Acromioclavicular Joint Injuries: When and How to Stabilize

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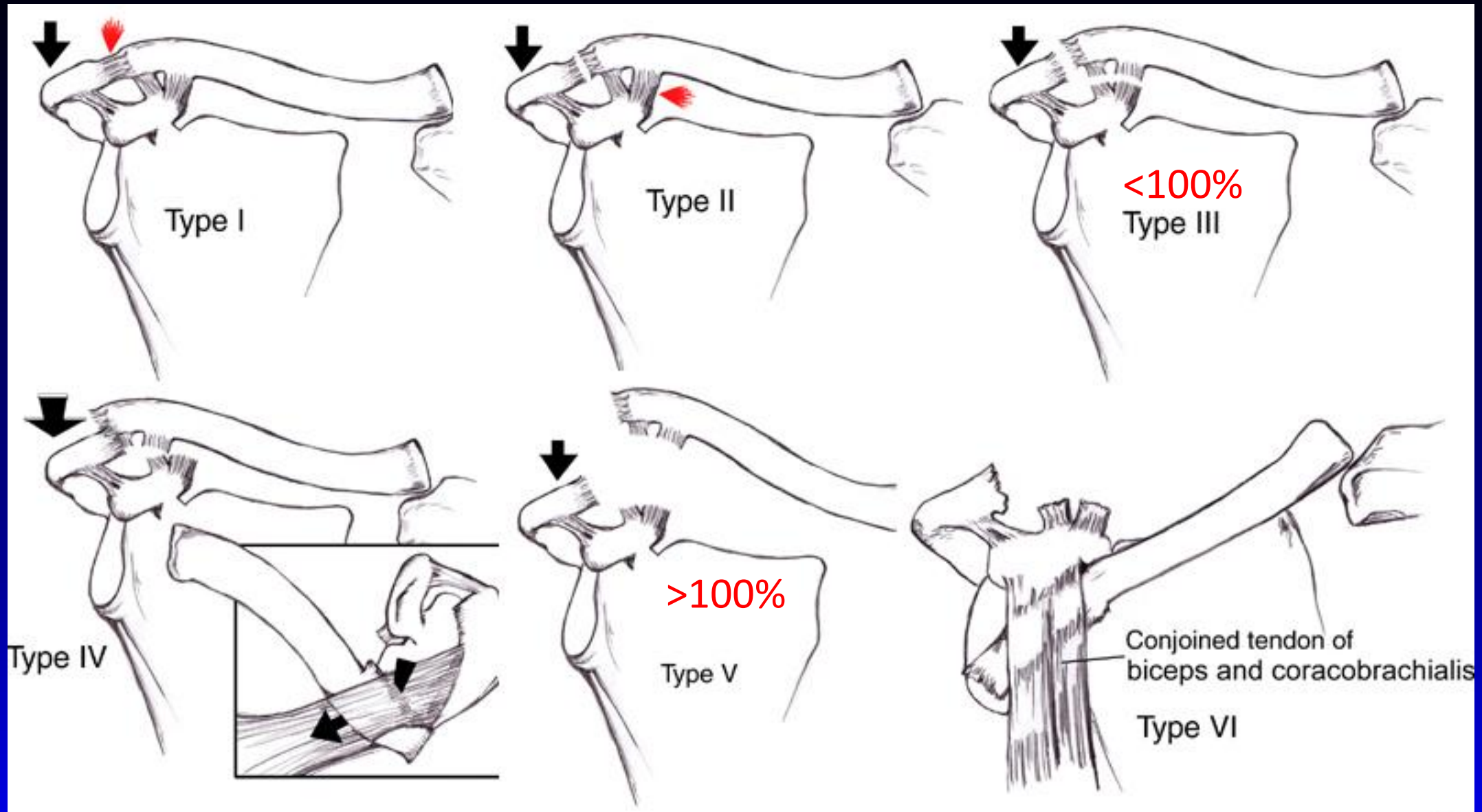
Type I
Type II
<100%
Type III
Type IV
>100%
Type V
Conjoined tendon of
biceps and coracobrachialis
Type VI

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AMERICAN ACADEMY OF ORTHOPAEDIC SURGEONS

Acromioclavicular Joint Injuries: Diagnosis and Management

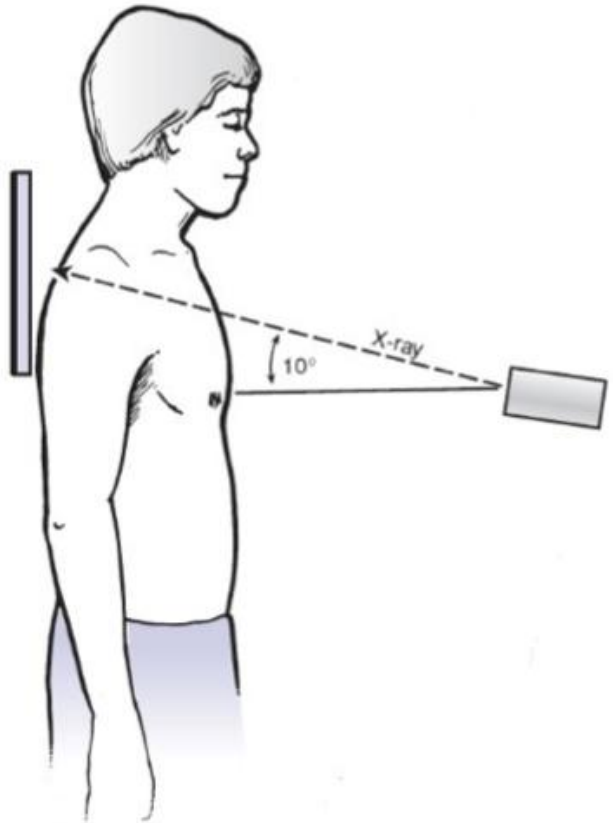
Simovitch, Ryan MD; Sanders, Brett MD; Ozbaydar, Mehmet MD; Lavery, Kyle BS; Warner, Jon J. P. MD

