

Clavicle Fractures

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No Conflicts of Interest



I make money the old fashioned way, I earn it !

Clavicle Fractures: Background

- Most commonly fractured human bone
- 80% mid-shaft
- Historical treatment: non-operative
 - ✓ Neer (1960)
 - ✓ Rowe (1968) } 99.5% union rate
- “Just put it in a sling – it will heal”
- Recent data indicates this is not accurate
 - ✓ Displaced fractures: nonunion = 15% to 30%
 - ✓ Dysfunction even if healed

Deficits After Non-operative Treatment

McKee: JBJS, 2006

- 30 patients
- Mean age 37 years
- “Displaced” fracture that healed
- ROM: 170 degrees elevation
- Strength
 - ✓ Maximum 81%
 - ✓ Endurance 75%
- Constant score: 71 (100 = maximum)
- Shortening > 2cm predictive of poor result

Non-operative Treatment v. Plate Fixation

COTS: JBJS 2007

- Multicenter randomized prospective trial
- 132 patients
- Age 16 to 60 years
- Displaced mid-shaft clavicle fracture
- Sling v. plate fixation
- Minimum 1 year follow-up
 - ✓ 62 operative
 - ✓ 49 sling
- Comparable groups



Non-operative Treatment v. Plate Fixation

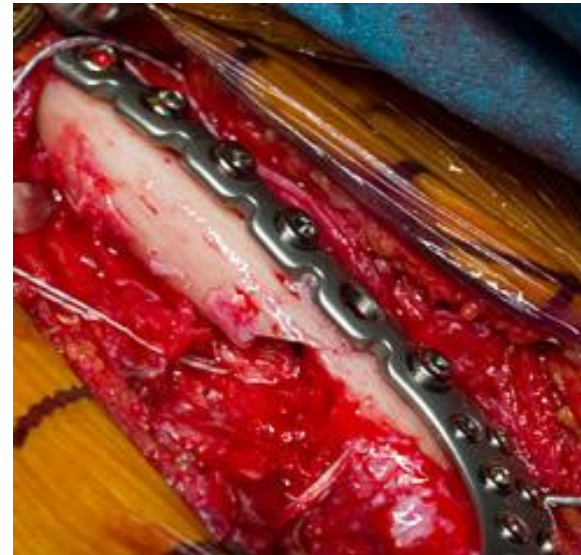
COTS: JBS 2007

	Plate	Sling
Time to healing (weeks)	16.4*	28.4
Nonunion	3%*	14%
Symptomatic malunion	0%*	18%
Constant score 1 year	95*	88
DASH score 1 year	5*	14
Satisfaction 1 year	Odds ratio= 3.5* in favor of plate fixation	
Surgical complications	<ul style="list-style-type: none">• 7% prominent hardware (superior plate)• 4% wound infection• 1% mechanical failure	

Non-operative Treatment v. Plate Fixation

Robinson: JBJS 2013

- Multicenter randomized prospective trial
- 200 patients
- Age 16 to 60 years
- Displaced mid-shaft clavicle fracture
- Sling v. plate fixation
- Minimum 1 year follow-up
 - ✓ 86 operative
 - ✓ 92 sling
- Comparable groups



Non-operative Treatment v. Plate Fixation

Robinson: JBJS 2013

	Plate	Sling
Nonunion	1%*	26%
Constant score 1 year	92*	87
DASH score 1 year	3	6
Comments	<ul style="list-style-type: none">• 1% mechanical failure with plating• 12% plate removal (superior plate)• Smoking increases risk of non-union• Non-operative healed = same functional outcome as plate fixation• 24 non-union → 13 surgery; 100% healed	

Non-operative Treatment v. Plate Fixation

Meta-Analysis: JBJS 2013

- 6 studies
- Displaced mid-shaft clavicle fracture
- 412 patients
 - ✓ 212 operative (3 plate / 3 intra-medullary)
 - ✓ 200 sling
- Mean age: 25 to 41 years



Non-operative Treatment v. Plate Fixation

Met-Analysis: JBJS 2013

	Operative	Sling
Nonunion	1.5%*	15%
Constant score 1 year	94	90
DASH score 1 year	5	11
Complications	29%	42%

