

Distal Biceps & Triceps Injuries

Michael Gordon MD

Intercoastal Medical Group

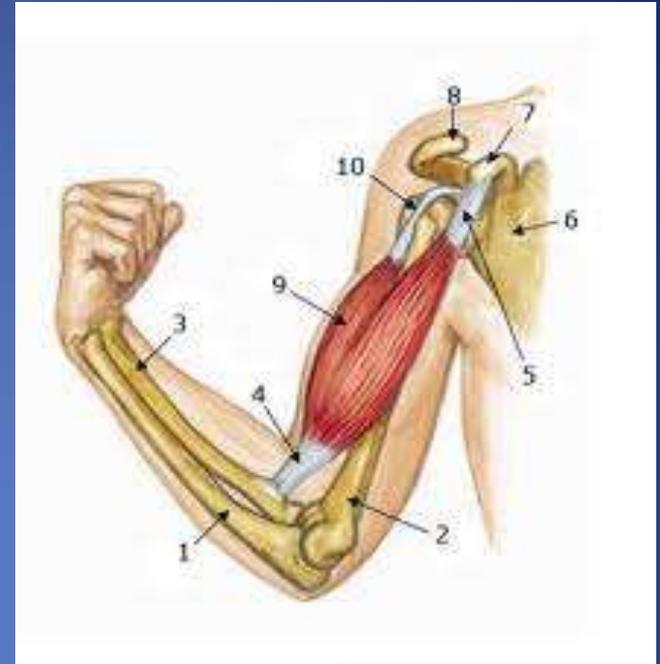
August 25, 2018

Special thanks to Bryan Reuss MD

(borrowed many slides)

Anatomy

- Bi = two (Latin)



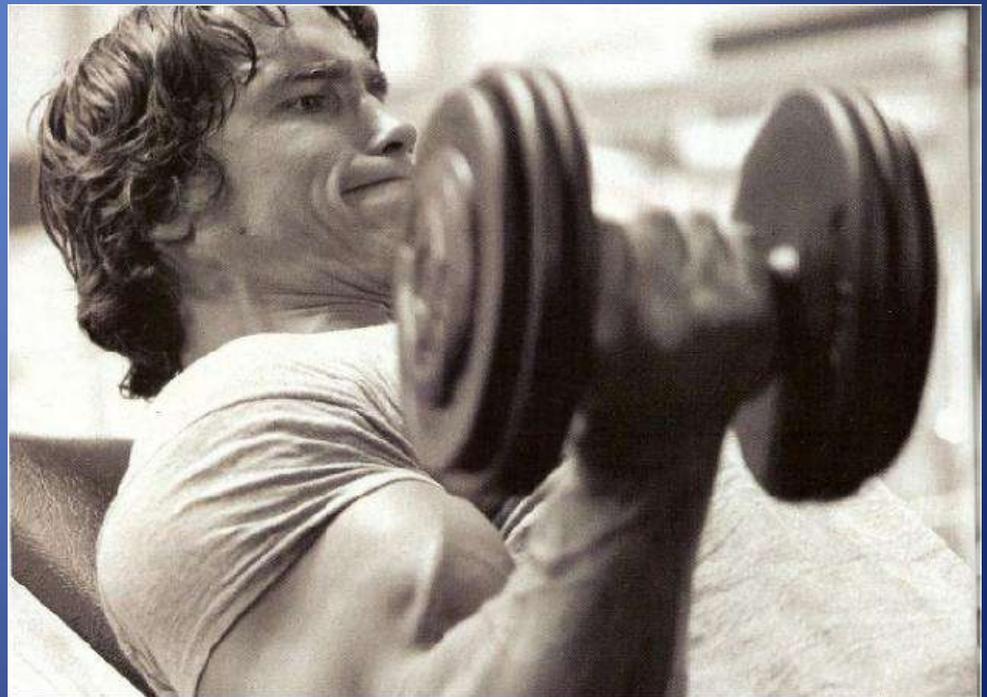
Function

- Supinator
- Assists brachialis with elbow flexion



Epidemiology

- 1.2 per 100,000 persons per year
- Men ages 30-50 usually



Mechanism

- Rapid, unexpected
- Eccentric Load



Why important?

- Biceps tear results in up to 50% loss of supination
- Up to 40% loss of flexion strength
- Significant loss of endurance



Symptoms

- Pain
- Deformity
- “Tearing” sensation
- Weakness
- Ecchymosis



Exam

- Visual



- Supination pain/strength



Hook Test



Diagnostic Imaging

- Xrays (Normal)



Ultrasound



MRI



SAT_GEMS / NPW /
TRF_GEMS / SP
TE 27.3



nm
mm
)

107928
5/5/1972
RIGHT ELBOW
Date: 11/27/2012
p 4
9/26

E OSP SAT_GEMS / NPW /
GEMS / TRF_GEMS / SP
266.7 / TE 29.6
FO
tion 17.1 mm
ness 3 mm
200 mm
x 512
1



Treatment



- Nonoperative: Not considered ideal treatment
 - Deformity
 - Pain
 - Loss of strength (sup/flex)
 - Reserved for sedentary patients/poor medical pts/those who do not require elbow flex/supination endurance
- Operative
 - Considered superior (Baker et al, Morrey et al, Chillemi et al)
 - Gold standard for athletes

Non-Operative Treatment



Partial Biceps Tears

- **Non Operative? - Controversial**
- **Perhaps indicated for tears < 50% ???
(2016 JASSH)**
- **Meta analysis 20 Studies with 91 pts.**
- **Only 5 pts successful non-operative Tx**
- **94% satisfactory with Surgery**

Partial Biceps Tears - Treated Surgically

- **COMPLICATIONS**

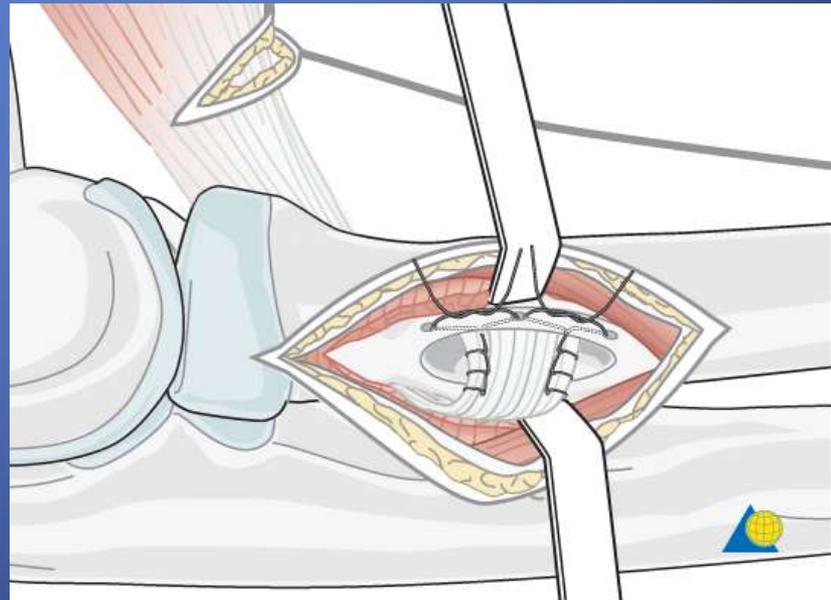
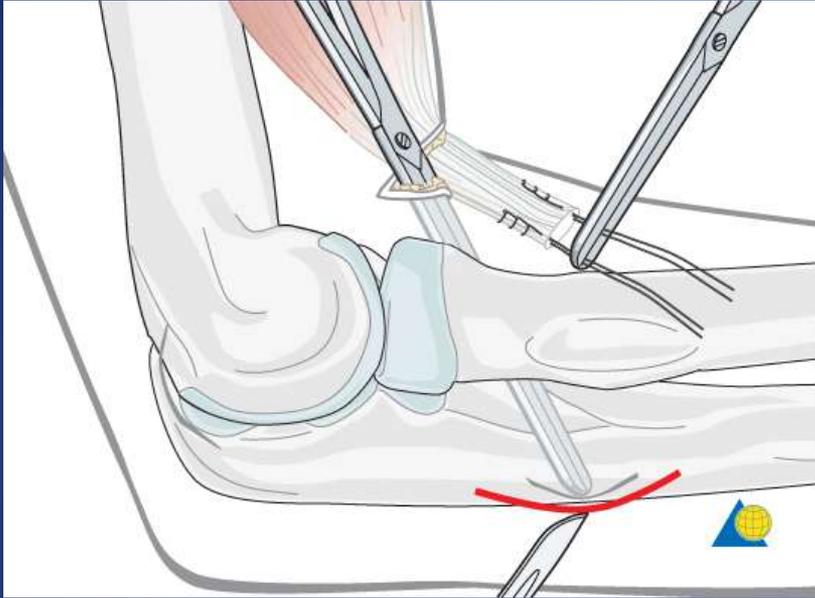
- **LABC nerve paresthesia 17%**
- **PIN palsy 6%**
- **Elbow discomfort 2%**
- **Surgical Revision 2%**
- **Heterotopic Ossification 1%**