Type	AC Ligaments	CC Ligaments	Deltopectoral Fascia	Radiographic CC Distance Increase	Radiographic AC Appearance	AC Joint Reducible
I	Sprained	Intact	Intact	Normal (1.1 to 1.3 cm)	Normal	N/A
II	Disrupted	Sprained	Intact	<25%	Widened	Yes
III	Disrupted	Disrupted	Disrupted	25%-100%	Widened	Yes
IV	Disrupted	Disrupted	Disrupted	Increased	Posterior clavicle displacement	No
V	Disrupted	Disrupted	Disrupted	100%-300%	N/A	No
VI	Disrupted	Intact	Disrupted	Decreased	N/A	No

* The type of AC injury can be discerned based on the pattern of ligament injury, AC joint position on radiographs, and whether the AC joint can be reduced on physical examination.

AC = acromioclavicular, CC = coracoclavicular, N/A = not applicable

- **AP**
- **Zanca view**
  - **AP centered on the AC joint with 10-15 degrees of cephalic tilt**



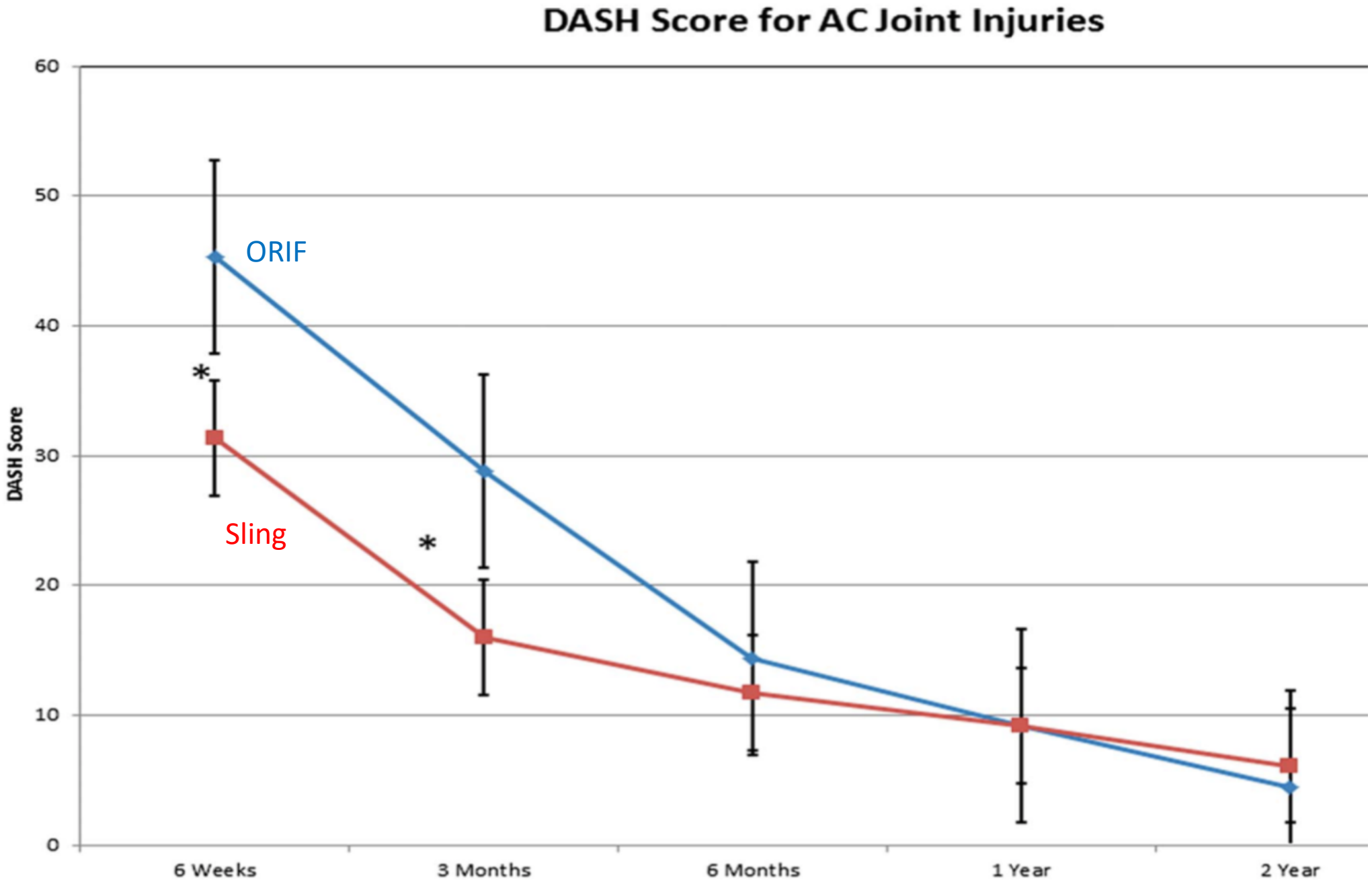
Images from: Corey Edgar. (2019) 'Acromioclavicular and Sternoclavicular Joint Injuries', In: Tornetta P, Ricci W, Ostrum R, McQueen M, McKee M, Court-Brown C, (eds). *Rockwood and Green's Fractures in Adults, 9th ed*. Philadelphia: Wolters Kluwer

When to fix?