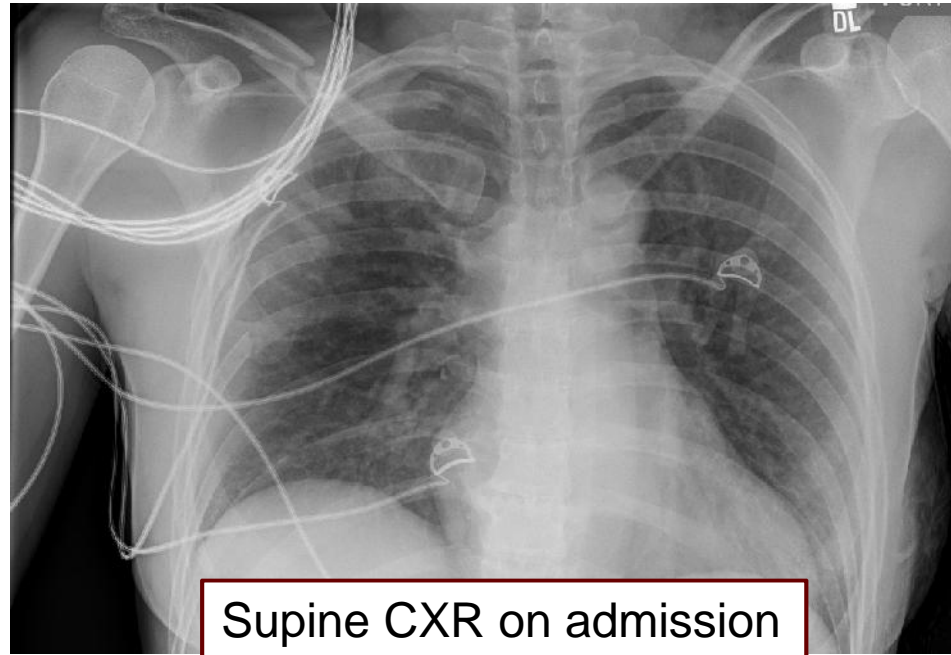
What Does the Data Tell Us?

How I Counsel Patients

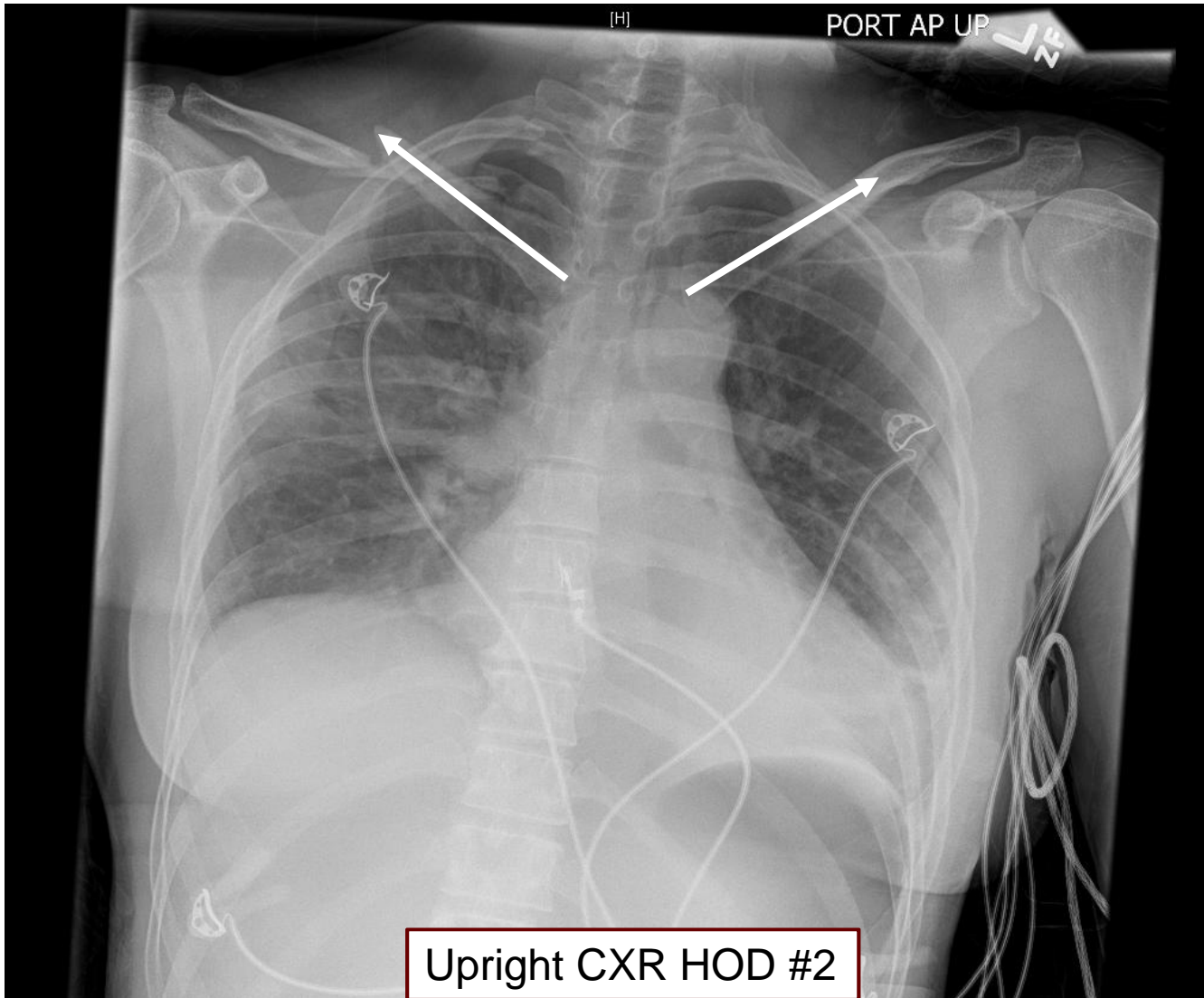
- Most clavicle fractures can be successfully treated without surgery
- “Displaced” mid-shaft fractures can be a problem
 - ✓ > 2 cm shortening
 - ✓ >100% inferior (bones not touching)
- If displaced → 15% to 25% will not heal
 - ✓ If it does not heal, the result is unfavorable
 - ✓ Pain and weakness
- If displaced but heals, there may be some weakness
 - ✓ 75% strength and endurance
 - ✓ Overall function outcome is good, but not perfect

