Sternoclavicular Joint Injuries: Management of the Acute Dislocation

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University of California, San Francisco

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Outline

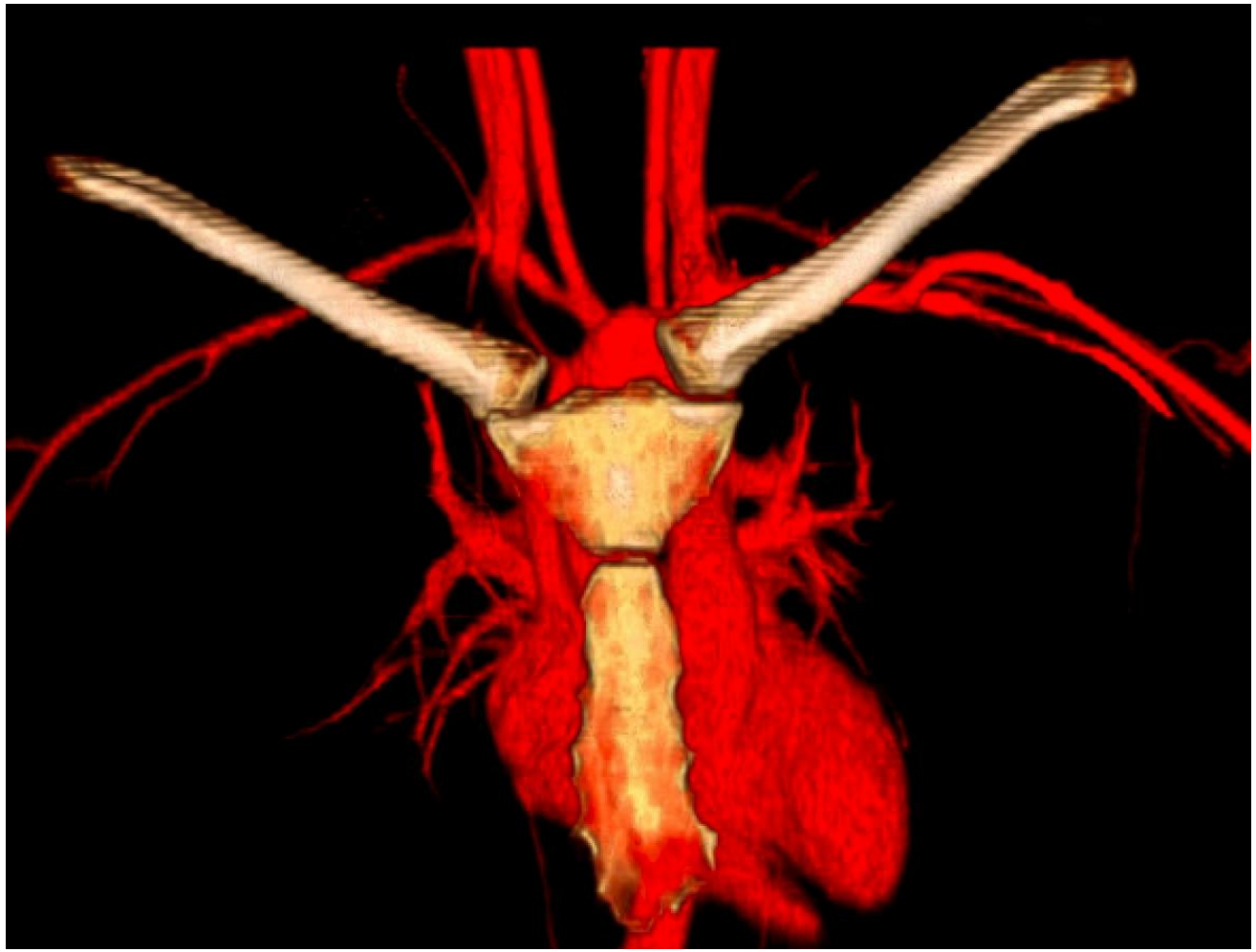
- Background
- Relevant Anatomy
- Treatment for acute dislocations
  - Anterior
  - Posterior

Background

- Uncommon injury (~3% of shoulder girdle dislocations)
- Most common cause:
  - Motor vehicle accident, high-impact sports
- Anterior or posterior dislocation of the SC joint
  - *Possible physeal injury in <25 years old*
- Mechanism:
  - Lateral compression of shoulder in protraction (posterior dislocation) or retraction (anterior dislocation)

Relevant Anatomy (5)

1. Proximity to vital structures



- Vasculature is ~6.6mm posterior to SC joint
- 75% have mediastinal structure within 1cm of SC joint

Ponce et al. JSES (2013)

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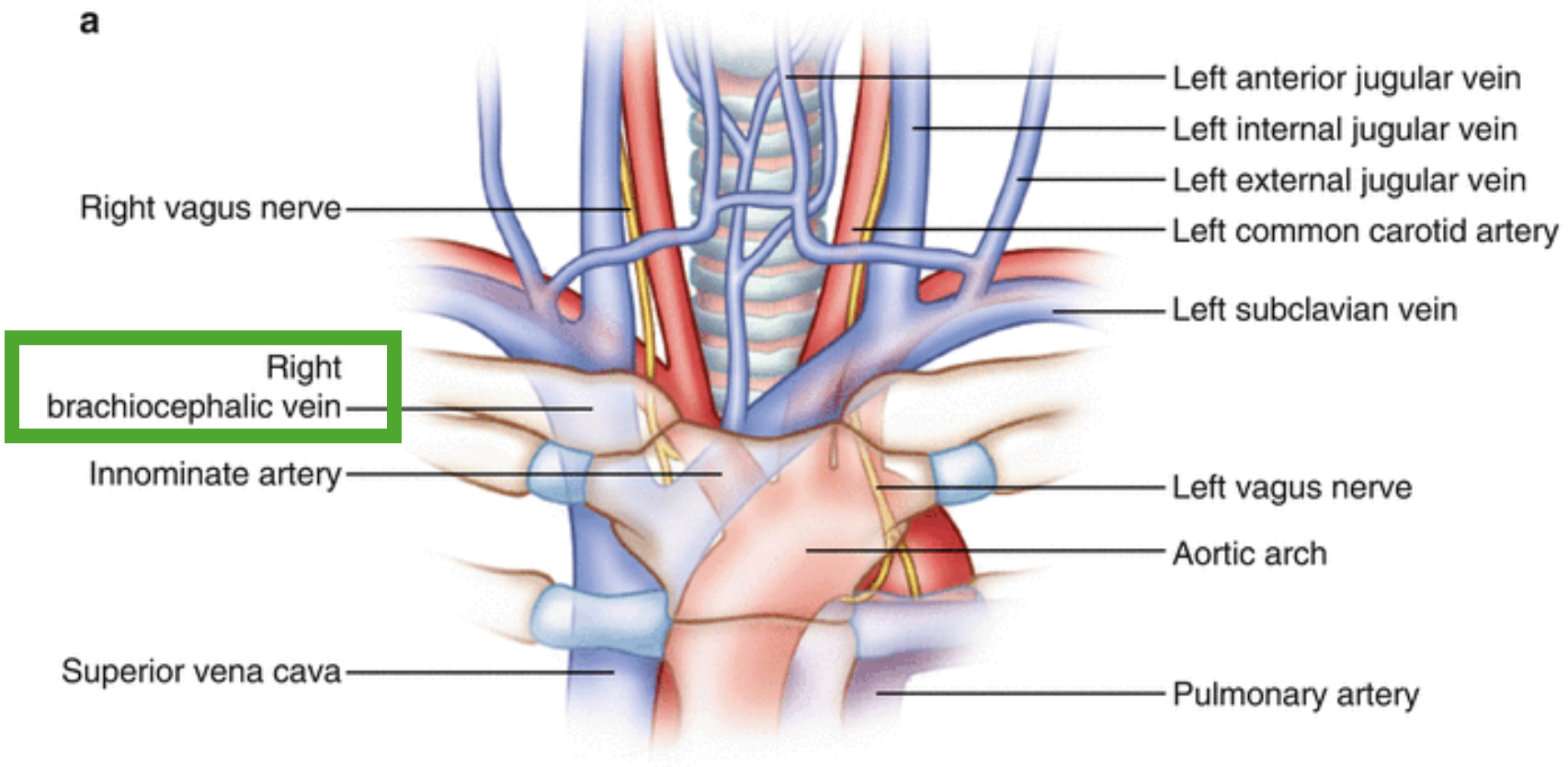