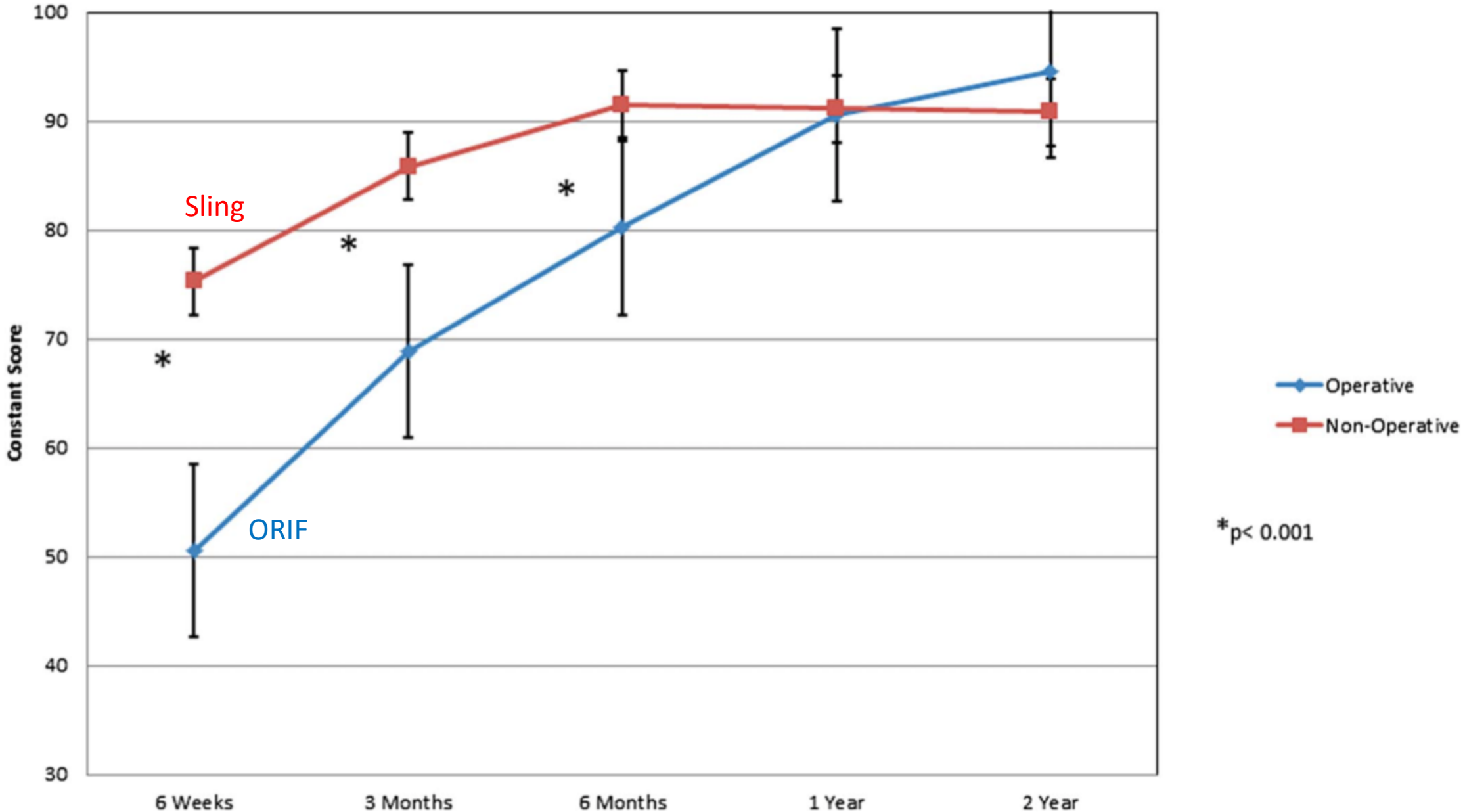
Multicenter Randomized Clinical Trial of Nonoperative Versus Operative Treatment of Acute Acromio-Clavicular Joint Dislocation

The Canadian Orthopaedic Trauma Society

- Inclusion criteria:
  - Acute (< 3 weeks) AC dislocations (III, IV, V)
  - Age 16 to 60, medically well
- Randomized to sling vs hook plate
- Comprehensive 2 year follow-up


DASH Score for AC Joint Injuries
DASH Score
60
50
40
30
20
10
0
ORIF
Sling
*
*
6 Weeks
3 Months
6 Months
1 Year
2 Year

Constant Score for AC Joint Injuries



Joint Reduction Better with ORIF

- Hook Plate (n=40): 4 dislocated, 14 subluxated, 22 reduced
- Non-operative (n=43) : 43 subluxated or dislocated
- P=0.001

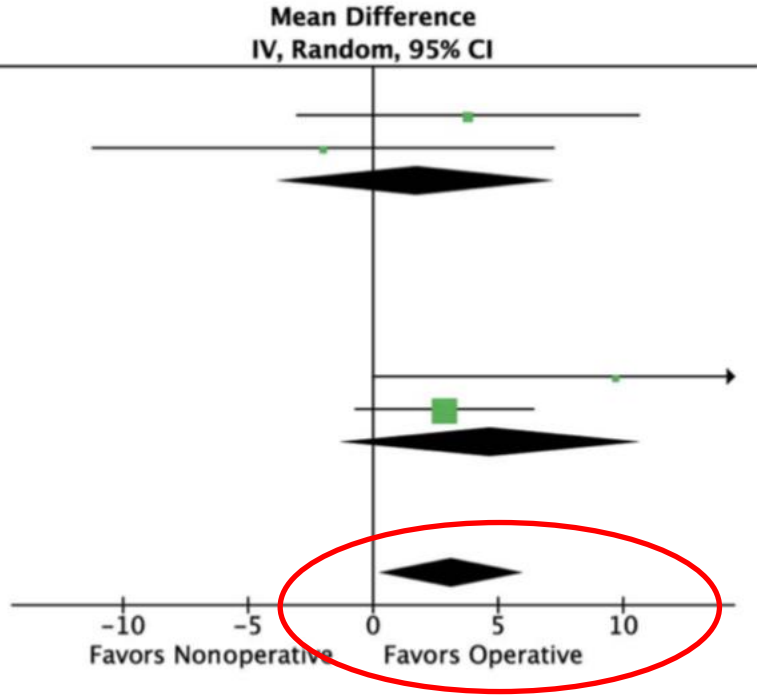
Operative Versus Nonoperative Management of Acute High-Grade Acromioclavicular Dislocations: A Systematic Review and Meta-Analysis

