



Nov 6, 2018

TOA Cadaveric Workshop



義大醫院骨科部

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Objectives

- Dorsal approach for distal radius
- Tendon transfer for radial nerve palsy

The Distal Radius Fractures



- The most common upper extremity fractures, 20%
- Bimodal distribution
sport injuries at a younger age
fragility fracture

~Karl JW. *J Orthop Trauma* 2015

Goals of Treatment

- Restore the neutral anatomy:
Joint Surface (distal radius and DRUJ) to within 1mm – *Knirk and Jupiter*
- Provide stability for early finger and elbow ROM
- Be aware of associated injuries

When to operate (AAOS)?

- Surgical fixation

- Post-reduction film

- Radial shortening > 3mm
- Dorsal tilt >10 deg
- Intra-articular displacement > 2mm

Treatment of Distal Radius Fractures . *J Am Acad Orthop Surg* 2010;18: 180-189

How to Approach

- Surgical indications : 年長者, 日常生活活動量少, 可考慮保守療法

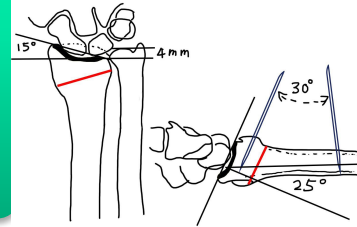
~Arora R. *JBJS A* 2011

~Nelson GN. *JOT* 2015

- PreOP planning: type of fixation, implants, approach, ulnar-side procedures

PreOP planning

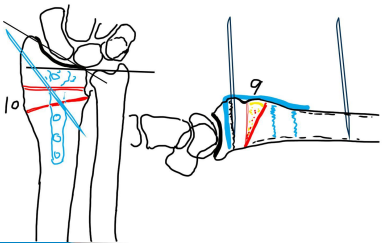
Type of fixation: external, internal



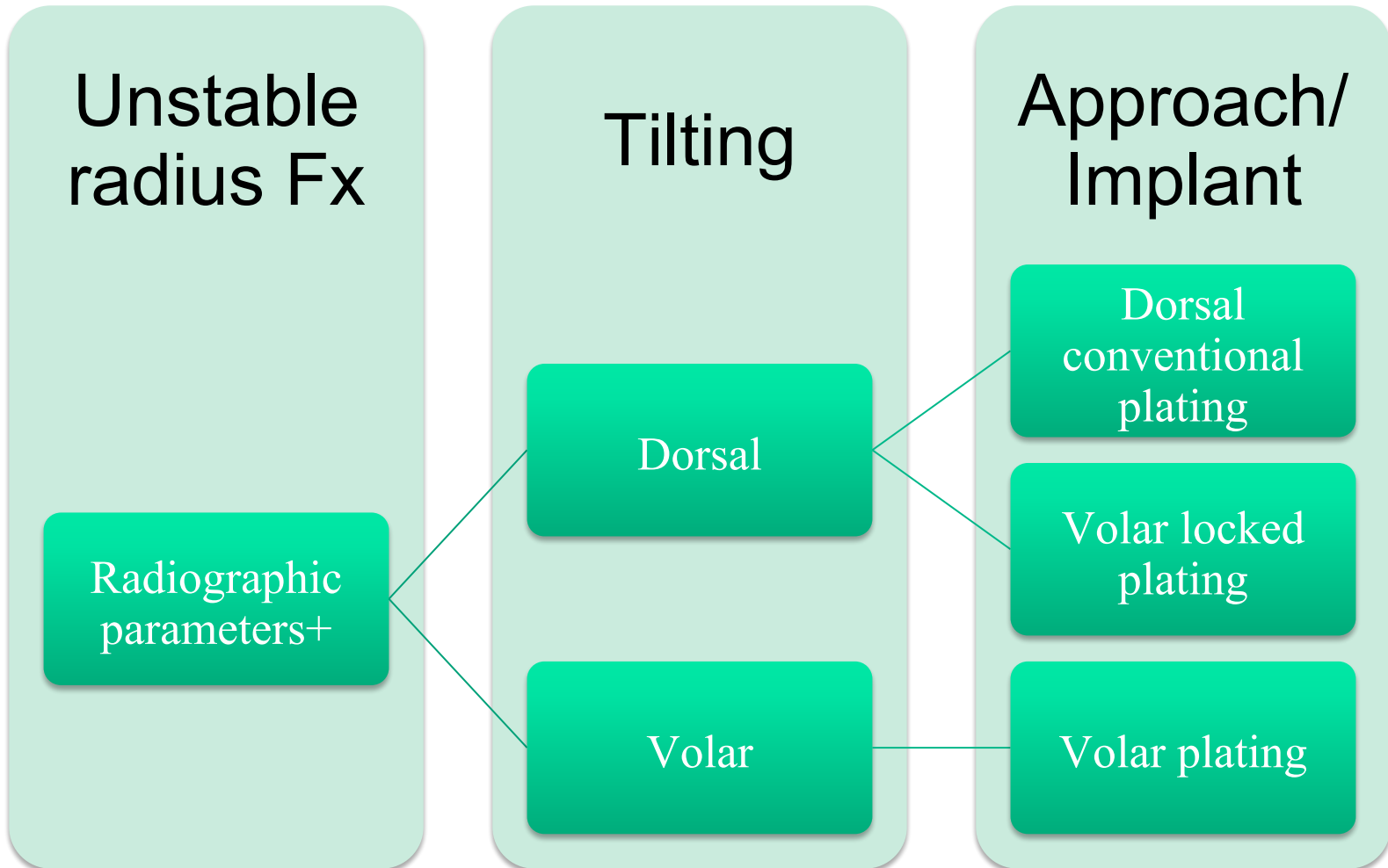
Implants: conventional, locked plating

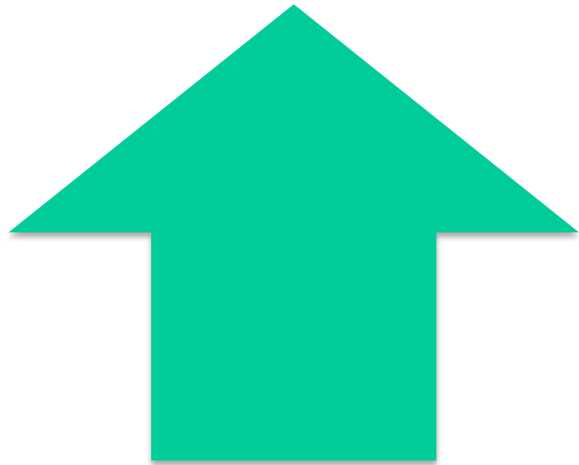
Approach: palmar, dorsal, or Both

Ulnar-side procedures and other injuries



Previous Concept





Volar locked plating



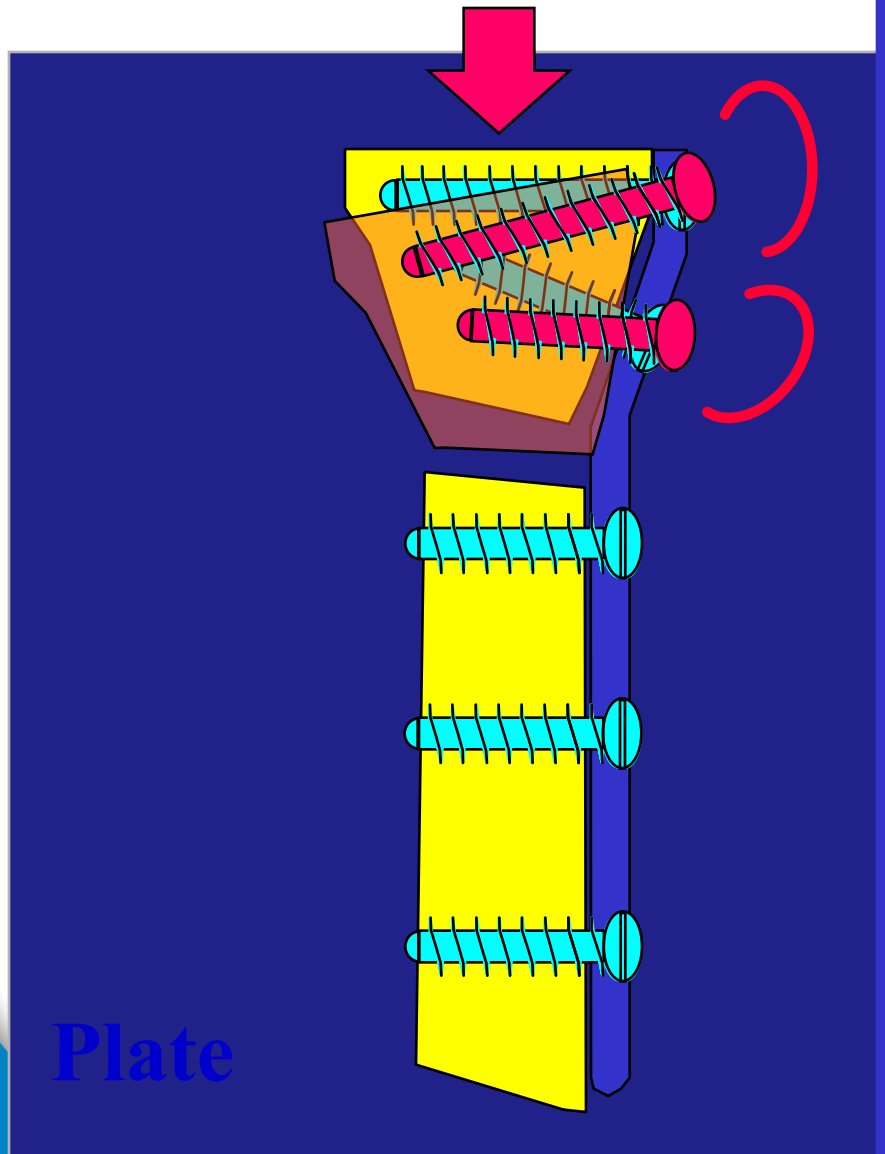
Closed reduction
and percutaneous
pinning

