Clavicle Fractures

Bump versus a Scar?

Matthew F. Dilisio, MD, FAAOS
Shoulder Surgery

Ortho Nebraska

SYMPOSIUM

Disclosures

Matthew F Dilisio, MD

- Arthroscopy Journal: Editorial or governing board
- Orthopedics Journal: Editorial or governing board
- Mid-America Orthopaedic Association, Program Committee/Chairman: Board or committee member
- Research and Education Funding: Creighton University 2015 Haddix Grant, 2016-2017 MAOA Traveling Fellow, 2017 Nebraska LB 692 State Grant, 2018 Nebraska Stem Cell State Grants
- Arthrex: Educational Speaker's Bureau

I (and/or my co-authors) have something to disclose.

AAOS Orthopaedic Disclosure Program on the AAOS website at http://www.aaos.org/disclosure

AAOS
American Academy of Orthopaedic Surgeons

Ortho Nebraska

Learning Objectives

- Review Basic Clavicle Anatomy, Exam, and Imaging
- Review Sternoclavicular Joint and Acromioclavicular Joint Injuries and Treatment Options
- Review Clavicle Fracture Types and Classifications
- Review Diagnosis and Treatment Options

Overview

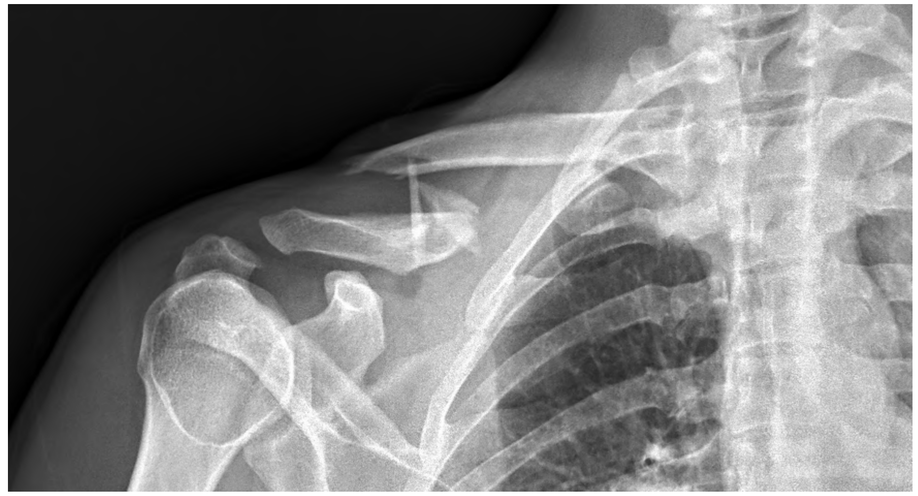
- Anatomy
- Clinical Evaluation
  - History
  - Exam
  - Imaging
- Clavicle Fractures
  - Medial
  - Lateral
  - Midshaft
- SC and AC Joint Instability
  - Classification
  - Treatment

Case

“I crashed my bike…”

- 33yo M s/p bike accident 2 days ago
  Enjoys biking and exercise
  Works in an office
  No preexisting shoulder issue

  - PMH/PSH/Meds/All: NC
  - TTP @ midshaft of the clavicle, NVID



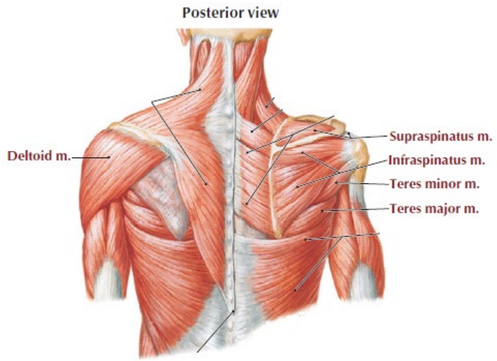
Plan?

Ortho Nebraska

Anatomy

Clavicle Function and Osseous Anatomy

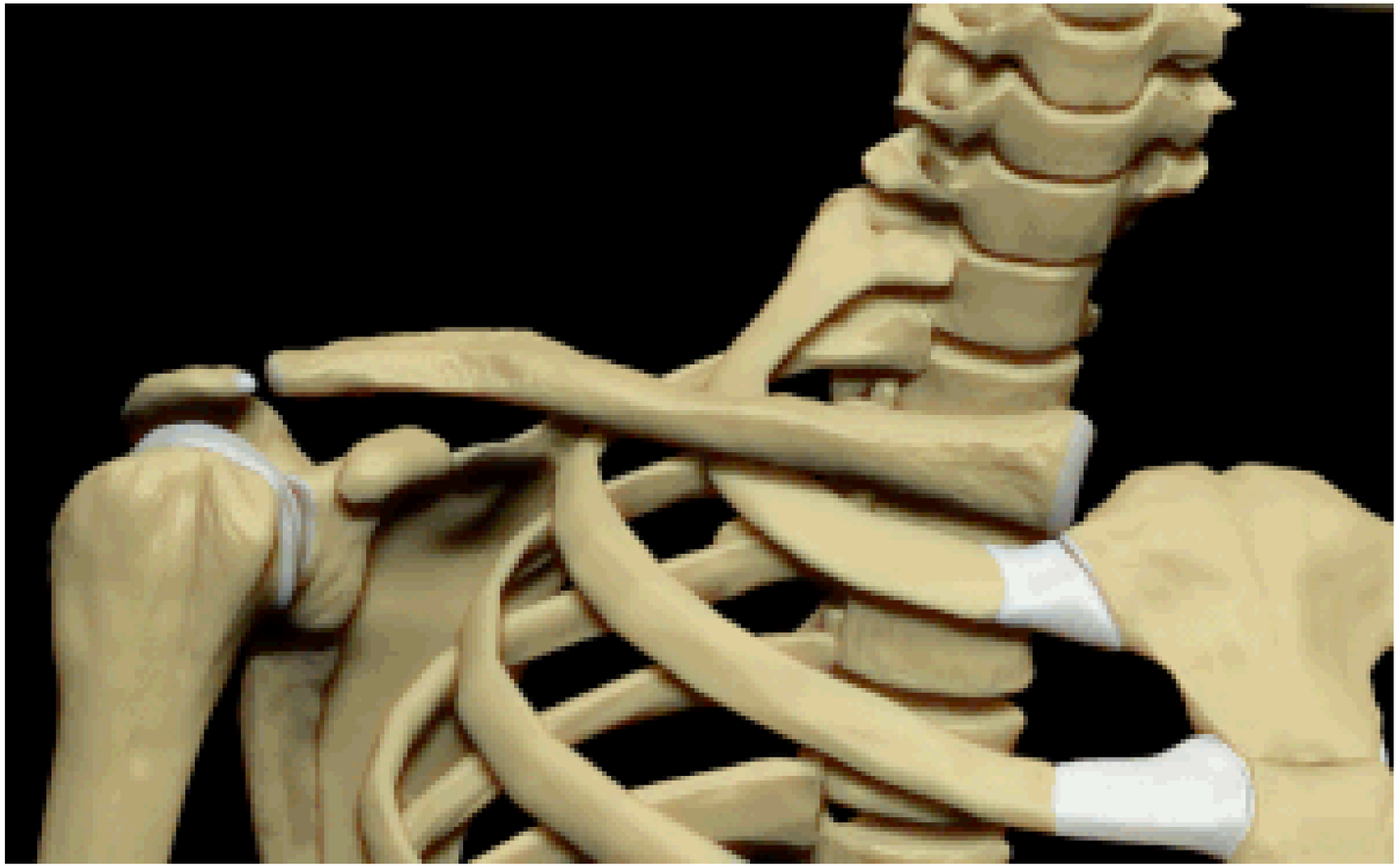
- Scapula Strut
  - 17 scapular muscular attachments
  - 1/3 of Shoulder Motion due to Scapular Motion



