1 pulley with smallest degree of compressive force
- Removal of FDS tendon decreases propensity to trigger
- There is increased volume of flexor tendons at a point just distal to A1 pulley
- This normal tendon morphology likely contributes to the triggering phenomena