~Costa ML. *Health Technol Assess Am* 2015
~Chaudhry H. *CORR* 2015

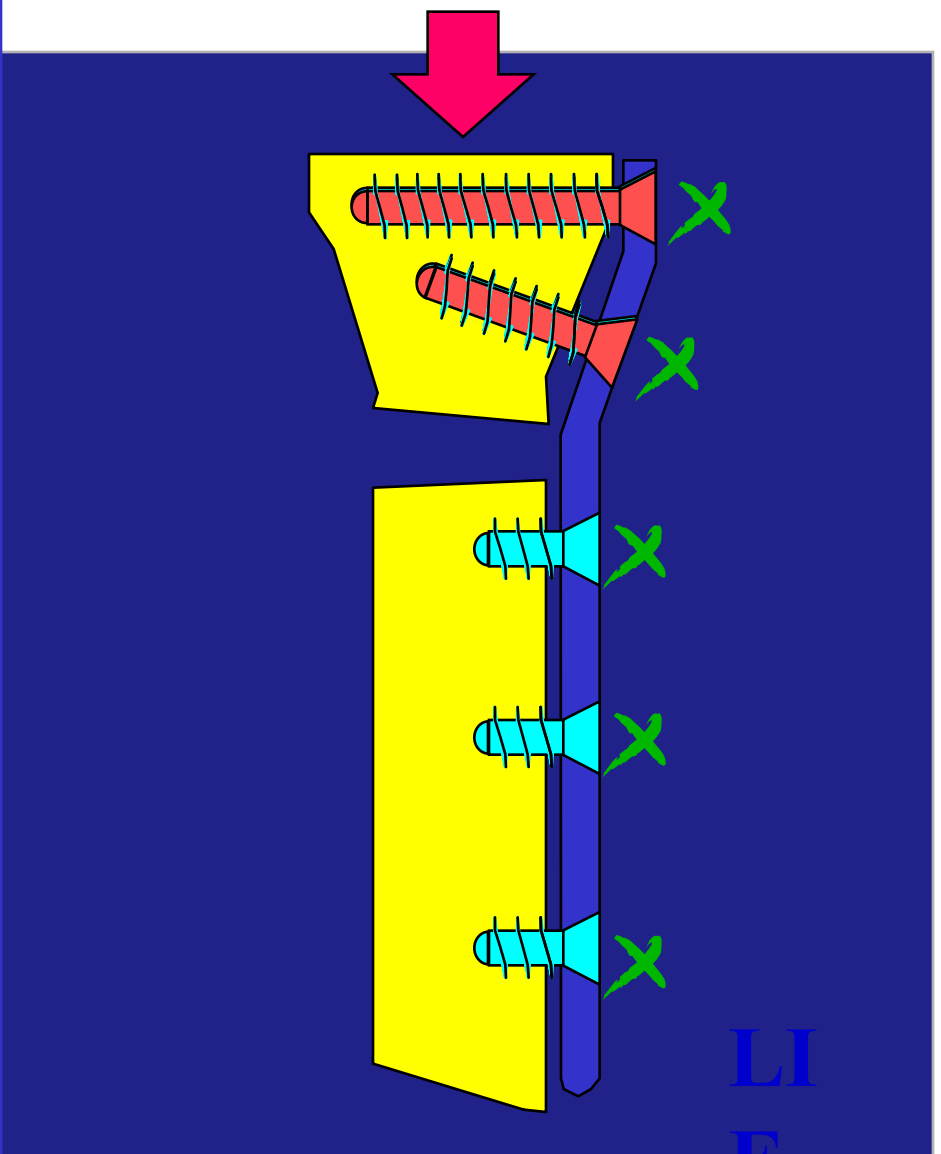
Comparison: Secondary Loss of Reduction

Standard Plate

Locked Internal Fixator




Plate



LI
F

LCP a very complete portfolio

Basic plate  **High-end plate**

The diagram shows three types of locking compression plates (LCP) in yellow. From left to right: a long basic plate with a simple T-shaped head, a shorter basic plate with a more complex head, and a high-end plate with a highly complex, multi-hole head. The plates are shown against a white background with anatomical illustrations of a human torso on either side. A vertical axis on the left is marked with an upward arrow, and a vertical axis on the right is marked with a downward arrow. A comparison bar at the bottom consists of six horizontal bars of different colors, each with a corresponding label.

Feature	Basic plate	High-end plate
Convenience for surgeon	Low	High
Stability of fixation	Low	High
Specific anatomical	Low	High
In consideration of clinical need	Low	High
Price per cas	Low	High



Both volar/dorsal angulation → volar locking plating (fixed-angle devices)

~JeudyJ, et al. Injury 2012



Dorsal Approach

INDICATIONS FOR DORSAL PLATE FIXATION:

- Associated intercarpal ligament injury
- Displaced dorsal lunate facet fracture
- A dorsal shearing radiocarpal fracture-dislocation

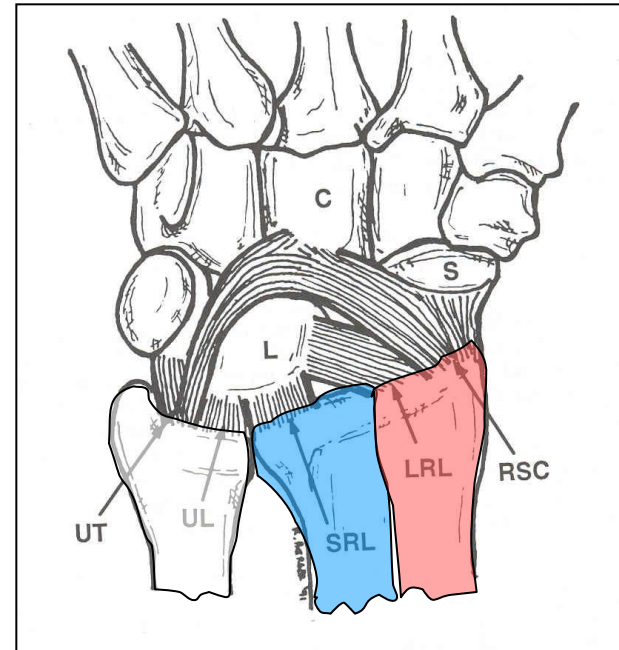
~Jupiter JB. *JBJS A* 2010

Periarticular rim fracture: Dorsal shearing radiocarpal fracture-dislocation



Three column theory [Rikli DA, et al 1996]

- **Radial Column: *Stability***
 - Osseous buttress radially
 - Insertion for stabilising capsular ligaments
- **Intermediate Column: *Load Transmission***
 - *Key to the radiocarpal joint*
- **Ulnar Column: *Load Transmission & Stability***
 - „Ulnar Pivot“

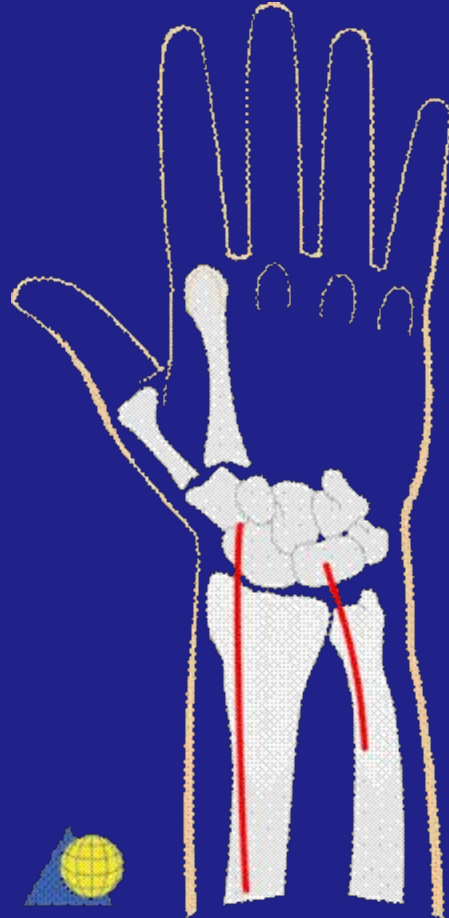


WHICH APPROACH?

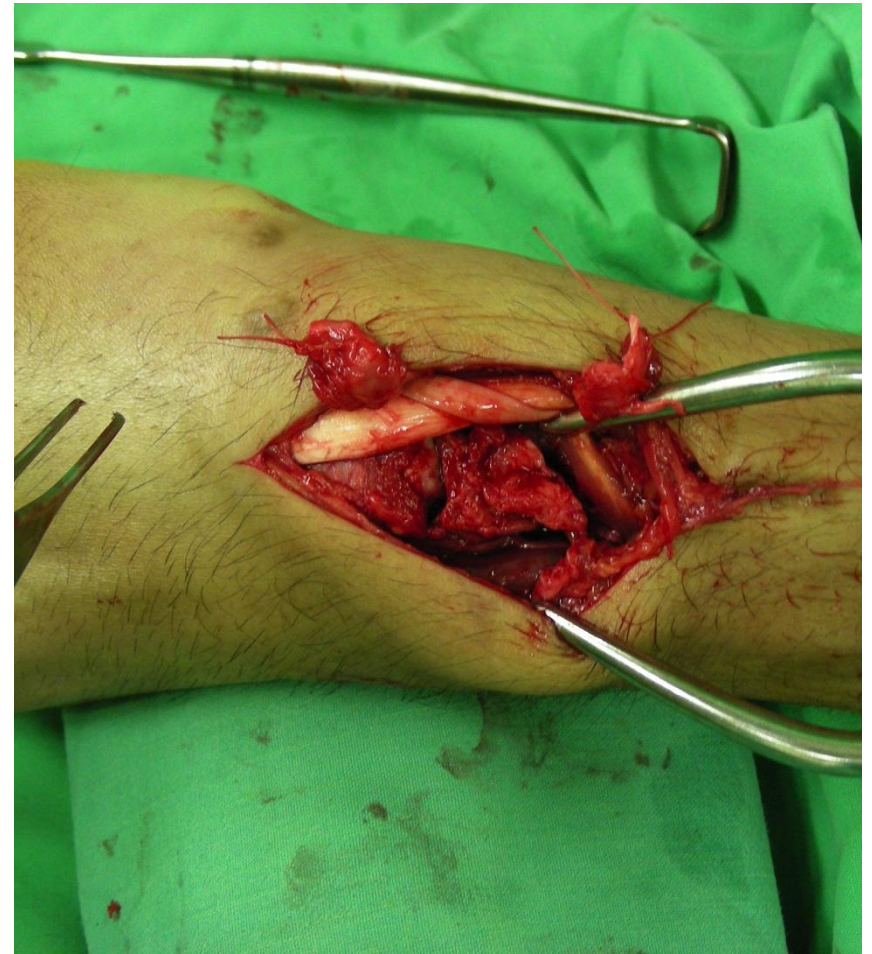


DORSAL

2nd-3rd DC



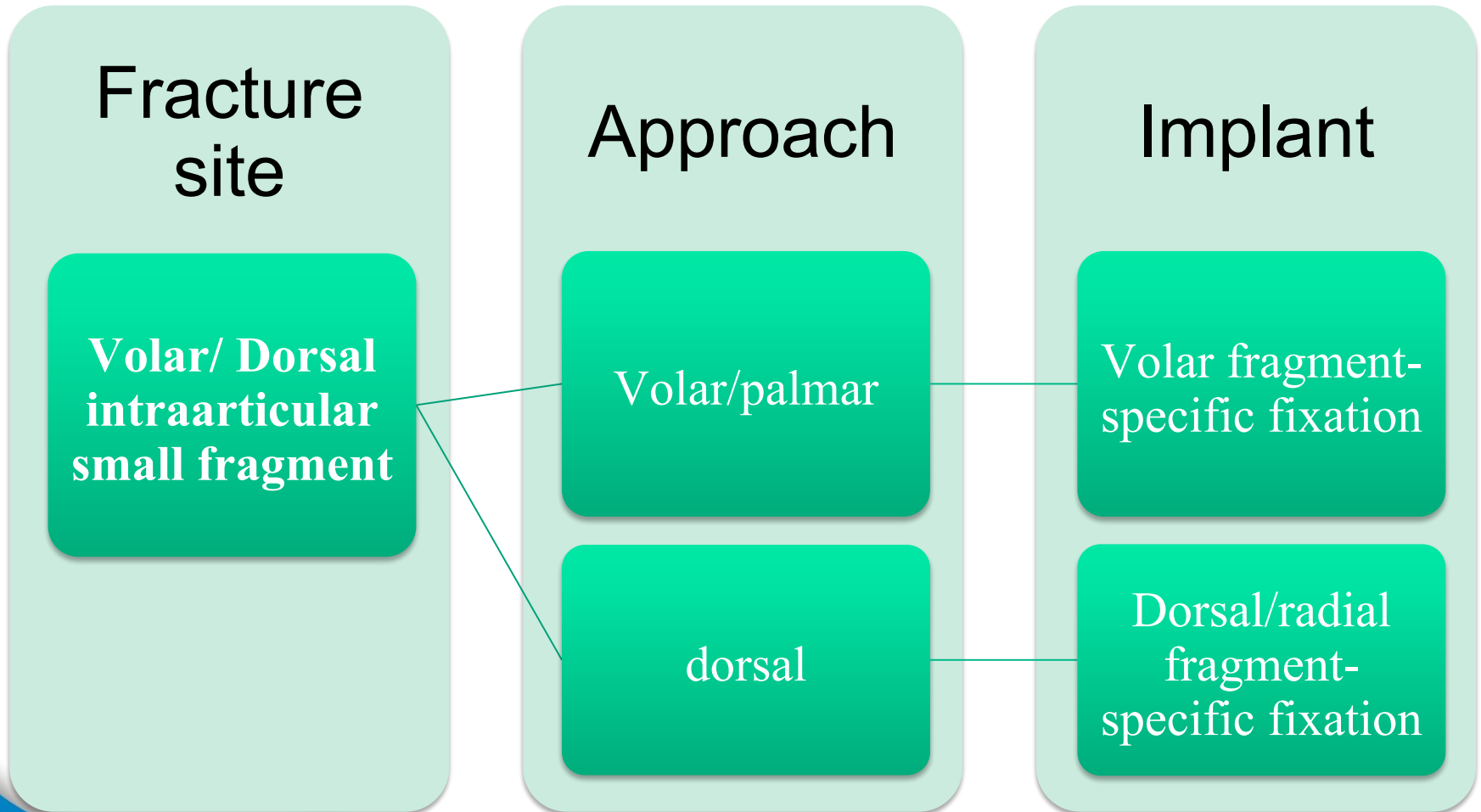
Dorsal approach



Dorsal fragment-specific fixation



Fragment-specific fixation



下次不敢了

上課竟
敢睡覺!