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Peter Millet – Musculoskeletal Key

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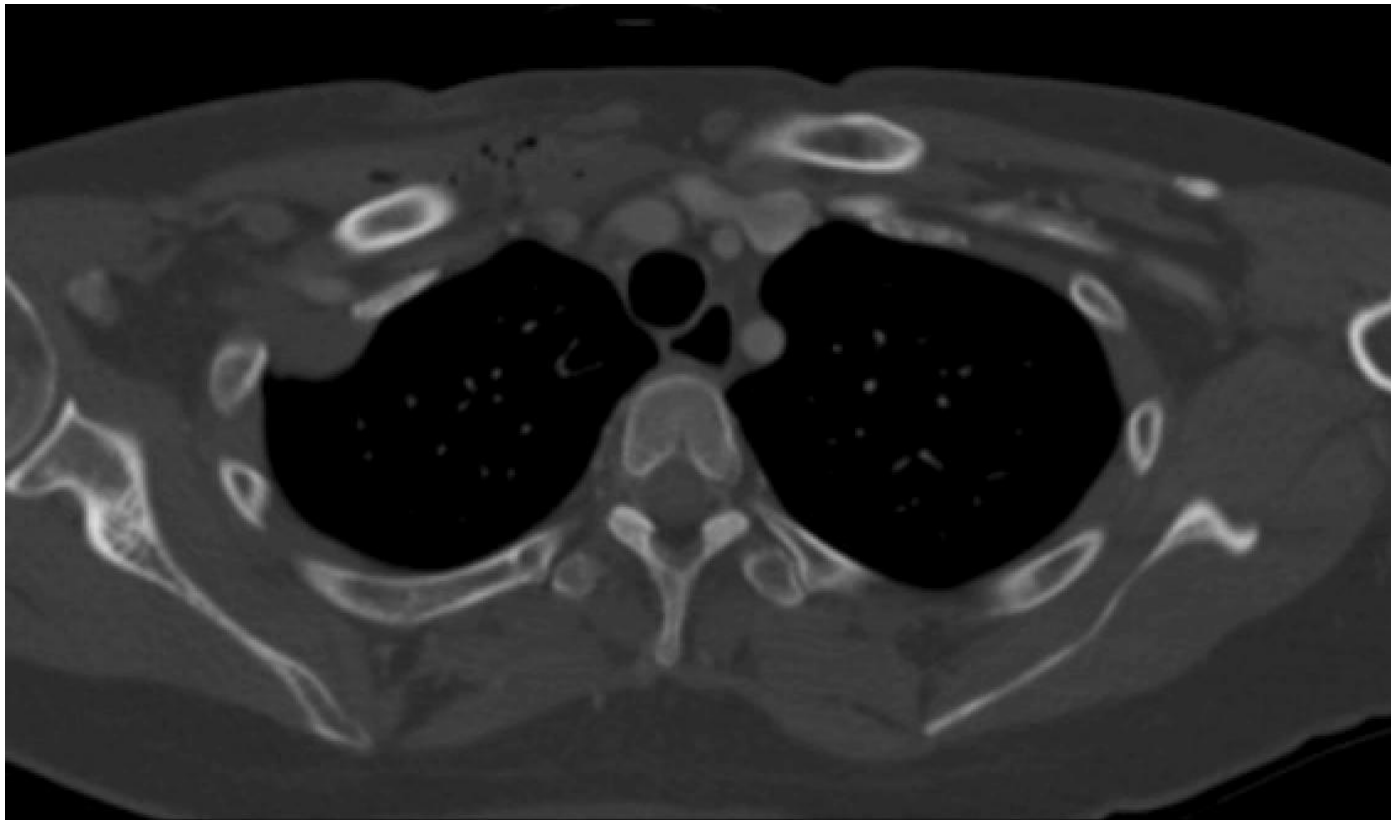