Nicholas Chang, MBBS, Andrew Furey, MD, MSc, FRCSC, and Anton Kurdin, MD

- 19 studies (n = 954)
- ORIF:
  - Better cosmetic outcome (OR = 0.05; P < 0.00001)
  - Better radiographic reduction (OR = 25; P < 0.0001)
  - Constant scores favored the operative group, but not reach MCID (MD = 3.1; P = 0.03)
- Nonoperative:
  - Faster return to work (MD = 4.2, P < 0.0001)
  - Lower implant complications (OR = 7.2, P < 0.0001)
  - Reduced infection rate (OR = 3.7, P = 0.007)
- No difference for DASH, return to sport, radiologic evidence of OA, and need for surgery after failed management.

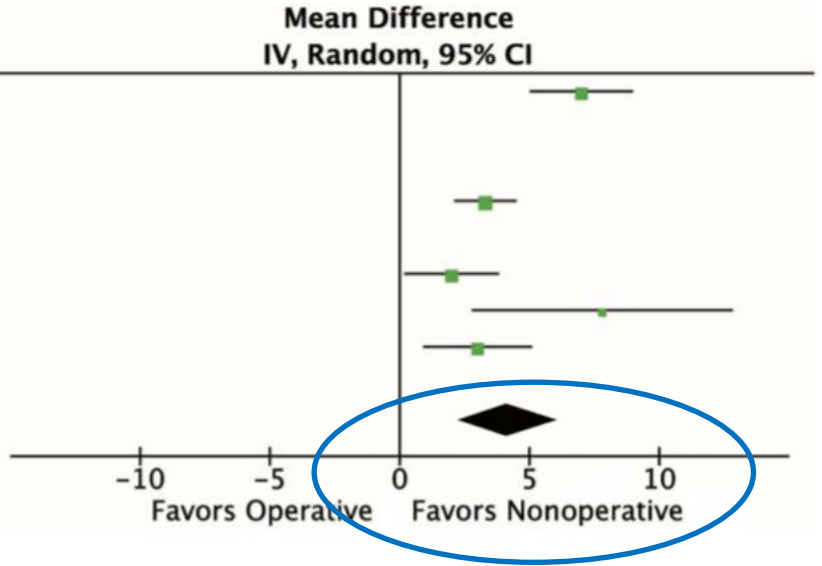
Constant Scores

Study or Subgroup	Operative Mean	SD	Total	Nonoperative Mean	SD	Total	Weight	Mean Difference IV, Random, 95% CI
1.1.1 Randomized Control Trials								
COTS 2015	94.63	5.59	25	90.84	15.92	23	17.5%	3.79 [-3.08, 10.66]
Joukainen 2014	83	16	16	85	7.5	9	9.7%	-2.00 [-11.25, 7.25]
Subtotal (95% CI)			**41**			**32**	**27.2%**	**1.73 [-3.78, 7.24]**
Heterogeneity: $Tau^2 = 0.00$; $Chi^2 = 0.97$, df = 1 (P = 0.32); $I^2 = 0\%$								
Test for overall effect: Z = 0.62 (P = 0.54)								
1.1.2 Cohort Studies								
Fremerey 2005	0	0	42	0	0	38		Not estimable
Gstettner 2008	90.4	12.9	24	80.7	17.4	17	8.7%	9.70 [-0.05, 19.45]
Natera (Combined 2015+2016)	93.9019	4.9181	31	91.05	7.35	21	64.1%	2.85 [-0.74, 6.44]
Subtotal (95% CI)			**55**			**38**	**72.8%**	**4.71 [-1.26, 10.69]**
Heterogeneity: $Tau^2 = 9.40$; $Chi^2 = 1.67$, df = 1 (P = 0.20); $I^2 = 40\%$								
Test for overall effect: Z = 1.55 (P = 0.12)								
Total (95% CI)			**96**			**70**	**100.0%**	**3.14 [0.27, 6.02]**
Heterogeneity: $Tau^2 = 0.00$; $Chi^2 = 2.99$, df = 3 (P = 0.39); $I^2 = 0\%$								
Test for overall effect: Z = 2.14 (P = 0.03)								
Test for subgroup differences: $Chi^2 = 0.52$, df = 1 (P = 0.47), $I^2 = 0\%$								



Return to work

Study or Subgroup	Operative Mean	SD	Total	Nonoperative Mean	SD	Total	Weight	Mean Difference IV, Random, 95% CI
Bakalim 1974	12	3	19	5	3.5	22	21.6%	7.00 [5.01, 8.99]
Bannister 1989	11	0	0	4	0	0		Not estimable
COTS 2015	0	0	28	0	0	27		Not estimable
Fremerey 2005	7	2.7	34	3.7	2.3	33	25.5%	3.30 [2.10, 4.50]
Galpin 1985	6.8	0	14	2.6	0	19		Not estimable
Larsen 1986	8	5	39	6	3	40	22.5%	2.00 [0.18, 3.82]
Press 1997	11.3	8.675	16	3.5	4.325	10	9.4%	7.80 [2.77, 12.83]
Rosenorn 1974	9	2.25	11	6	2.75	11	21.0%	3.00 [0.90, 5.10]
Total (95% CI)			**133**			**135**	**100.0%**	**4.17 [2.28, 6.06]**
Heterogeneity: $Tau^2 = 3.27$; $Chi^2 = 17.31$, df = 4 (P = 0.002); $I^2 = 77\%$								
Test for overall effect: Z = 4.32 (P < 0.0001)								