Humeral shaft fractures

Immediate radial nerve exploration

- - Open fractures
- - Distal-third spiral fractures
- - Secondary palsy following closed reduction

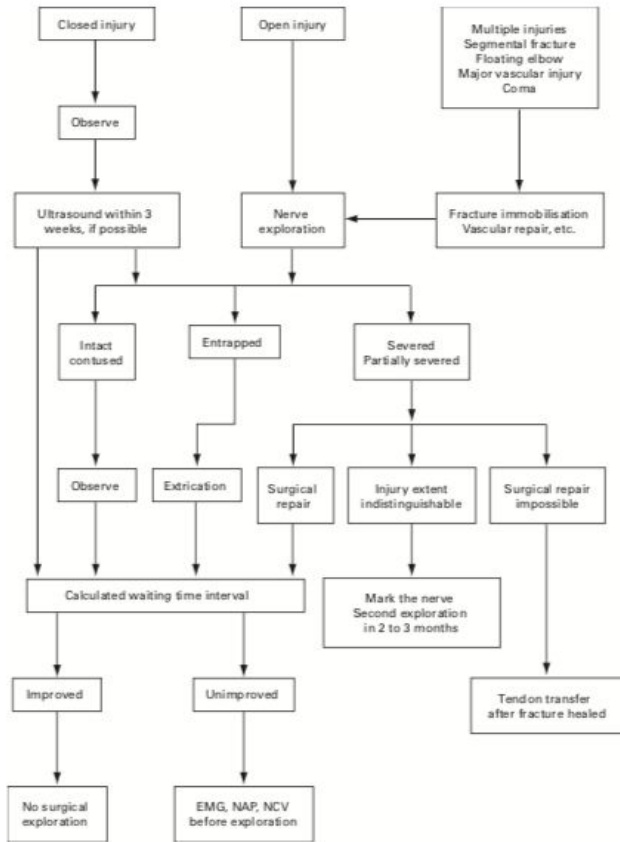
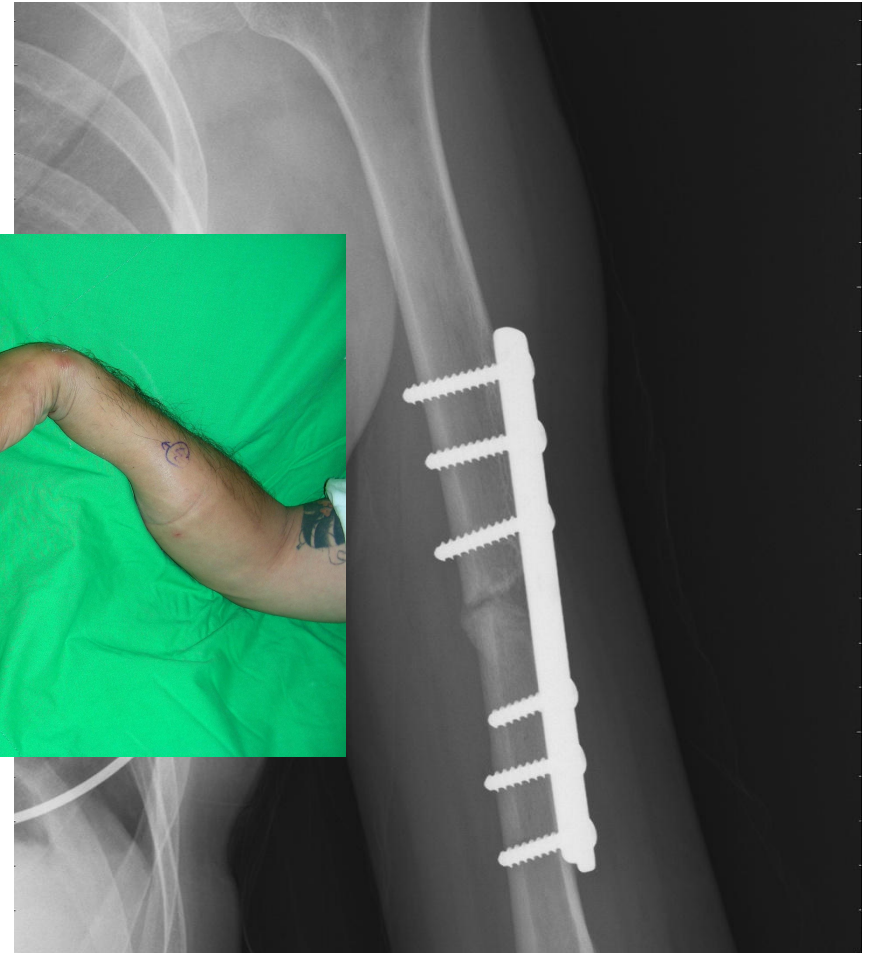
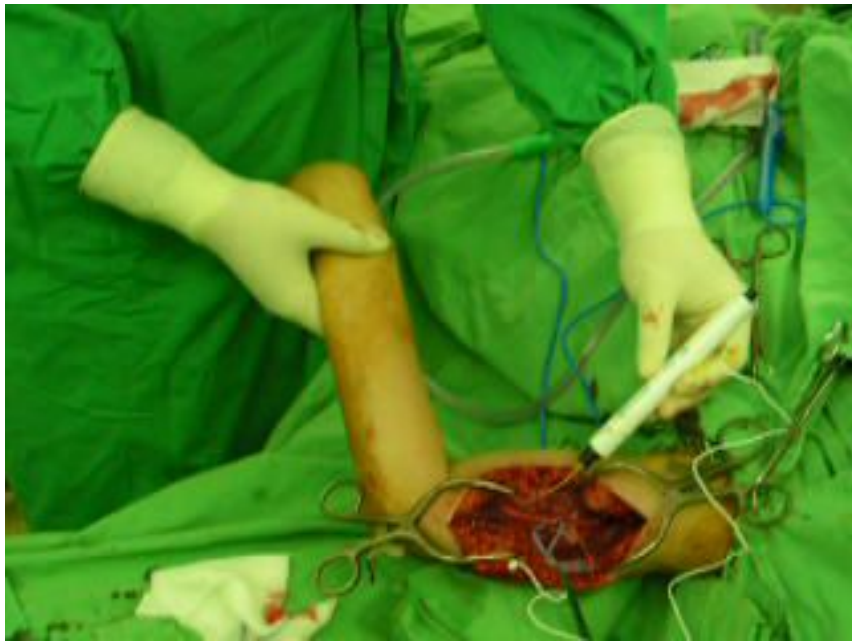
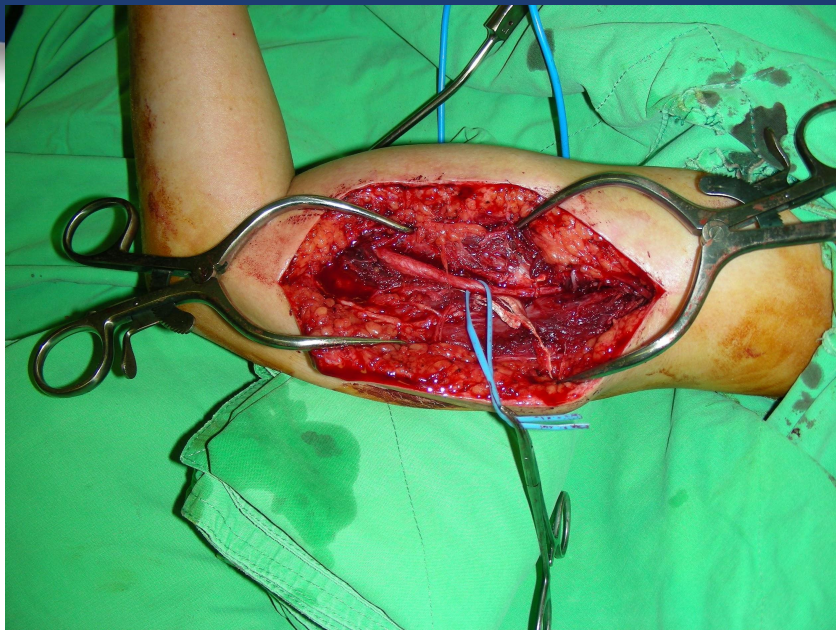
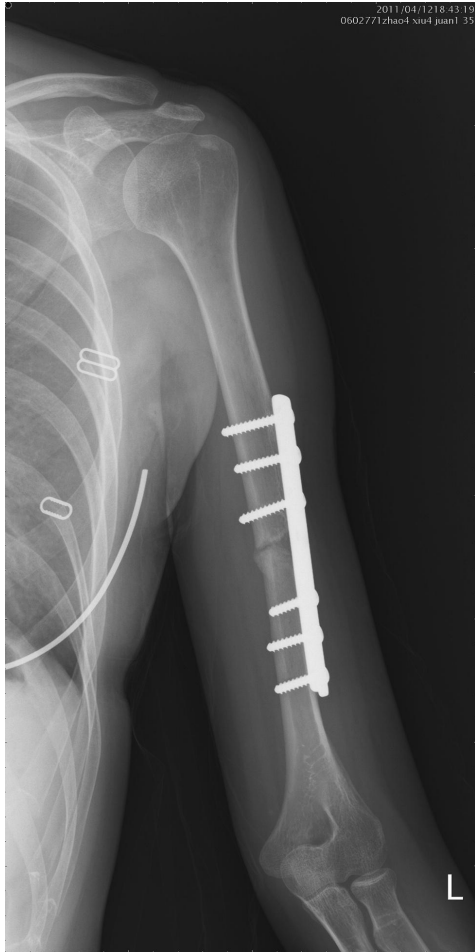
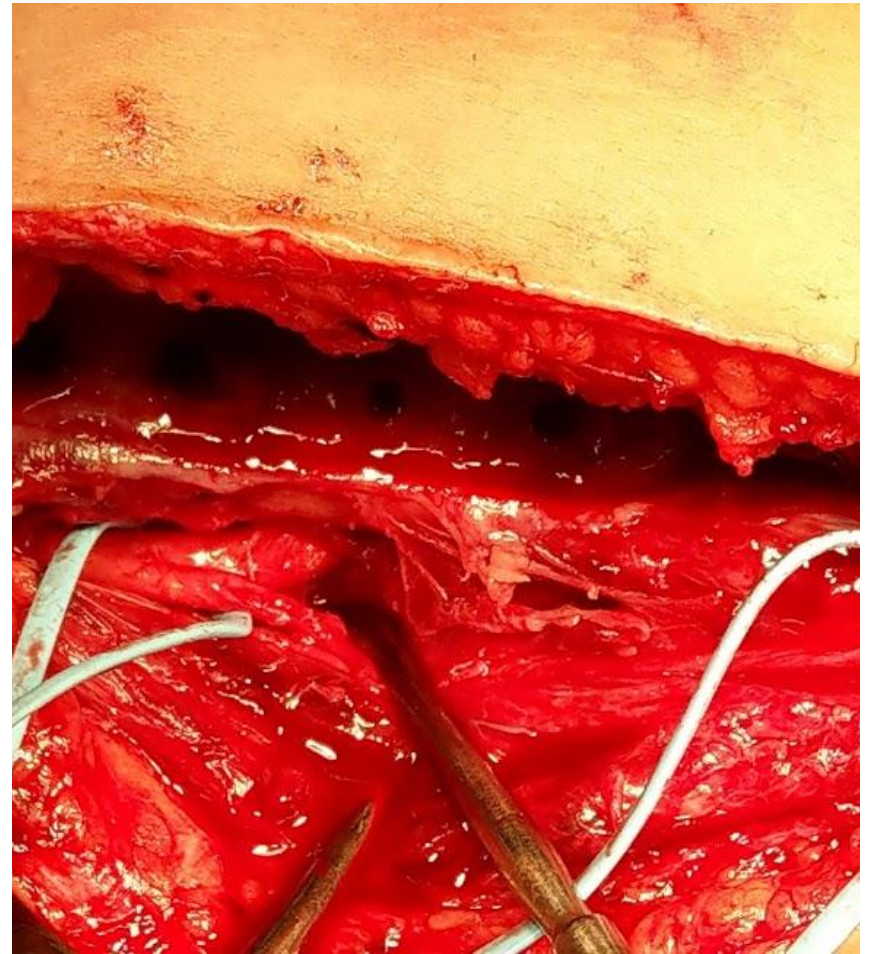
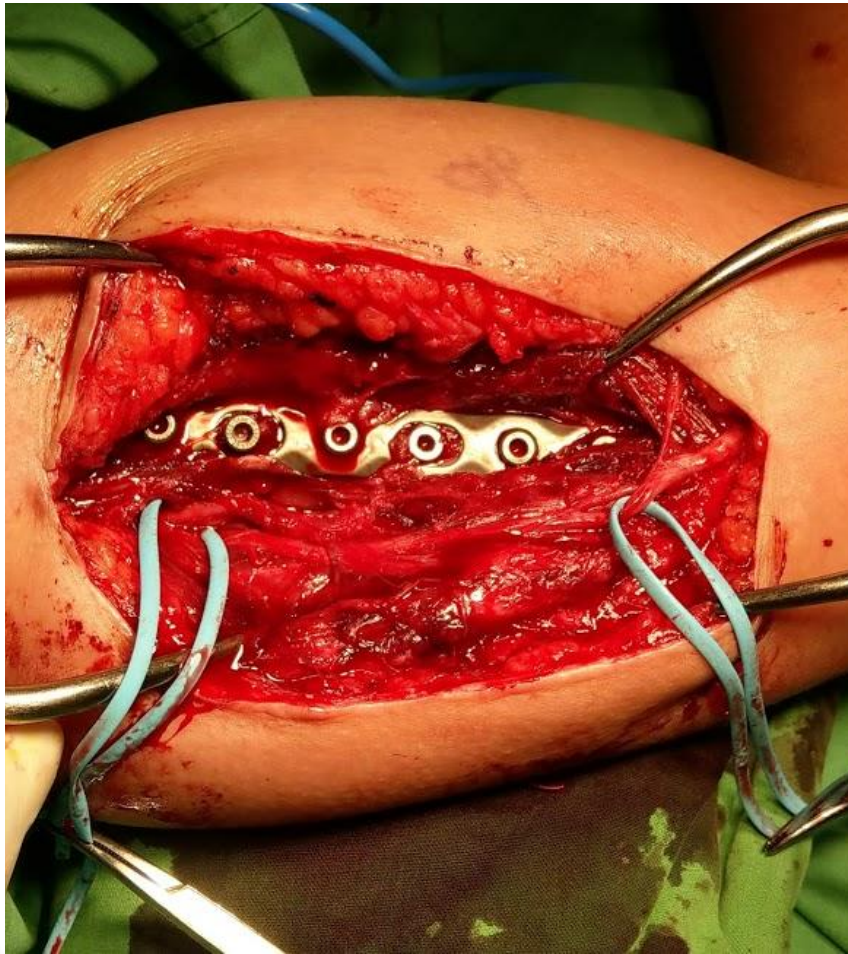