- Trachea
- Esophagus
- Lung

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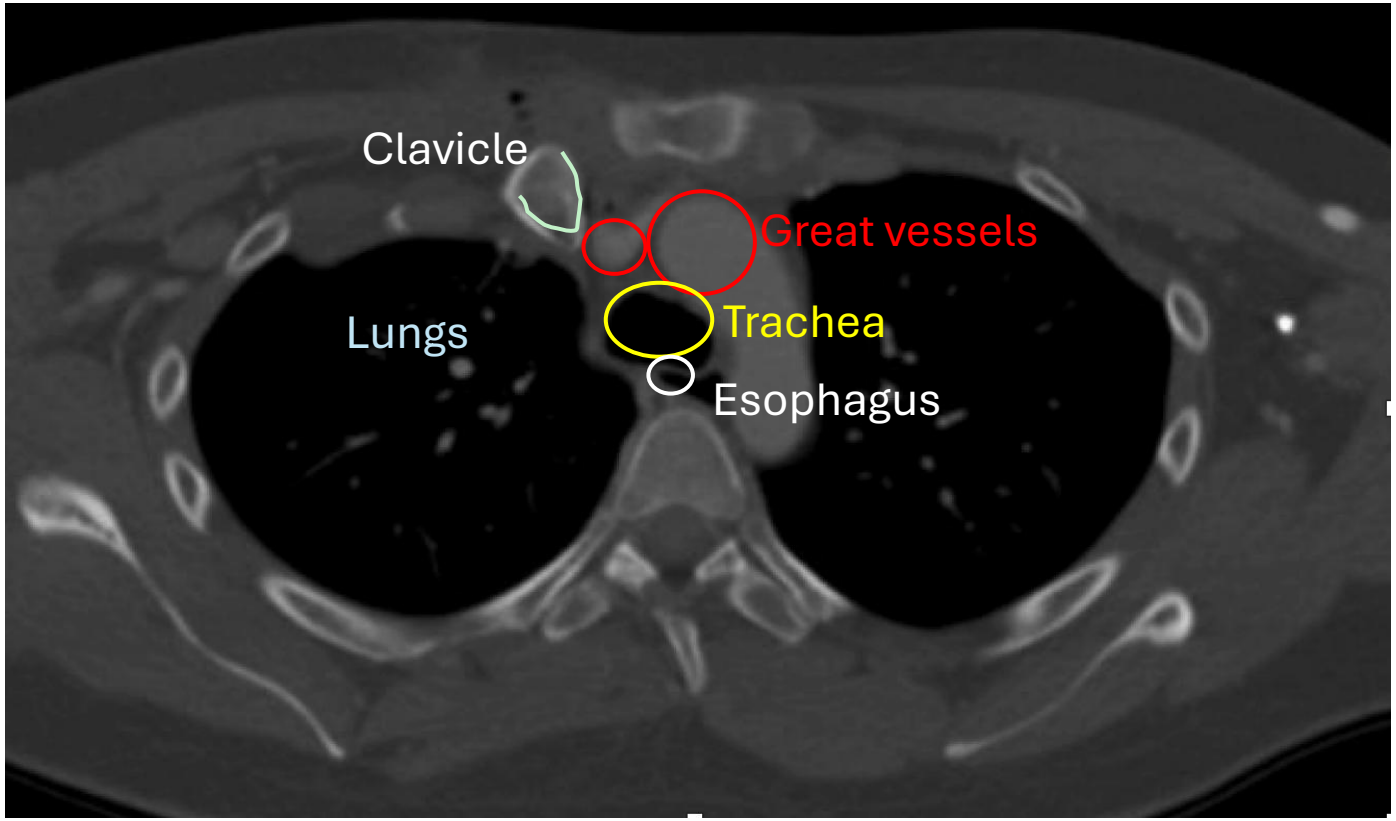

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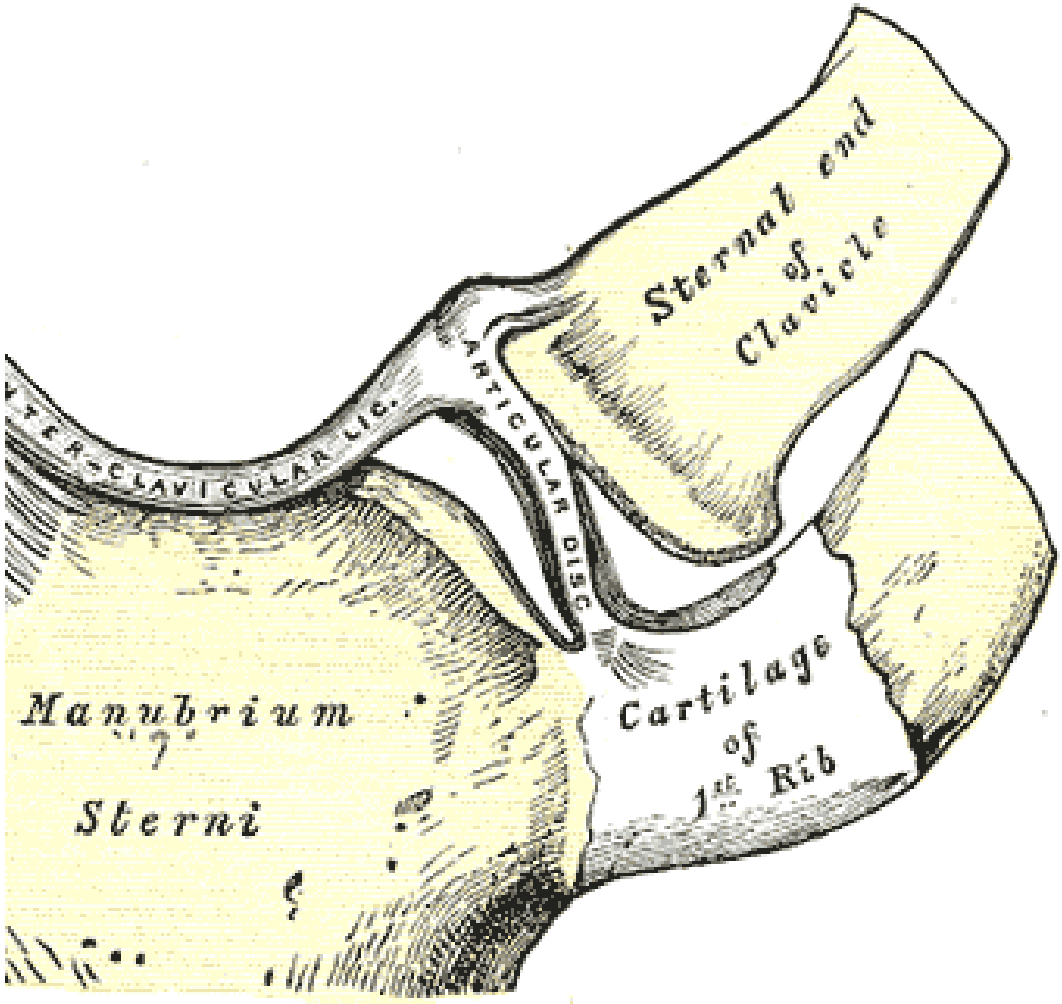
2. Joint Anatomy



