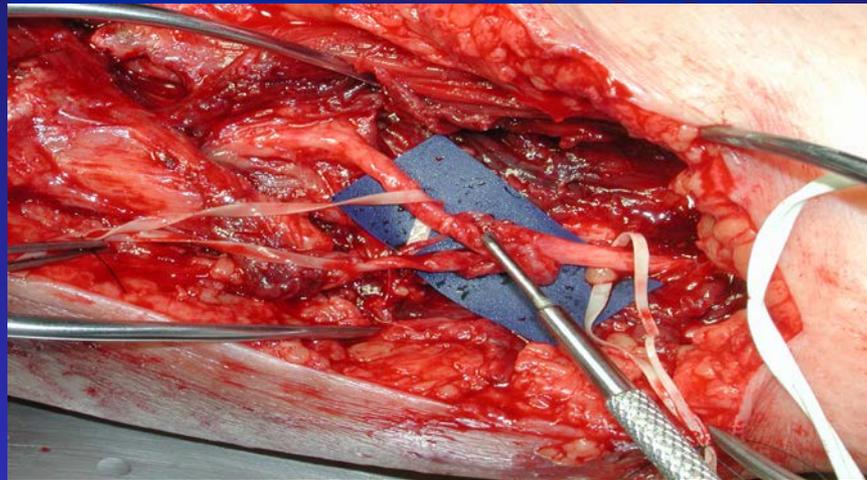


Radial Nerve Palsy Associated with Fracture of the Humerus



Robert W. Wysocki, MD

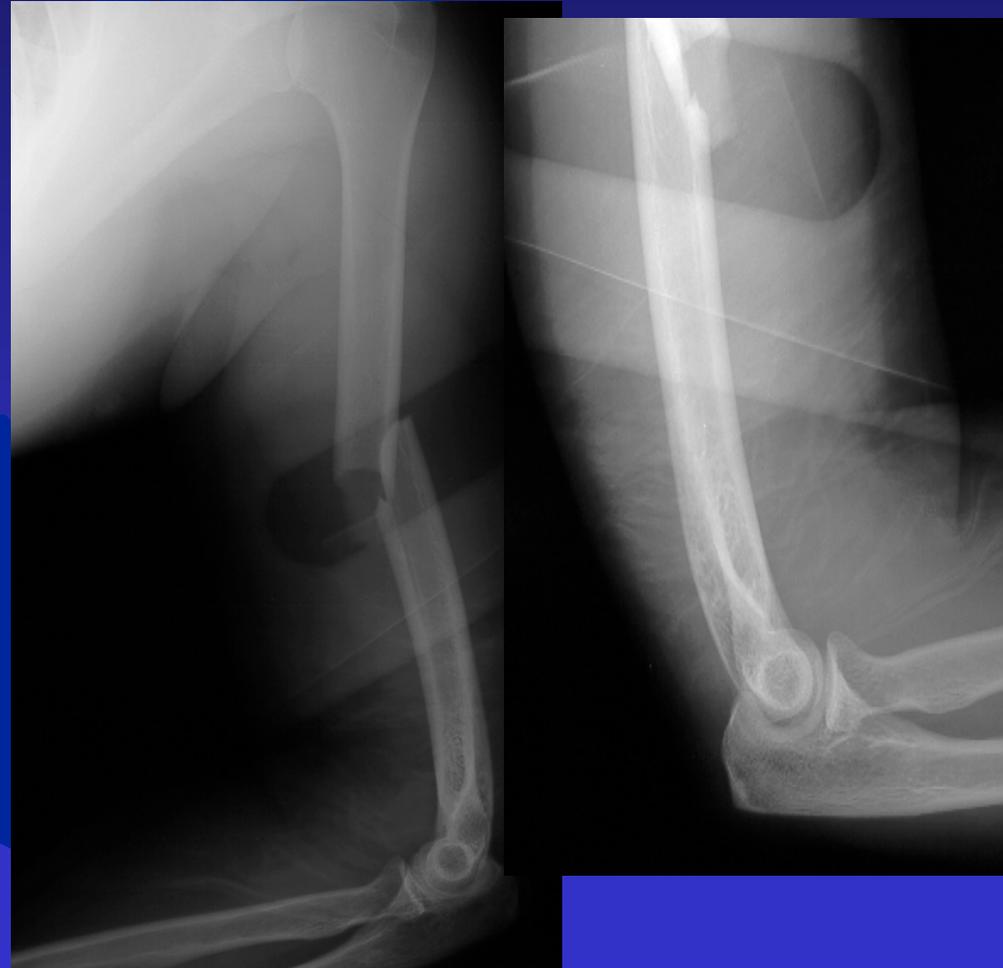
Division of Hand, Upper Extremity and
Microvascular Surgery