- Articulation

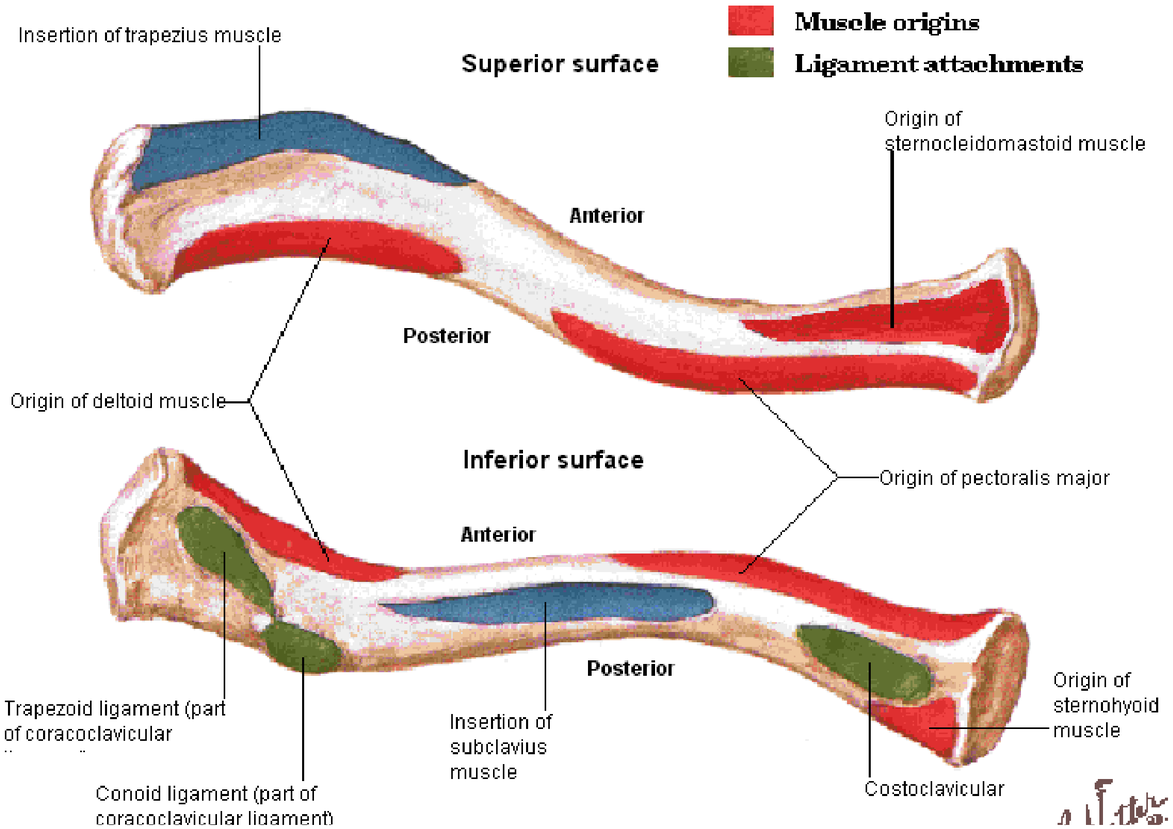
  Sternoclavicular Joint

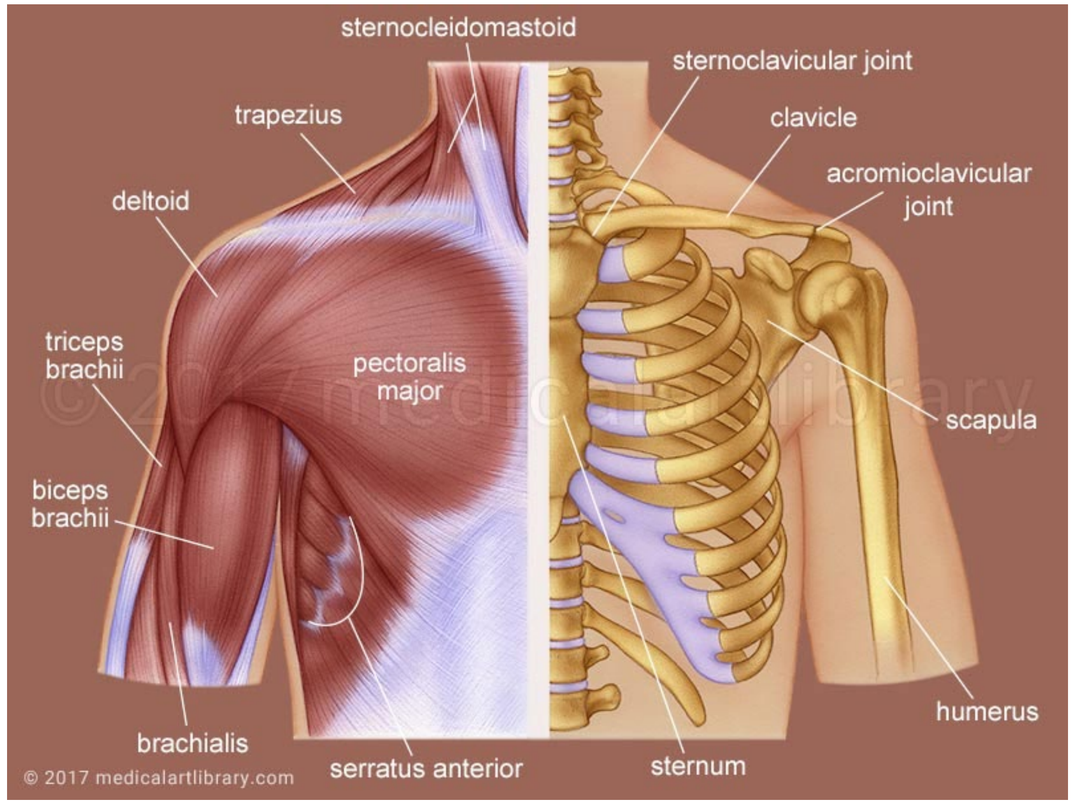
  Acromioclavicular Joint



Ortho Nebraska

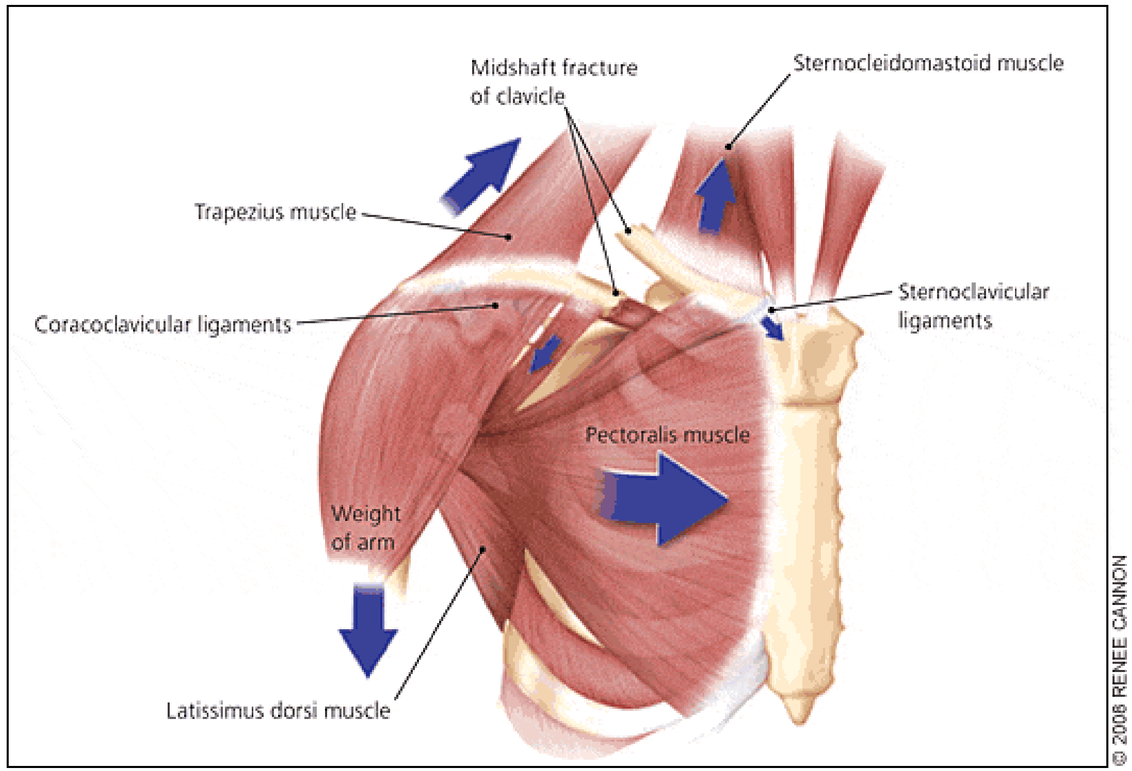
Clavicle Muscular Anatomy





Ortho Nebraska

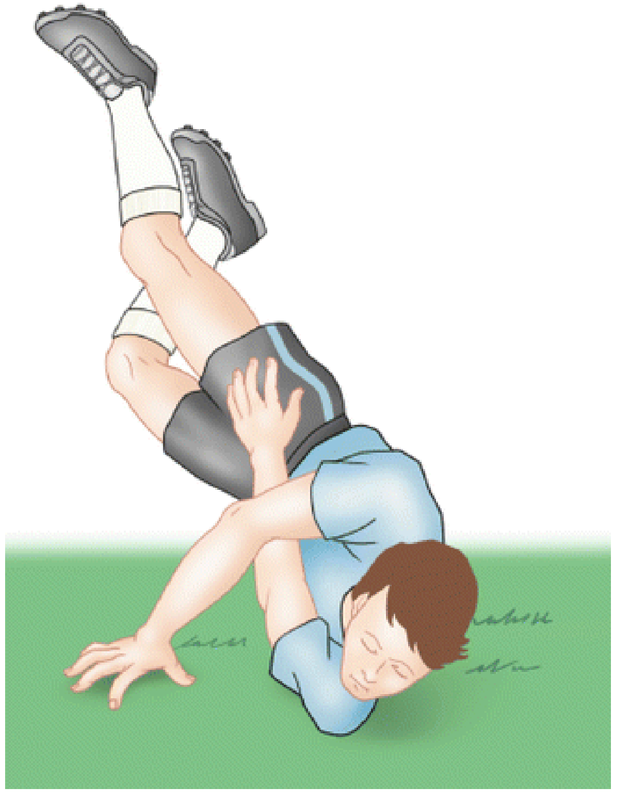
Clavicle Fracture



History, Exam, and Imaging

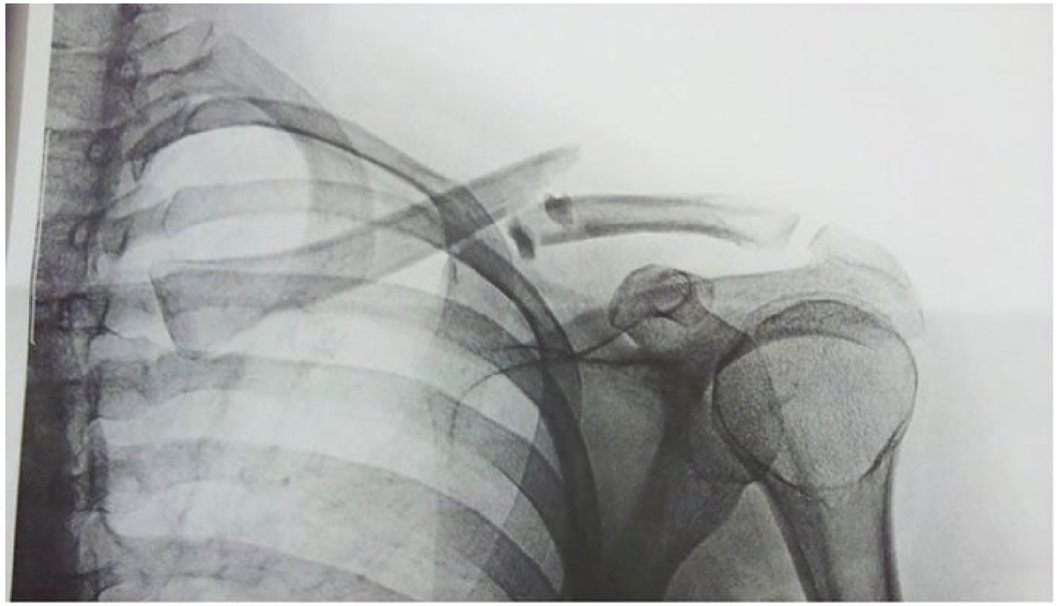
History

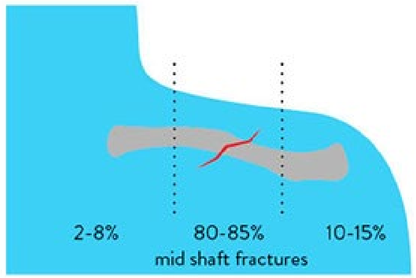
History

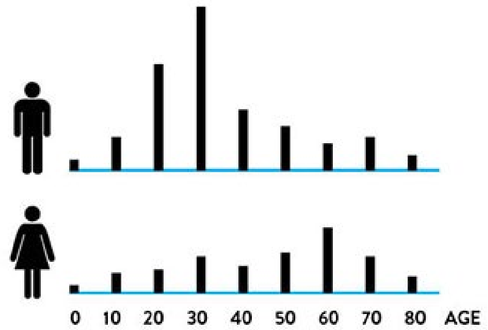


Ortho Nebraska

History

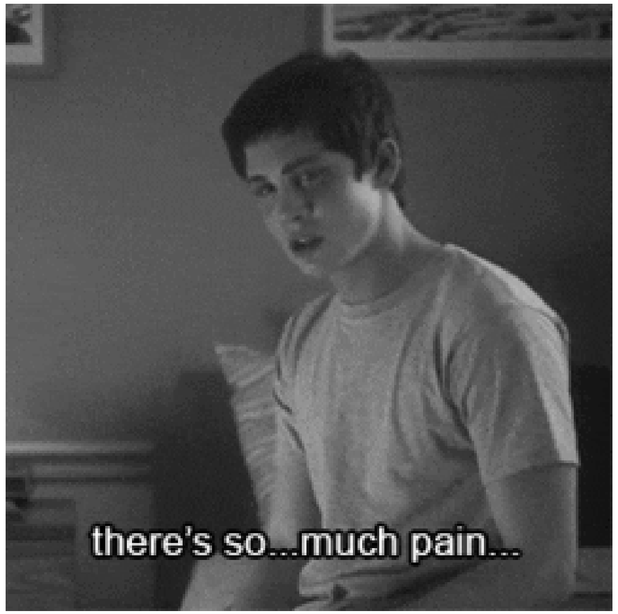






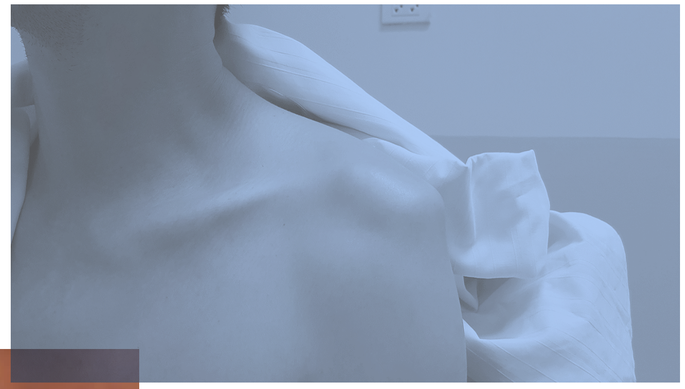
Ortho Nebraska

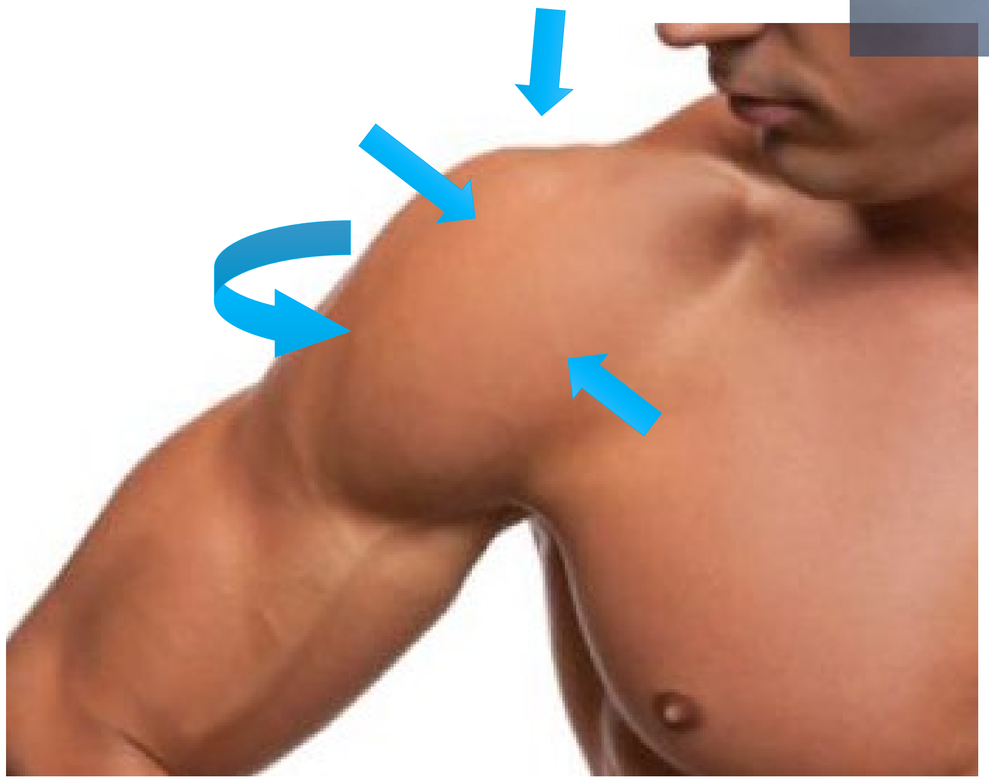
Shoulder Pain After Trauma

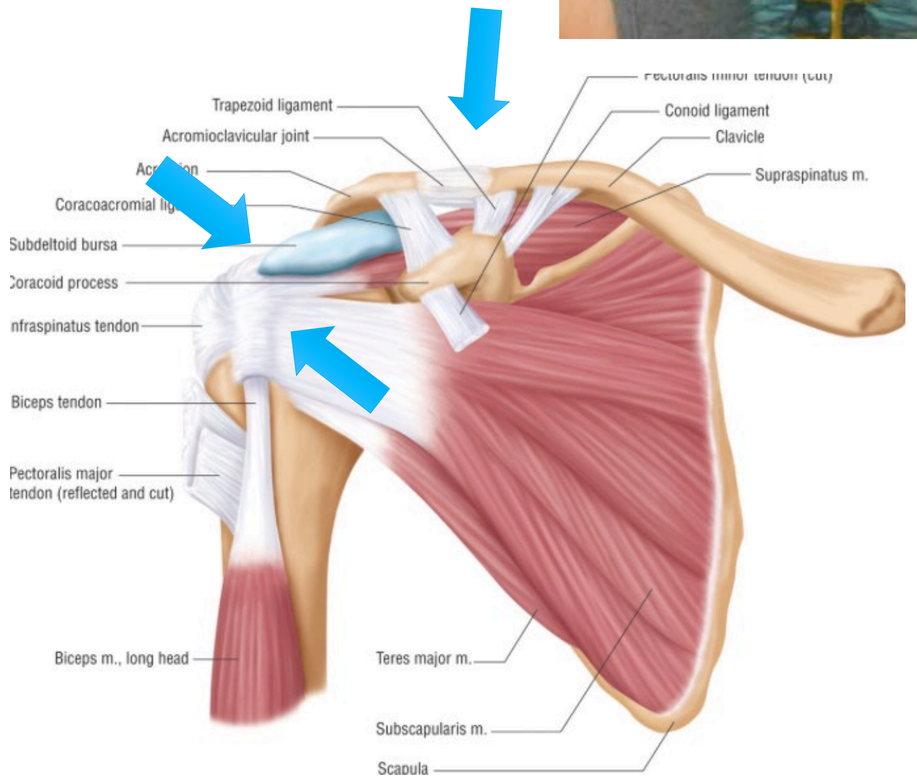


Ortho Nebraska

Exam #1: Location



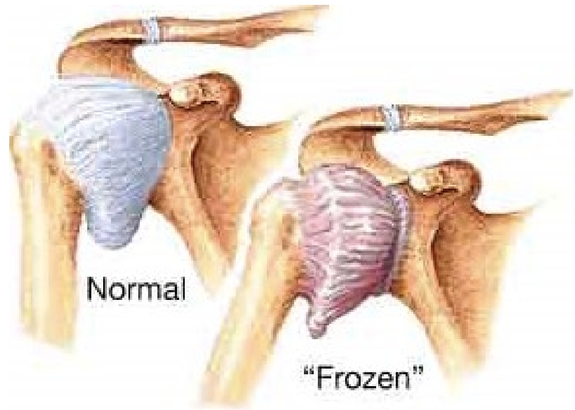


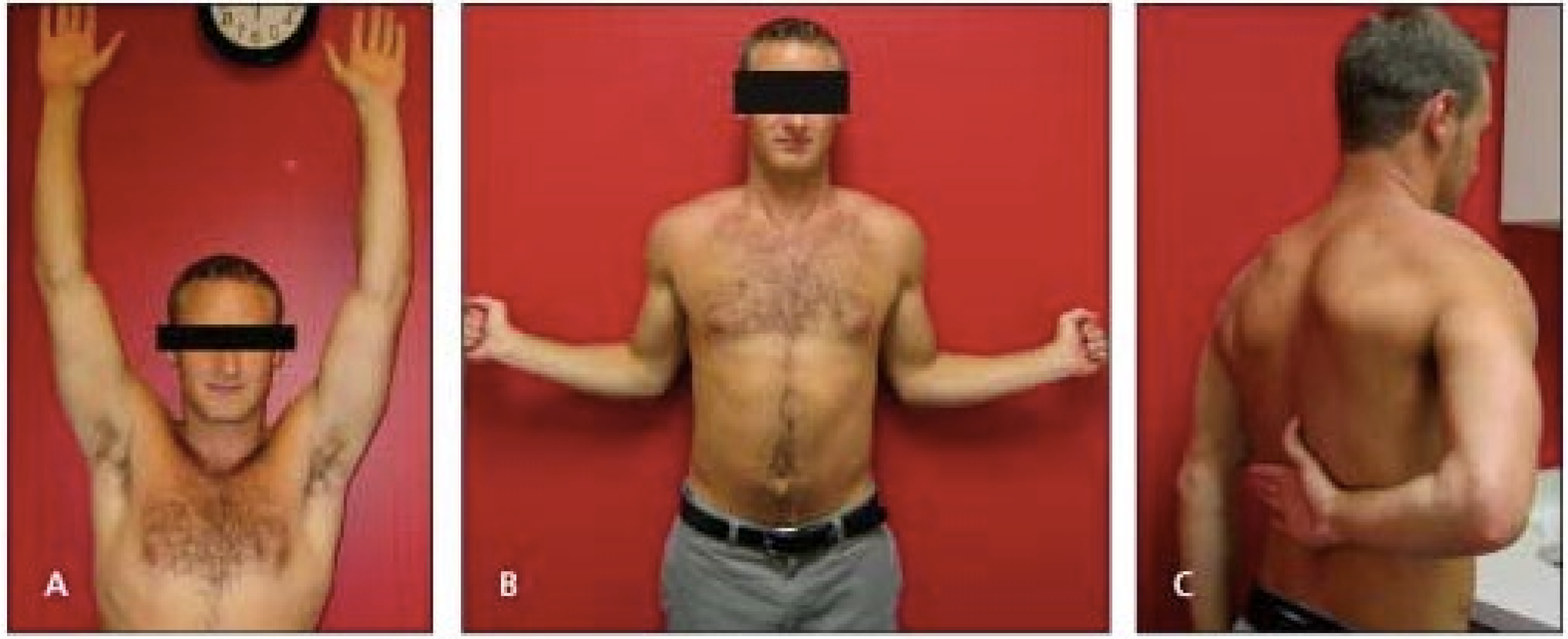


Ortho Nebraska

Exam #2: Range of Motion

- Forward Elevation
- External Rotation
- Internal Rotation

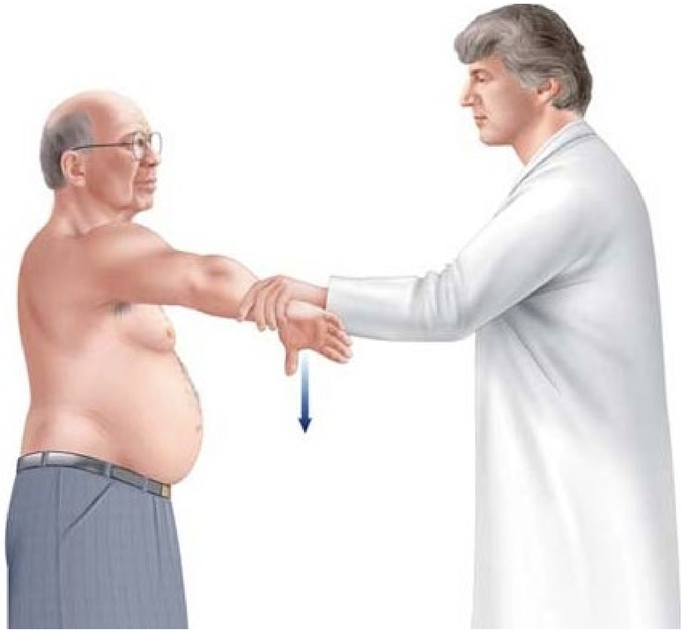


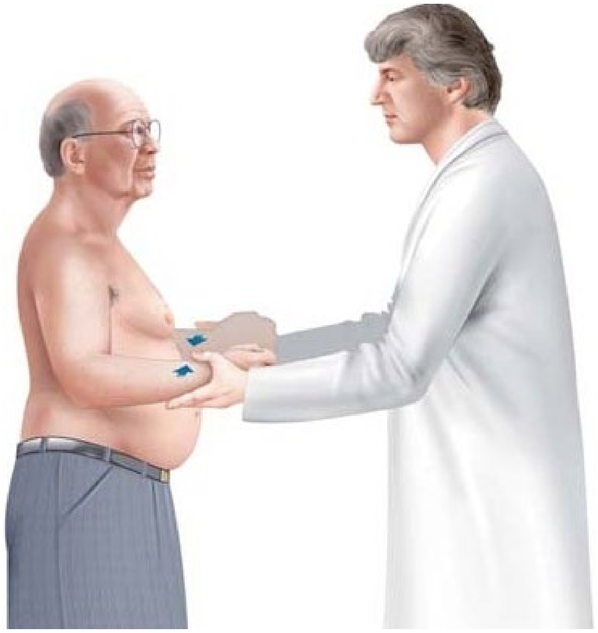