Operative Treatment Techniques

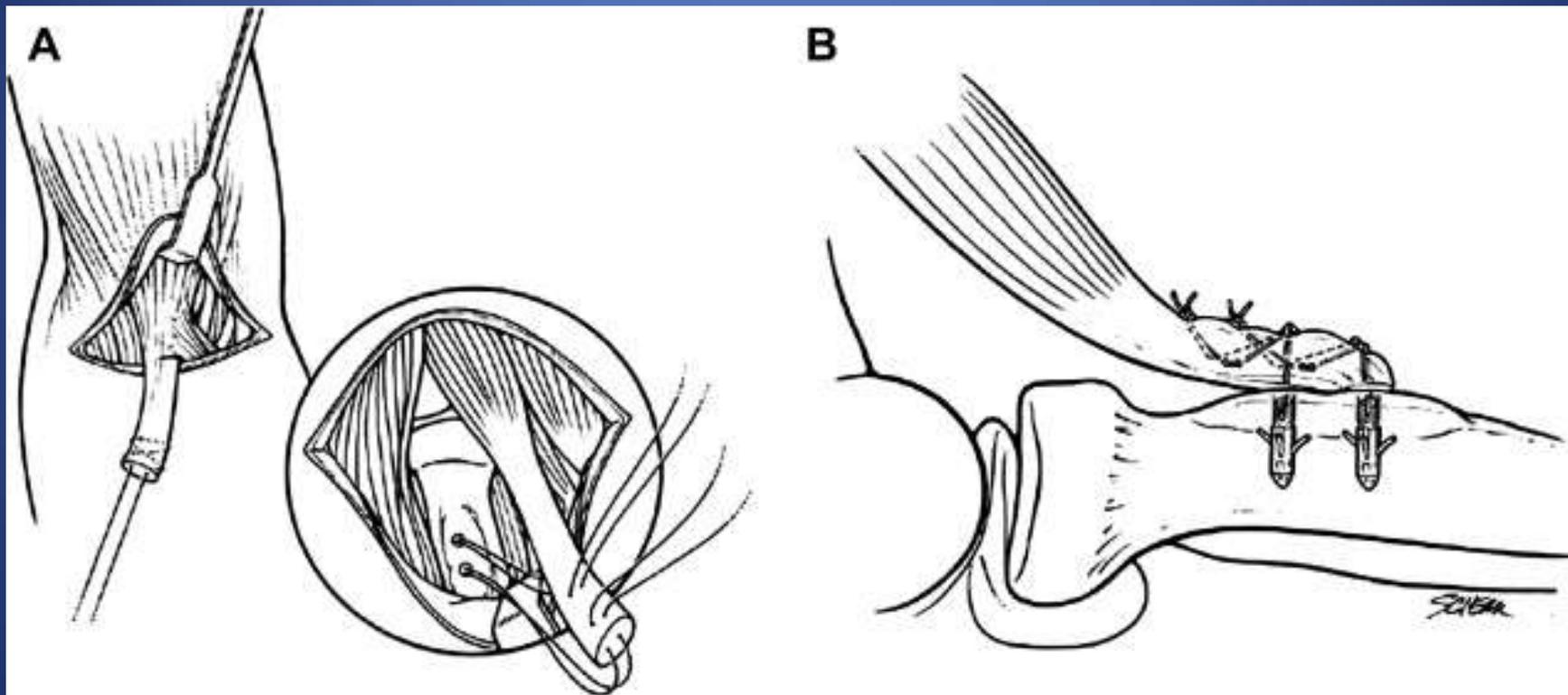
- One-Incision
 - Interference Screw
 - Button
 - Suture Anchor
- Two-Incision
 - Imbedded in trough



2- Incision Technique



One-Incision



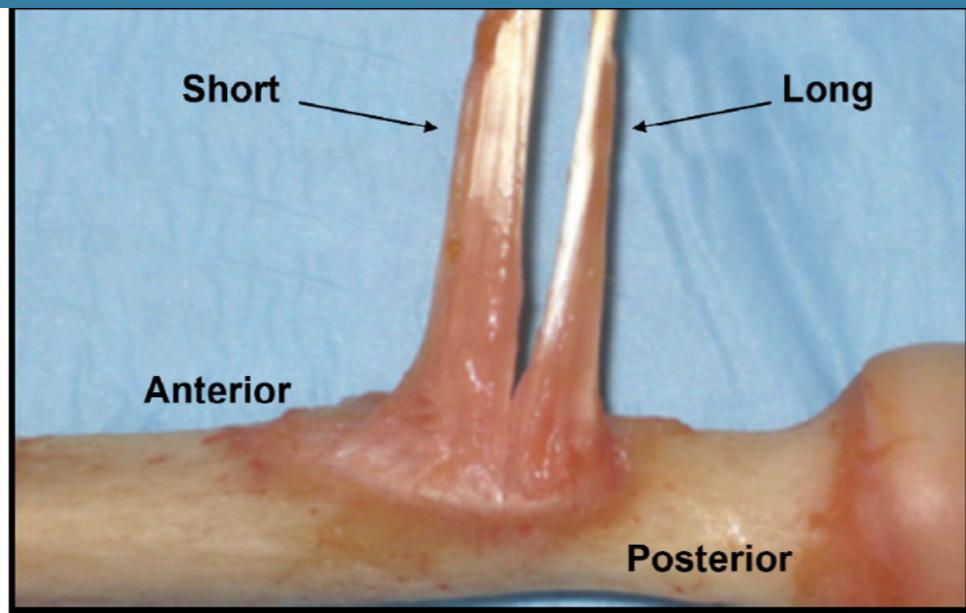


Figure 1 A cadaveric dissection illustrating the short and long heads. Both heads insert on the posterior aspect of the tuberosity. The short head inserts distal to the long head. (From Jarrett CD, Weir DM, Stuffmann ES, Jain S, Miller MC, Schmidt CC. Anatomic and biomechanical analysis of the short and long head components of the distal biceps tendon. *J Shoulder Elbow Surg* 2012;21:942-8. Reprinted with permission from Elsevier.)