Department of Orthopaedic Surgery

Rush University Medical Center

Case Example

- 42 yo AAM MVC
- Closed left humerus fracture
- T5 burst fracture
- T6 compression fx
- Multiple rib fxs
- Sternal fx
- Hemopneumothorax



Physical Examination on Presentation to Emergency Room

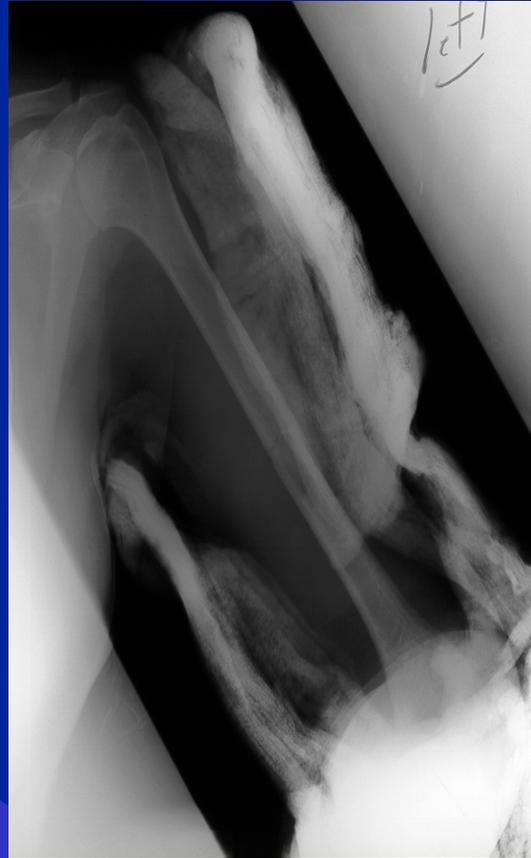
- Left humerus with internal rotation and varus deformity
 - Radial nerve intact (firing, though pain limited quantification)
 - Median/ulnar nerves intact, palpable radial/ulnar pulses

Emergency Room Management

Closed reduction

- Distraction
- Valgus stress
- External rotation of distal fracture fragment

Coaptation splint



Immediately Following Reduction

- Found to have 0/5 wrist extension, EPL
- Decreased sensibility to light touch in radial nerve sensory distribution
- Neurovascularly intact otherwise