Ortho Nebraska

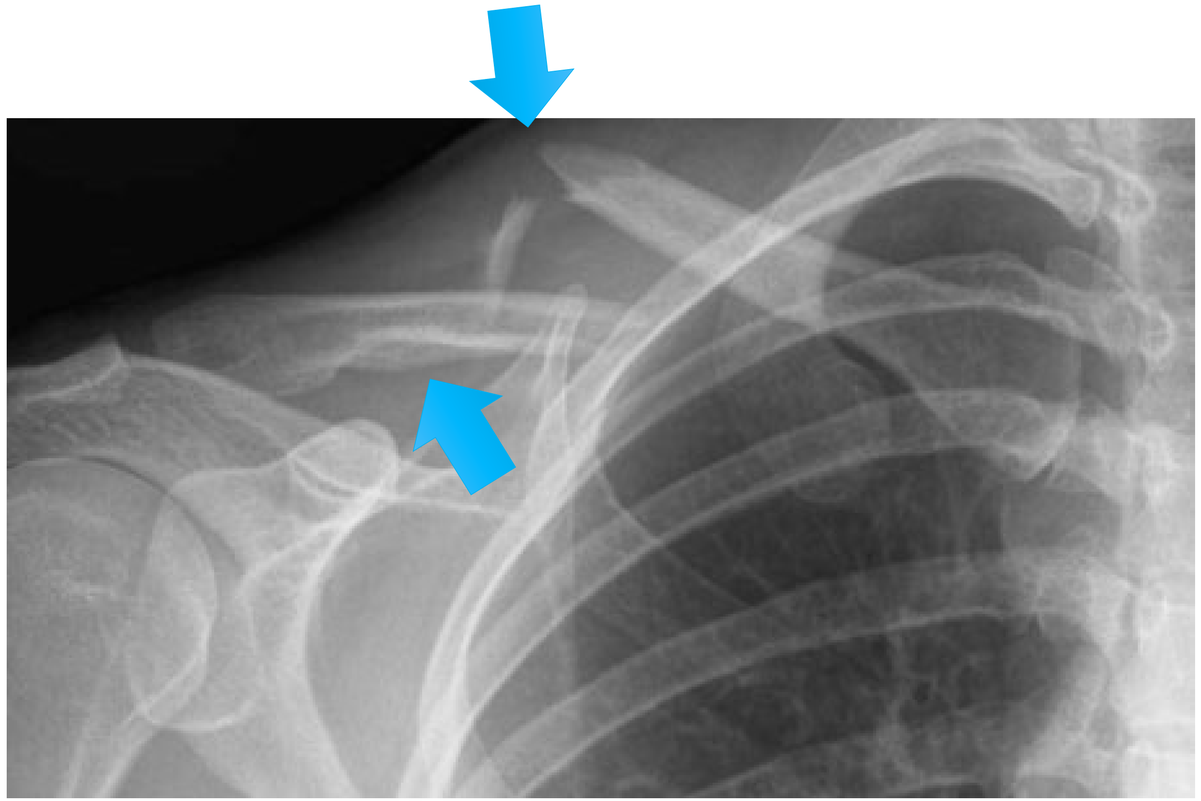
Exam #3: Strength

- Forward Elevation
- Internal Rotation
- External Rotation



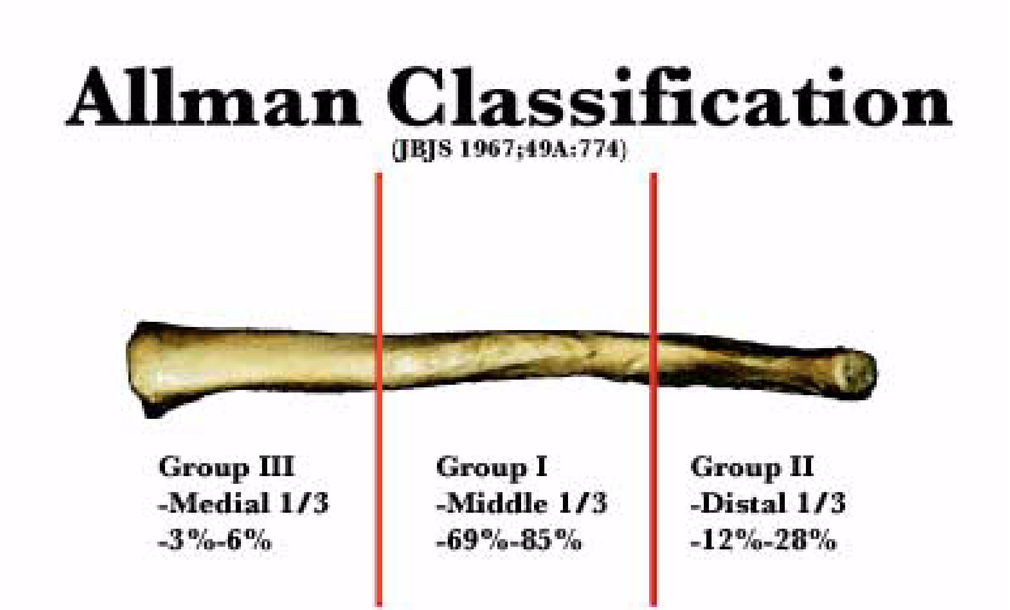


Imaging



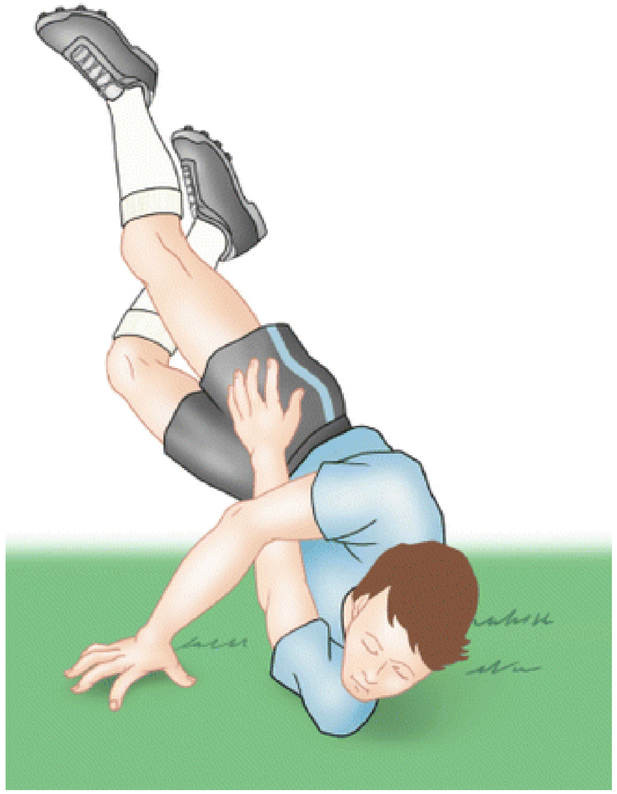
Classification

Clavicle Fractures Classification



Treatment

Case: 22yo M s/p fall while playing soccer



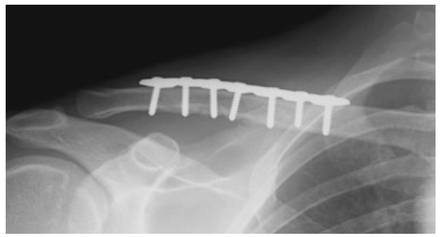
NOW WHAT???

Ortho Nebraska

Treatment Options

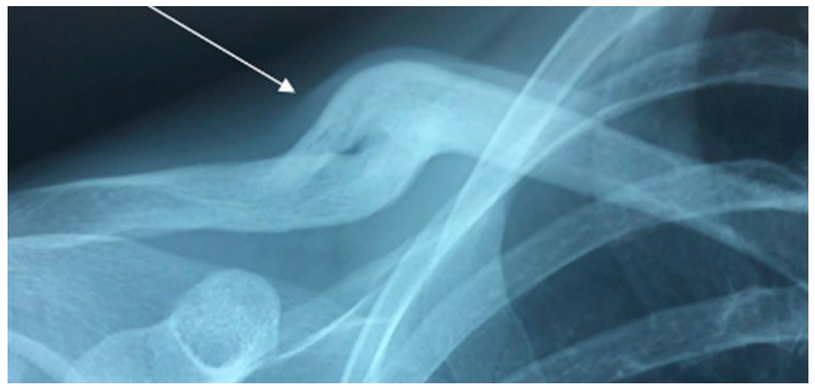
Displaced Midshaft Clavicle Fracture

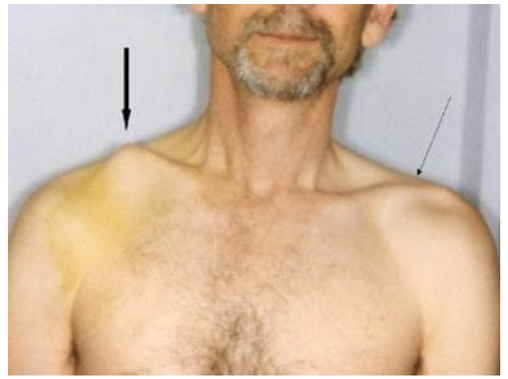
- Conservative Treatment
  - Sling for 4 Weeks
- Operative Treatment
  - ORIF/Plate
  - Intramedullary Fixation



Ortho Nebraska

HISTORY of Clavicle Management: Bump vs. Scar?





› Clin Orthop Relat Res. 1968 May-Jun;58:29-42.

An atlas of anatomy and treatment of midclavicular fractures

C R Rowe

March 5, 1960

NONUNION OF THE CLAVICLE

Charles S. Neer II, M.D.

» Author Affiliations

JAMA. 1960;172(10):1006-1011. doi:10.1001/jama.1960.03020100014003

