

Update on Tendon Surgery  
April 2016  
Atlanta Trauma Symposium

Joshua Ratner MD  
The Hand and Upper Extremity  
Center of GA

---

---

---

---

---

---

---

---

**Zone 2: "No Man's Land"**



- Used to be avoided
- The "modern era of flexor tendon repair" began in the late 1960's
- Bunnell and others advocating minimal touch, delicate handling

Areas of focus for last 40 years

- Repair strength
- Rehab protocols

---

---

---

---

---


---

---

---

Zone 2 Remains A Challenge

- Areas of continued research
  - Repair Techniques
    - Materials
    - Suture Configuration
  - Rehab Methods
  - Biology



---

---

---

---

---

---


---

---

### Latest Info and Evidence Materials

#### Barbed Suture

- Allows for knotless repair
- Increases tendon/suture interaction
- Reviews are mixed, but more are favorable than not
  - Less inflammation
  - Less adhesion
  - Less debris at repair site
- Need one size larger suture (3-0 traditional = 2-0 barbed)
- Maximum load no different
- Gap formation no different
- Greater work of flexion (energy expended moving tendon)  
(Ben-Amotz, JHS 2015)
- Greater likelihood of breakage  
(Maddox, JHS 2015)




---

---

---

---

---

---

---

---

---

---

---

---

### Tendon Repair Keys

- Repair strength is proportional to the number of crossing strands
- Stiffer suture gaps less (how about stainless steel?)
- Repair strength best when >7mm and < 12mm of tendon is grabbed
- Work of flexion increases when both slips of FDS are repaired

Myer and Fowler, Ortho Clinics 2016

---

---

---

---

---

---

---

---

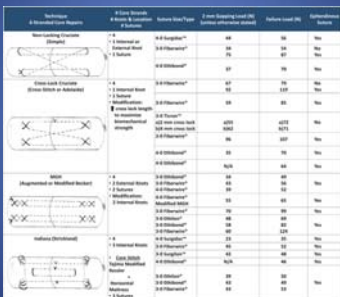
---

---

---

---

### Latest Info and Evidence Suture Configuration



Technique	# Strands	Repair Strength (%)	Work of Flexion (%)	Comments
2 Strand	2	50	100	
3 Strand	3	75	150	
4 Strand	4	100	200	
5 Strand	5	125	250	
6 Strand	6	150	300	
7 Strand	7	175	350	
8 Strand	8	200	400	
9 Strand	9	225	450	
10 Strand	10	250	500	
11 Strand	11	275	550	
12 Strand	12	300	600	
13 Strand	13	325	650	
14 Strand	14	350	700	
15 Strand	15	375	750	
16 Strand	16	400	800	
17 Strand	17	425	850	
18 Strand	18	450	900	
19 Strand	19	475	950	
20 Strand	20	500	1000	

---

---

---

---

---

---

---

---

---

---

---

---

### Latest Info and Evidence

#### Suture Configuration

- Use a four strand grasping repair (at least)
- Choice of configuration...do what you do well
- Locking sutures.....up to you
- Core suture & epitendinous suture helps gliding

---

---

---

---

---

---

---

---

### Latest Info and Evidence

#### Biology

“using pharmacology to modify the healing environment”

- TGF-Beta: involved in fibrosis.
  - A neutralizing Ab limits scarring in rat dermal wounds  
(Chang, PlastReconSurg 2000)
  - Next step: independently control fibroblasts, epitendon tenocytes and intrinsic tenocytes using 3 TGF-B isoforms
- VEGF: may allow for increased blood flow to tendon repair sites
  - VEGF expressing viral vectors in acellular allograft tendon

Loiselle, et al JHS 2016

---

---

---

---

---

---

---

---

### Tendons and Radius Fractures

#### Volar plates and their complications

- Late FPL rupture
- Extensor Tendons



Courtesy of Ryan Calfee, MD



---

---

---

---

---

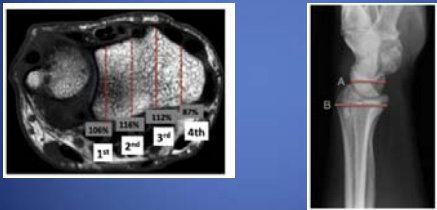
---

---

---

### Tendons and Radius Fractures Safe Screw Length

Ljungquist, et al JHS 2015



The size of the longest screw should NOT exceed the width of the lunate on the lateral film

---

---

---

---

---

---

---

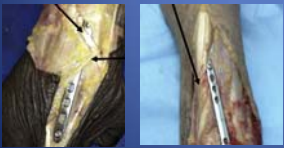
---

---

---

### Tendons and Radius Fractures Bridge Plating Technique

**RISKS OF TENDON ENTRAPMENT**  
Risk of Tendon Entrapment Under a Dorsal Bridge Plate in a Distal Radius Fracture Model  
Sarah Lewis, MD, Amir Mansel, MD, Milan Strozynski, MD, Akhshai Ghosh, MD  
JHS 2015



Take Home Points

1. Placing plate distal to proximal from the 2<sup>nd</sup> MC was less likely to entrap tendons as compared to the 3<sup>rd</sup> MC
2. Open the third incision (dorsal radial metaphysis) to check!!

---

---

---

---

---

---

---

---

---

---

### Thank You



*The Hand & Upper Extremity*  
CENTER OF GEORGIA, P.C.  
[www.HandCenterGA.com](http://www.HandCenterGA.com)

---

---

---

---

---

---

---

---

---

---