Case 1

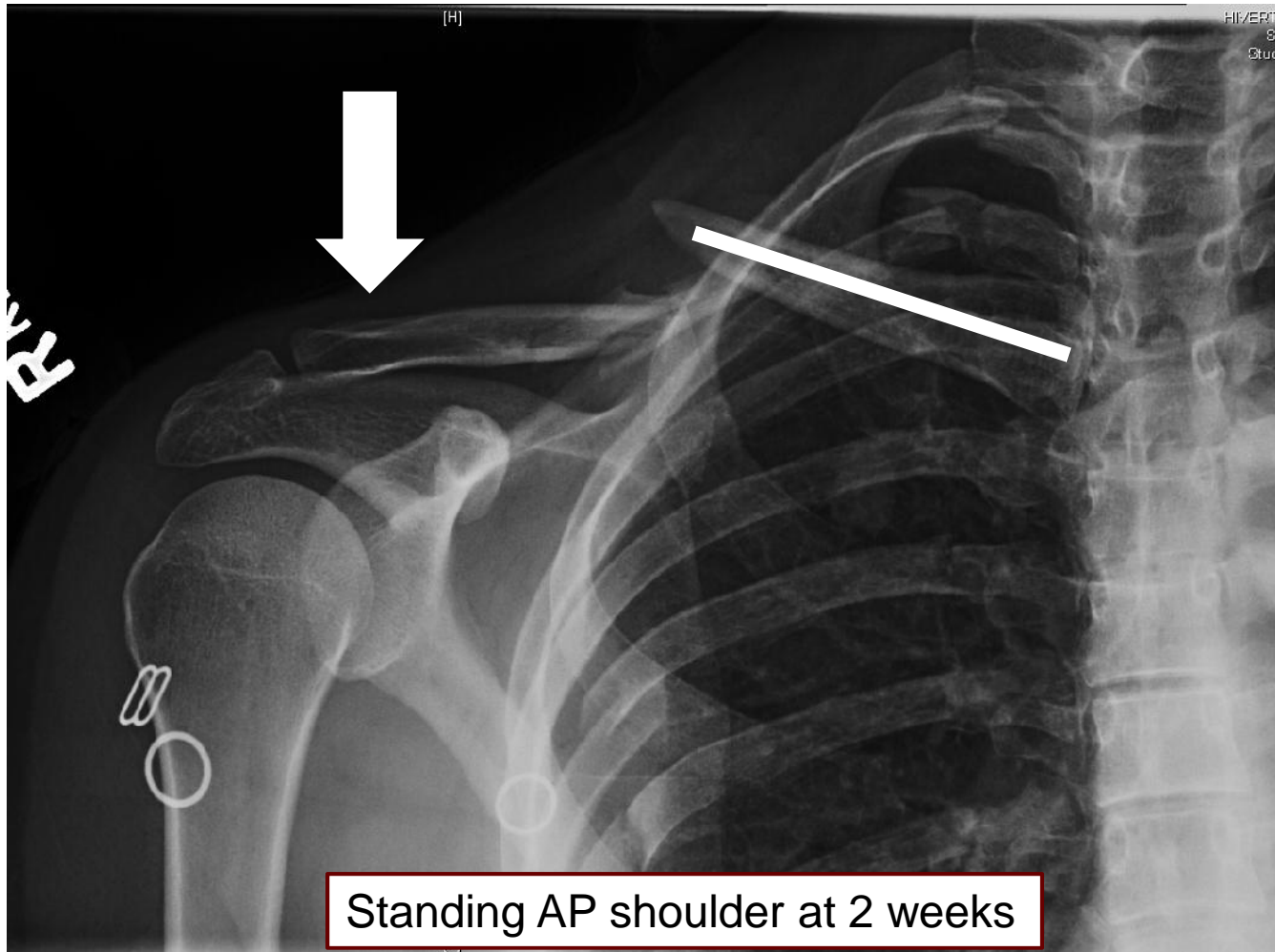
- 32 female physician
- Car v. bicycle
- Multiple injuries
 - ✓ Pulmonary contusion
 - ✓ Rib fractures
 - ✓ Spleen laceration
 - ✓ Liver laceration
 - ✓ Concussion