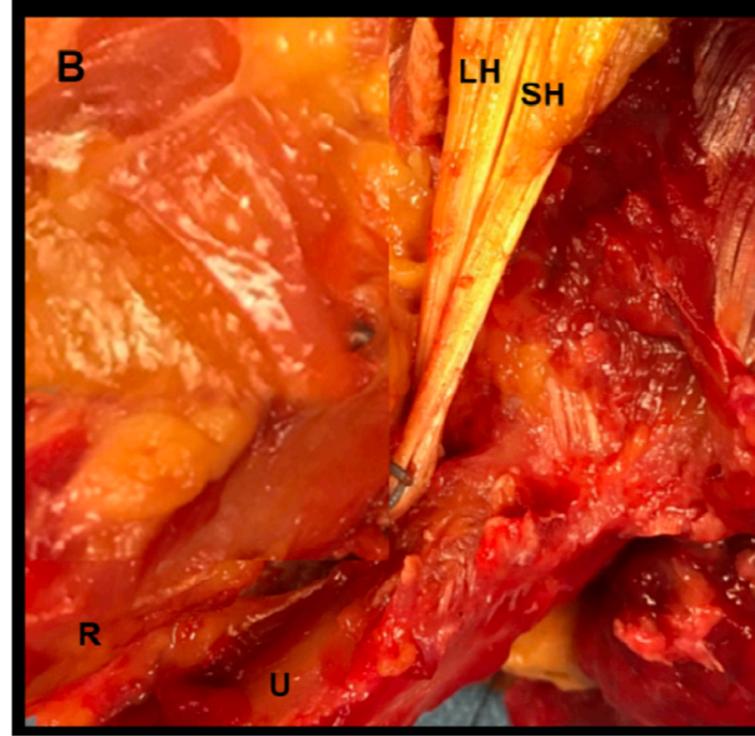
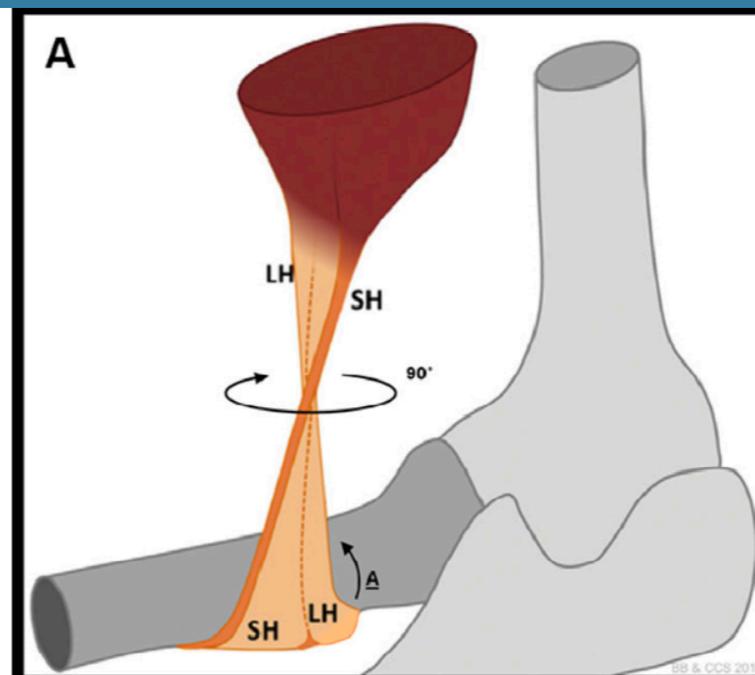
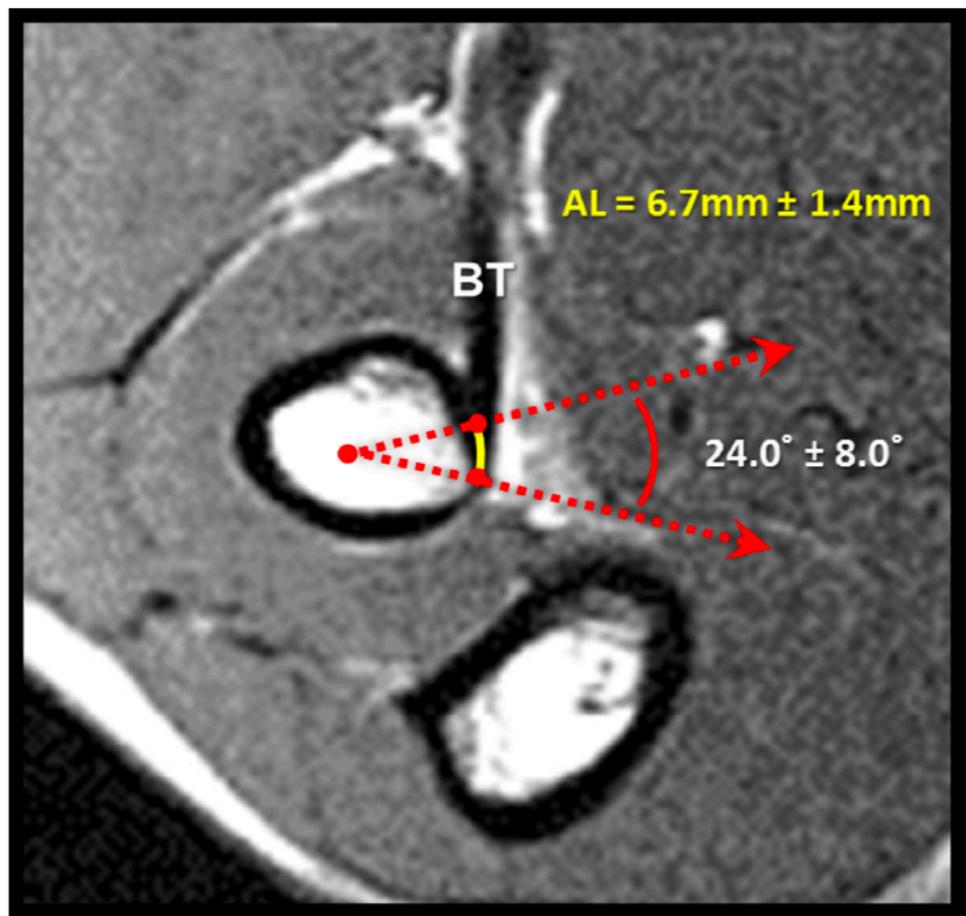
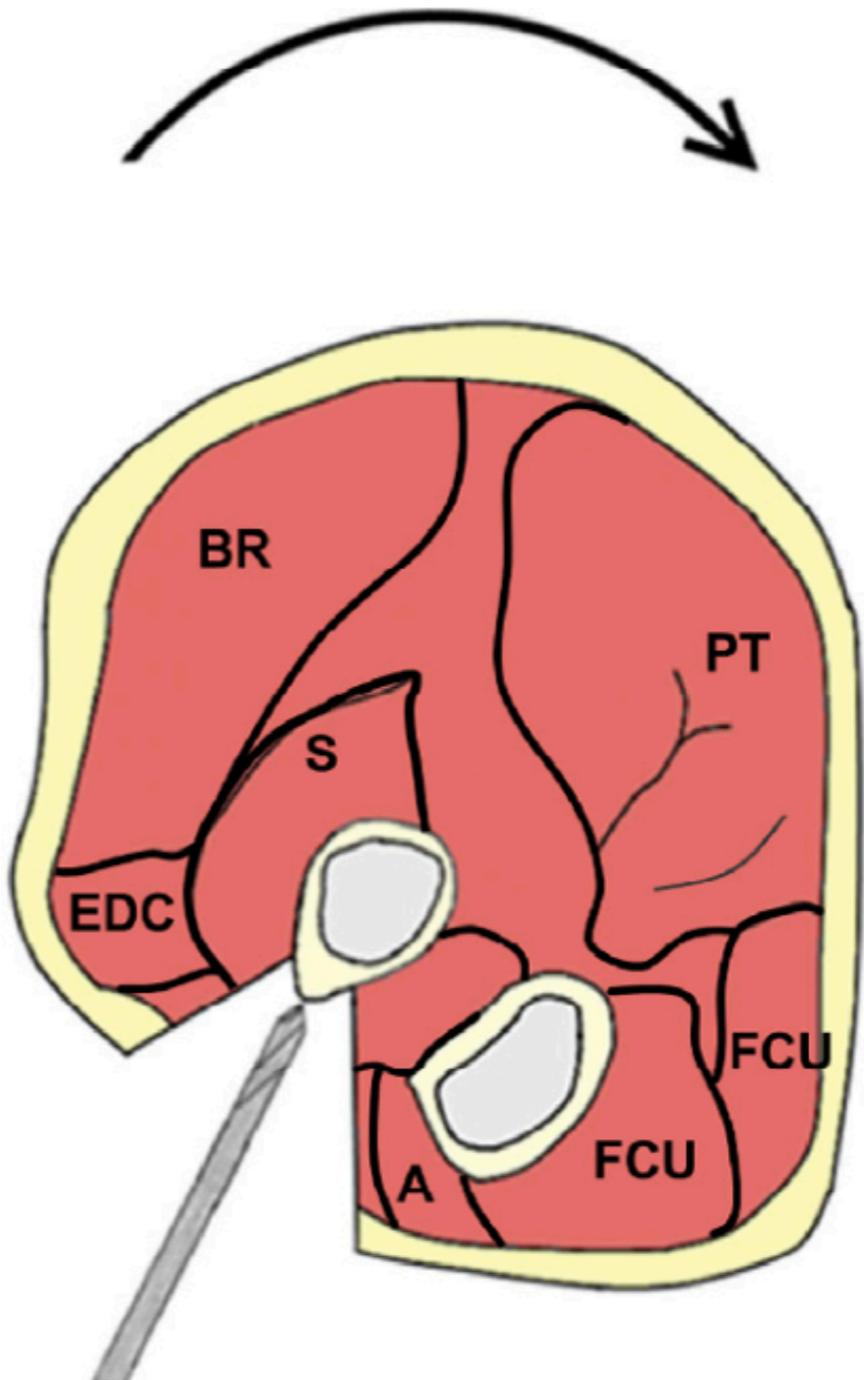
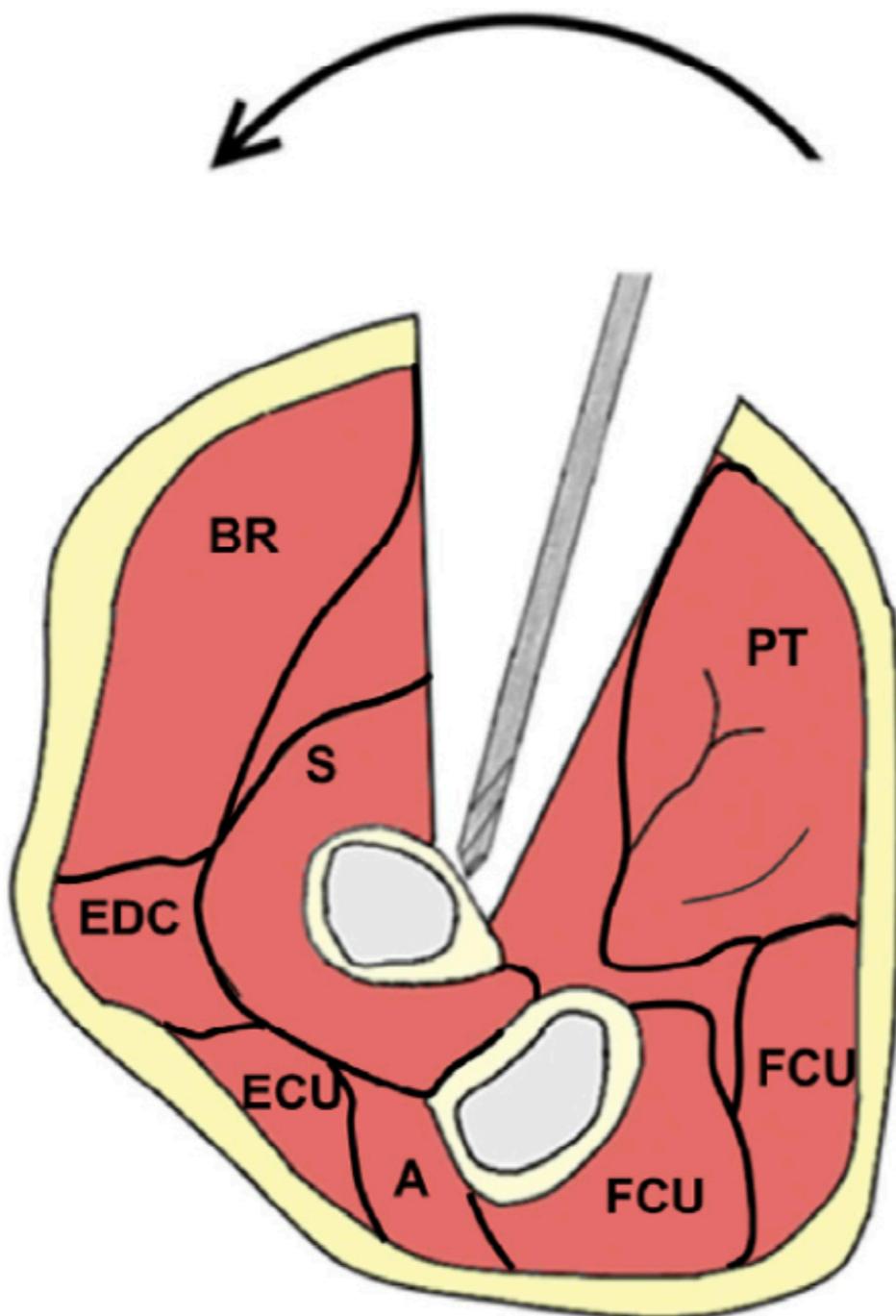