Rowe stated that “nonunion occurs, but is rare” and espoused the “excellent reparative powers” of the clavicle with nonsurgical treatment

Ortho Nebraska

HISTORY of Clavicle Management: Bump vs. Scar?

CLOSED TREATMENT OF DISPLACED MIDDLE-THIRD FRACTURES OF THE CLAVICLE GIVES POOR RESULTS

JAMES M. HILL, MICHAEL H. McGUIRE, LYNN A. CROSBY

From Creighton University, Omaha, USA

We evaluated 242 consecutive fractures of the clavicle in adults which had been treated conservatively. Of these, 66 (27%) were originally in the middle third of the clavicle and had been completely displaced. We reviewed 52 of these patients at a mean of 38 months after injury.

Eight of the 52 fractures (15%) had developed nonunion, and 16 patients (31%) reported unsatisfactory results. Thirteen patients had mild to moderate residual pain and 15 had some evidence of brachial plexus irritation. Of the 28 who had cosmetic complaints, only 11 considered accepting corrective surgery. No patient had significant impairment of range of movement or shoulder strength as a result of the injury.

We found that *initial* shortening at the fracture of ≥20 mm had a highly significant association with nonunion ($p < 0.0001$) and the chance of an unsatisfactory result. *Final* shortening of 20 mm or more was associated with an unsatisfactory result, but not with nonunion. No other patient variable, treatment factor, or fracture characteristic had a significant effect on outcome.

We now recommend open reduction and internal fixation of severely displaced fractures of the middle third of the clavicle in adult patients.

J Bone Joint Surg [Br] 1997;79-B:537-9.
Received 17 December 1996; Accepted after revision 10 April 1997

Fracture of the clavicle is common, accounting for 5% to 12% of all fractures and up to 44% of injuries to the shoulder girdle.[1-3] About 70% to 80% of these fractures are in the middle third of the bone.[1,4]

We suspected that our results for severely displaced fractures of this type in adults were poor, and therefore reviewed our experience.