Case 1

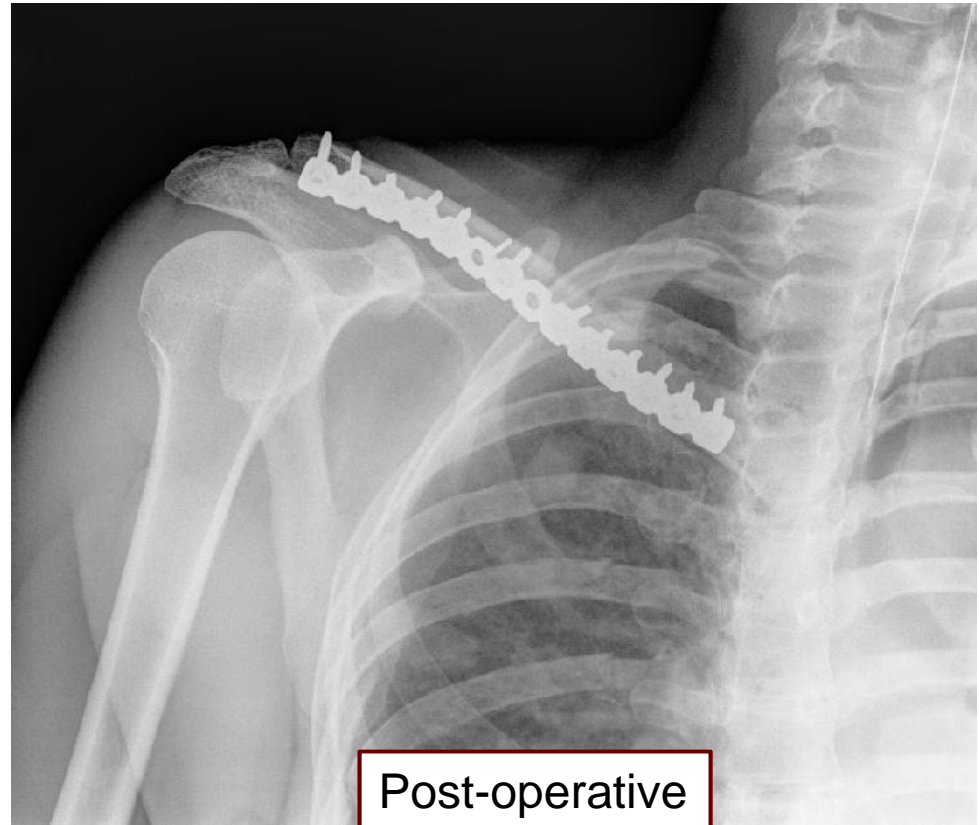


Case 1



Case1

- Supine position
- 2.7 mm locking plate