- Saddle-shaped synovial joint
- Joint incongruous (<50%)
- Intra-articular disc

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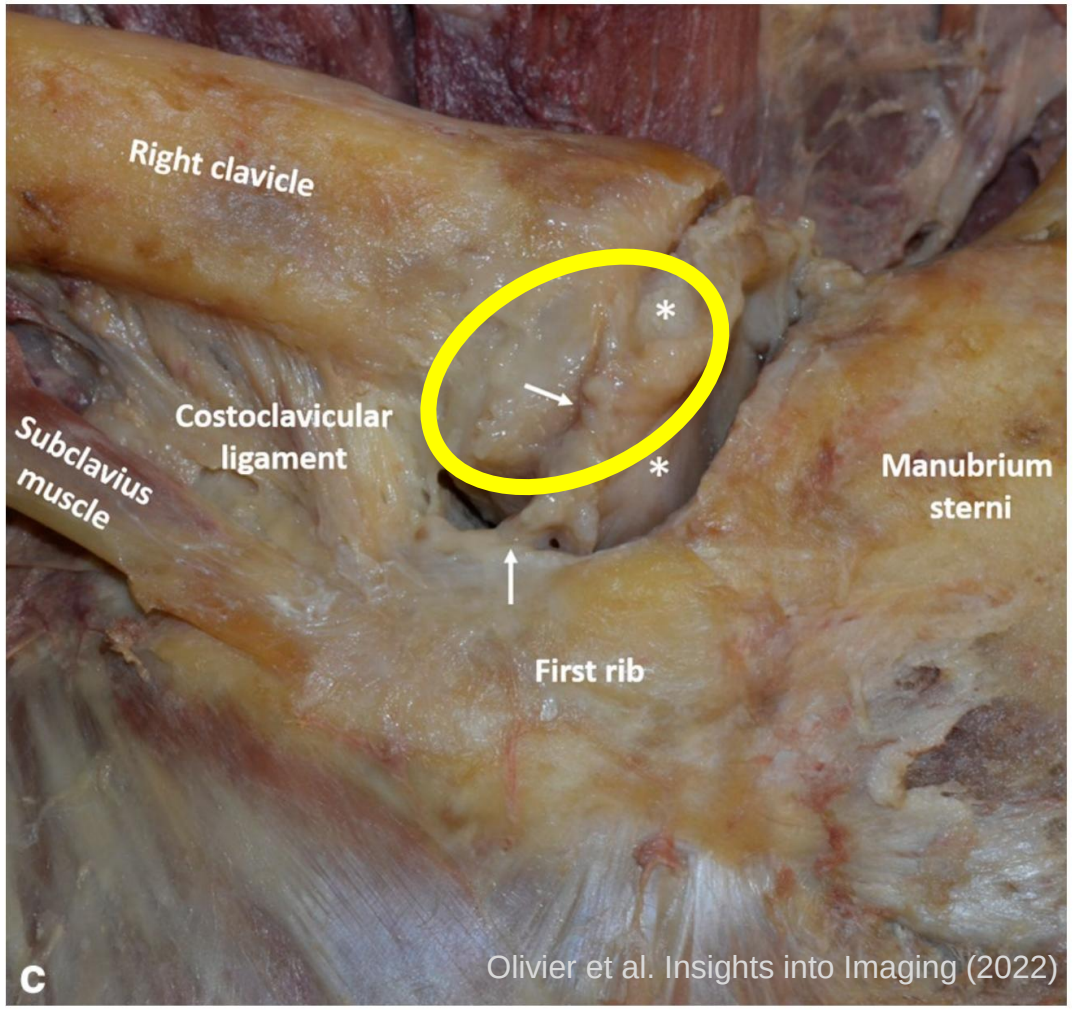
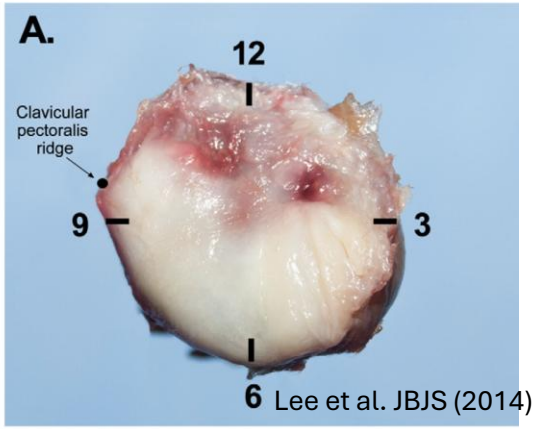


- Saddle-shaped synovial joint
- Joint incongruous (<50%)
- Intra-articular disc
- Medial clavicle articular cartilage
  - Covers 2/3 of end of medial clavicle
  - Anteroinferior aspect



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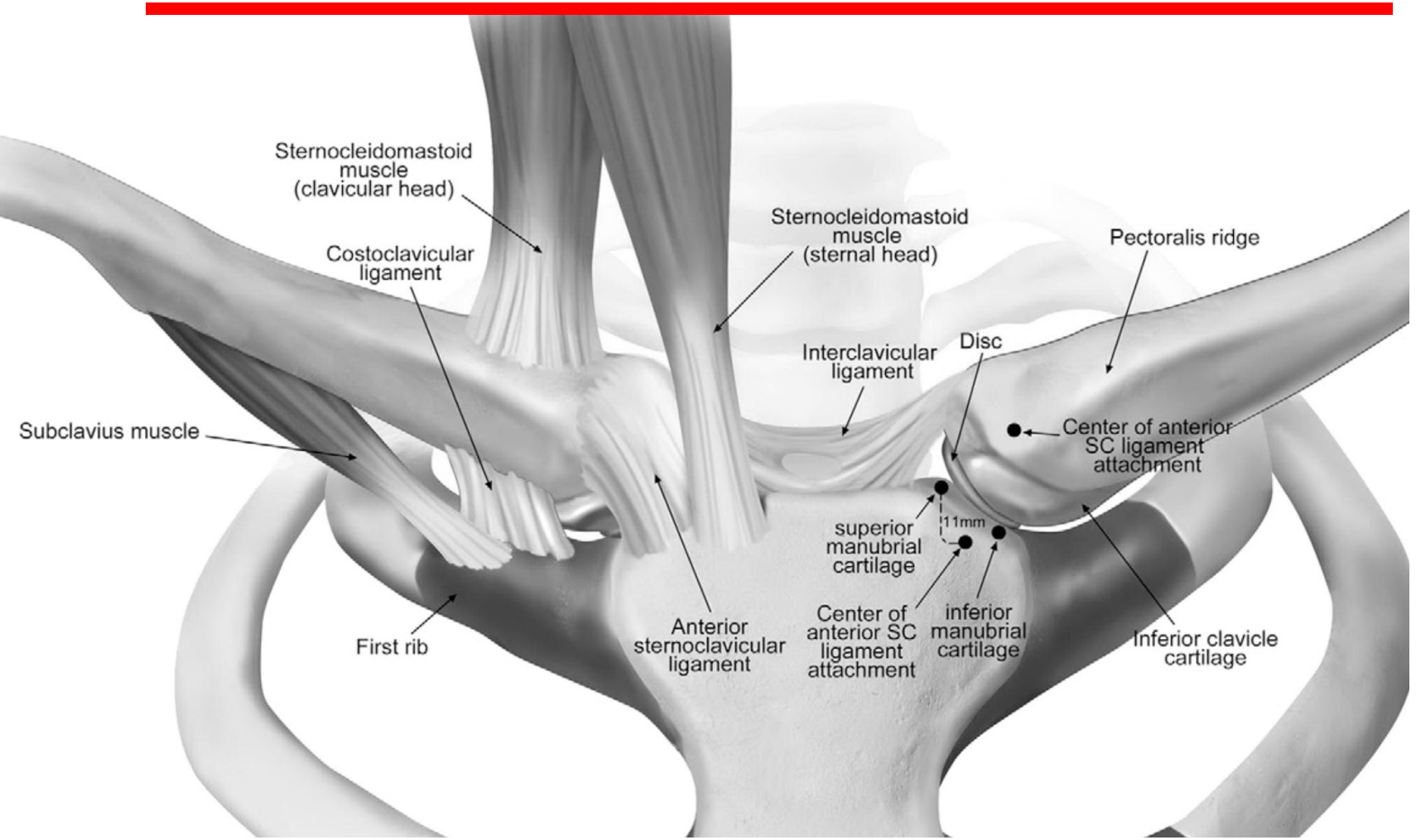
3. Capsule-ligamentous complex