PATIENTS AND METHODS

From 1988 to 1992 inclusive we treated 242 consecutive fractures of the clavicle in adult patients. Of these, 66 (27%) were in the middle third and completely displaced. We attempted to review all these patients, but four had died and we were unable to locate ten.

We therefore contacted 52 patients of whom 47 were examined clinically and had radiographs at a mean follow-up of 38 months (15 to 68). There were 37 men and 15 women; their mean age was 34 years (18 to 59), and there were 33 left- and 19 right-sided injuries.

Nineteen of the fractures (36%) were on the dominant side, and 20 patients (38%) were smokers at the time of injury. Twenty-eight patients had manual work; 24 had sedentary occupations.

The fracture was caused by a fall or a direct blow in 30 patients (58%), only two describing a fall on an outstretched hand. Twenty patients (38%) were uncertain of the mechanism and 21 (40%) had other injuries such as rib fractures, a head injury, or a long-bone fracture. There were two grade-I open injuries.

Ortho Nebraska

HISTORY of Clavicle Management: Bump vs. Scar?

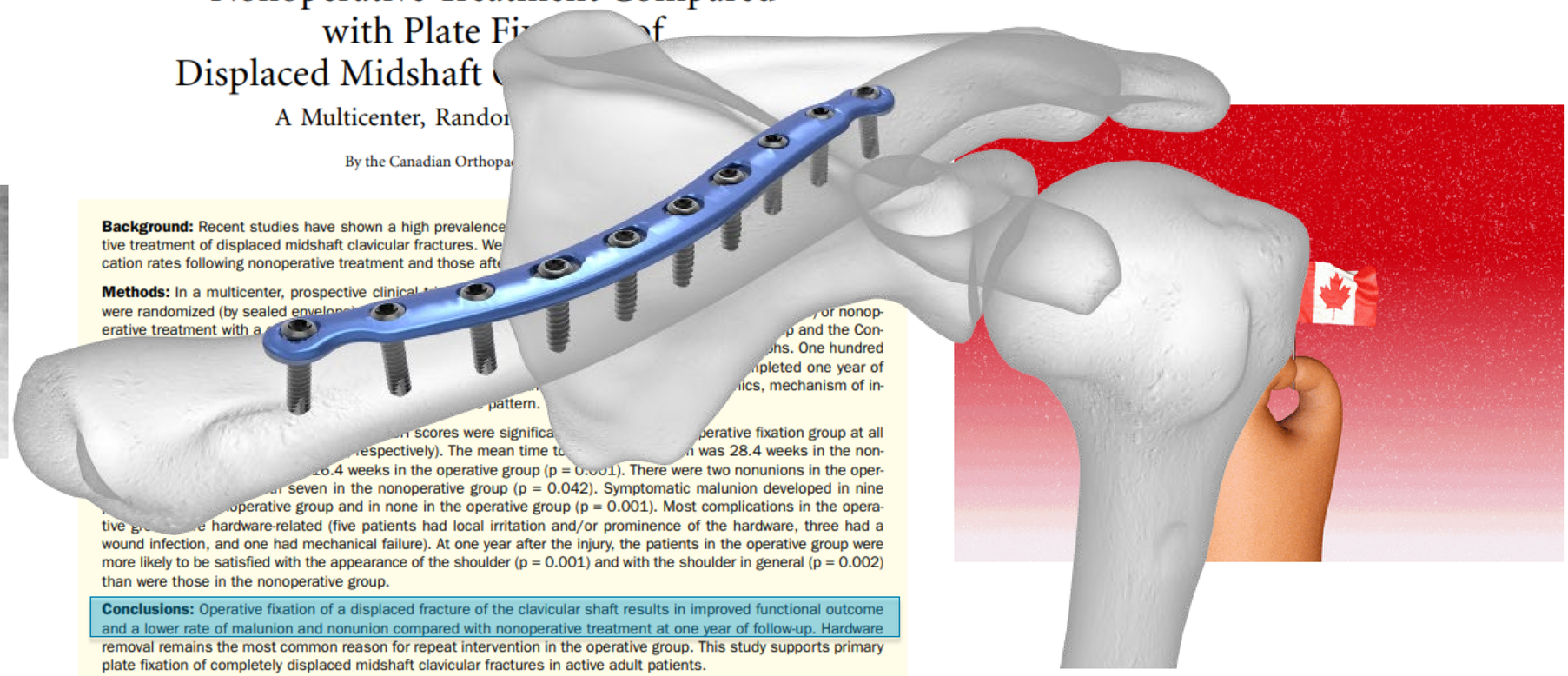
- 100% Displacement
- 2cm Shortening

1

Nonoperative Treatment Compared with Plate Fi… of Displaced Midshaft …

A Multicenter, Randoi…

By the Canadian Orthopa…



Background: Recent studies have shown a high prevalence… tive treatment of displaced midshaft clavicular fractures. We… cation rates following nonoperative treatment and those afte…

Methods: In a multicenter, prospective clinical t… were randomized (by sealed envelope… …or nonop- erative treatment with a … …p and the Con- …hs. One hundred …mpleted one year of …ics, mechanism of in- … pattern.

… scores were significa… …perative fixation group at all …respectively). The mean time to … was 28.4 weeks in the non- …8.4 weeks in the operative group (p = 0.001). There were two nonunions in the oper- … seven in the nonoperative group (p = 0.042). Symptomatic malunion developed in nine … operative group and in none in the operative group (p = 0.001). Most complications in the opera- tive g… hardware-related (five patients had local irritation and/or prominence of the hardware, three had a wound infection, and one had mechanical failure). At one year after the injury, the patients in the operative group were more likely to be satisfied with the appearance of the shoulder (p = 0.001) and with the shoulder in general (p = 0.002) than were those in the nonoperative group.

Conclusions: Operative fixation of a displaced fracture of the clavicular shaft results in improved functional outcome and a lower rate of malunion and nonunion compared with nonoperative treatment at one year of follow-up. Hardware removal remains the most common reason for repeat intervention in the operative group. This study supports primary plate fixation of completely displaced midshaft clavicular fractures in active adult patients.

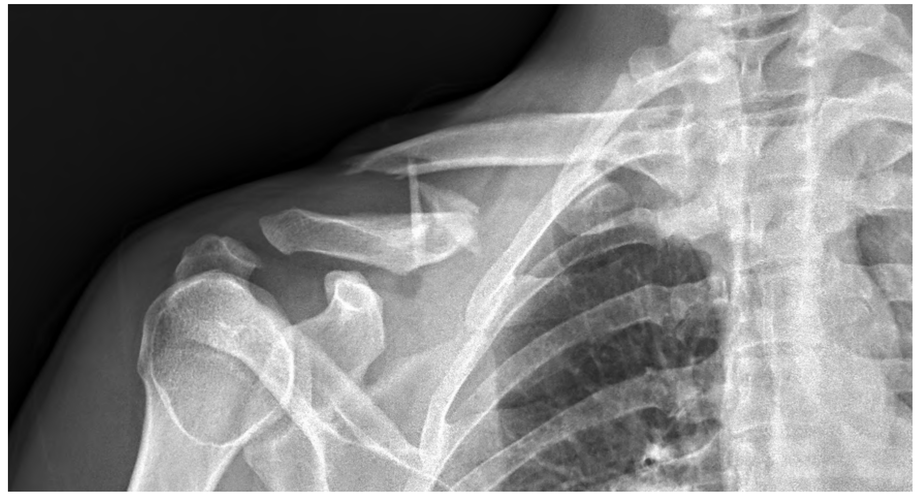
Level of Evidence: Therapeutic Level I. See Instructions to Authors for a complete description of levels of evidence.

Ortho Nebraska

“I crashed my bike…”

- 33yo M s/p bike accident 2 days ago
  Enjoys biking and exercise
  Works in an office
  No preexisting shoulder issue

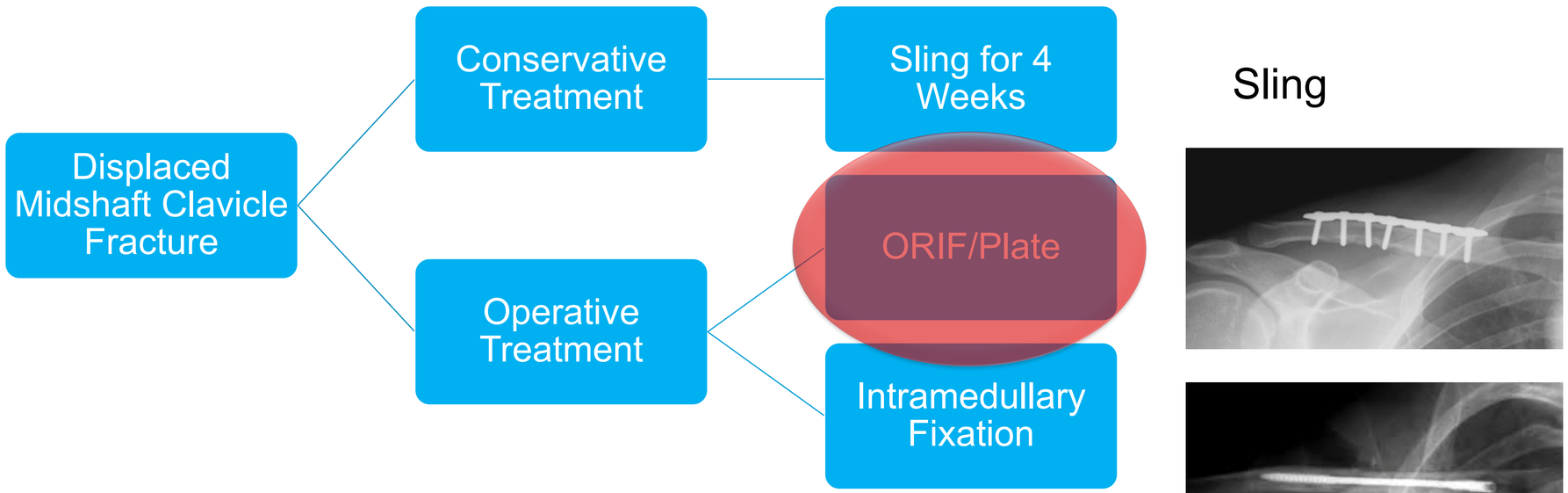
  - PMH/PSH/Meds/All: NC
  - TTP @ midshaft of the clavicle, NVID



Plan?