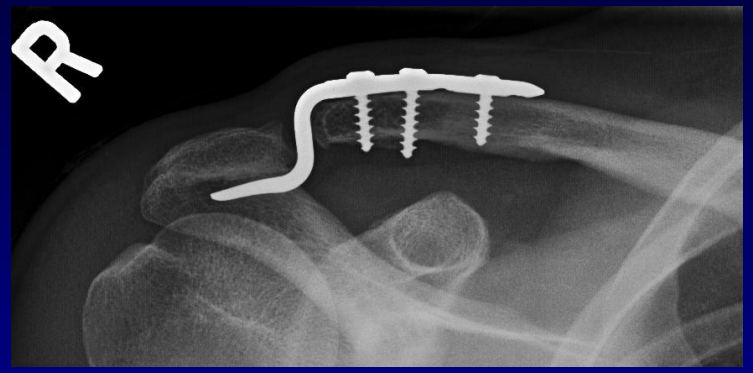
So when is surgery indicated?

Surgical indications	Contraindications to surgery
• Young, healthy, active individual • Grade V (>100% displaced) • Open or impeding open • Poly-trauma	• Elderly patient • Osteoporosis or poor bone quality • Sedentary lifestyle • Poor surgical candidate • Poor compliance (substance abuse, ETOH)

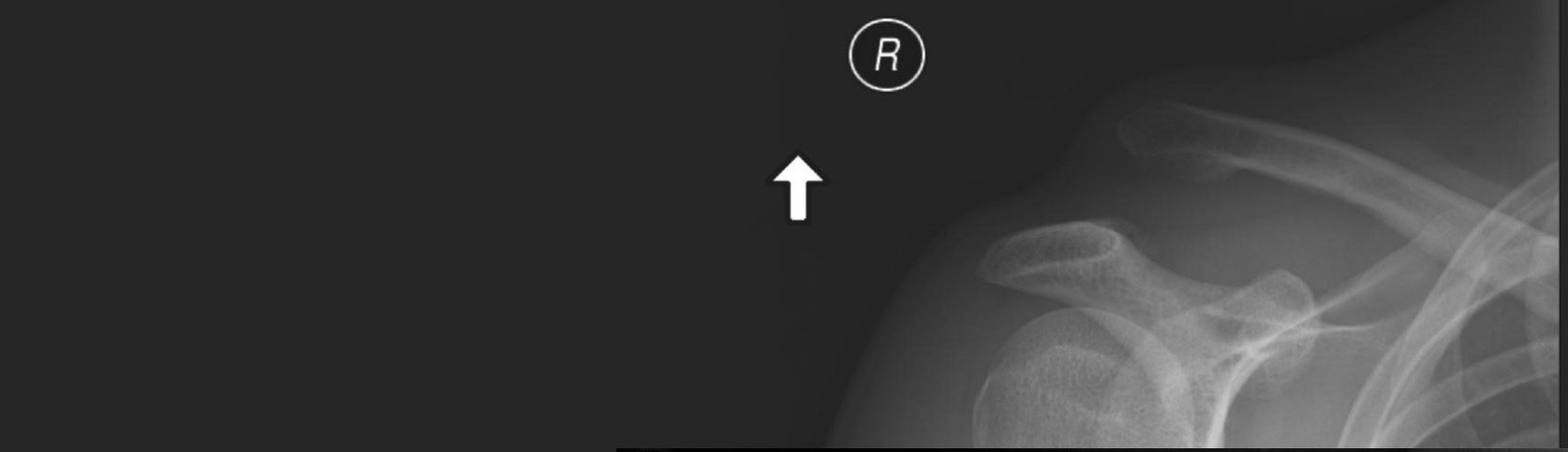

L

How to fix?