- Anterior

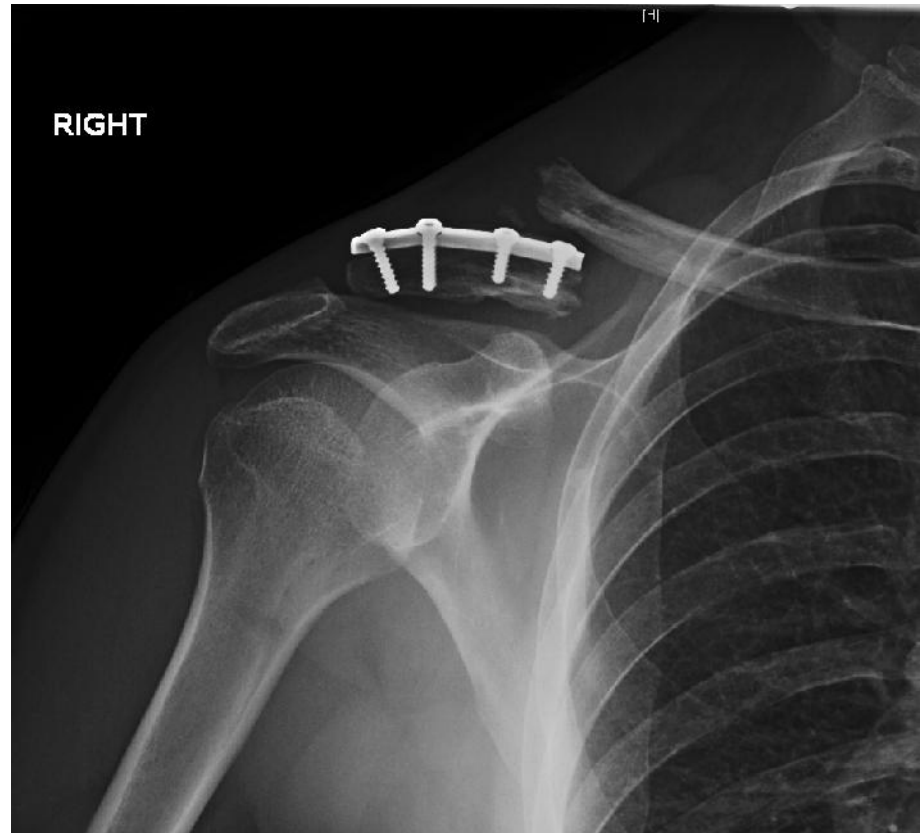


Case1

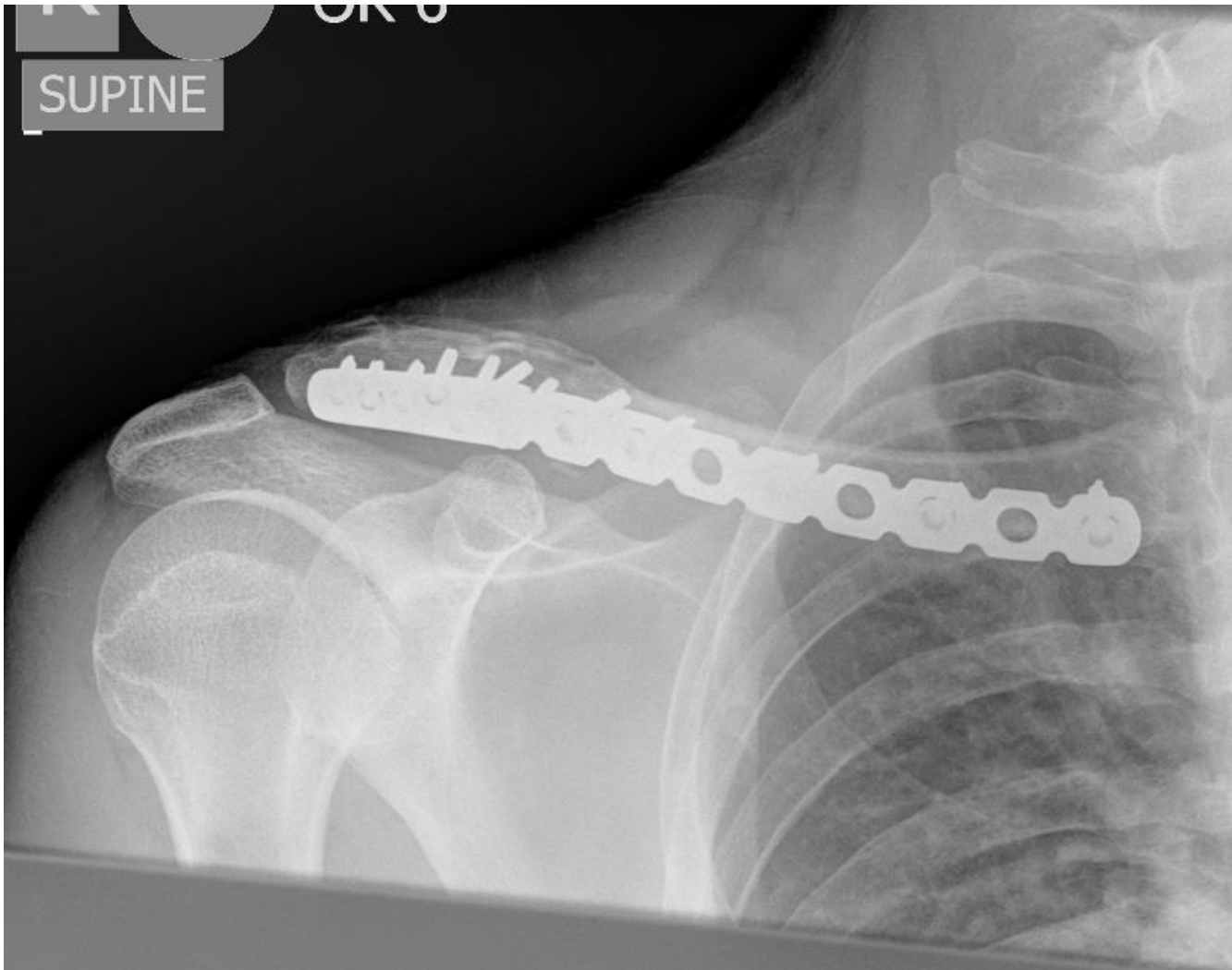