Ortho Nebraska

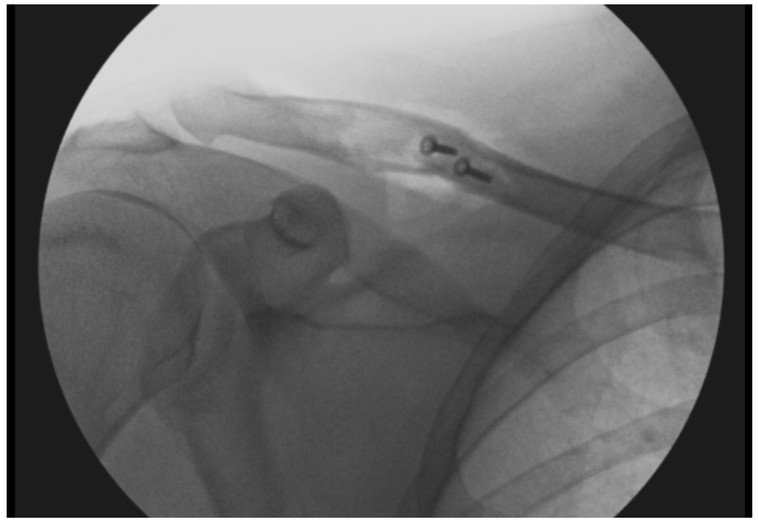
Treatment Options

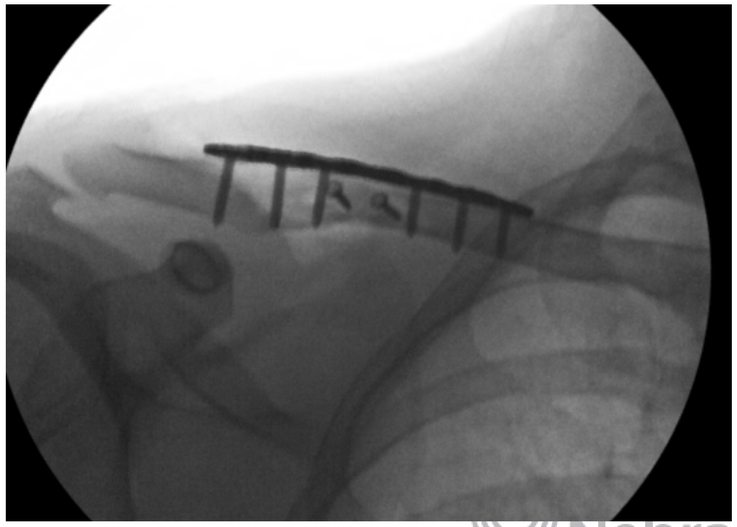


Sling

Ortho Nebraska

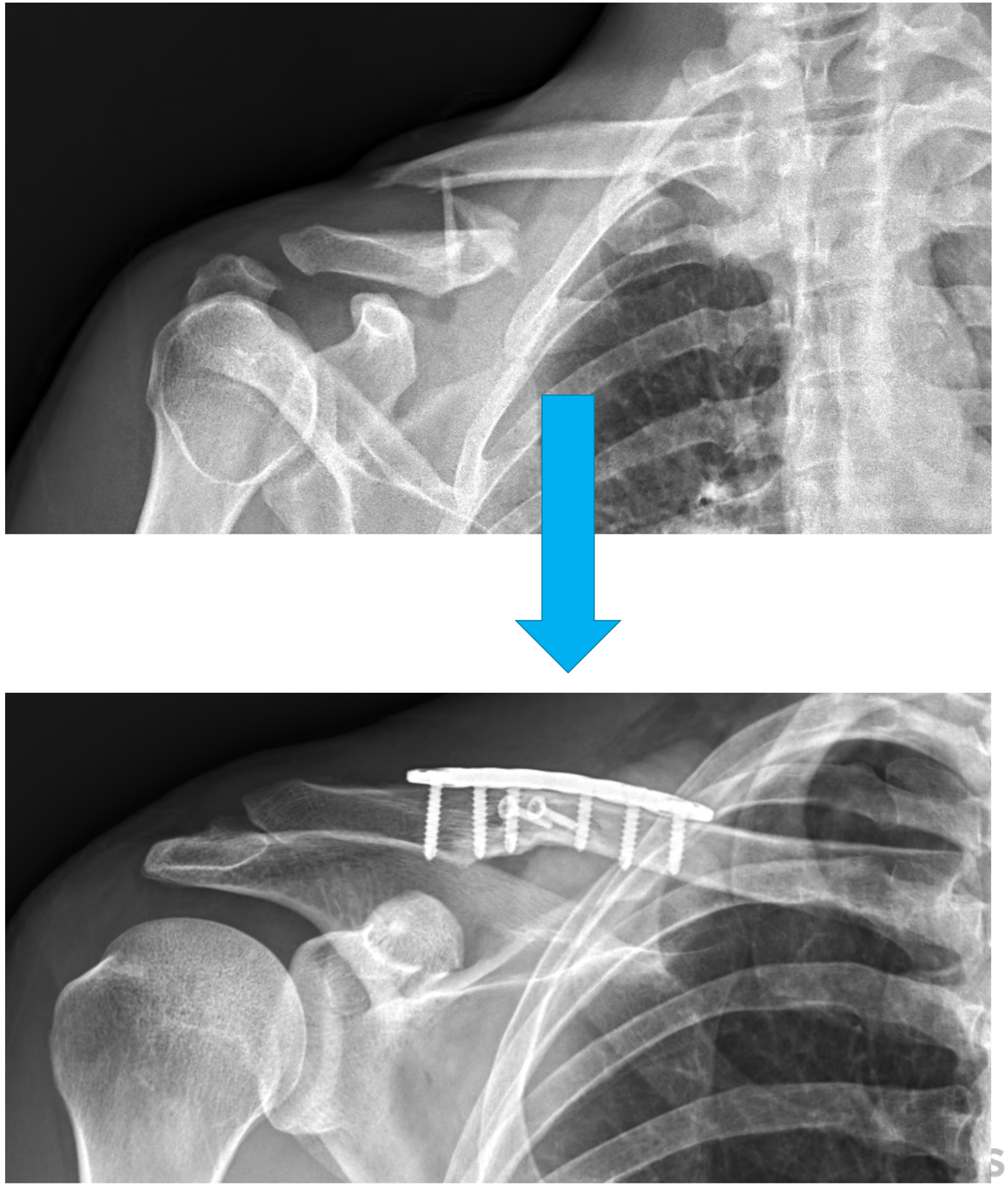
Midshaft Clavicle ORIF





Outcomes

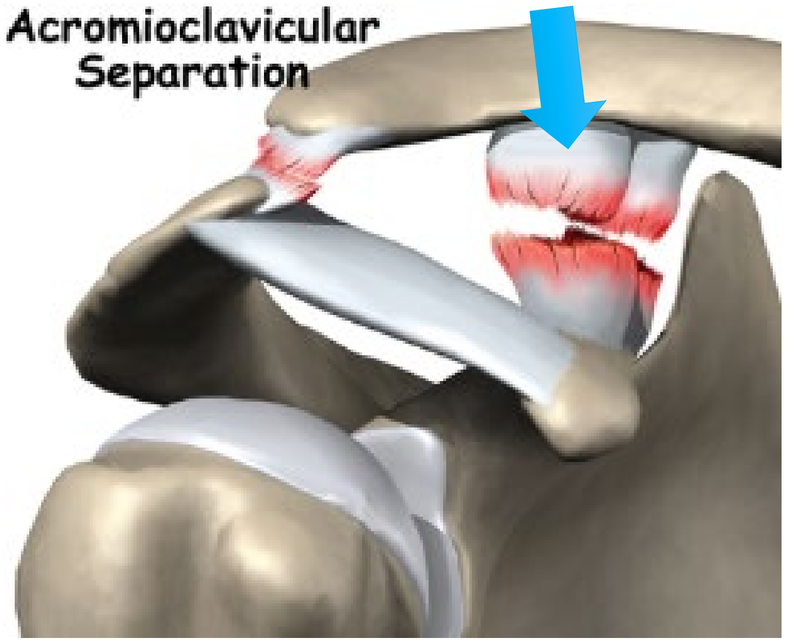
- 4 Month Follow-Up
  0/10 pain
  100% Subjective Shoulder Value
  Full Shoulder ROM and Strength
  Returned to unrestricted activities and athletics at 2 months