- Hook plate



- Endobutton fixation (eg Tightrope)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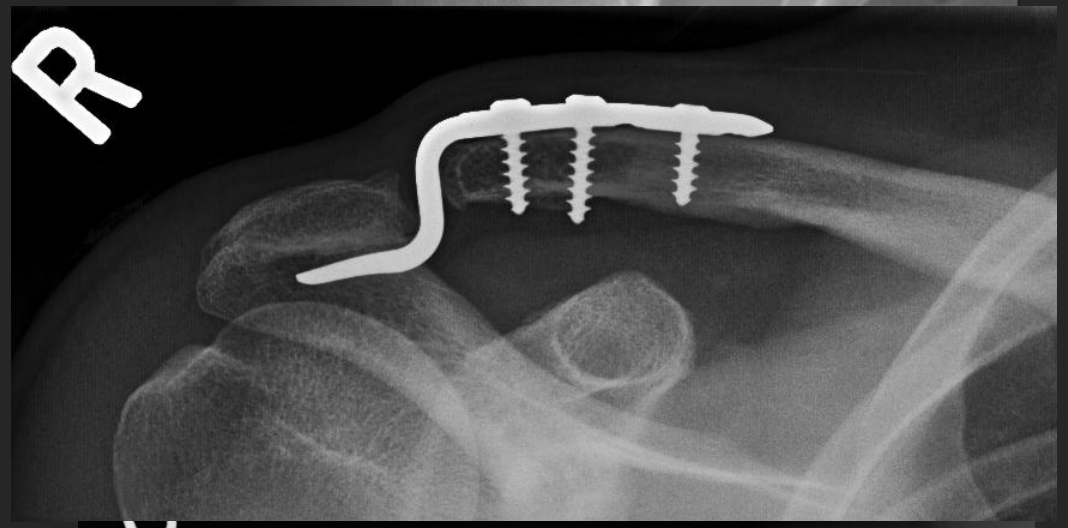
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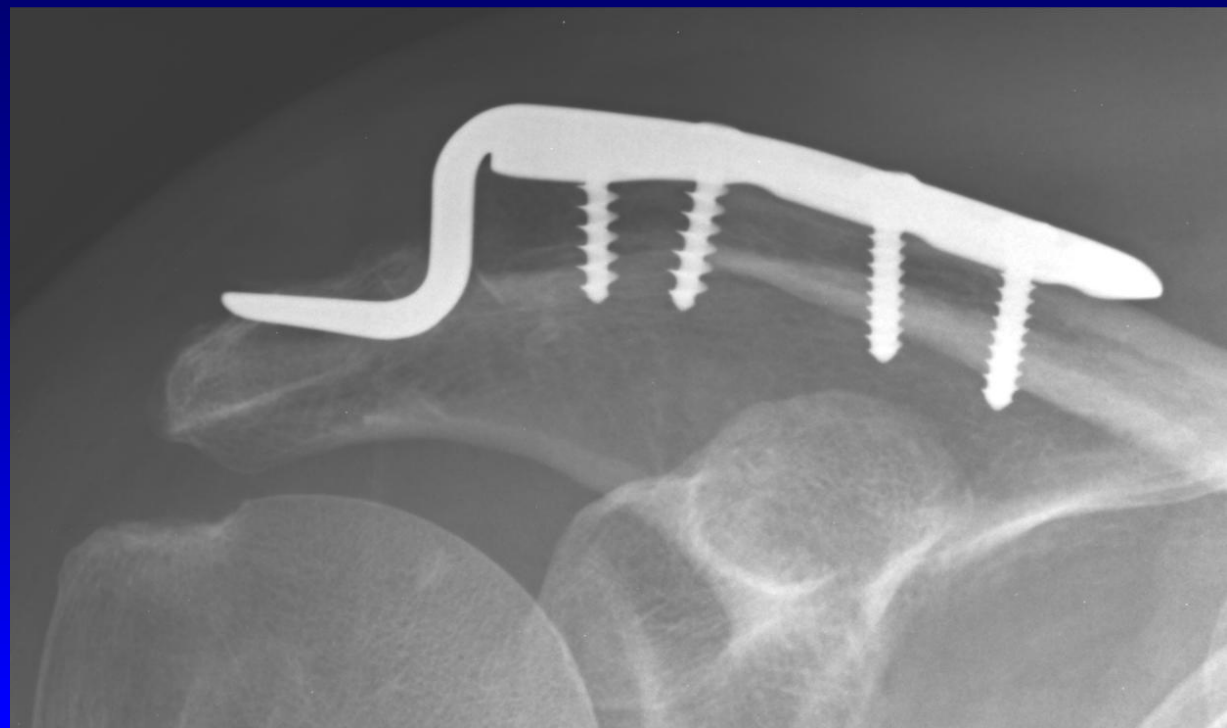
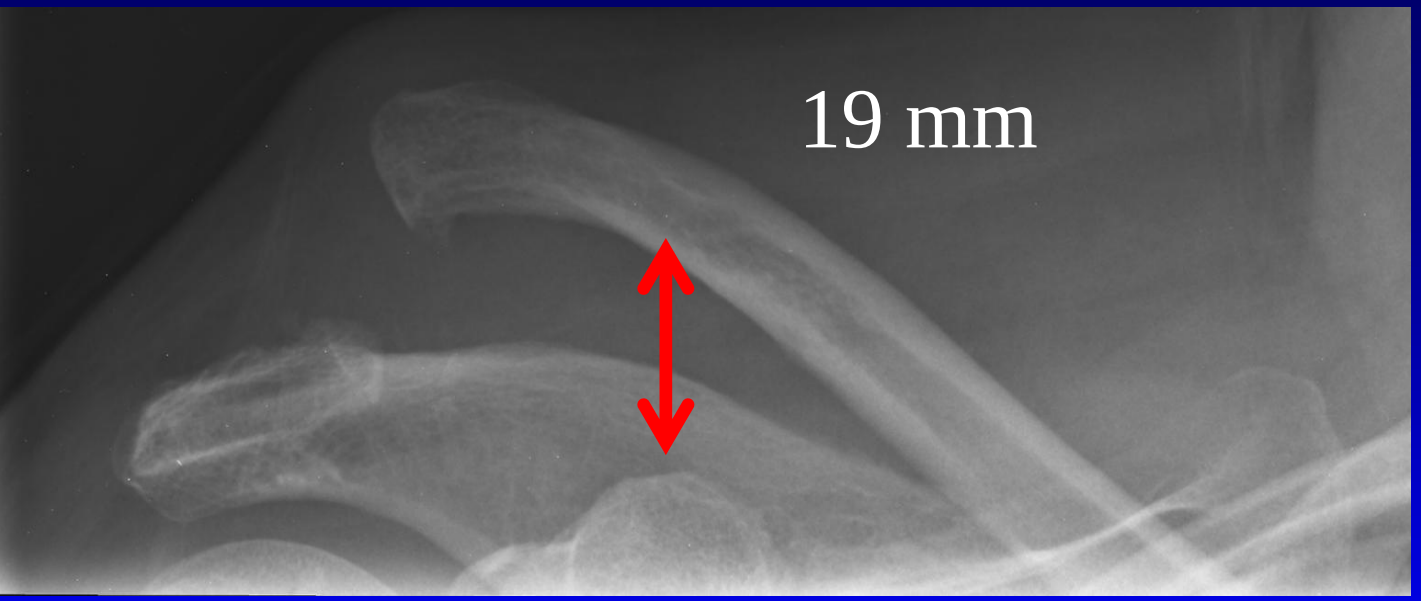
Complications