Case 2

- 29 male
- Motor cross
- Surgery 10 years prior



Case 2

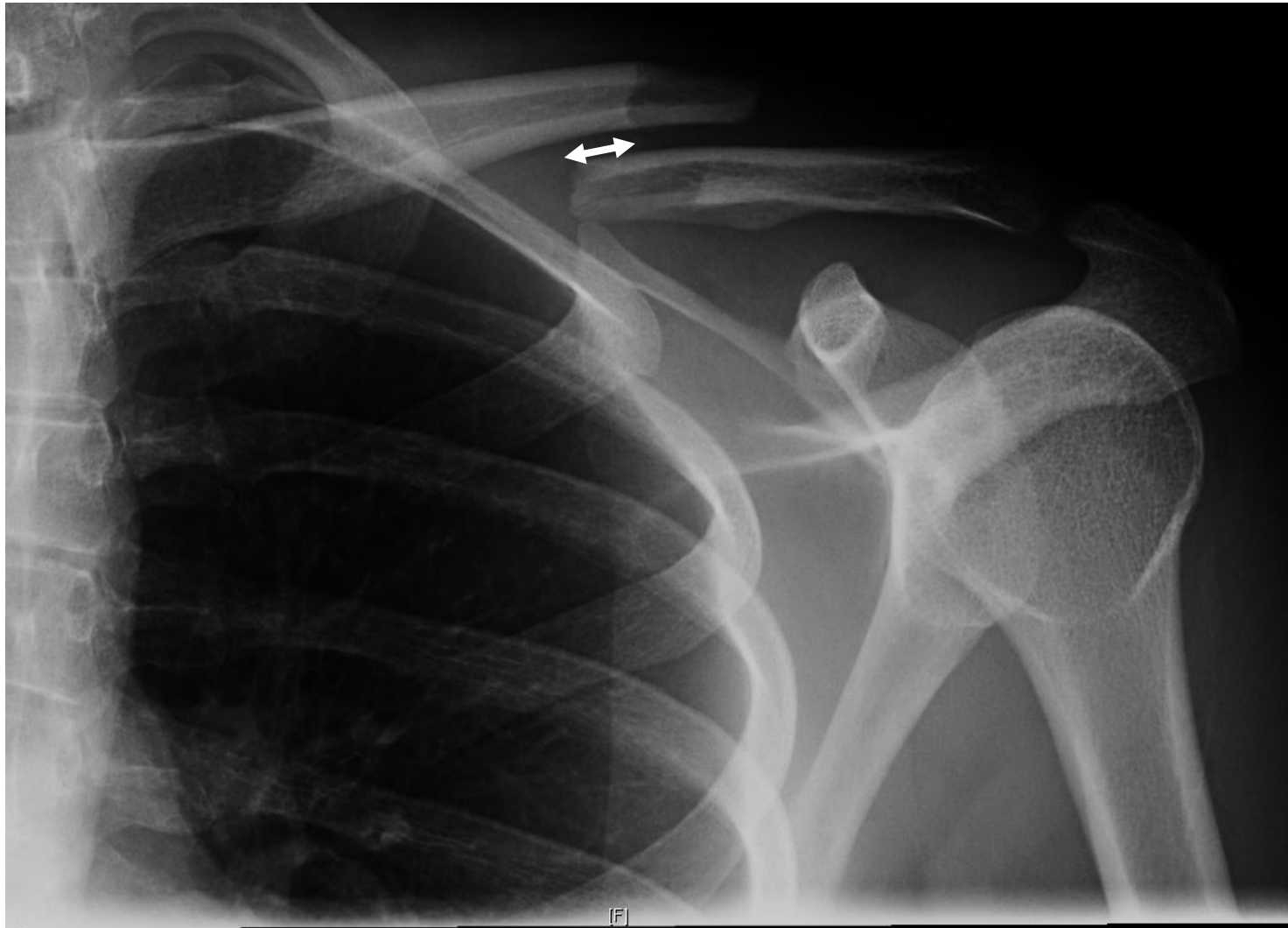