- Surgical outcomes are generally excellent for displaced clavicle fractures
- Greatest risk if need for hardware removal

AC Joint Injuries

“Shoulder Separations”/AC Joint Dislocations



Ortho Nebraska

AC Joint Injury Classification

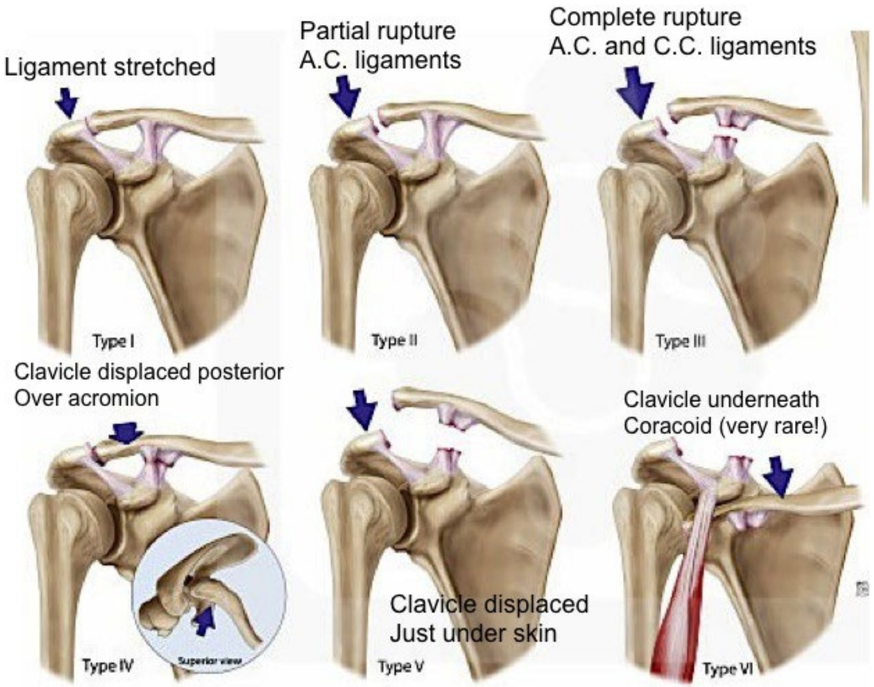
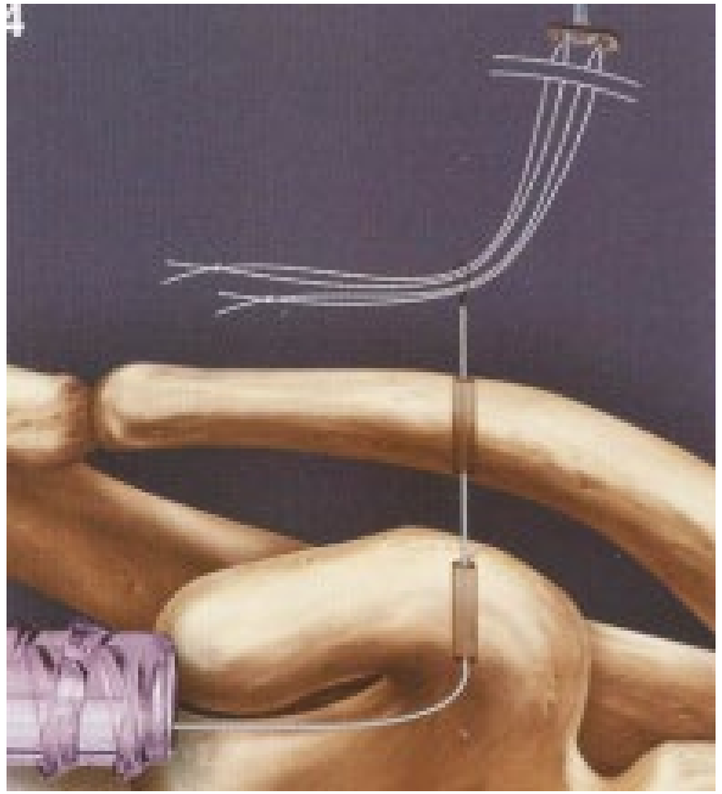


Table. Rockwood Classification of AC joint injuries.

Type	Direction of clavicle displacement	Radiographic findings
I	None	No increase in coracoclavicular (CC) interspace
II	Superior	CC interspace increase of < 25%
III	Superior	CC interspace increase of 25% to 100%
IV	Posterior	Axillary view necessary to diagnose. Distal clavicle displaced posteriorly through trapezius.
V	Superior	CC distance > 100% of contralateral (clavicle herniated through deltotrapezial fascia)
VI	Inferior	Distal clavicle is subacromial or subcoracoid. Rare injury.

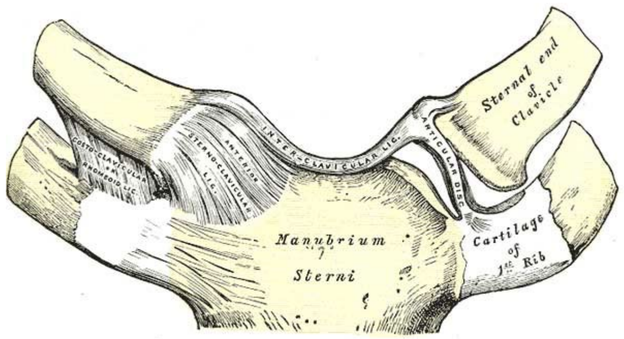
AC Joint Injury Treatment

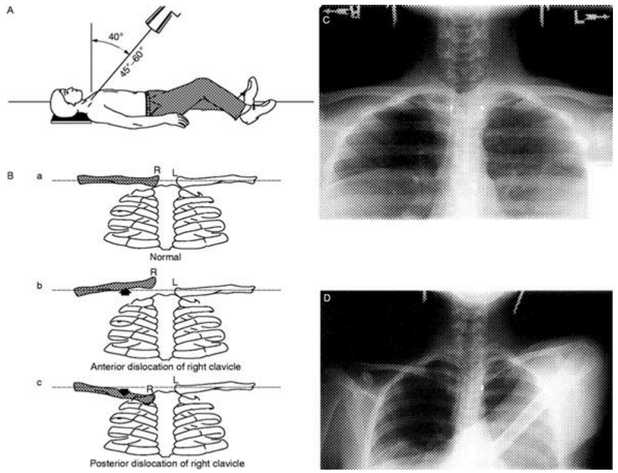


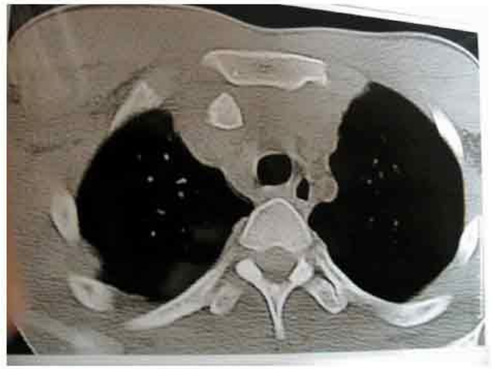
Ortho Nebraska

SC Joint Injuries

SC Joint Injuries

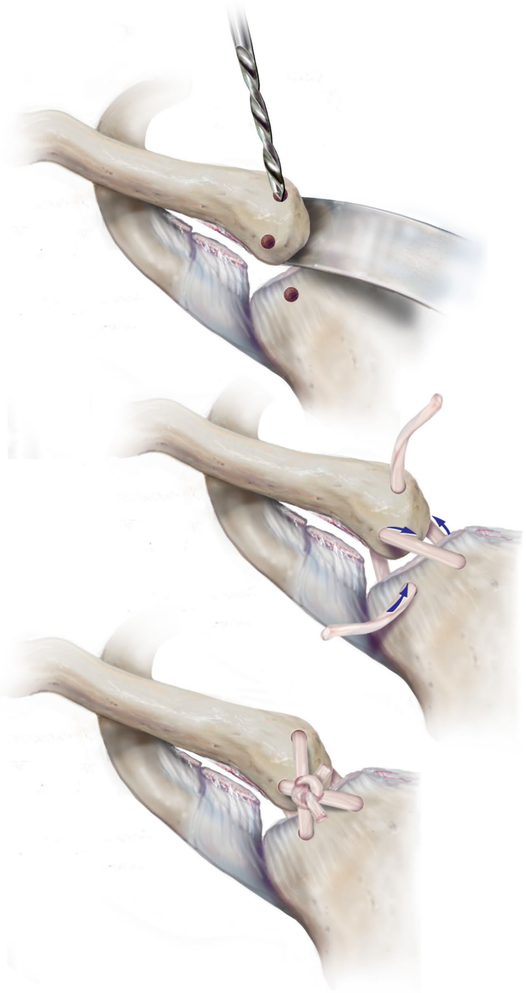






Ortho Nebraska

SC Joint Injury Treatment



Clinical Bottom Line

- Conservative treatment of clavicle fractures is appropriate for fractures that demonstrate mild displacement.
- For displaced fractures, operative treatment can provide more predictable healing and recovery in select patients.
- Risks and benefits of both conservative and operative treatment should be discussed with every clavicle fracture patient and a shared decision-making model should be utilized.

Click
Schedule Online

Call
(402) 609-3000

Text
(844) 399-8240

Walk In
View Locations

Questions

OrthoNebraska
Journey On