Capsule-ligamentous complex provides stability:

- Anterior sternoclavicular ligament
- Posterior sternoclavicular ligament *(joint capsule thickening)*
- Costoclavicular ligament
- Interclavicular ligament
- Intra-articular discoligamentous complex

Lee et al. JBJS (2014)

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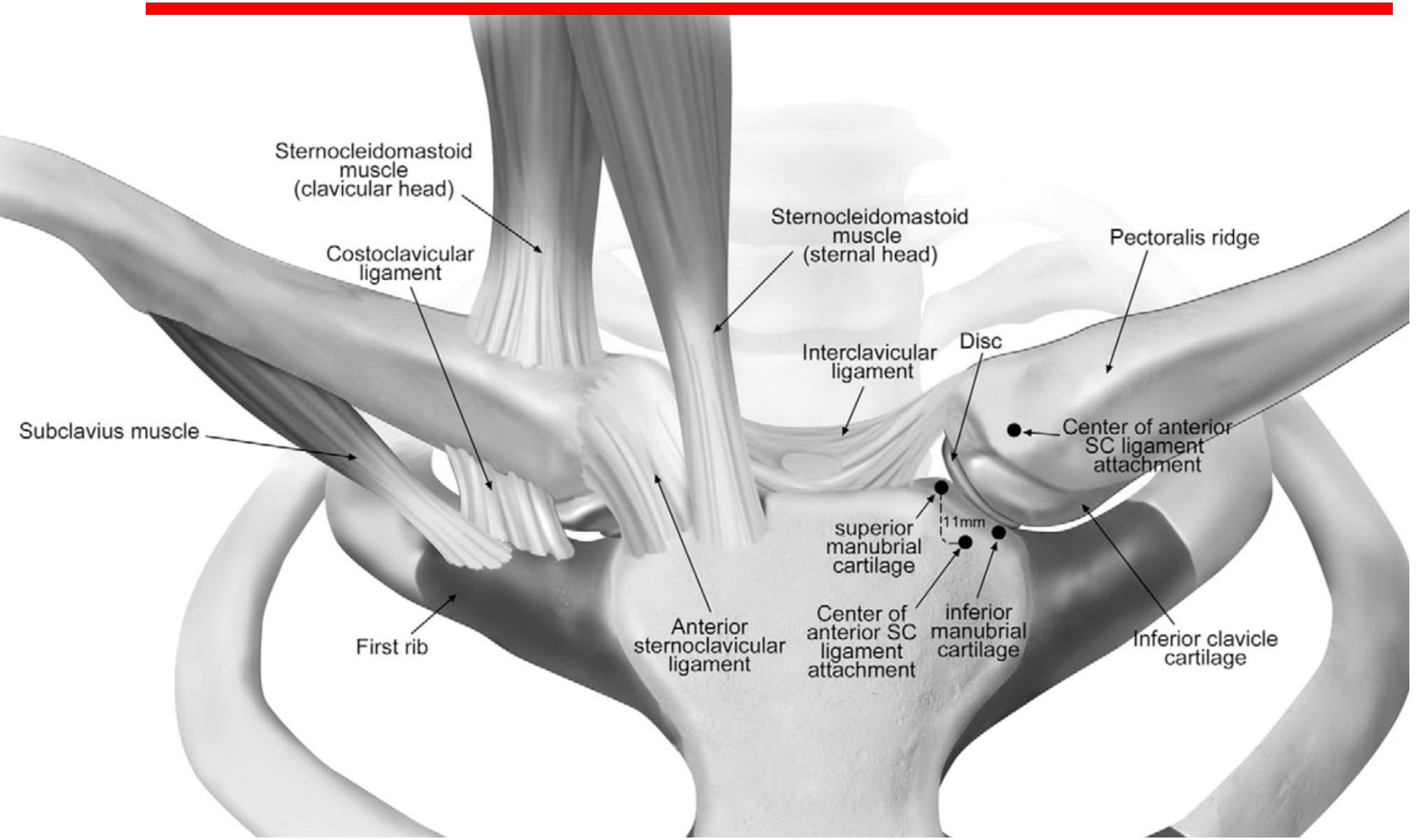

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a Olivier et al. Insights into Imaging (2022)