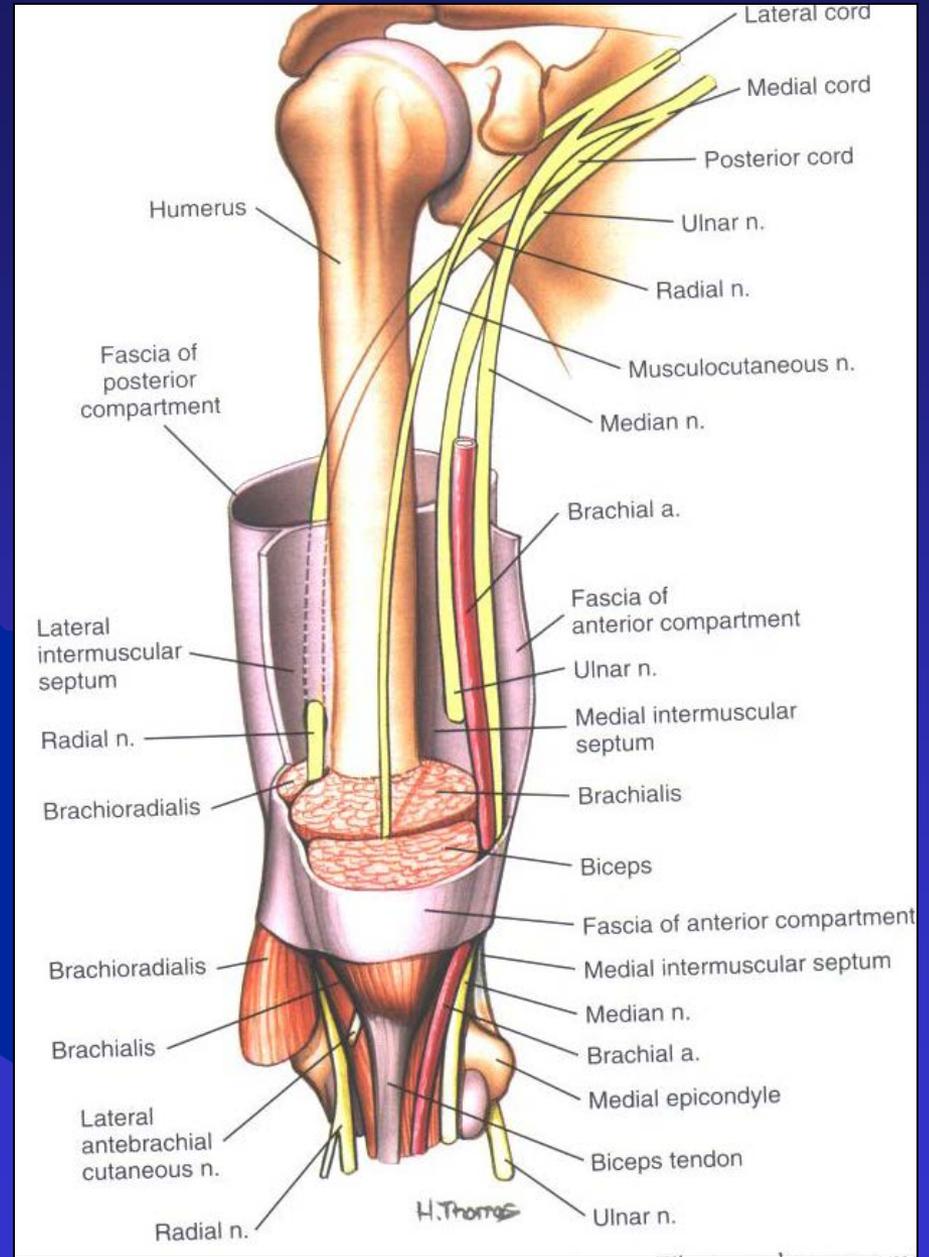


Humeral Shaft Fractures

- 1 to 3% of all fractures
- Bi-modal distribution demographically
- Tolerance:
 - 20 deg sagittal
 - 30 deg coronal angulation
 - 3 cm shortening