Figure 3 Schematic and picture illustrating the external rotation of the biceps tendon from proximal to distal. (A) Schematic illustrating the 90° external rotation of the distal biceps tendon. (From Schmidt CC, Jarrett CD, Brown BT. The distal biceps tendon. *J Hand Surg Am* 2013;38:811-21. Reprinted with permission from Elsevier.) (B) Cadaveric dissection showing that the short head begins medial and ends distal to the long head of the distal biceps tendon. *LH*, long head; *SH*, short head; *R*, radius; *U*, ulna; *A*, anterior.

moment than the short head in a supinated forearm position



Case Example

- 28-y/o Professional Bodybuilder
- Doing pull-ups and felt a “pop”
- Immediate deformity and significant pain
- Ecchymosis within 48 hours



Case Example

- Patient chose operative treatment
 - Weakness
 - Pain
 - Deformity
 - Career

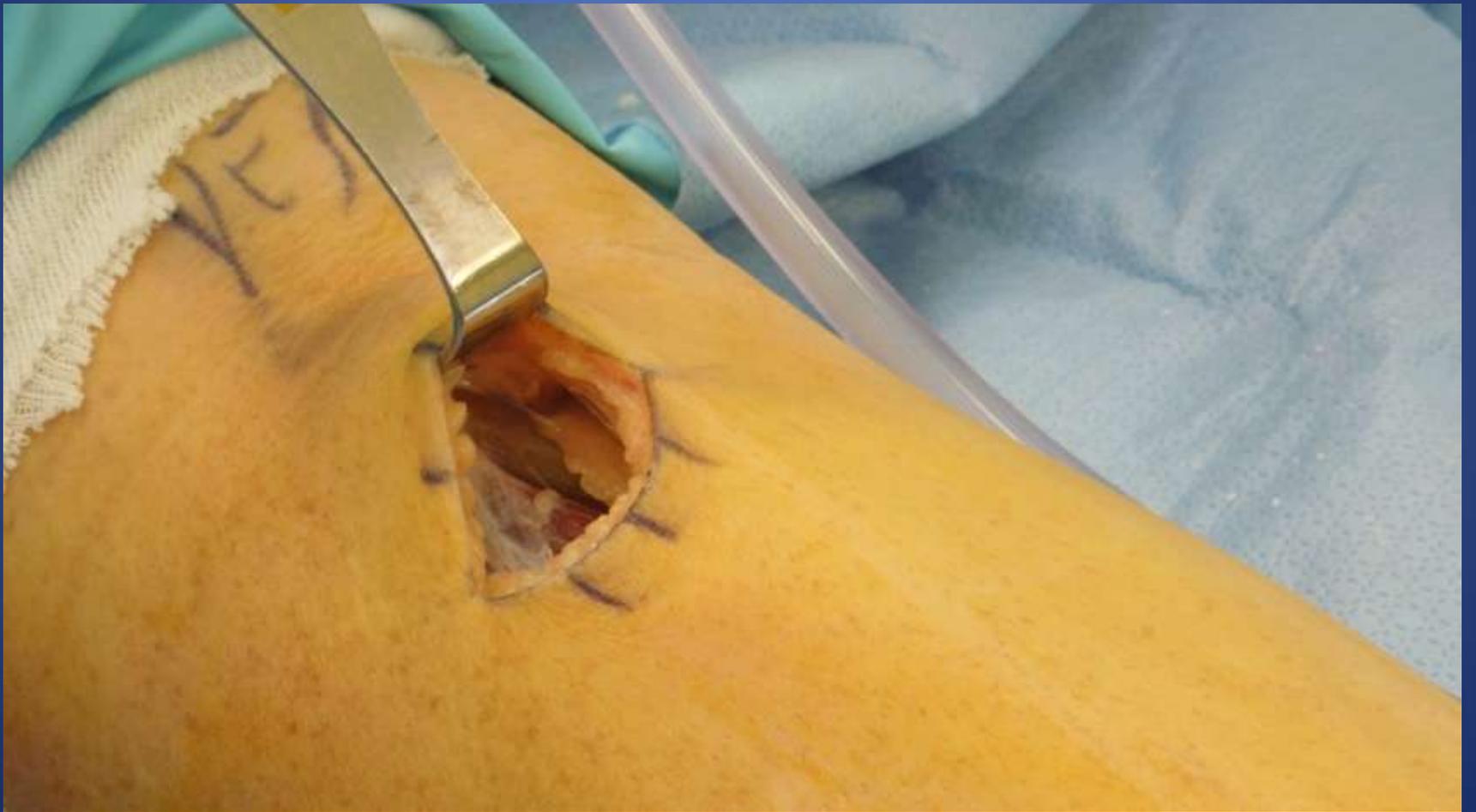




Case Example



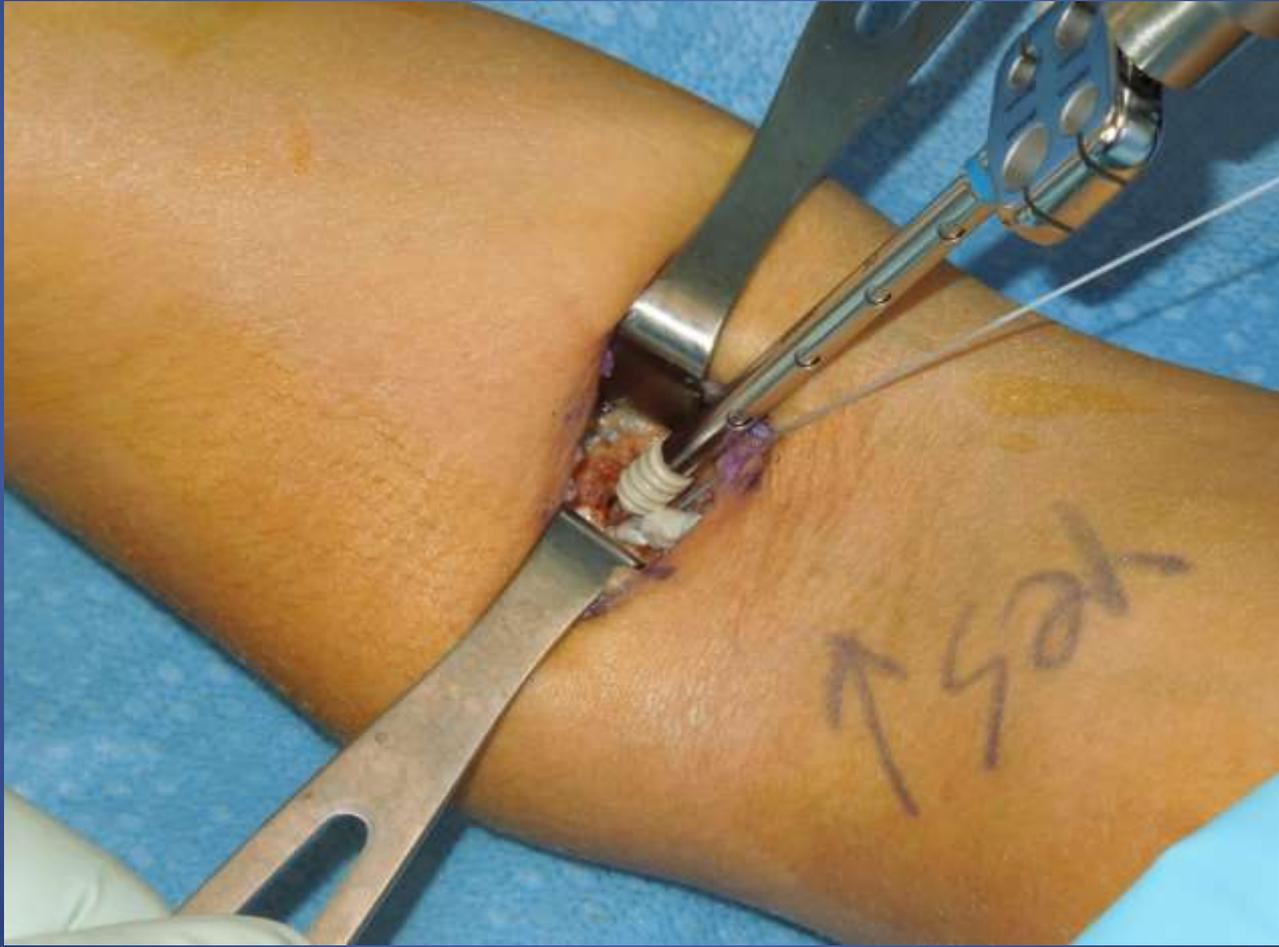


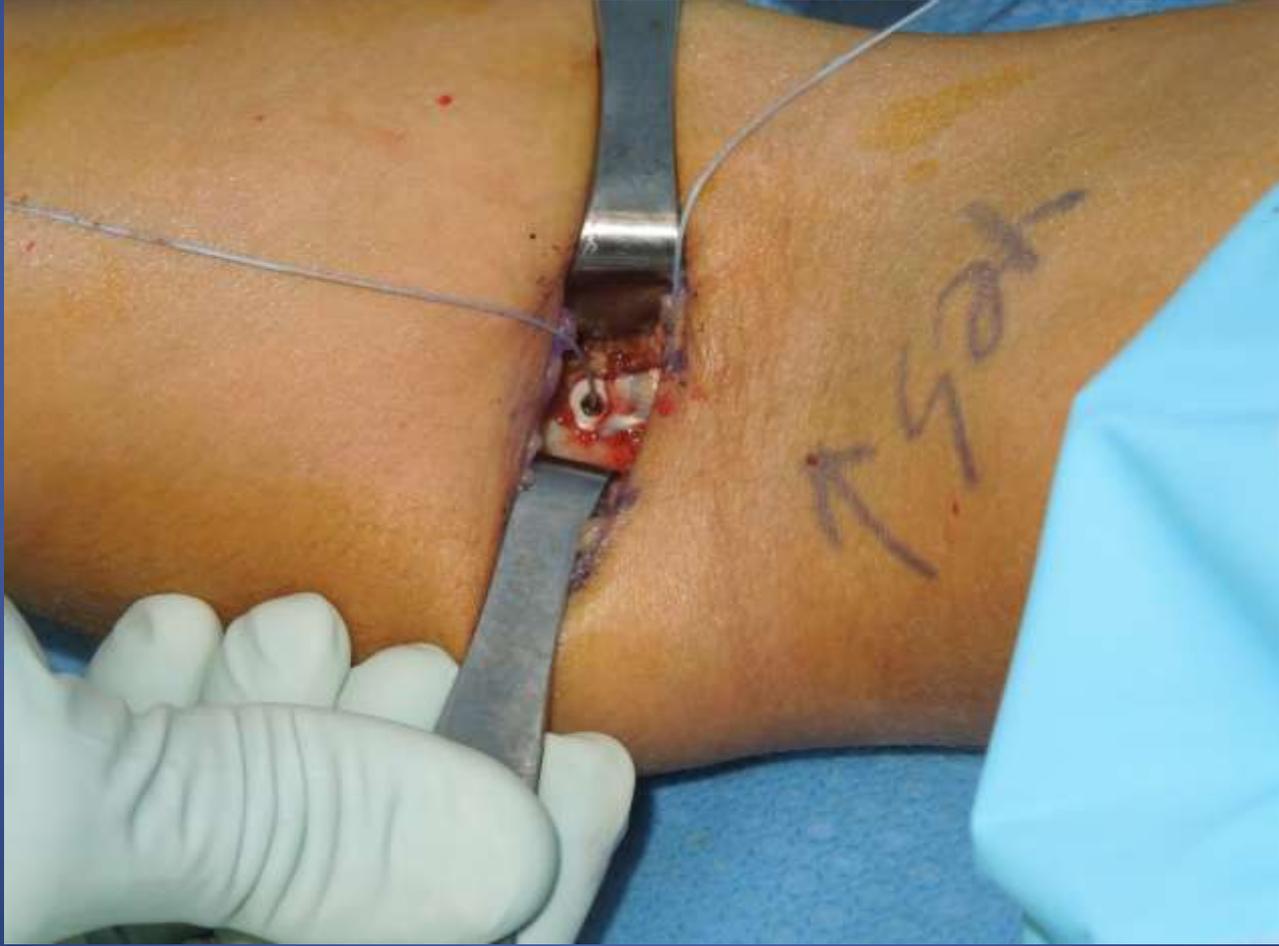
















Other Incision Examples



My technique



- Mazzocca et al, AJSM, 2007