Fig. 1

Treatment algorithm for a radial nerve palsy associated with a fracture of the shaft of the humerus (the role of ultrasound has yet to be properly determined) (EMG, electromyogram; NAP, nerve axonal physiology; NCV, nerve conduction velocity).







Landmarks soft tissue window

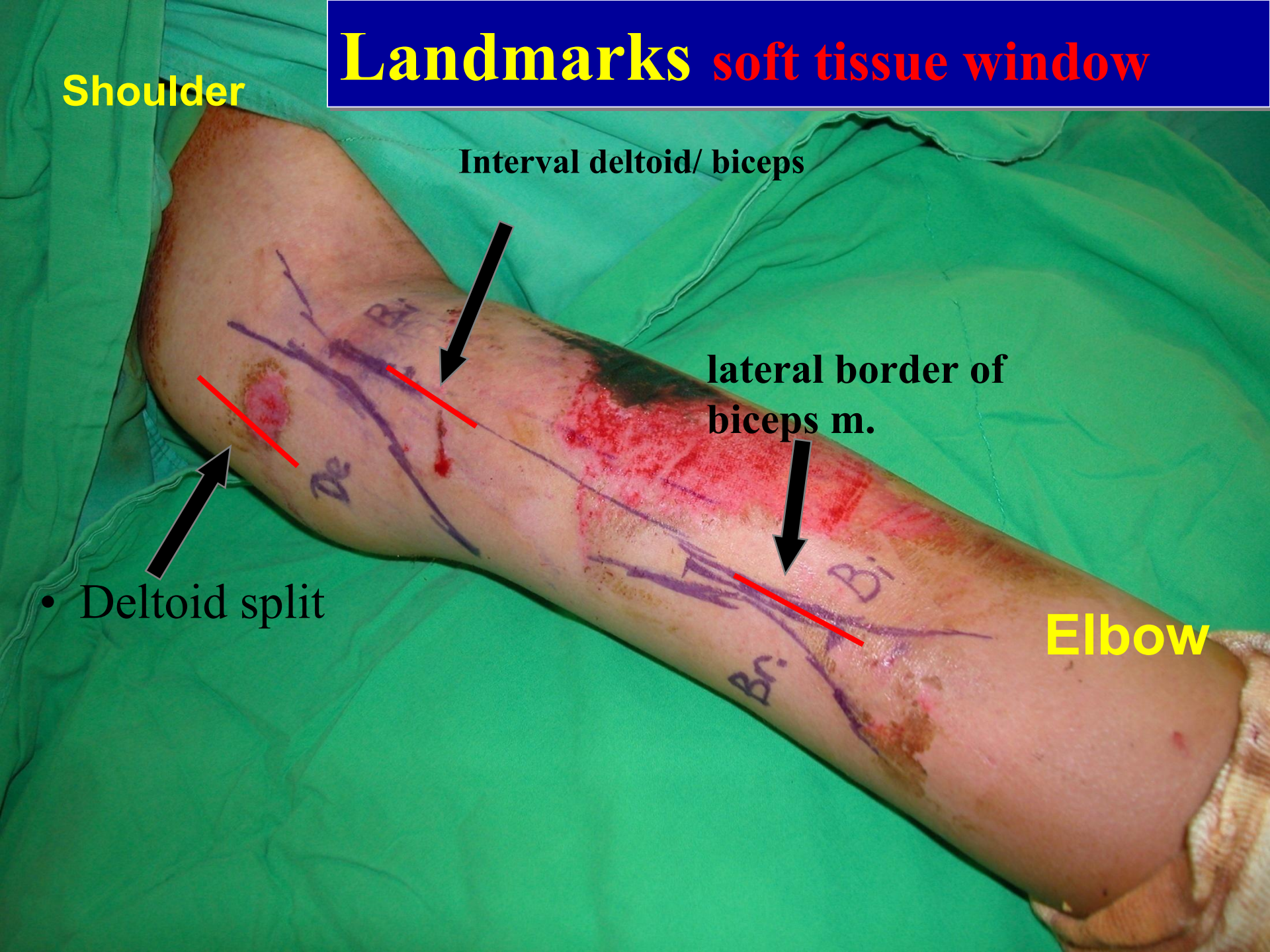
Shoulder

Interval deltoid/ biceps

lateral border of biceps m.

• Deltoid split

Elbow

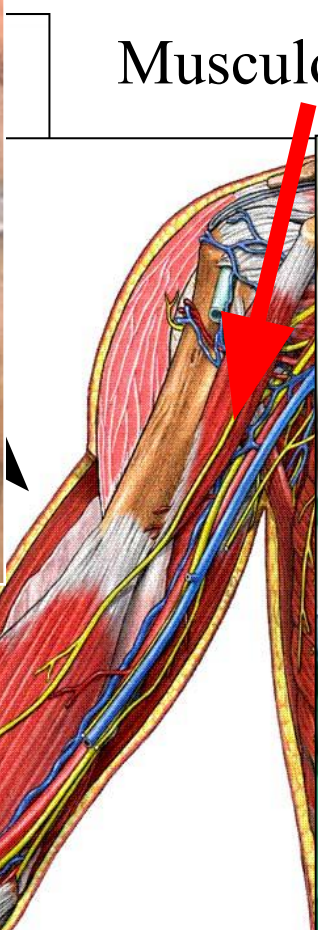
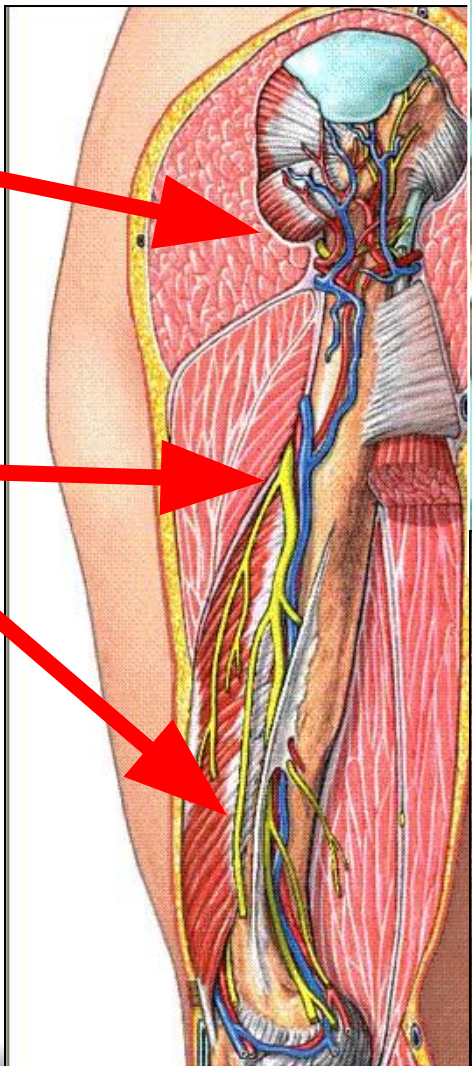