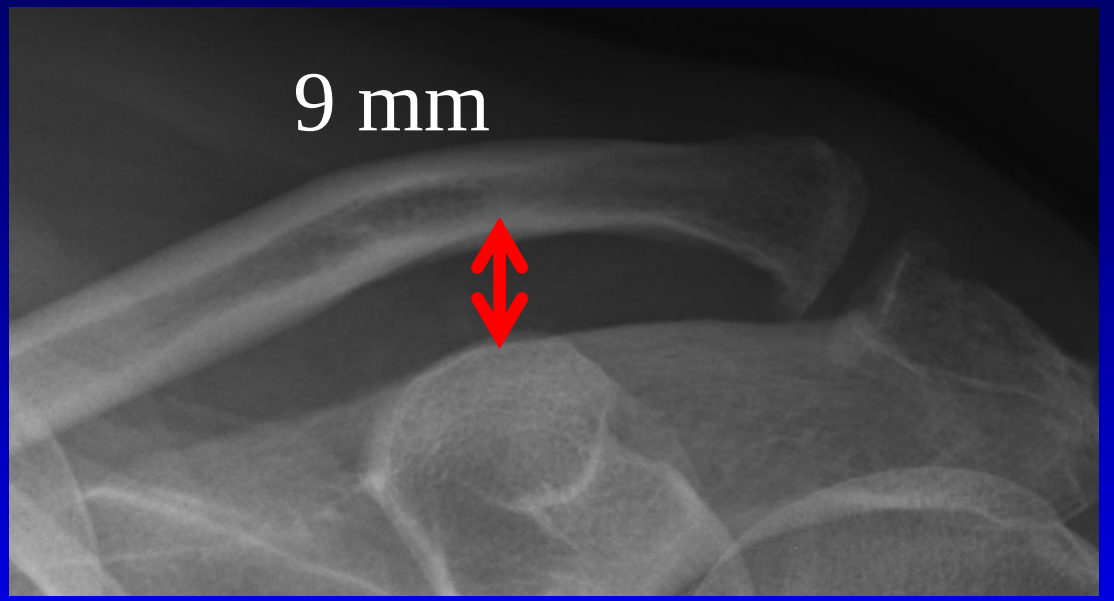
- Over reduction
- Acromial erosions
- Hardware removal in most