 - Tested/compared 4 different techniques
 - Endobutton, interference screw, bone tunnel, suture anchor
 - Endobutton: greatest load to failure
 - Interference screw: least displacement
- I use a hybrid technique with BOTH an interference screw/endobutton
 - Best of both worlds!

Post-Op Care/Rehab

- Brace for 5-6 weeks (depending on tension)
- E. stim, cold therapy, gentle ROM (usually around 15°/week), wrist/shoulder exercises, scar mobilization
- After 6 weeks: light strengthening, finalize ROM (including sup/pro), grip strength
- After 3 months: finalize strength/endurance

Less than 20 lbs
Strengthening until 6 months
after surgery



3 Weeks Post-Op



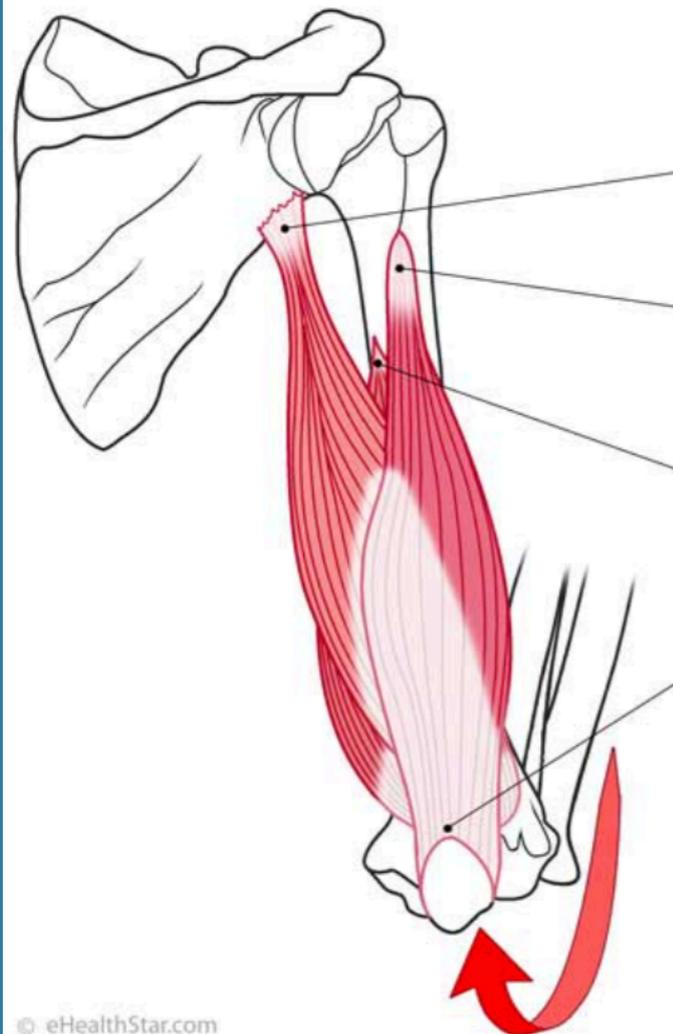
Triceps Rupture



Triceps Tendon Tears

- **Rare (0.8% of Tendon Ruptures)**
- **Football Players**
- **Weight Lifters**
- **Anabolic Steroid Use**
- **Male:Female 2:1**

Triceps Brachii



Origin:

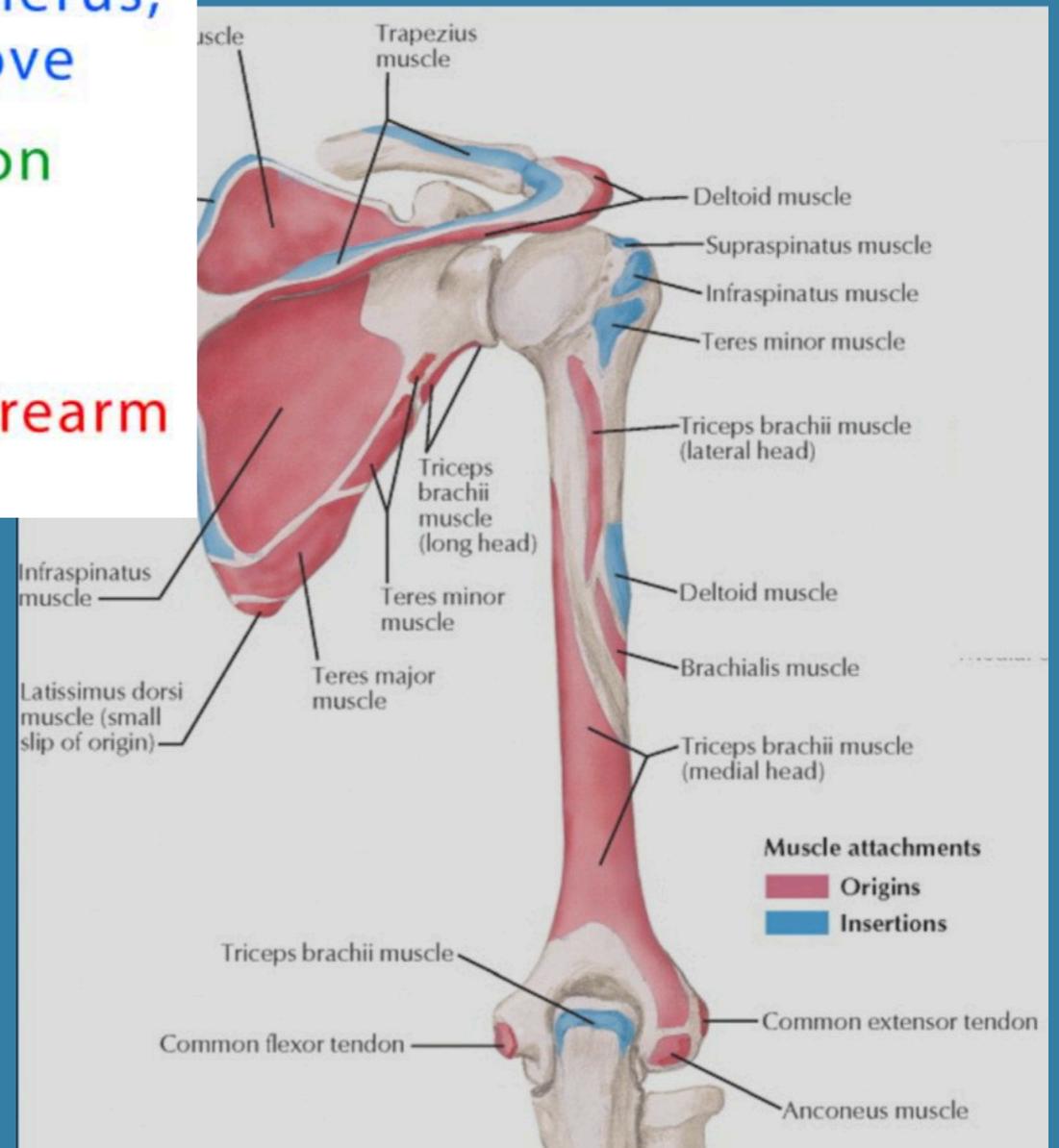
- Long head: infraglenoid tubercle of scapula
- Lateral head: humerus, above radial groove
- Medial head: humerus, below radial groove