Structures at risk- humerus

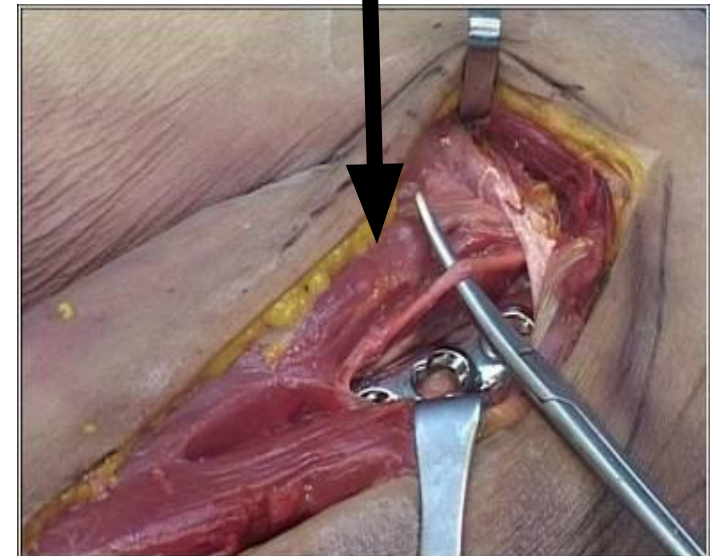
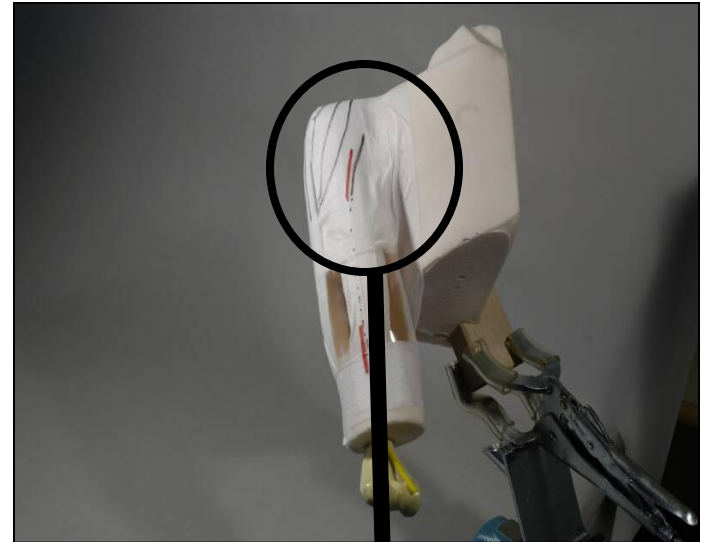
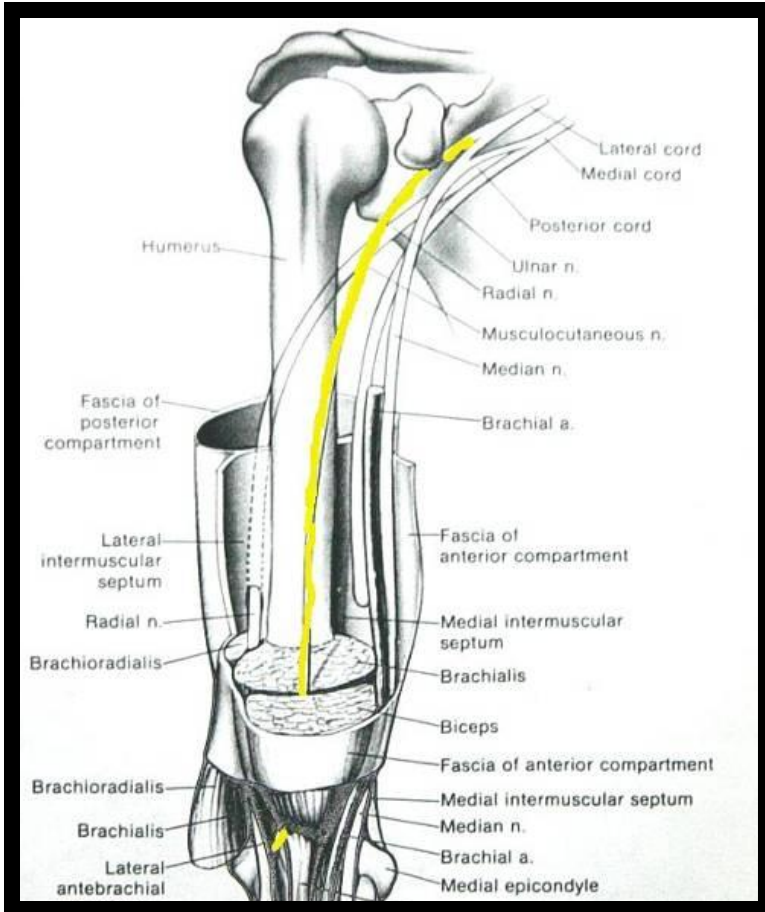
Axillary n

Radial n

Musculocutaneous n

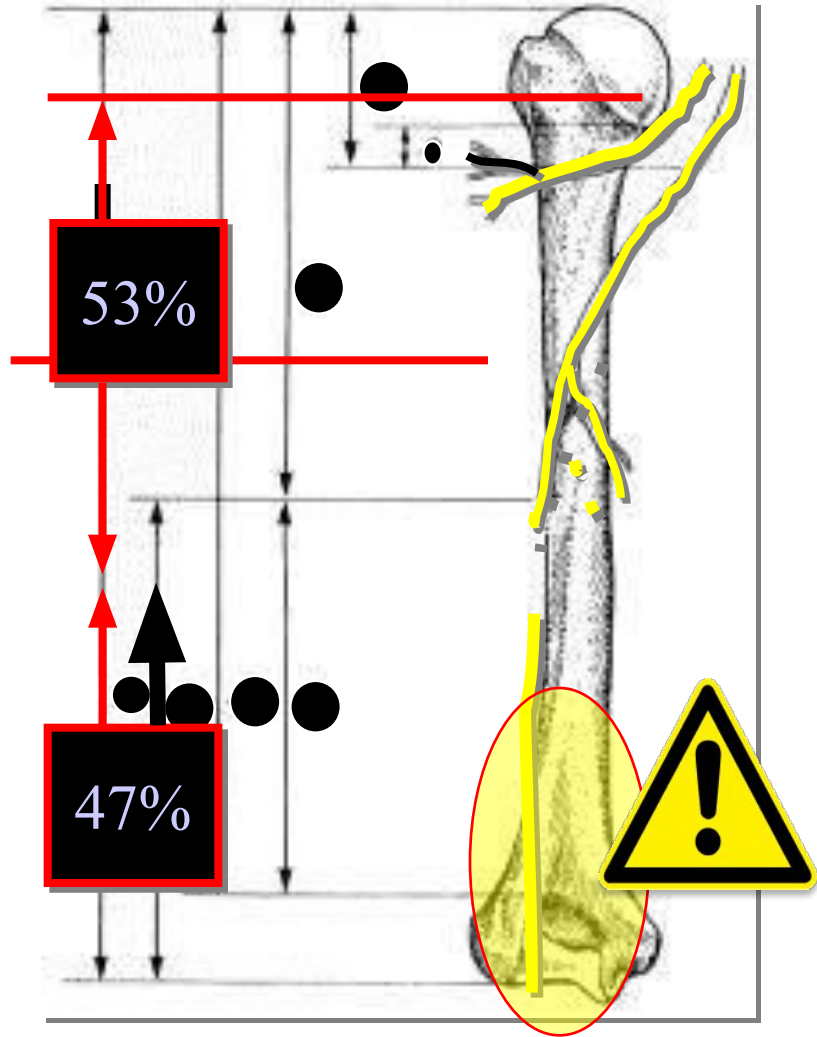
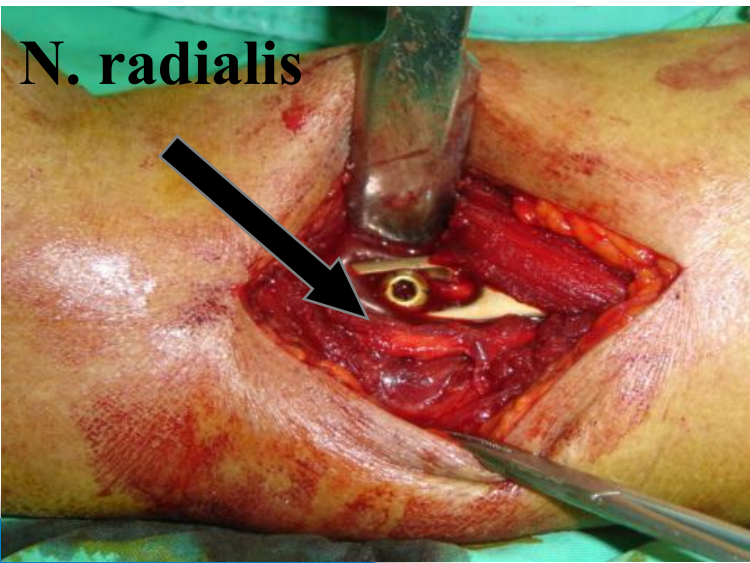
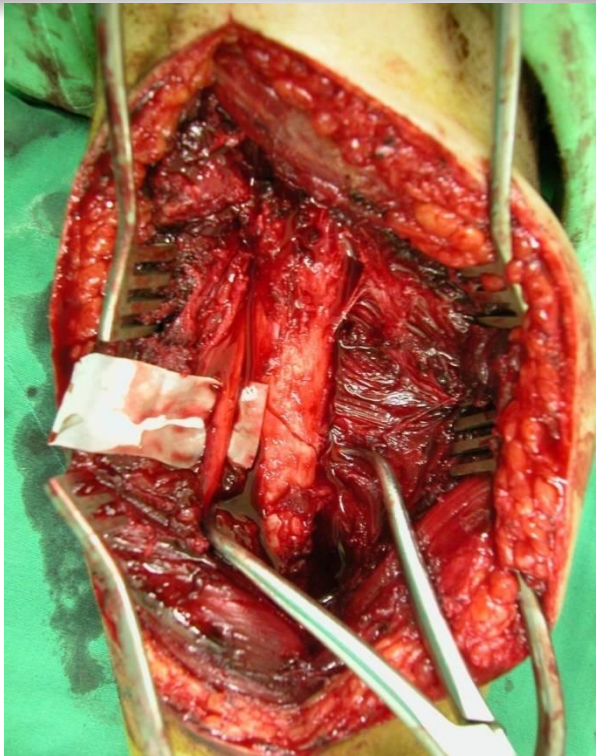


Approach and structures at risk



**Musculocut. Between coracobrachialis
and biceps muscle**

Radial N.



Bono et al, CORR 2000

Problem!!