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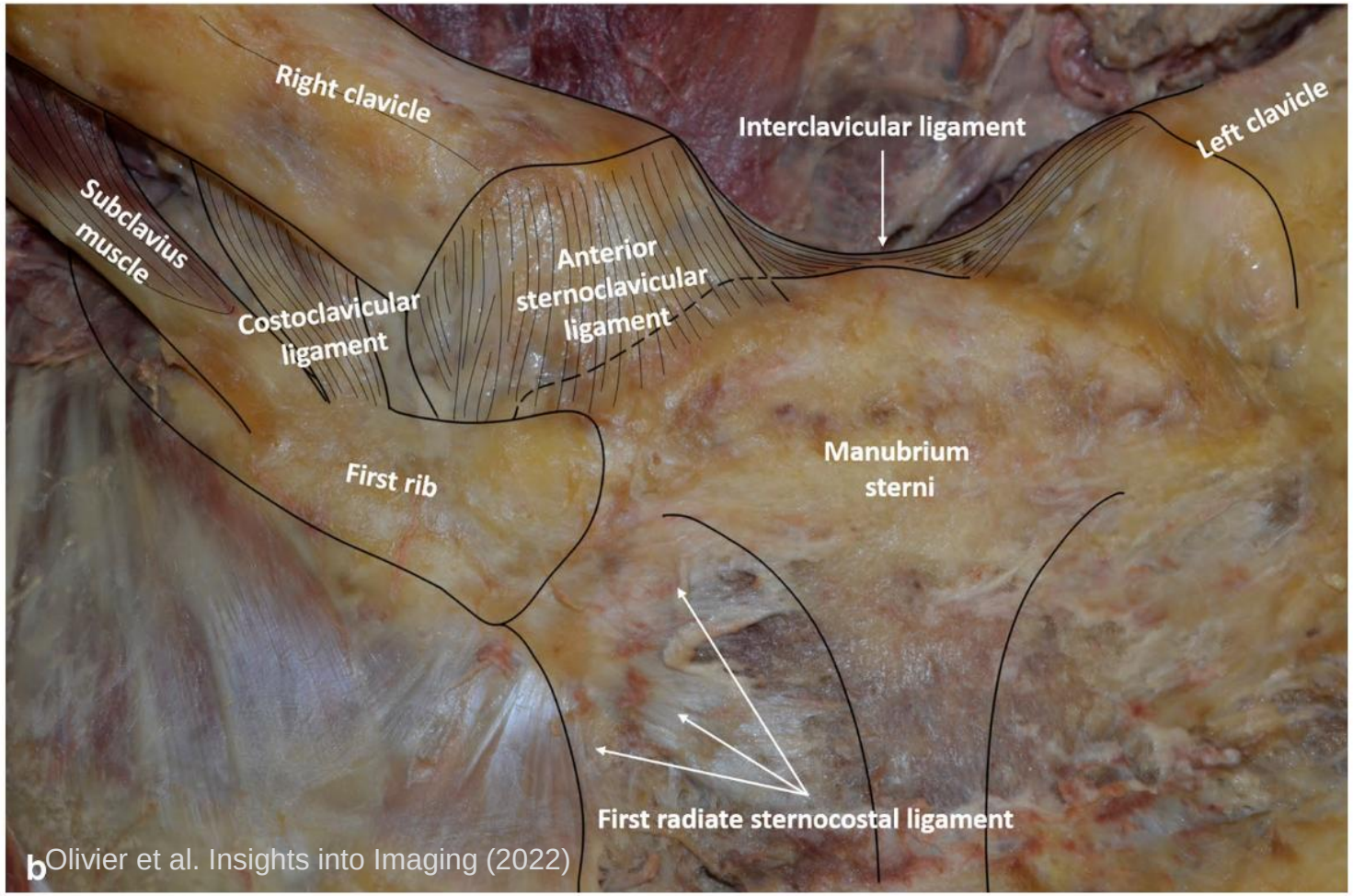

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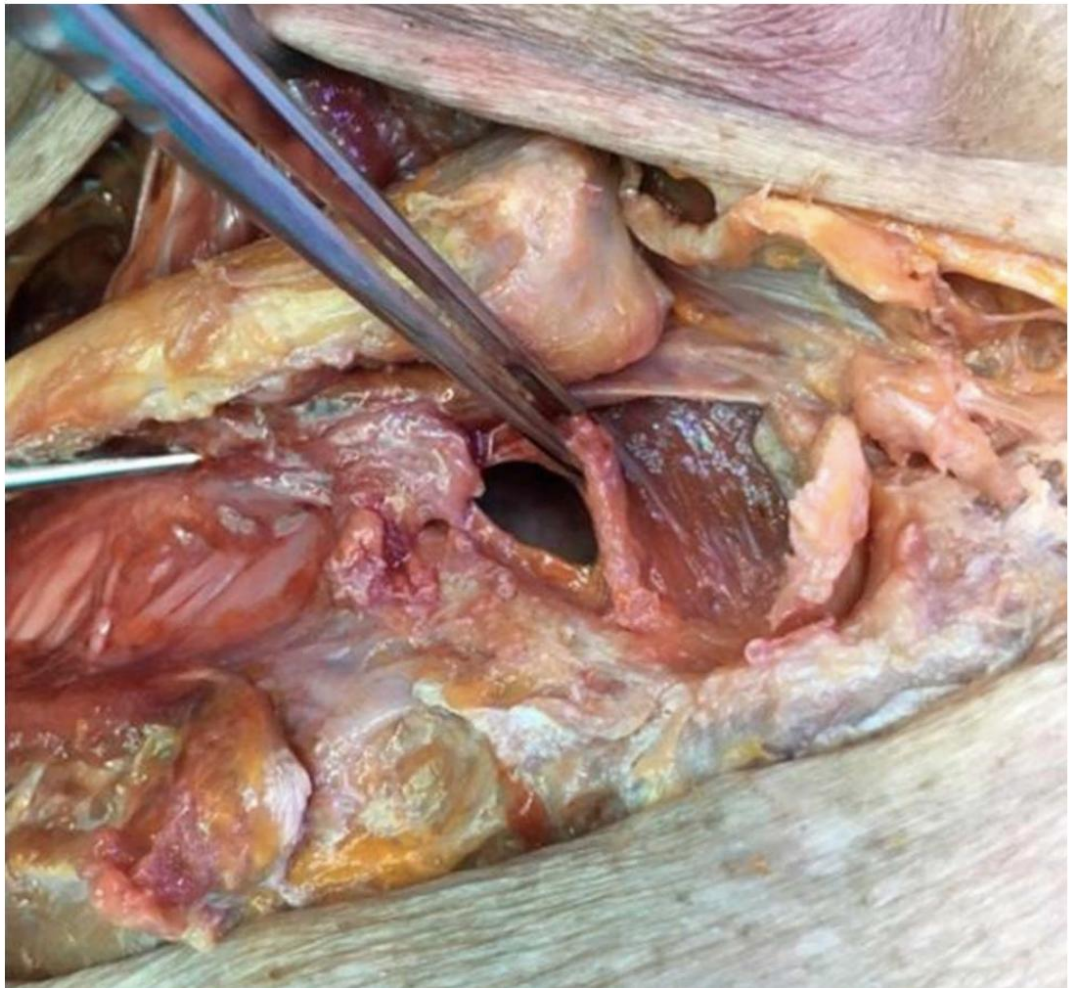
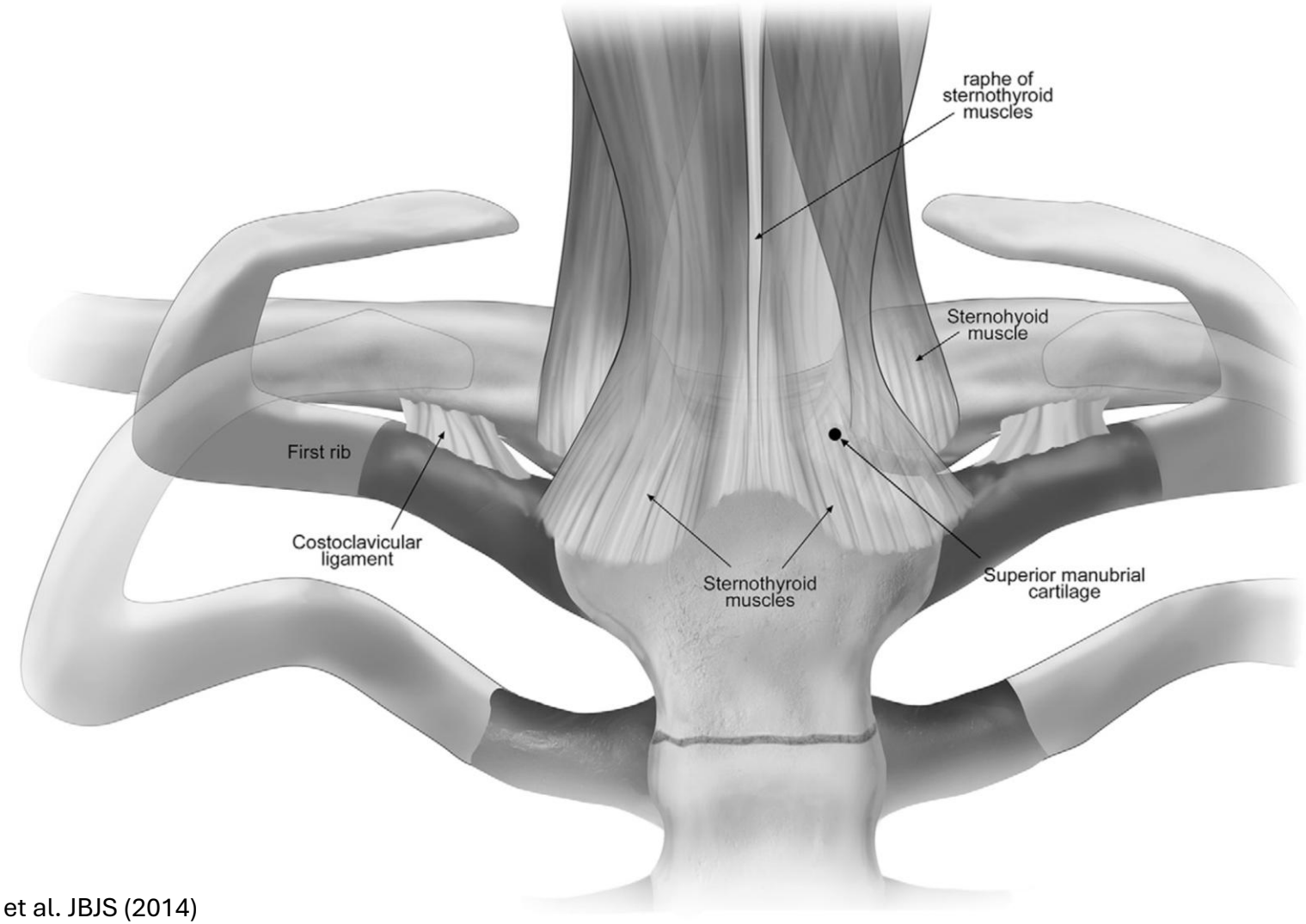
4. Musculature