Insertion: olecranon of ulna

Action: Extends forearm

© eHealthStar.com

Radial Nerve

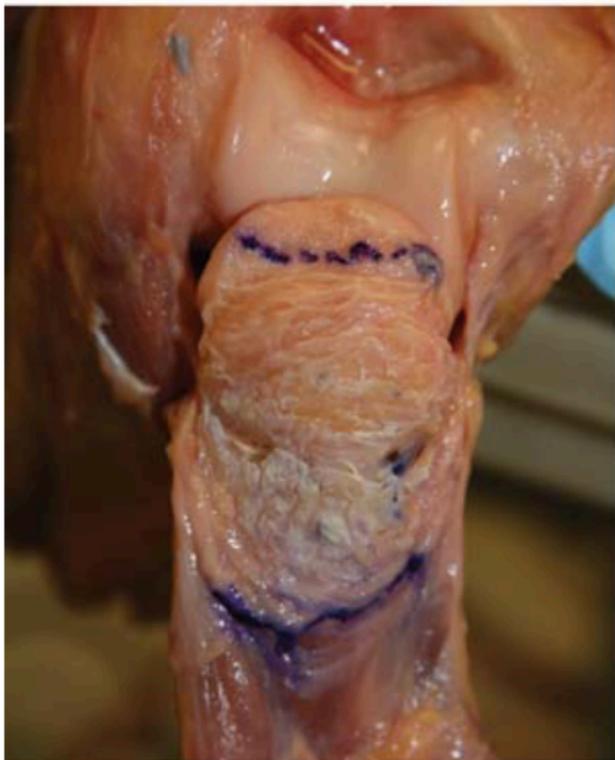




A



B



C



D



The lateral triceps expansion is marked with a caliper. The olecranon and the triceps tendon proper are dotted with marker.

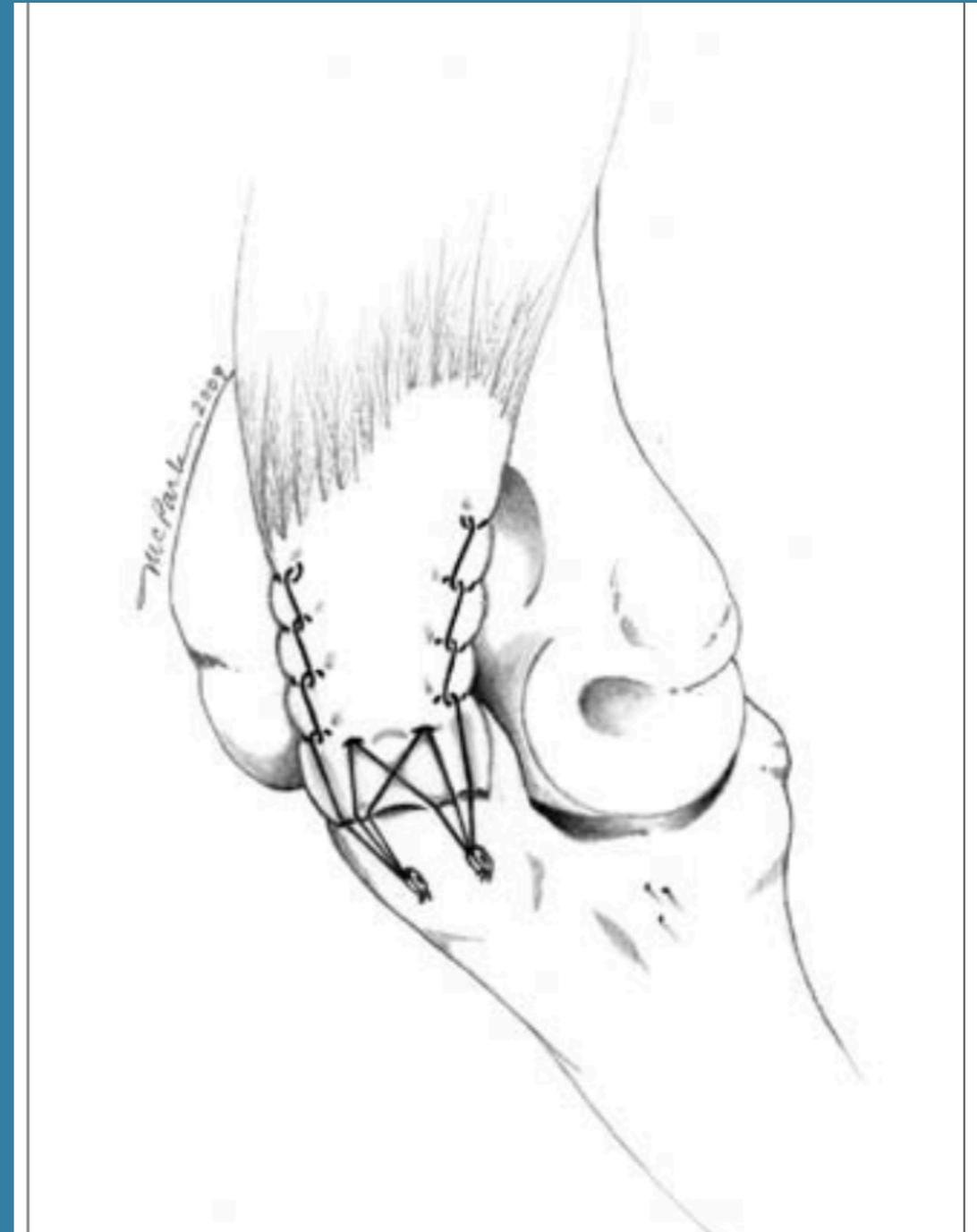
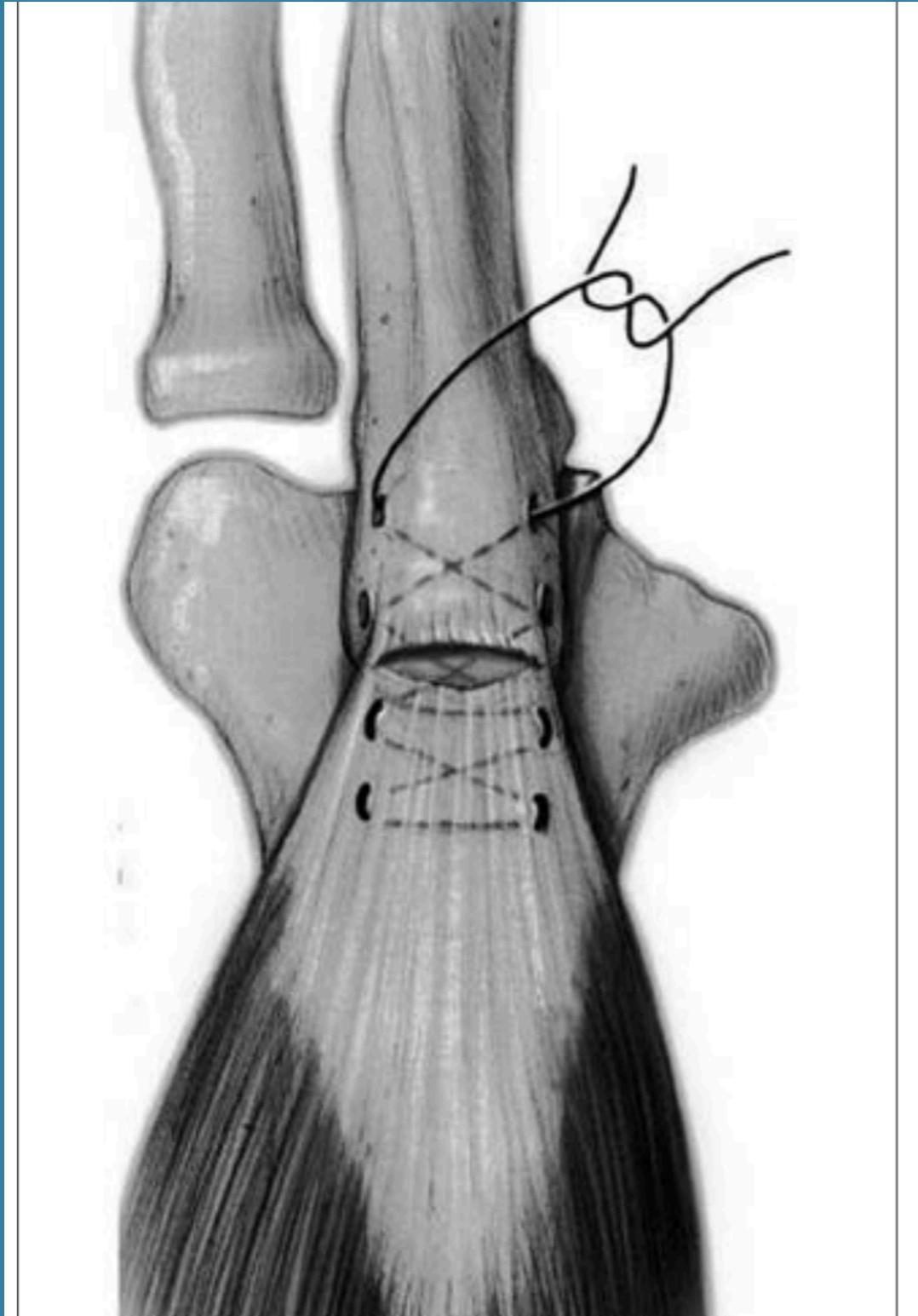
A, AP photograph of a cadaveric elbow. The triceps footprint on the olecranon is outlined with marker. In an anatomic study, the footprint was found to measure 466 mm².⁸ **B**, Lateral view of the triceps footprint. Note the distance of the proximal portion of the footprint to the articular surface. The footprint wraps around the tip of the olecranon distally. **C**, AP view of the triceps tendon as it is released from its footprint. The large area of attachment on the tendon itself is clearly visualized (marked in purple). **D**, The distance from the tip of the olecranon to the proximal portion of the footprint is measured with a digital caliper. In this specimen, that measurement is 12 mm.