Relevant Anatomy



Radial Nerve Injury

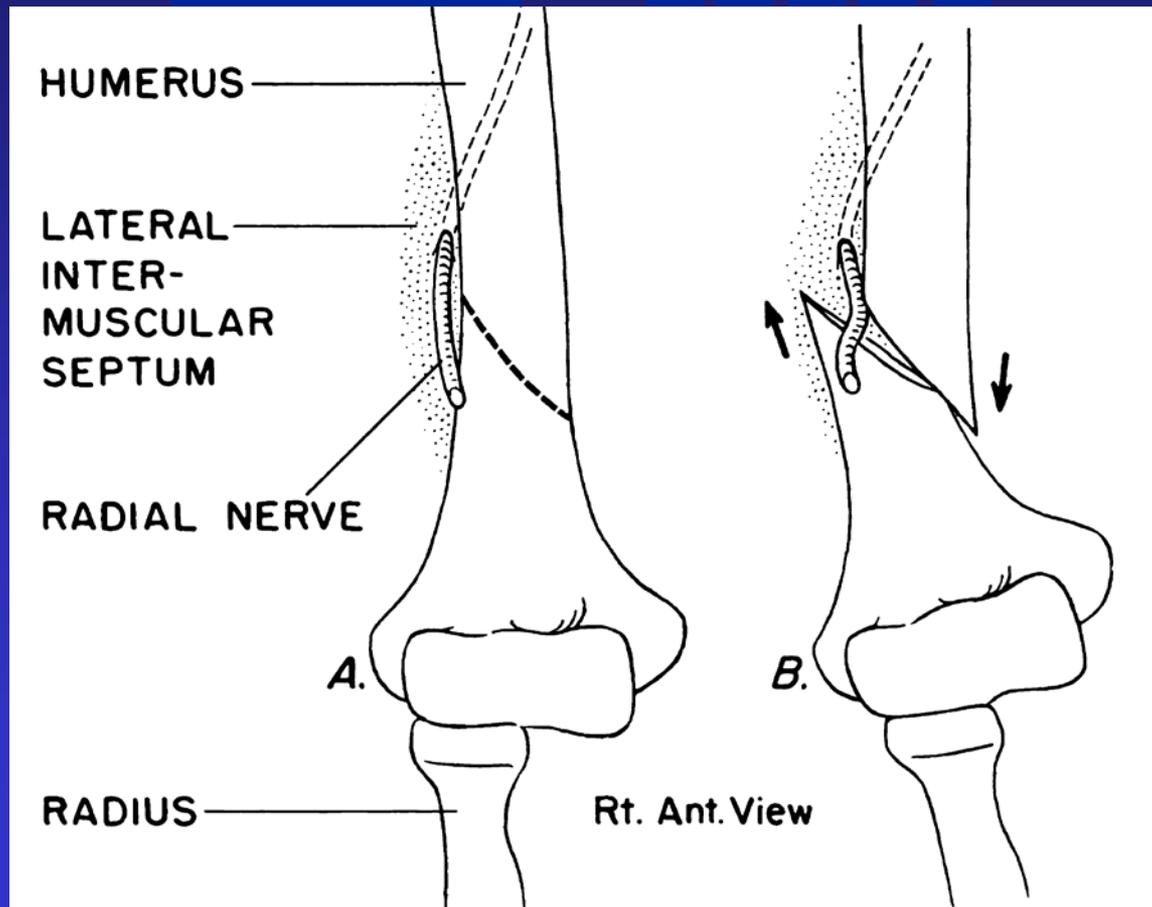
Incidence and Contributing Factors

- Incidence varies from 8-11% of shaft fractures

What about fracture location??

Fractures of the Humerus with Radial-Nerve Paralysis*

BY ARTHUR HOLSTEIN, M.D.†, AND GWILYM B. LEWIS, M.D.†, BERKELEY, CALIFORNIA



Radial Nerve Injury

Incidence and Contributing Factors

- Incidence varies from 8-11% of shaft fractures
- Location: Proximal 2%, Middle 10%, Distal 20%

What about open vs. closed injury??

Radial Nerve Injury

Incidence and Contributing Factors

- Foster et al. – 14 open fractures with radial nerve palsy, 64% had surgically correctable radial nerve lesion
- Bishop et al. – Mixed case series, found only 40% chance of nerve recovery when open fracture observed
- Shao et al. – Meta-analysis, no significant relationship between recovery and open vs. closed

Radial Nerve Injury

Incidence and Contributing Factors

- Incidence varies from 8-11% of shaft fractures
- Location: Proximal 2%, Middle 10%, Distal 20%
- Open vs. closed - Controversial

What about secondary radial nerve palsy??