Case 3

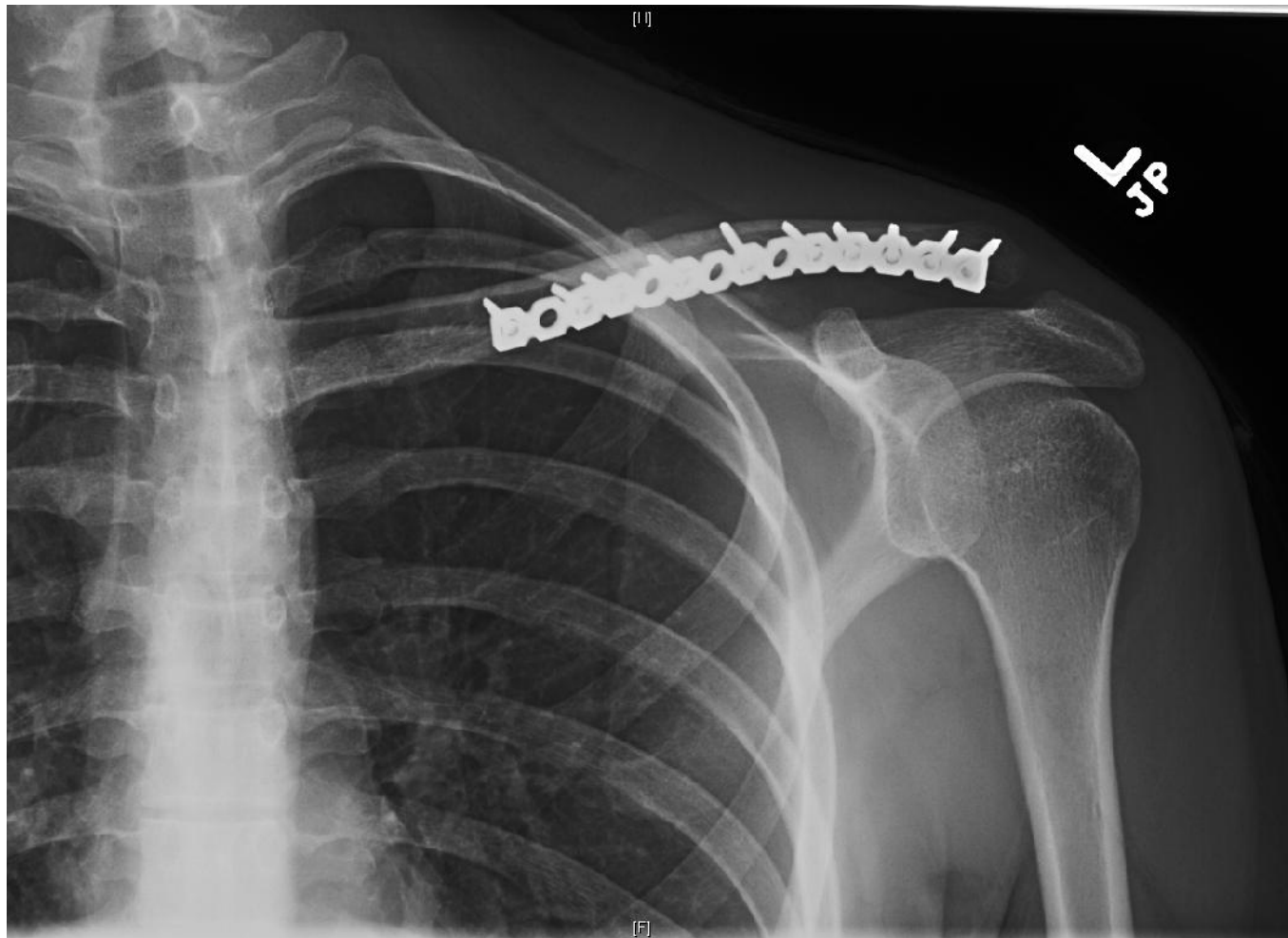
- 19 BU hockey player
- Mid-season injury