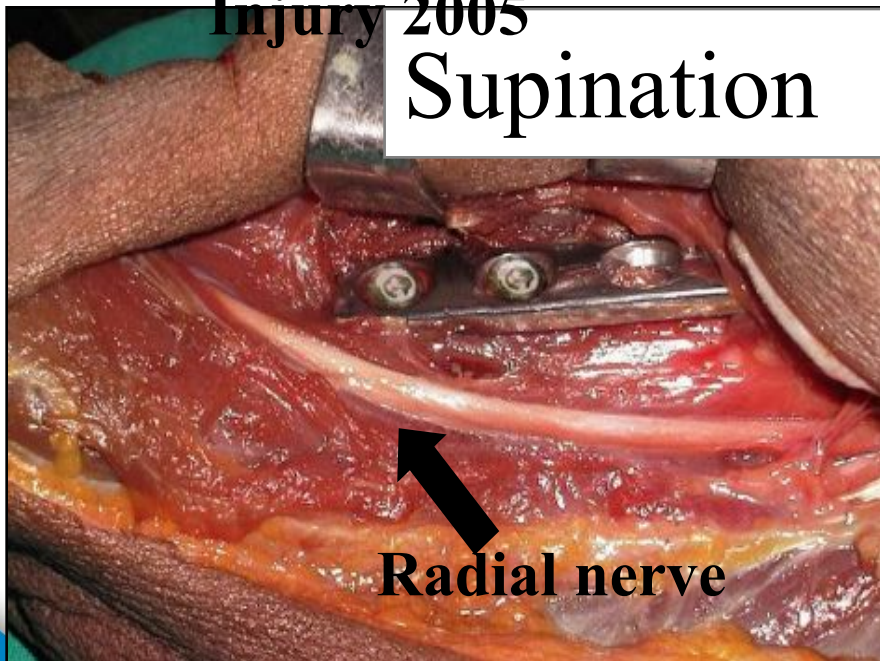


Forearm in full supination
radial n. move more lateral

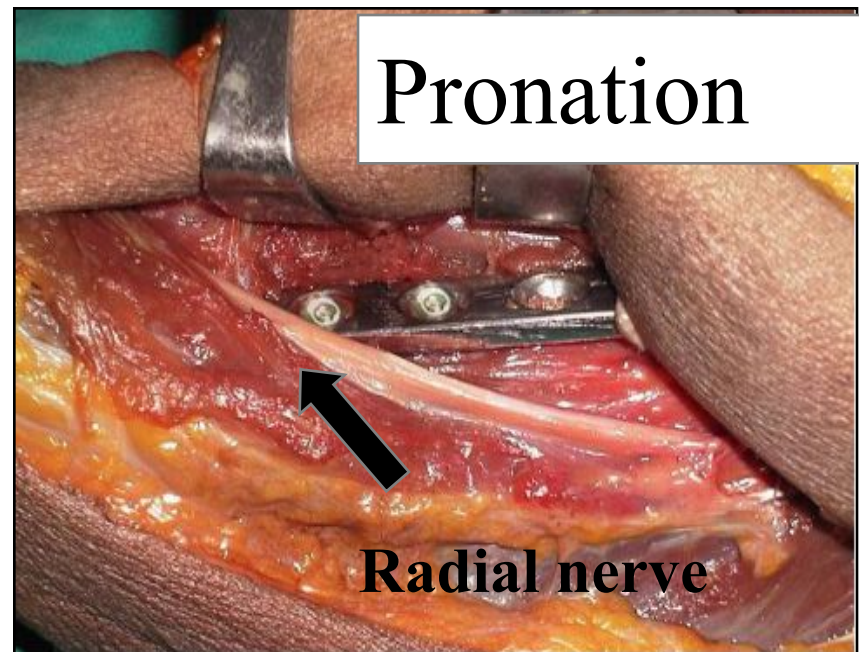


T. Apivatthakakul,
Injury 2005

Supination

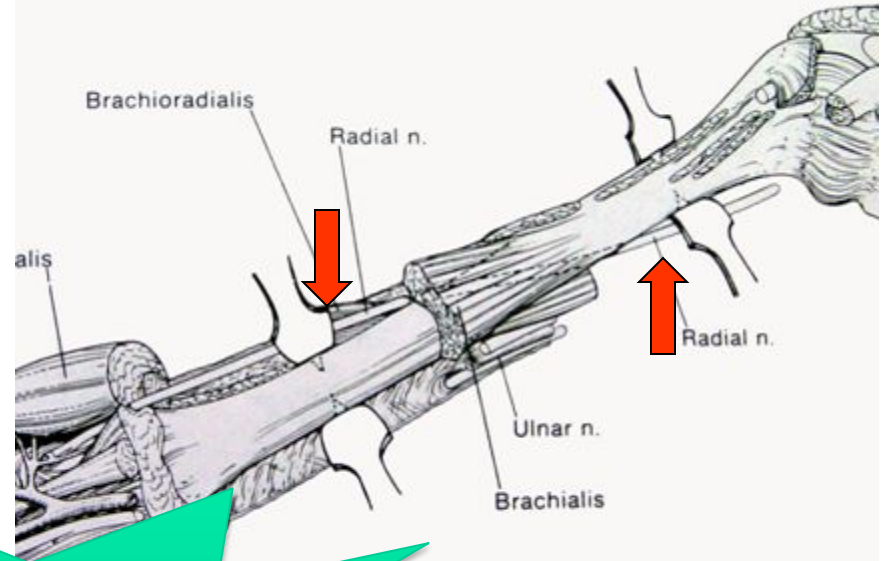
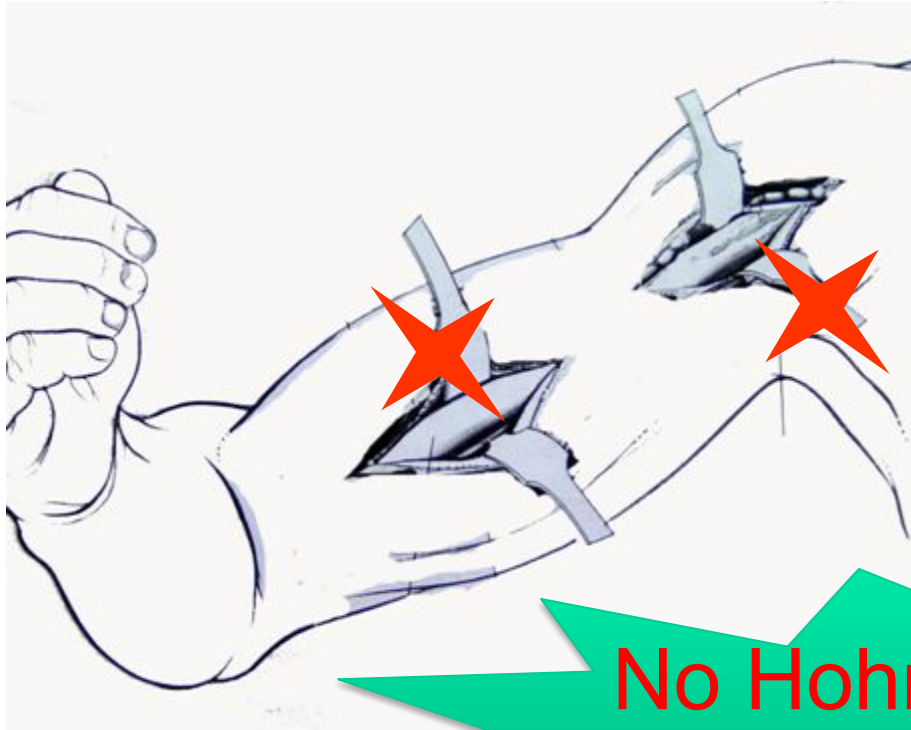


Pronation





Structures at risk



No Hohmann
retractor

Humeral Shaft Fractures

-Holstein-Lewis fracture)

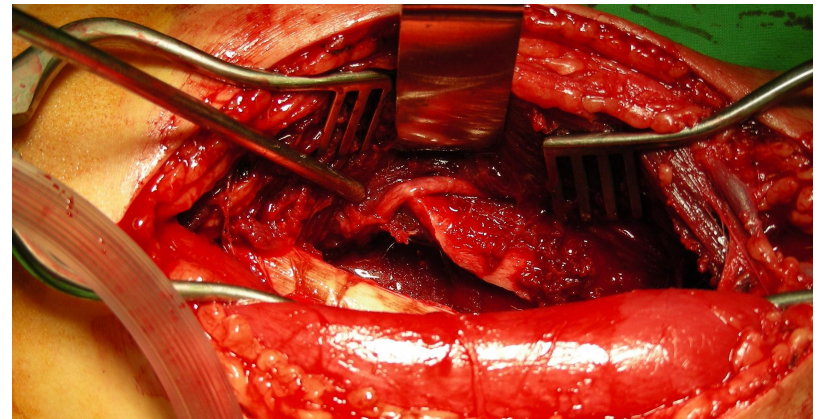
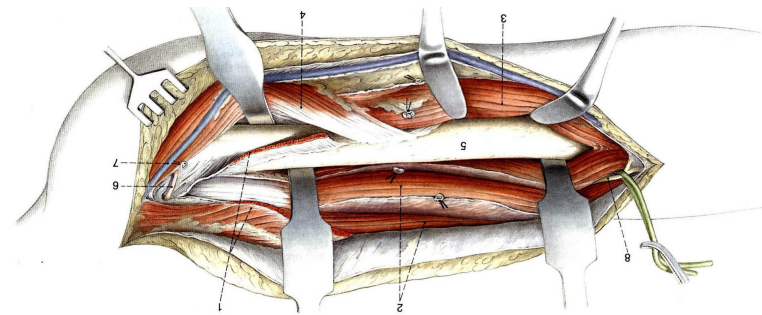
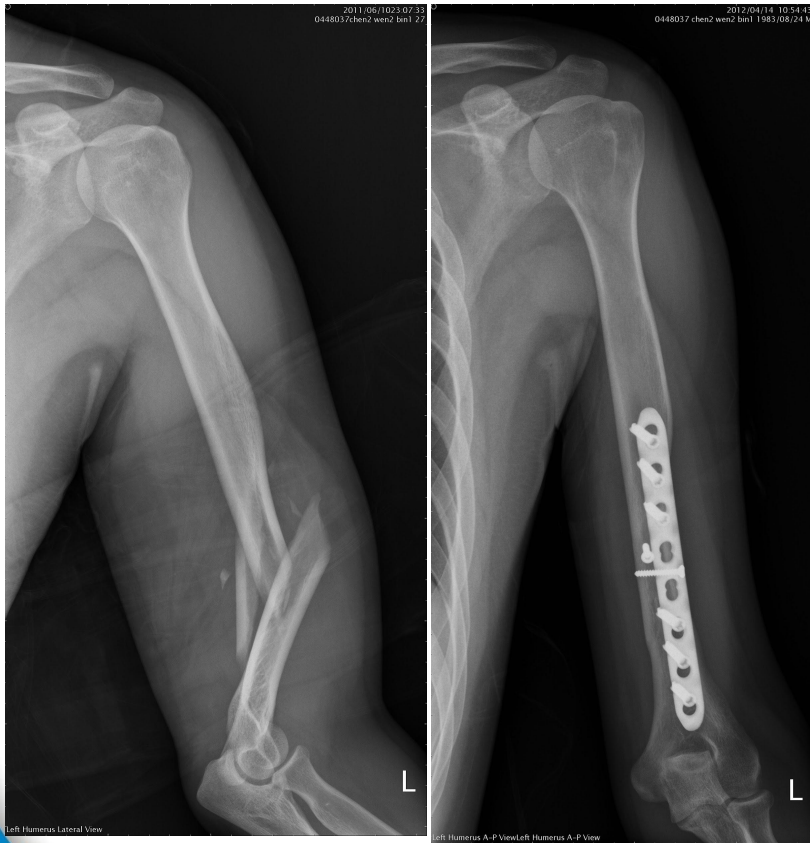
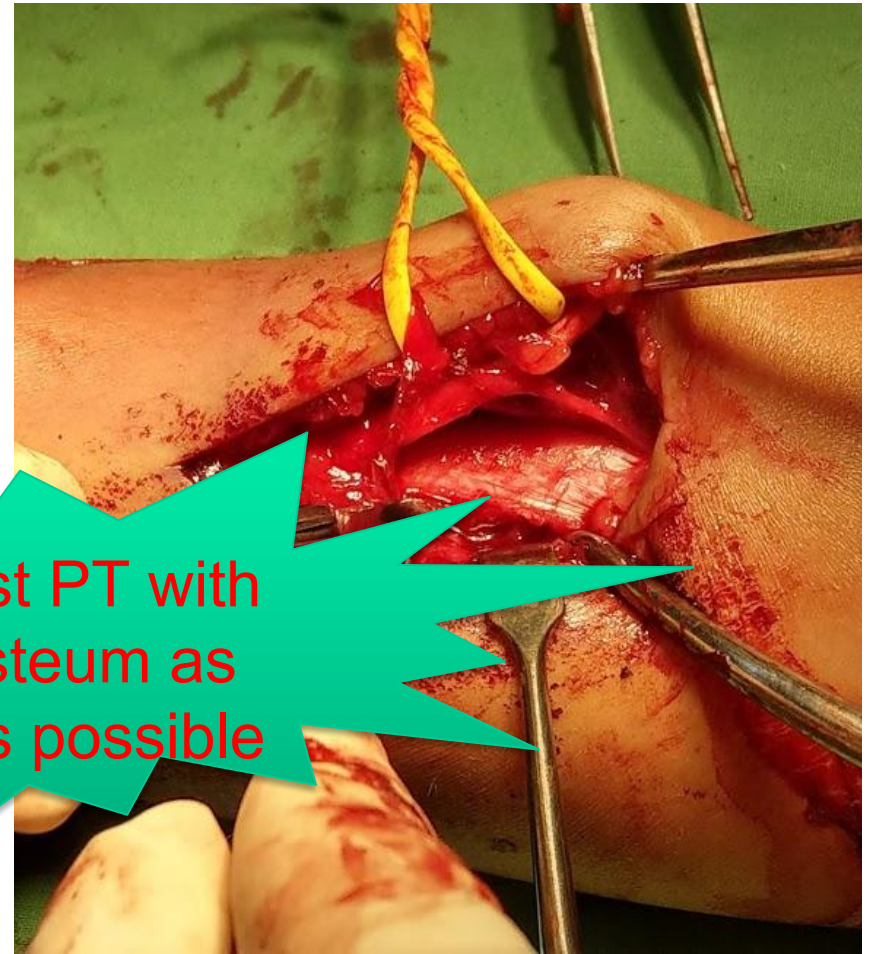