Radial Nerve Injury

Incidence and Contributing Factors

- Shaw et al. – 45 mixed cases, only 40% of primary palsies resolved, but 100% of secondary recovered
- Shao et al. – Meta-analysis, 88% primary resolved vs. 93% secondary

Radial Nerve Injury

Incidence and Contributing Factors

- Incidence varies from 8-11% of shaft fractures
- Location: Proximal 2%, Middle 10%, Distal 20%
- Open vs. closed – Controversial
- Secondary palsy – No different or better recovery than primary

Diagnostic Testing??

- EMG/NCS
 - Baseline study at 3-6 weeks
 - Repeat study at 12+ weeks if no clinical improvement
- Ultrasound
 - Bodner et al. reported abrupt cutoff in a case of entrapment, and 11/11 recovery with nerves intact on ultrasound

Radial Nerve Injury

Overall recovery rate of primary radial nerve palsy with closed fracture of the humerus is 70-90%

Why not just explore all of them??

Radial Nerve Injury

Why not just explore all of them??

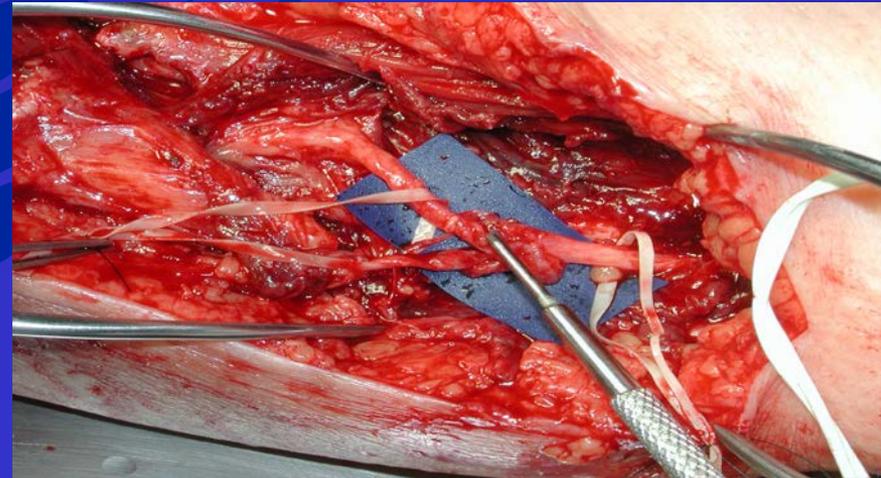
- 1) Rate of recovery of intact radial nerve is WORSE if explored versus if observed
 - * Ring et al – 73% vs. 83%
 - * Bostman et al – 73% vs. 87%

- 2) Final outcome no different if explored late versus early

Radial Nerve Injury

Delayed Nerve Grafting

- 1) Results of grafting superior if before 6 months
- 2) Graft length has no affect until >10 cm
Shergill et al.
- 3) Expect overall recovery of >85%
Nunley et al., Shergill et al.