The triceps insertion is not a focal point on the olecranon. Rather, the distal triceps inserts over a wide area or footprint (Figure 1, A through C). In a cadaver study, the footprint was found to start 12 mm distal to the tip of the olecranon (Figure 1, D) and to blend with the posterior capsule; the footprint measured 466 mm².⁸ The width of the distal triceps tendon insertion ranges from 1.9 to 4.2 cm⁹ and consists of the triceps tendon proper (ie, the confluence of tendon from all three heads inserting on the olecranon) and the lateral triceps ex-

Non Operative Tx

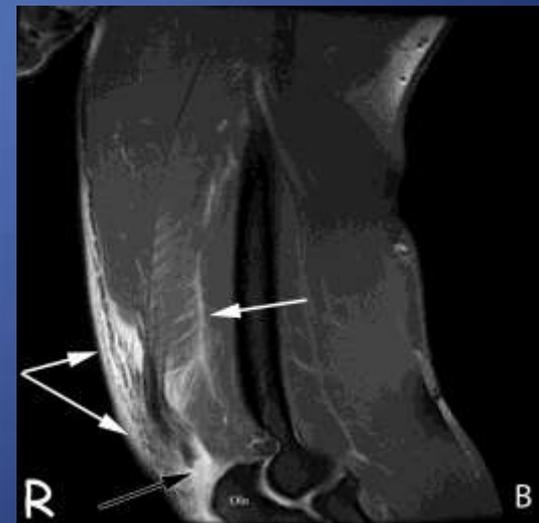
- **Less than 50% Tear**
- **Older Medically Frail Patient**
- **Sedentary Patient**
 - **4 weeks at 30 degrees**
 - **Gentle ROM and strengthening**

Operative Tx - Repair Techniques



Case Example

- 41-y/o Powerlifter hears “ripping” while doing heavy “skull-crushers”
- Ecchymosis, defect in distal triceps
- Severe weakness to elbow extension
- Ultrasound in clinic: Triceps Rupture off olecranon