Table 2. Combinations of Transfers

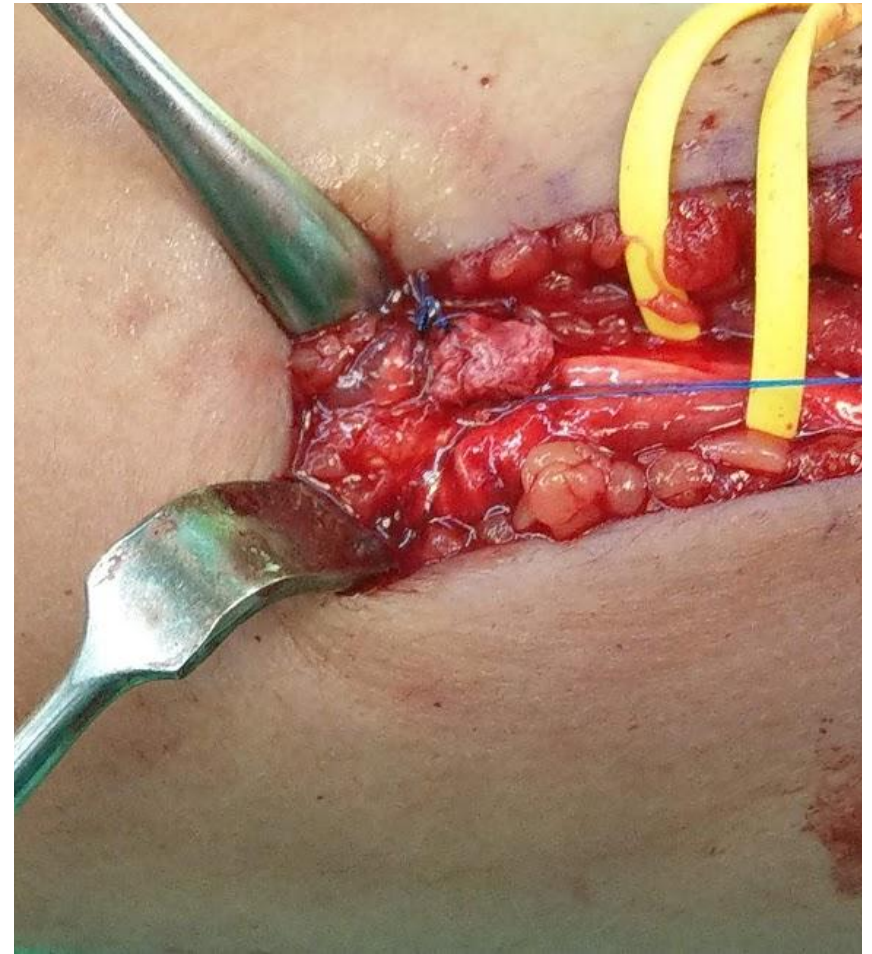
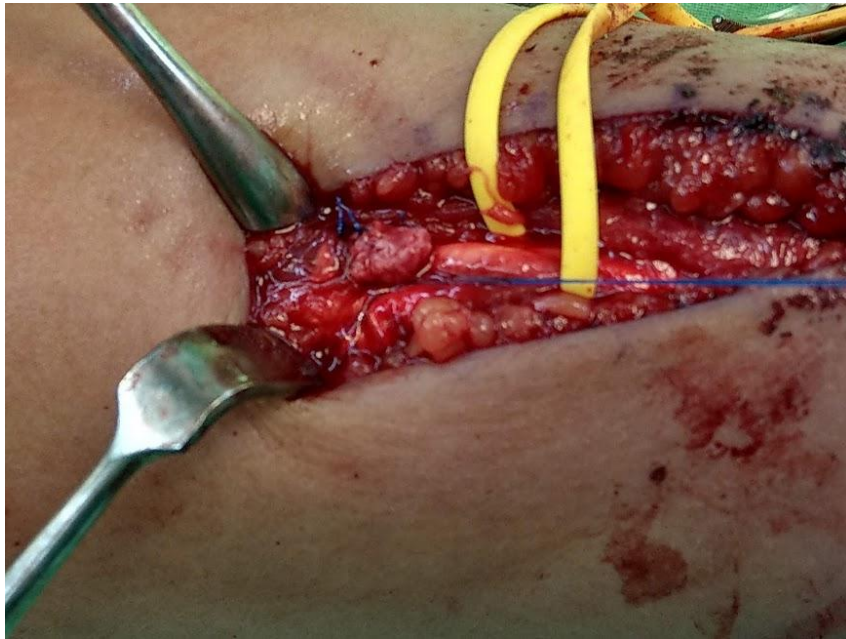
	Authors associated with Transfers(year)	TRANSFERS	Modifications
FCR TRANSFER	Starr(1922) ³² Brand(1985) ⁸ Tsuge Adachi(1980) ⁴⁴	PT to ECRB FCR to EDC PL to rerouted EPL	Tsuge transferred FCR through IOM to EDC
SUPERFICIALIS TRANSFER	Boyes(1960) ⁵ Chiunard(1978) ²⁹	PT to ECRL and ECRB FDS(III) to EDC FDS(IV) to EIP and EPL	FCR also transferred to APL/EPB for thumb abduction
FCU TRANSFER	Jones(1916 and 1921) ^{30,31} Merle D'Aubigné ^{49,33,34} Tubiana ^{45,33,34}	PT to ECRB FCU to EDC PL to rerouted EPL	Jones used FCR to reconstruct thumb and index extension D'Aubigné used PT to ECRL/ECRB; FCU to EDC, EIP and EPL; and PL to EPB/APL Tubiana: PT to ECRB and ECRL which is transferred to base of 4th MC
MODIFICATIONS WHEN PL IS ABSENT		FCR to EDC FDS(IV) through IOM to EPL and EIP OR FDS(IV) rerouted around ulnar side of wrist to EPL and EIP OR FDS(III) rerouted to radial side of wrist to rerouted EPL	Tubiana felt FDS was too strong for thumb extension. For case of absent PL used the following: PT to ECRB and transferred ECRL (to base of 4th) FDS(IV) to EDC(II-V) FCR rerouted on the ulnar side of wrist to EIP and EPL

PT to ECRB

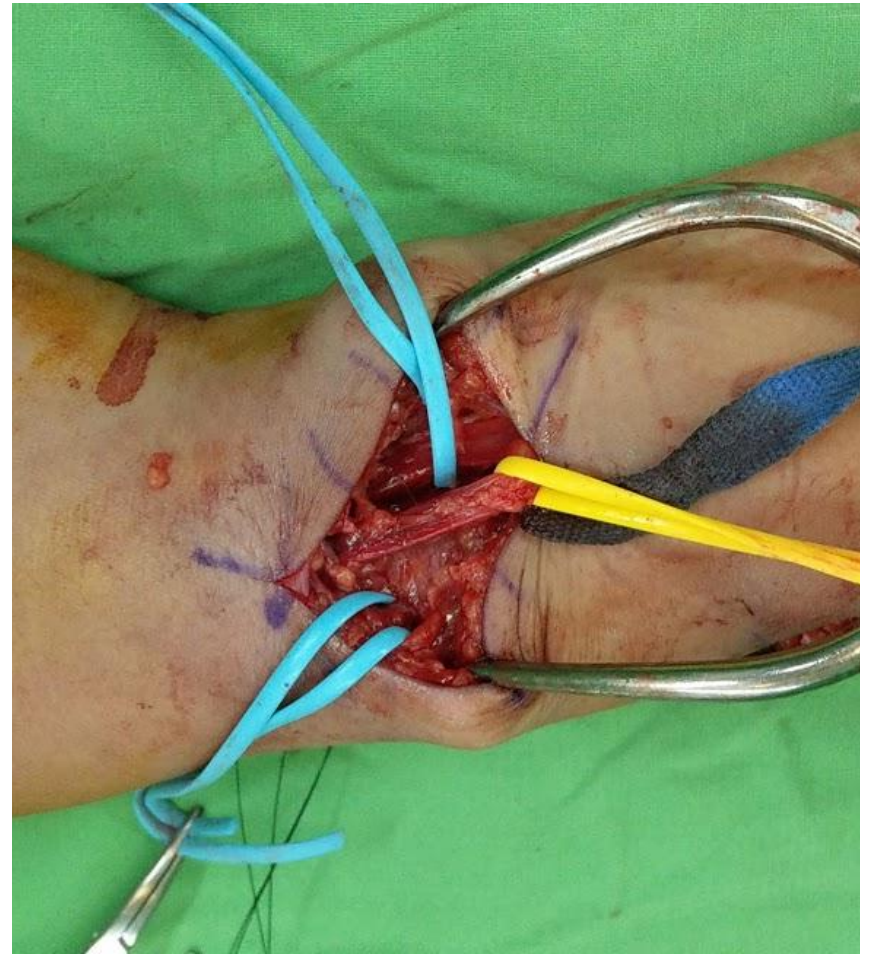
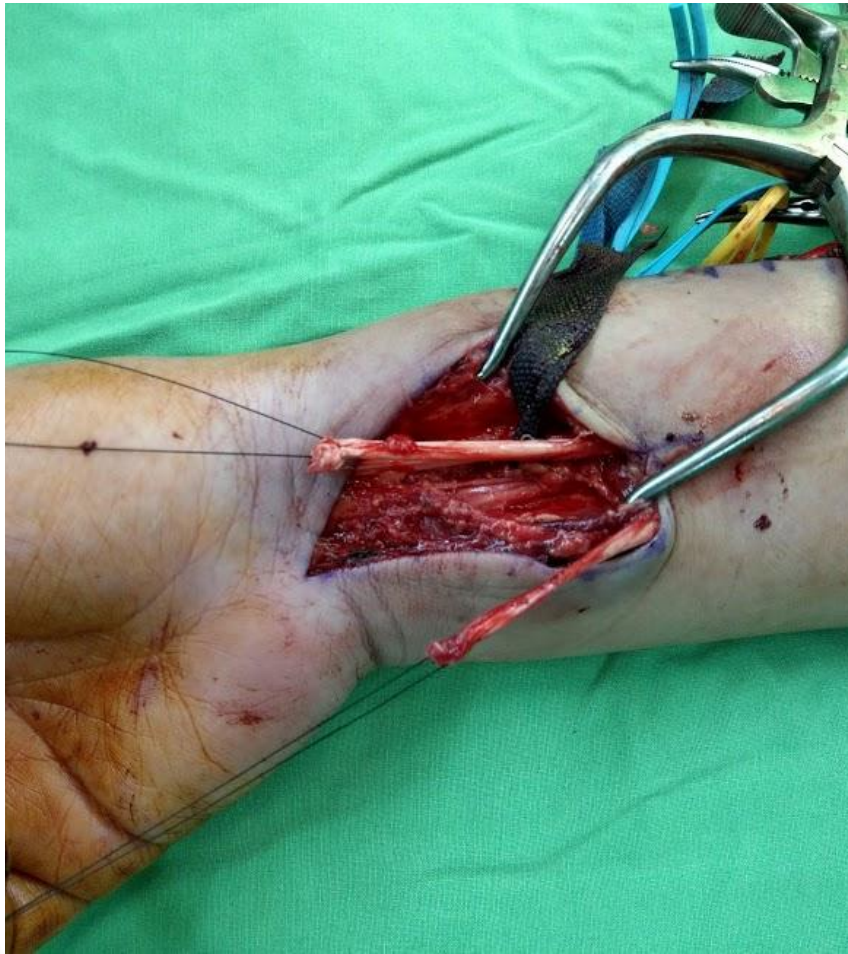


