Novel Use of Silastic Vessel Loops in the Staged Reconstruction of Chronic Flexor Tendon Injuries

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INTRODUCTION

- Hand injuries encompass 20% of all injuries treated in the ED
- Majority of hand lacerations demonstrate underlying tendon injury
- Flexor tendon injuries most frequently occur in zone 2
- Two staged flexor tendon repair if segmental loss and scarring/absence of the pulley system
- Method standardized in 1971 by Hunter and Salisbury
- Tubular pseudo-sheath for tendon graft is created with a silastic (silicone) rod in the anatomical location of the flexor tendon
- Second stage involves explantation of the silicone rod and placement of a free tendon graft within the newly formed sheath
- Studies have explored alternatives that create the same physiologic and histologic pseudo-sheath including foley catheters and feeding tubes
- Silicone rods cost several hundred dollars and are typically only available for elective cases
- Silastic vessel loops cost <$2 each and are readily available

CASES

- HPI: 48 yo F R-hand dominant, presented 10 days after fall off ladder
- Exam: Pain, bruising, and immobility of the RSF; DIP hyperextended and unable to flex
- Diagnosis: Jersey-finger injury resulting in rupture of the RSF FDP tendon
- Surgery #1:
  - RSF with absence of FDP tendon at DIP joint
  - Free tendon graft with palmaris longus
  - Post op: some flexion at RSF DIP joint initially, later no active flexion with hyperextension at DIP joint and flexor tendon adhesions along the skin
- Surgery #2 (1st stage repair):
  - No tendon within flexor tendon sheath concerning for dehiscence
  - Graft identified at level of wrist with scar tissue, unable to advance with tenolysis
  - Silicone spacer not available; two vessel loops sutured together and placed
- Surgery #3 (2nd stage repair):
  - 2 months later, taken for 2nd stage repair, vessel loops explanted
  - Distal FDP in wrist not suitable for repair; FDS of RRF used as motor
  - Palmaris longus tendon from L hand tunneled through pseudo-sheath
  - Post op: improved RSF PIP flexion until 2 months later with loss of function
  - Partial dehiscence of repair, patient not interested in further intervention

- HPI: 58 yo M, presented 1 day after fall while hiking with laceration to base of RSF
- PMH: CAD, COPD, T2DM, HTN, HLD, 2 PPD, heavy EtOH use
- Exam: laceration to volar and ulnar base of RSF, pulsatile bleeding, diminished sensation, motor exam limited due to pain
- Diagnosis: neurovascular injury to RSF
- Surgery #1:
  - No flexion cascade of RSF concerning for tendon injury
  - Complete transection of ulnar digital nerve and artery
  - Artery not salvageable and ends ligated; digital nerve repair with AxoGuard nerve protector
  - Lack of FDS and FDP tendon from A1 to A4 pulley, scarred at base of proximal phalanx
  - Silicone spacer not available; vessel loops tunneled down to wrist
  - Post op: DTs and noncompliance, cellulitis requiring PO abx at home
- Surgery #2:
  - 1 month post op worsening R hand swelling, dehiscence, and drainage from surgical site
  - I&D of wrist incision, RSF incision opened and exposed vessel loops explanted

DISCUSSION

- Vessel loops successfully placed as substitutes
- Outcomes limited by patient factors and patient selection
  - Similar complications of dehiscence and infection with other materials
- Material costs for surgery suspected to be lower
  - $1-$2 per vessel loop vs $550+ per Hunter rod (Wright Medical)
- More readily available in smaller hospitals, those without reps, and developing countries
- Ability to adjust diameter and length based on anatomic location
  - No need to have multiple silicone rods in stock that may expire before use
- Advantage over other materials
  - Perforations in Foley catheter - disruption in pseudo-sheath and tube breakage
  - Hollow lumen in Foley and feeding tubes – space for fluid collection and infection
- Future directions
  - Randomized control trial
  - Formal cost analysis
  - Study other materials including Foley catheters and feeding tubes

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