Positioning

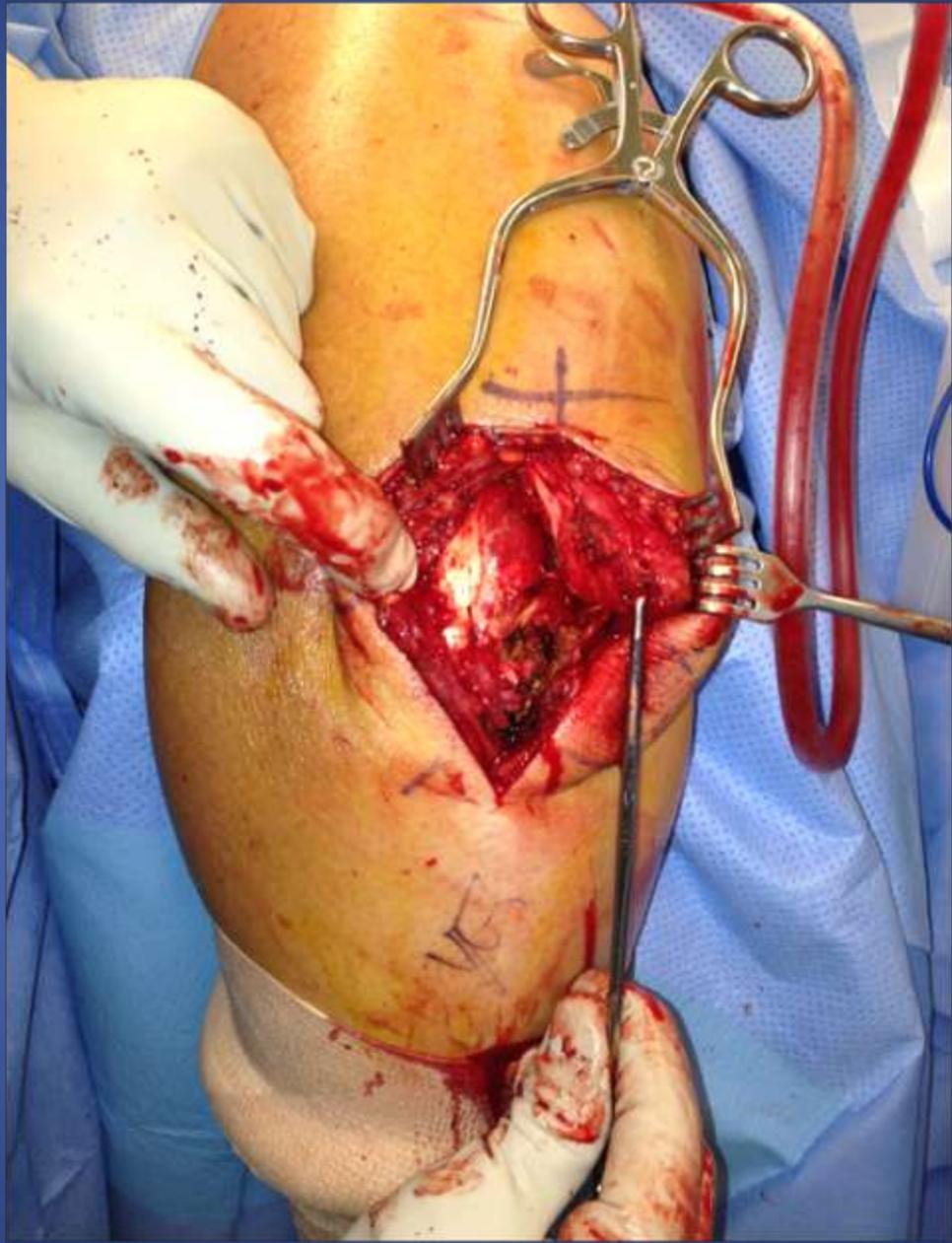


Palpable Defect



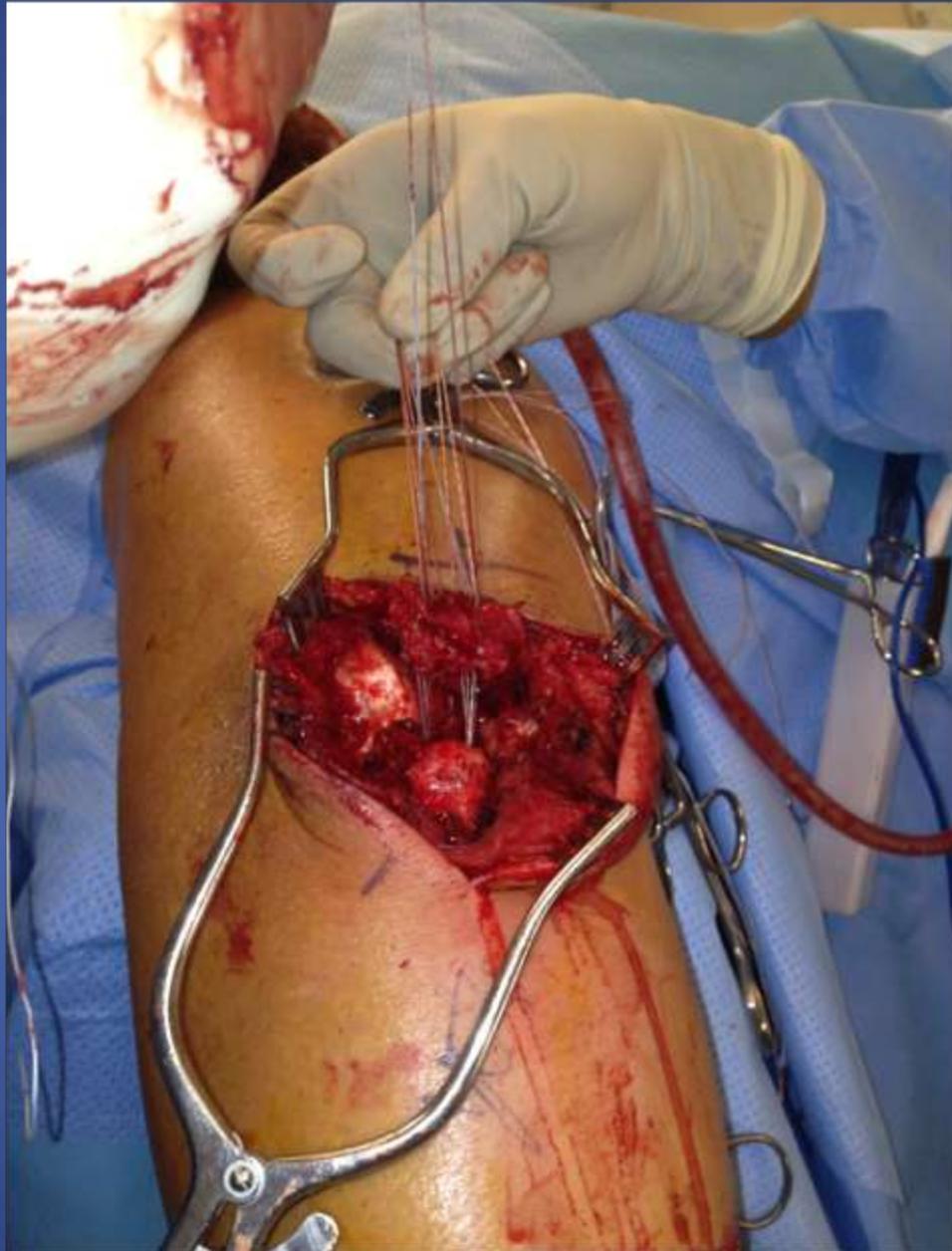


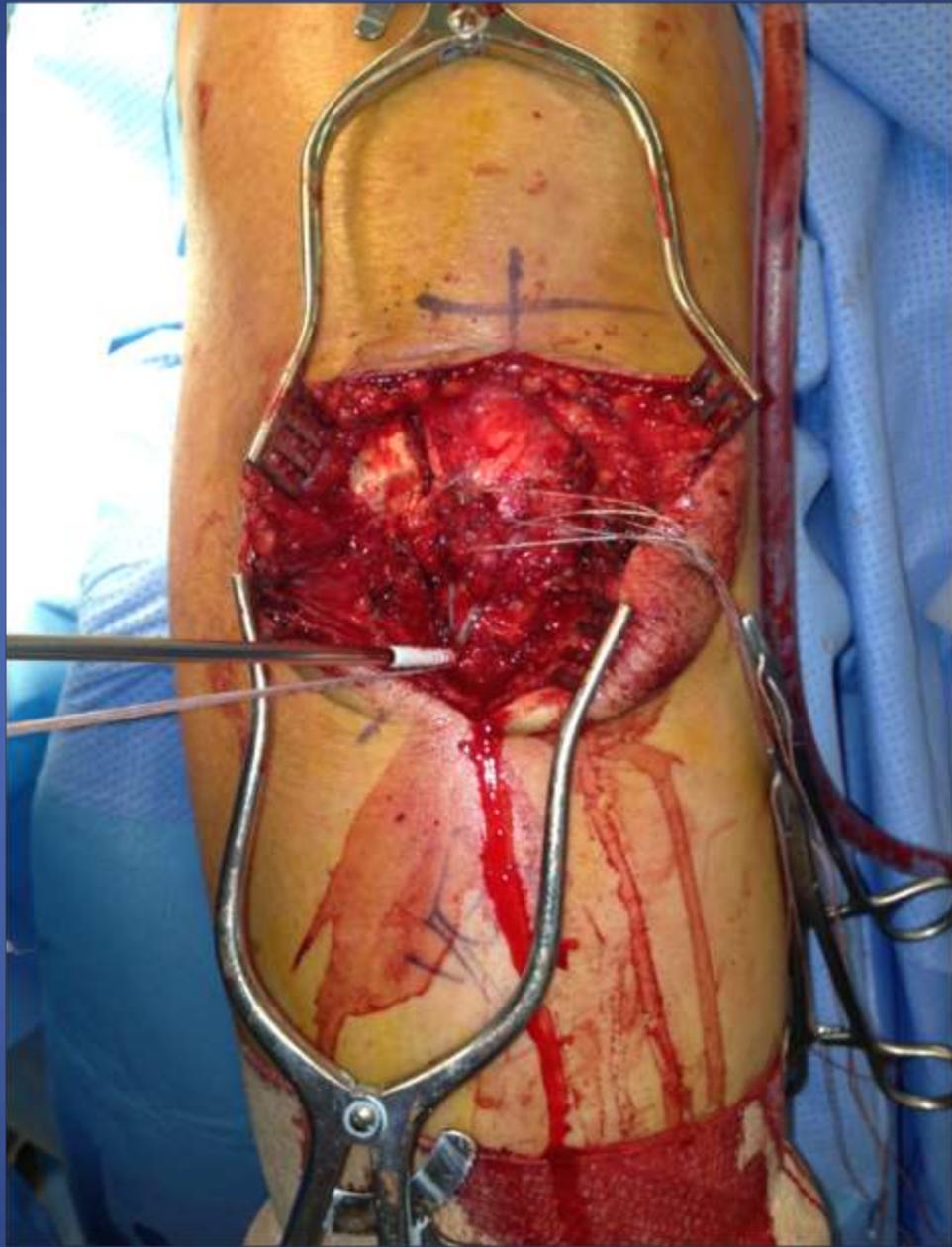




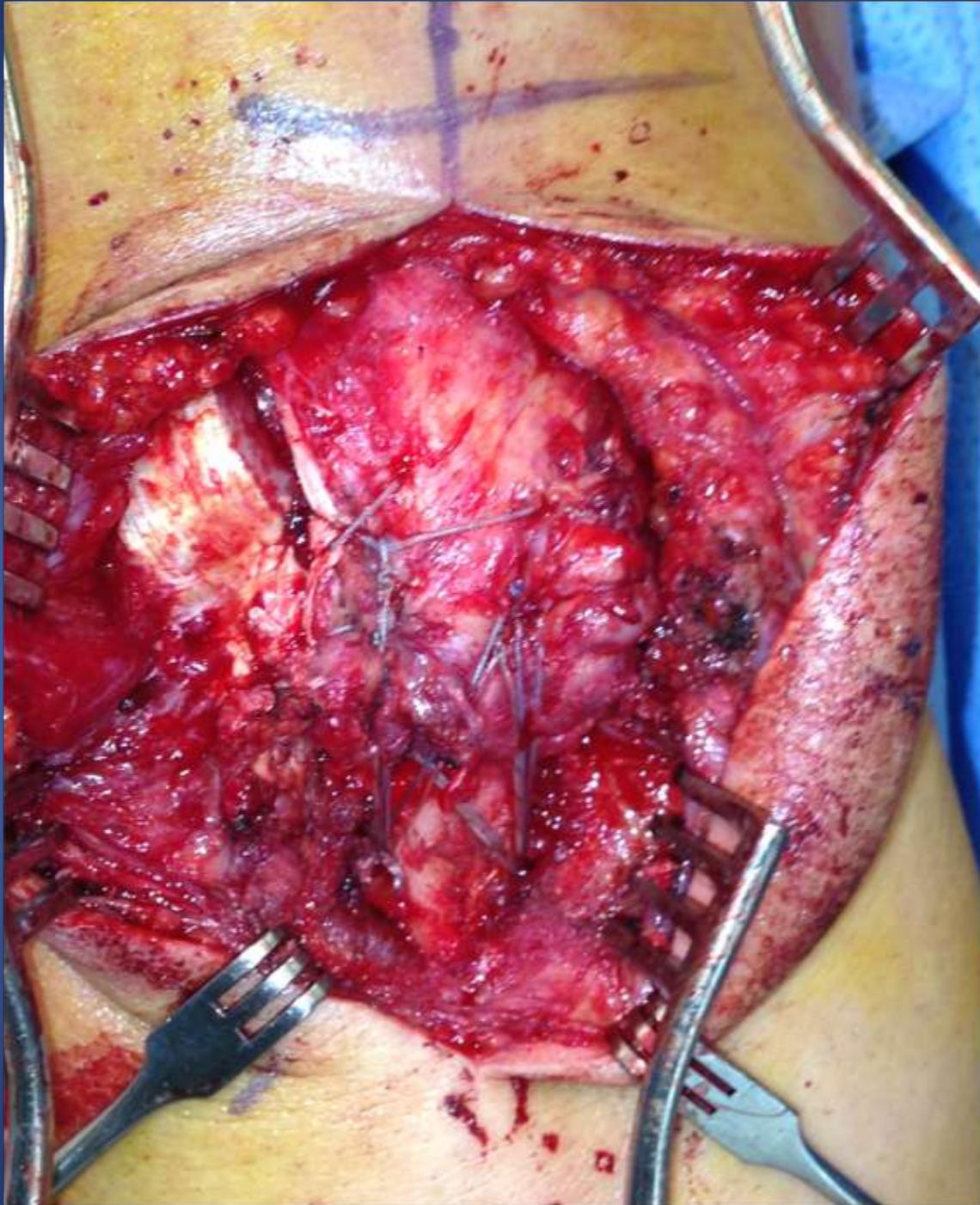












Operative Tx - Repair

- **POST OP PROTOCOL**
- **Usually immobilized in 30 degrees of flexion for 1-2 weeks. (Wound healing)**
- **Slow steady progression of elbow flexion until 4-6 weeks (patient dependent)**
- **Gentle AROM/PROM until 3 months**
- **Light Strengthening Until 6 months**
- **Resume full strengthening after 6 months (May take up to 1 year)**

Outcomes - Triceps

- **92% Strength (75-106%)**
- **8% loss of ROM**