Harvest PT with
periosteum as
long as possible

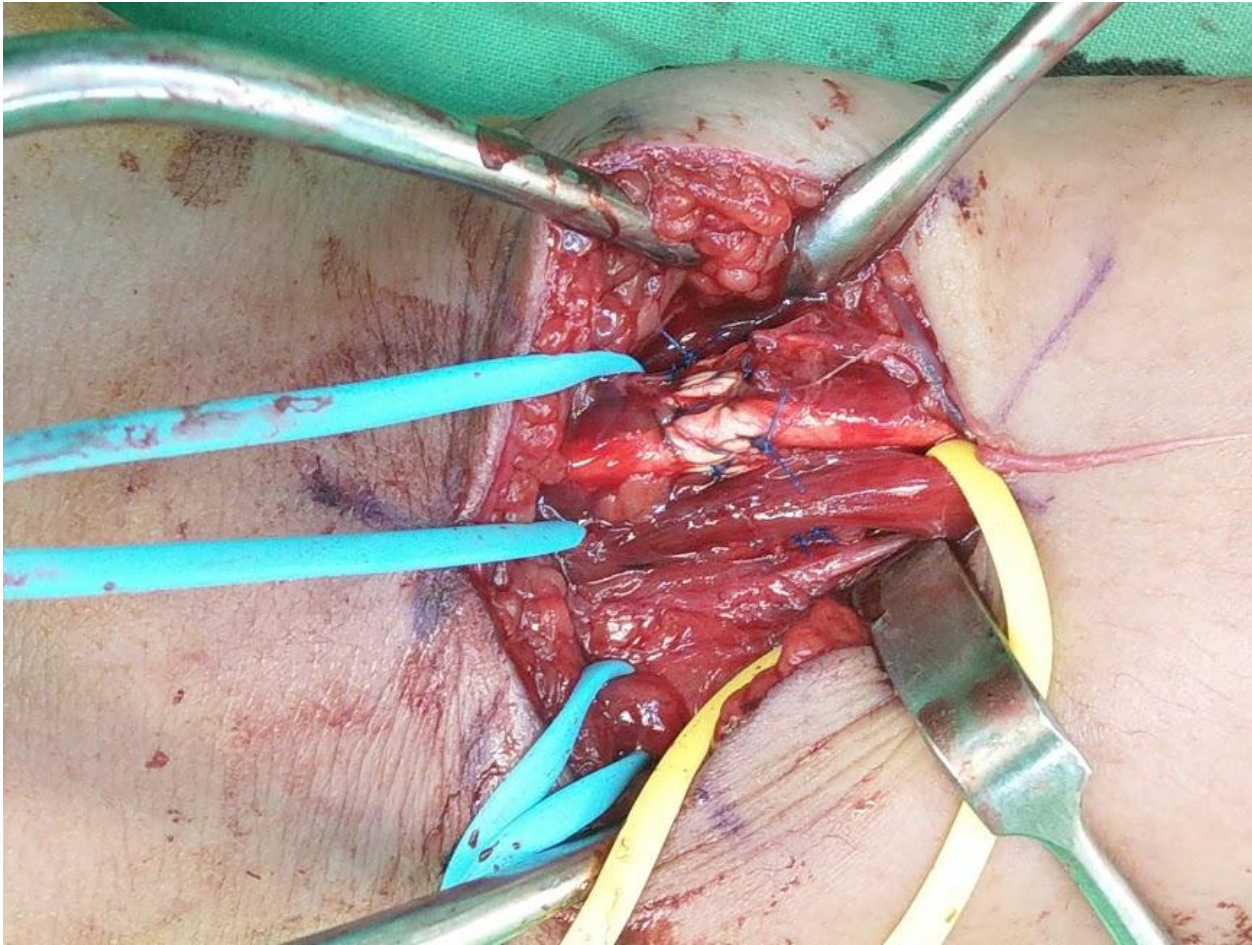
PT to ECRB



PL to EPL/ FCR to EDC



PL to EPL/ FCR to EDC



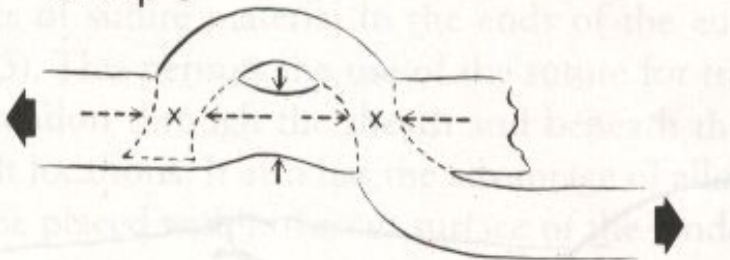
Group 1

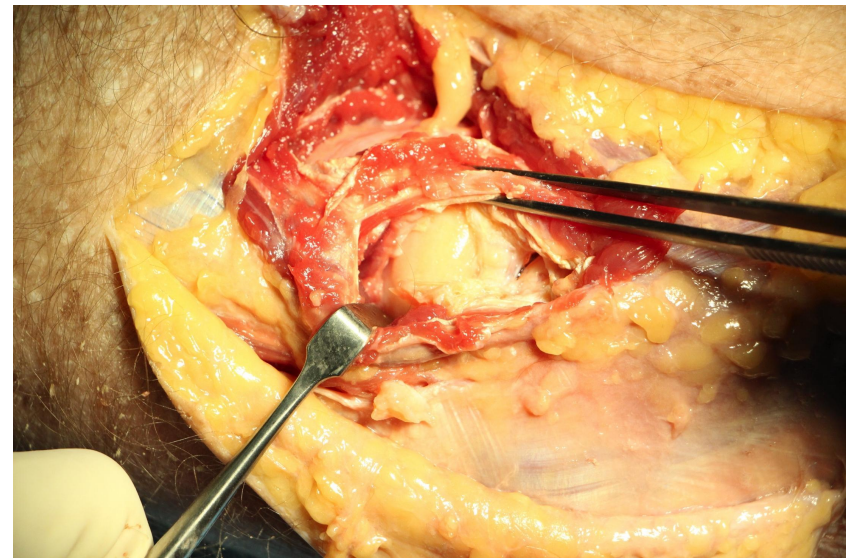
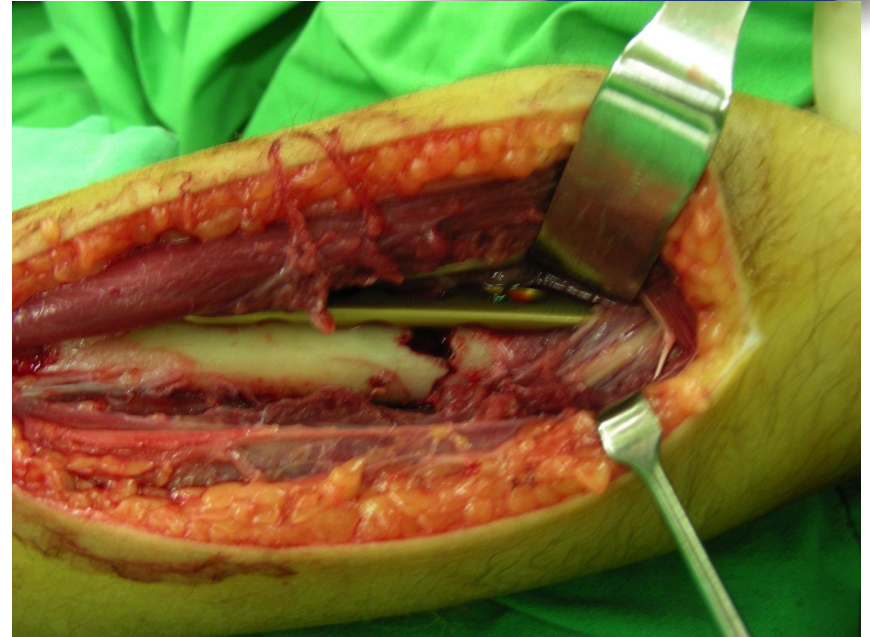


Group 2



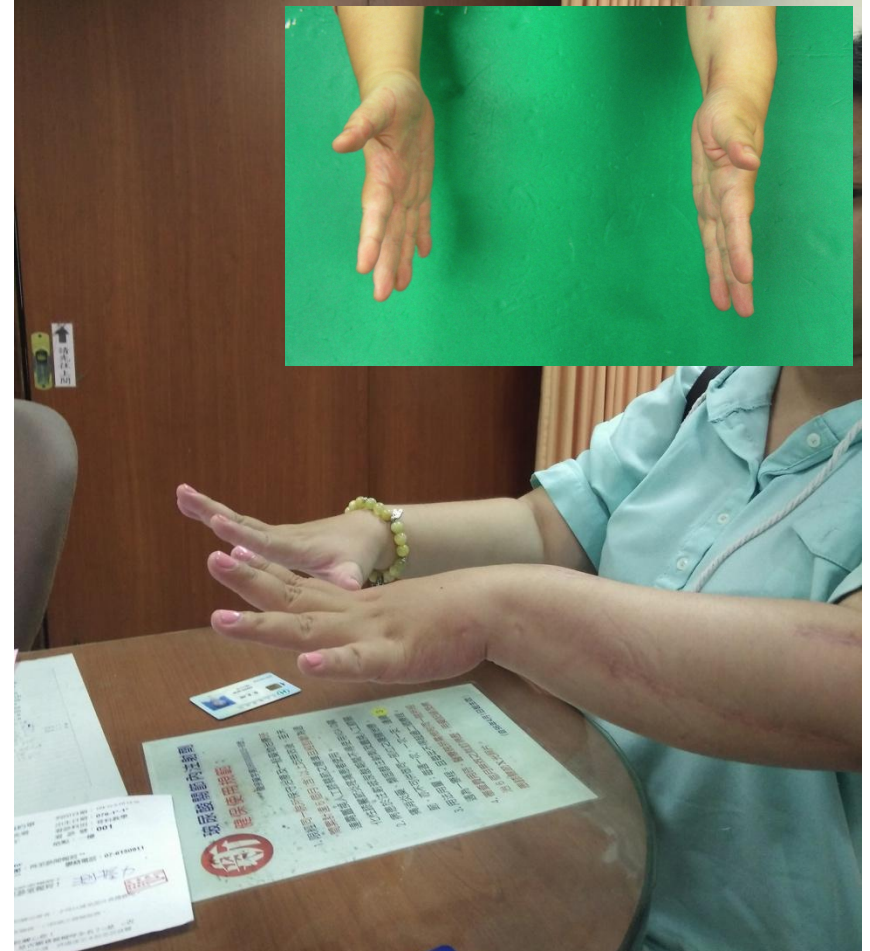
Group 3





Low radial nerve palsy





Summary- dorsal approach

- Indications for dorsal plate fixation:
 - Associated intercarpal lig injury
 - Displaced dorsal lunate facet fracture
 - A dorsal shearing radiocarpal fr-dislocation
- Z incision of extensor retinaculum

Summary- Radial N palsy

- Approach matter!
Anterolateral approach
No Hofmann
- High radial nerve palsy
PT to ECRB
Low radial nerve palsy
-PL to EPL
-FCR to EDC





IVERSITY

Thanks for your attention !!!

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