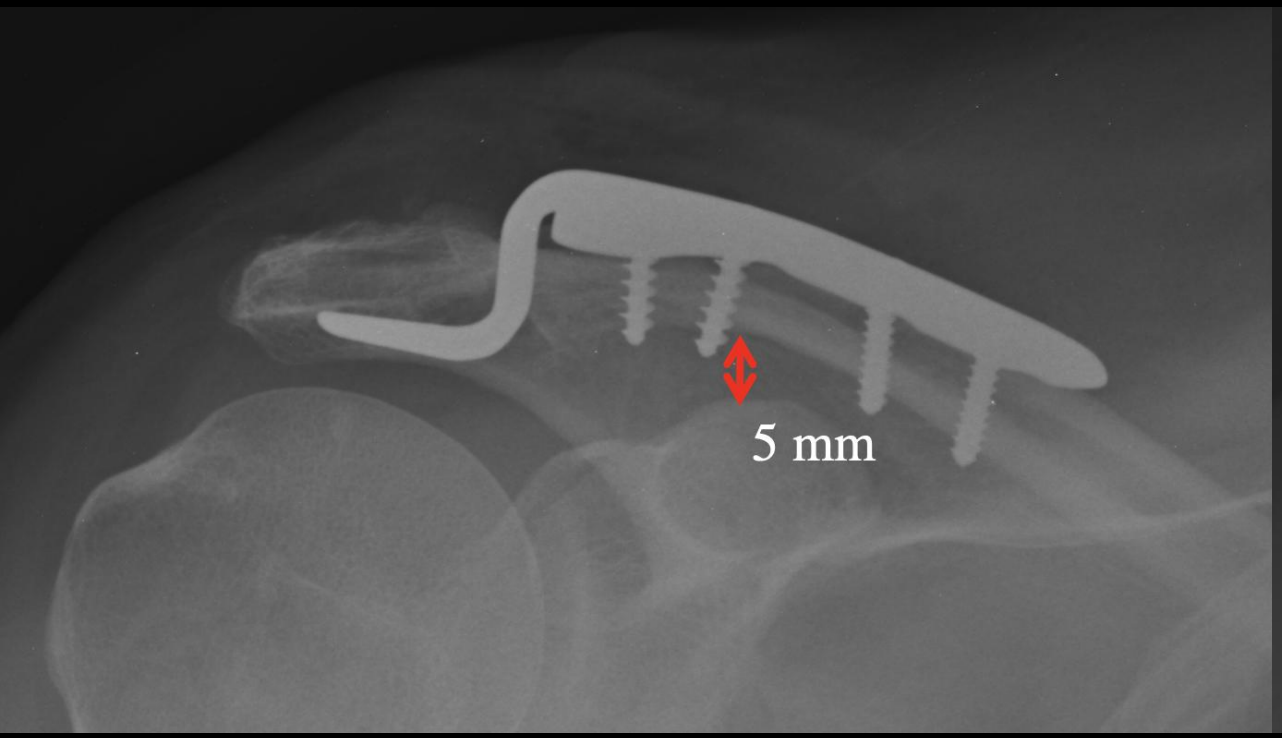
Assess coraco-clavicular distance

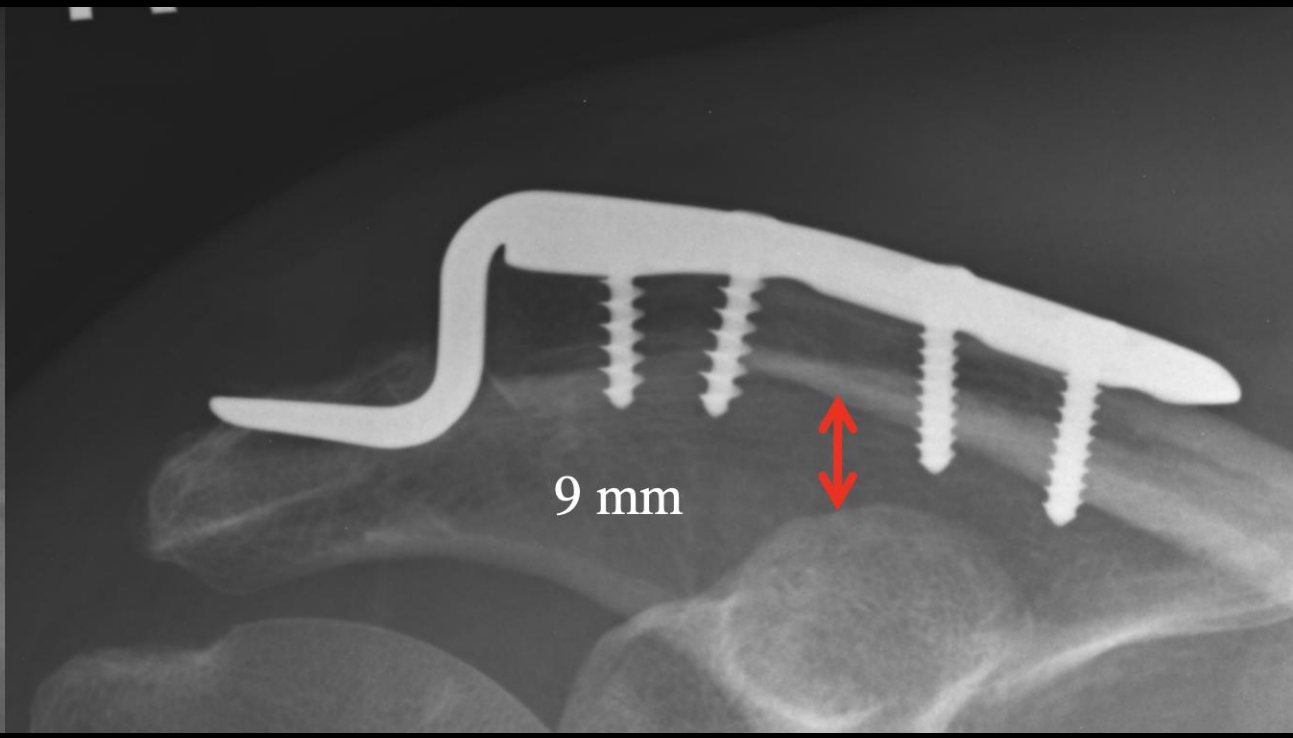


Injured AC joint



Normal AC joint


5 mm


9 mm

5 Hole Plate

6 Hole Plate

7 Hole Plate

9 Hole Plate

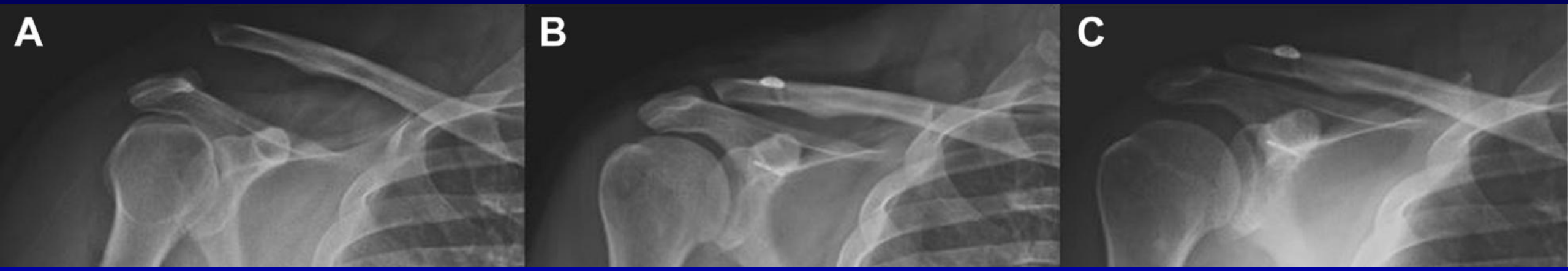
(Left Plates Shown)

VariAx 2 Hook Plate

Radiographic displacement of acute acromioclavicular joint dislocations fixed with AC TightRope

Anell Olivos-Meza, PhD, Arturo Almazán-Diaz, MD, José Alberto Calvo, MD, César Alejandro Jiménez-Aroche, MD, Marco Vinicio Valdez-Chávez, MD, Francisco Pérez-Jiménez, MD, Clemente Ibarra, PhD, Francisco Cruz-López, MD *

Orthopedic Sports Medicine, Instituto Nacional de Rehabilitación Luis Guillermo Ibarra Ibarra, Mexico City, Mexico



- 27% postoperative displacement:
  - 19% partial loss of reduction
  - 8% failure

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REVIEW

Complications following arthroscopic fixation of acromioclavicular separations: a systematic review of the literature

- Complications
  - Hardware irritation 35%
  - Coracoid/clavicle fracture 5%
  - Loss of AC joint reduction 27%
  - Hardware migration into the clavicle/coracoid up to 89%

Summary

- Patient selection is key

- AC joint repair
  - Surgery can improves reduction
  - No difference in functional outcomes
  - Indications still unclear

Thanks!

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