Radial Nerve Injury

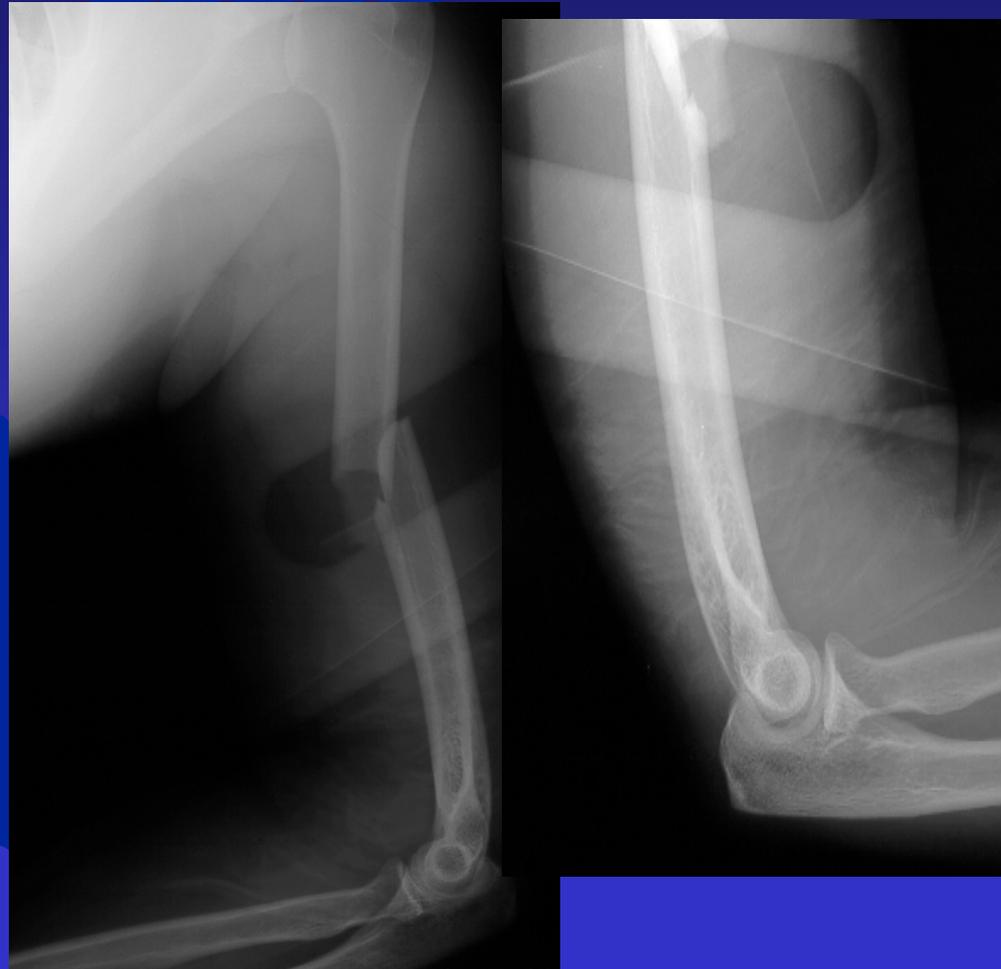
What about the people who don't get functional recovery??

Radial Nerve Injury

- Radial Nerve Tendon Transfers
 - 1) Wrist extension: PT to ECRB
 - 2) Index through small finger extension: FCR to EDC
 - 3) Thumb extension: PL to EPL

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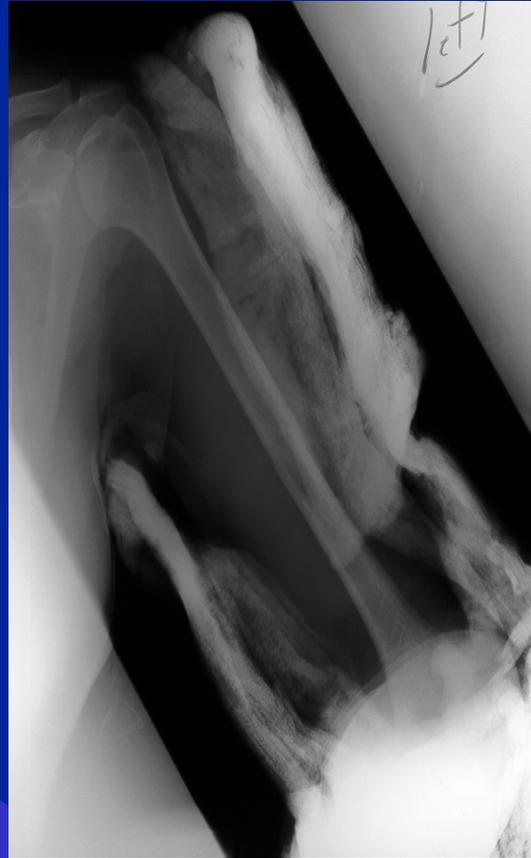
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Algorithm

- Treat ALL expectantly EXCEPT open fracture
- EMG at 3 weeks (consider ultrasound)
- Repeat EMG at 12 weeks if no recovery
- Ideal exploration time is 4 months
- Sural nerve graft if < 10 cm if not in continuity
- Radial nerve tendon transfers for >1 year, > 10 cm defect, or for failed grafting

Thank You!