Hesse et al. JOT (2023)

- Subclavius muscle
  - Separates posterior clavicle from great vessels

4. Musculature



- Posterior view of SC joint
- Sternothyroid and sternohyoid muscle

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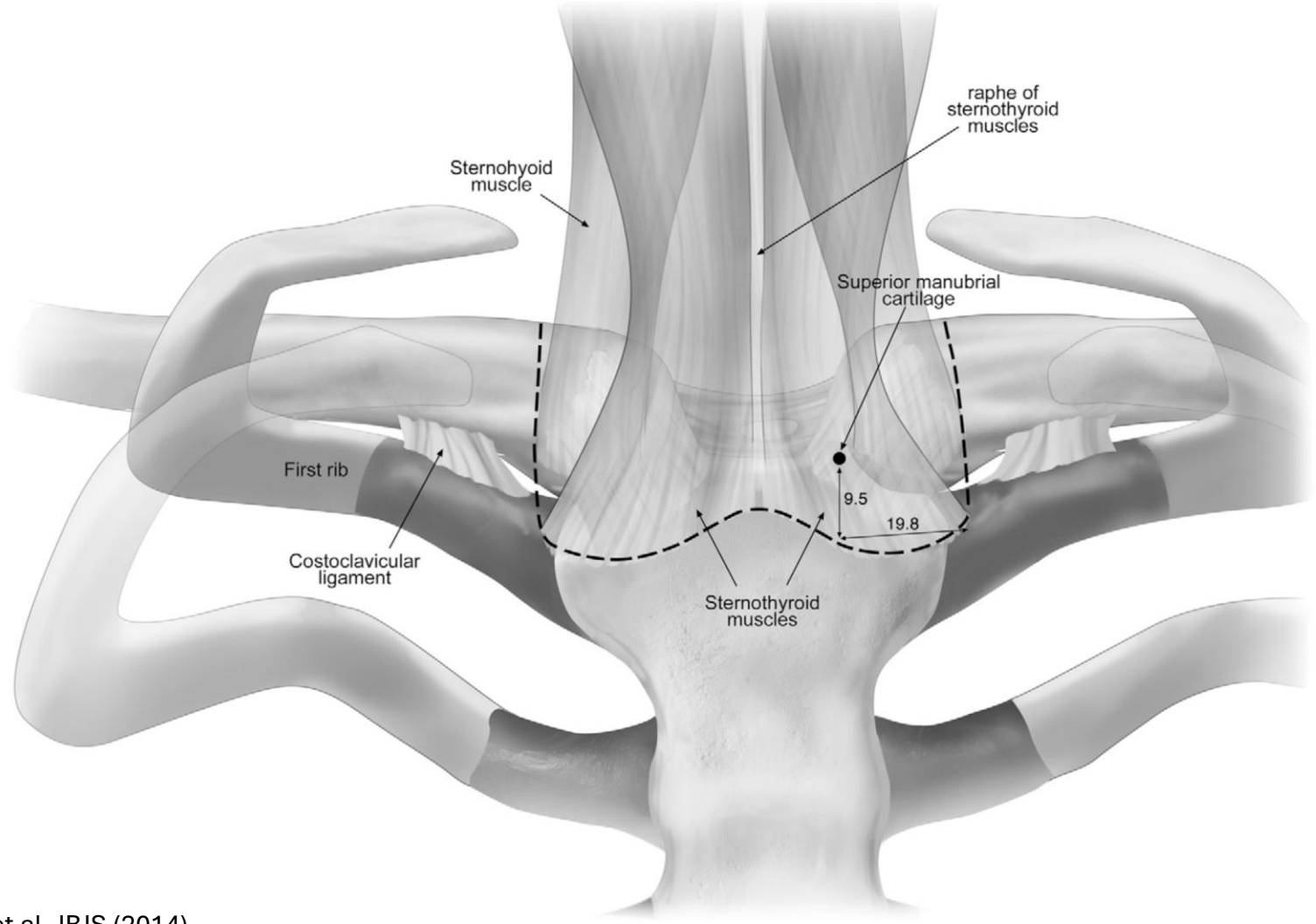
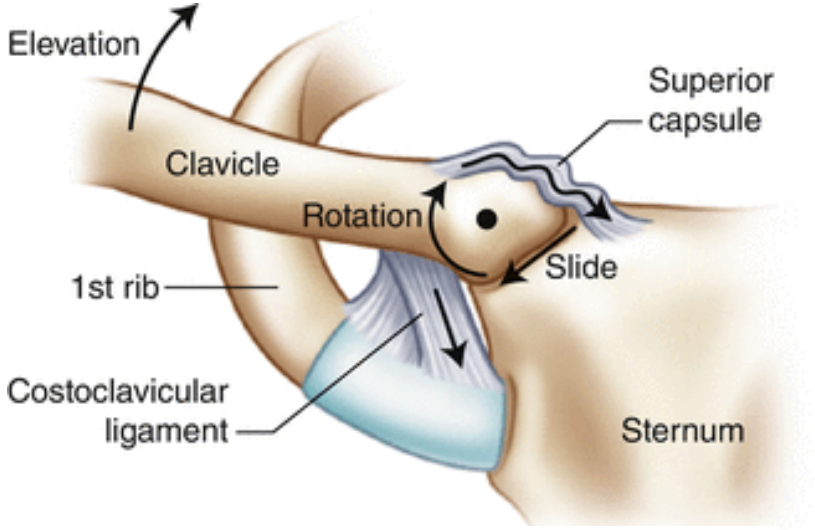
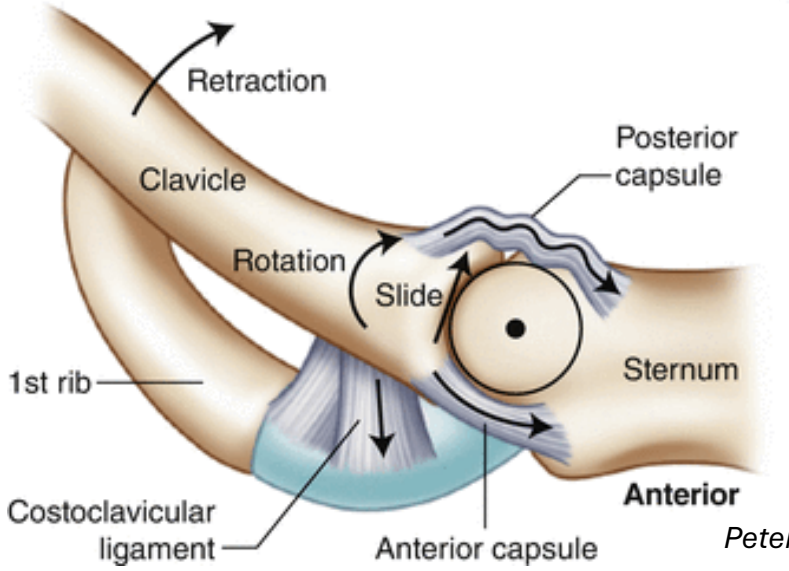