Case 3



Case 3



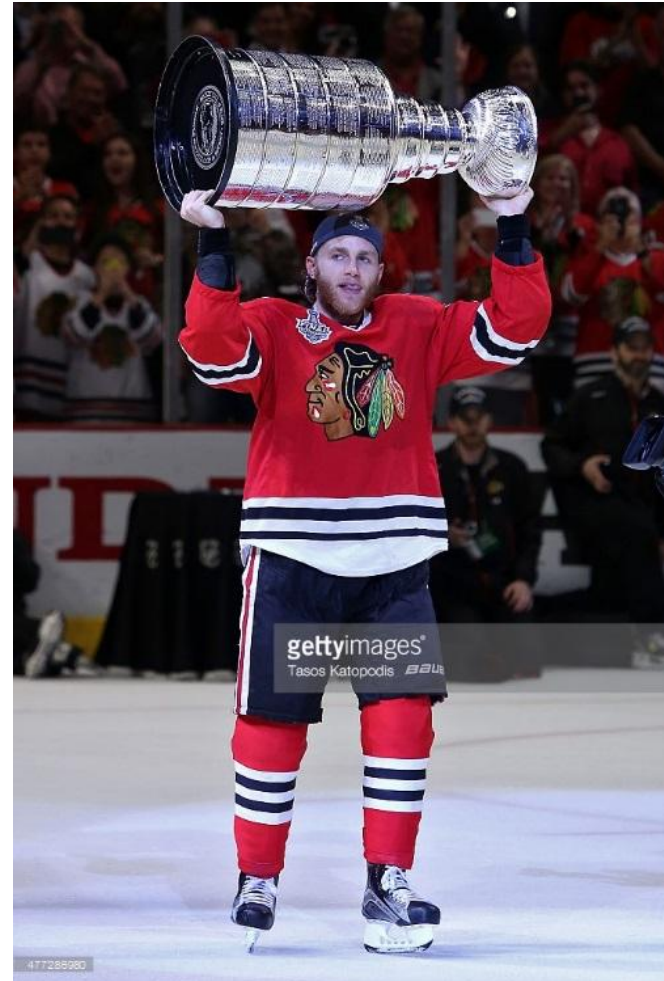
February 25, 2015

**Patrick Kane out of Blackhawks' lineup 12 weeks
Undergoes successful surgery to repair fractured clavicle**



June 15, 2015

Blackhawks shut out Lightning to win Stanley Cup



Summary

- Most clavicle fractures can be successfully treated without surgery
- Displaced mid-shaft fractures
 - ✓ ~ 80% heal and do reasonably well
 - ✓ Operative treatment is an alternative for selected patients
 - ✓ Plate fixation provides predictably good outcomes
 - ✓ Anterior plates are less prominent
- Shared decision making = patient centered care