Complications of Flexor Tendon Repair
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How do we best get there?

• What are the best surgical techniques?
• What are the best rehab protocols?
• What pitfalls are we trying to avoid?
Complications of Flexor Tendon Repair

Nearly anything can go wrong, but most things are predictable and therefore avoidable.

- Wound healing issues/infection
- Scar contracture
- Flexor tendon adhesions
- Joint contracture (PIP)
- Tendon rupture
- Triggering
- Pulley Rupture (bow stringing)
- Quadrigia

Plan your scar, incorporating the traumatic laceration
Minimize risk of scar contracture (no longitudinal scars without Z-plasties!)
Take care with small flaps to avoid necrosis

- Preoperative education of the patient is critical!
- Set expectations:
  - The surgery
  - Early postop course
  - Duration of rehab
  - Need for formal therapy
  - Necessity for compliance
  - Impact on work/sport
  - Risks of complications and what that might mean for them
- Spending the time preop will pay off postop!
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Scar contracture

Dissection to the flexor sheath
- Protect the A2 and A4 pulleys and work around them
- Can lose up to ½ and still be competent

Bowstringing
- Unrecognized or untreated significant traumatic A2,4 pulley injury or iatrogenic injury during efforts to expose, retrieve, and repair the tendon
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If pulleys are found to be incompetent at the time of surgery:

Reconstruct!

Risks:
More adhesions
Extensor issues
Overtightening (triggering or inability to pull through)

Handling the tendons

“No touch technique” – obviously impossible

Minimal touch technique

Avoid creating iatrogenic trauma to the previously pristine smooth gliding surfaces
• If you need to manipulate the tendon with instrument, touch the raw cut surface (will be inside the repair)
• Single 25G needle can “hold tendon” for you
• Appropriate suture placement the first time (not multiple passes)
• Once suture is placed hold onto that instead of the tendon
• Minimize trauma within the sheath (may be best to open more proximally to find the stump rather than “fish for it”)

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Flexor Tendon Adhesions

Limited active ROM > passive ROM
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Flexor Tendon Adhesions – what to do?

• Don’t overstuff the sheath
  • Maybe repair only one slip of FDS or only FDP
  • Dilate the pulley?
  • Don’t bunch the repair
  • Epitendinous suture to smooth edges
• Early motion protocols to work on differential glide
• Up to 20% require tenolysis

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If tenolysis:

• Try to assess for adhesion vs rupture preop via u/s
• Prepare for 2 stage reconstruction….just in case
• Can lead to later rupture (the adhesions may be most of what is “holding on”)
• Make sure the soft tissues are ready (matured scar, resolved edema) – usually 3-4 months
• Maximize PROM preop
• Make sure patient is ready for the rehab
• Bier block – assess AROM intraop
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Flexor tendon repair

• At least 4 strand core repair with nonabsorbable suture
• Epitendinous in zone 2
• No gapping but minimal bunching
• Make sure the repair will glide under the pulley (actively)

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Flexor tendon rehab

• Usually start 3-4 days postop (need to arrange this preop!)
• Dorsal block splint
• Early motion protocol—modified Duran
• Edema control

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Flexor tendon rupture

• 4-5%
• If FDS only, may cause adhesions and dysfunction of FDP but may not require further intervention
• FDP only with intact functioning FDS, may be best to accept FDS finger +/- fuse DIP prn
• If no competent flexor, repair vs reconstruct
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To evaluate for rupture - Ultrasound

Dynamic and includes attempted active motion
Very dependent on the examiner!!

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• One Stage Repair
  • 1. Minimal scarring
  • 2. Pliable joints
  • 3. Adequate retinacular pulley system
  • 4. Typically not Zone 2
  • 5. Usually very soon after the rupture happens
    • Sometimes can re-repair

• Two Stage Repair
  • 1. Severe adhesions or scarred tendon bed
  • 2. Contractures
  • 3. Disruption of pulley system
  • 4. Missed injuries
  • 5. Injuries not suitable for primary repair (gross contamination)

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After a previously repaired tendon ruptures:

Flexor tendon reconstruction
First stage:
• Excision of tendons in digit
• Insertion of silicone rod
• Ensure pulleys are adequate / reconstruct
• Rehab!!
Second stage: (3-4 months)
• Pull tendon graft through the new sheath and secure
  • Palmaris, FDS, plantaris, toe extensor
Might need tenolysis
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Joint Contracture (PIP)
May be in combination with adhesions
Unrecognized extensor injury

Kleinert protocol
If patient is not compliant, may lead to significant flexion contractures

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• Splinting
  • Dynamic
  • Night extension
  • Casting – flexors can’t glide
• AA/PROM
• Surgery:
  • Release sheath contracture between A2,4
  • Tenolysis
  • Release check reins, accessory collaterals, VP
  • Manipulate
  • Change the arc but often don’t "normalize" the motion
**Complications of Flexor Tendon Repair**

### Triggering
Most often nonoperative care

![Image of a hand with fingers extended]

### Quadrigia
Due to link between FDP of long/ring/small, if one is repaired too tightly or adhesions, the others lack full flexion (lag)

- Don’t overshorten (1 cm max)
- Careful technique

![Images of hands showing flexion lag and normal hand]

### Meta-analysis - 29 studies
- Reoperation rate 6%
- Rupture 4%
- Adhesions 4%

- Type of core suture/epitendinous does not affect rupture rate
- Epitendinous suture decreased reoperation rate by 84%
- Adhesion formation with modified Kessler is 57% lower

*Dy et al. JHS 2012*