- Posterior view of SC joint
- Sternothyroid and sternohyoid muscle
  - *Anterior to mediastinal structures*

Lee et al. JBJS (2014)

5. Motion through the joint





Peter Millet – Musculoskeletal Key

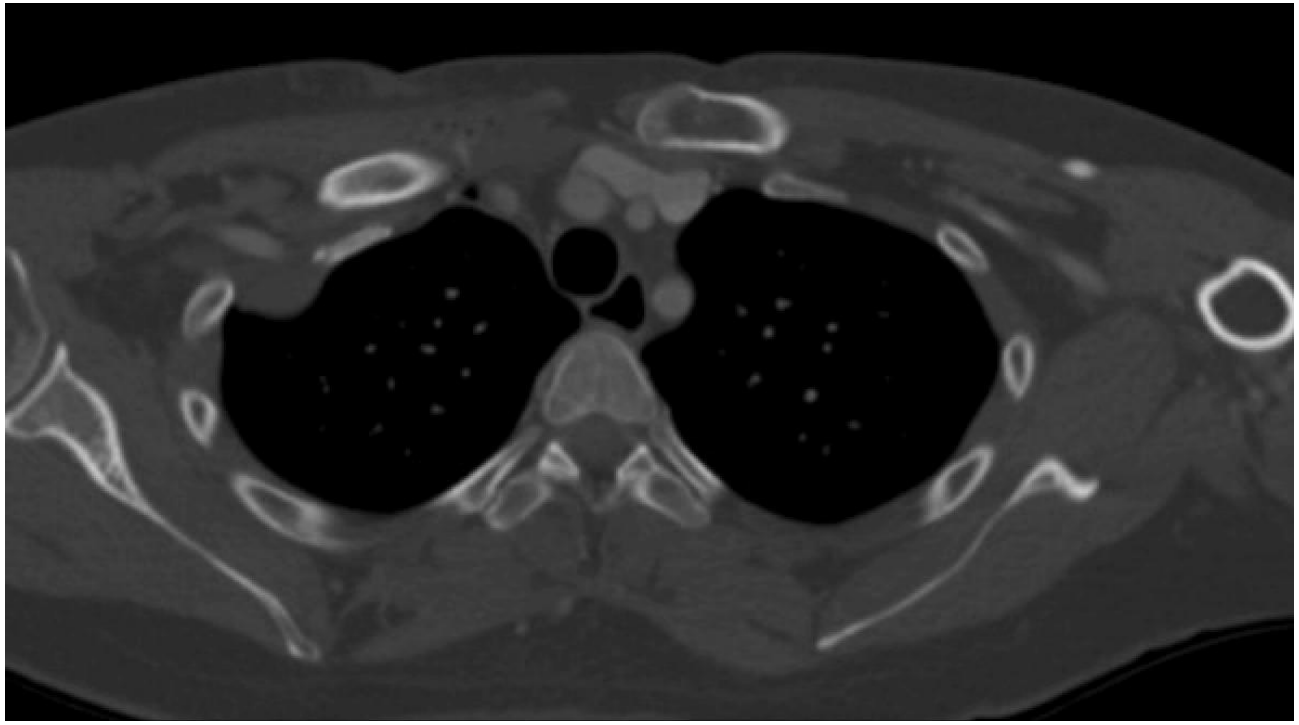
- Scapulothoracic movement occurs through the joint
  - ***Anteriorly/posteriorly*** *for clavicular protraction/retraction (up to 35 degrees)*
  - ***Superiorly/inferiorly*** *for elevation (up to 40 degrees)*
  - ***Rotation*** *of clavicle (up to 40 degrees along longitudinal axis)*
- Injury may limit:
  - Scapulothoracic motion
  - Affect AC joint motion
  - Arm elevation

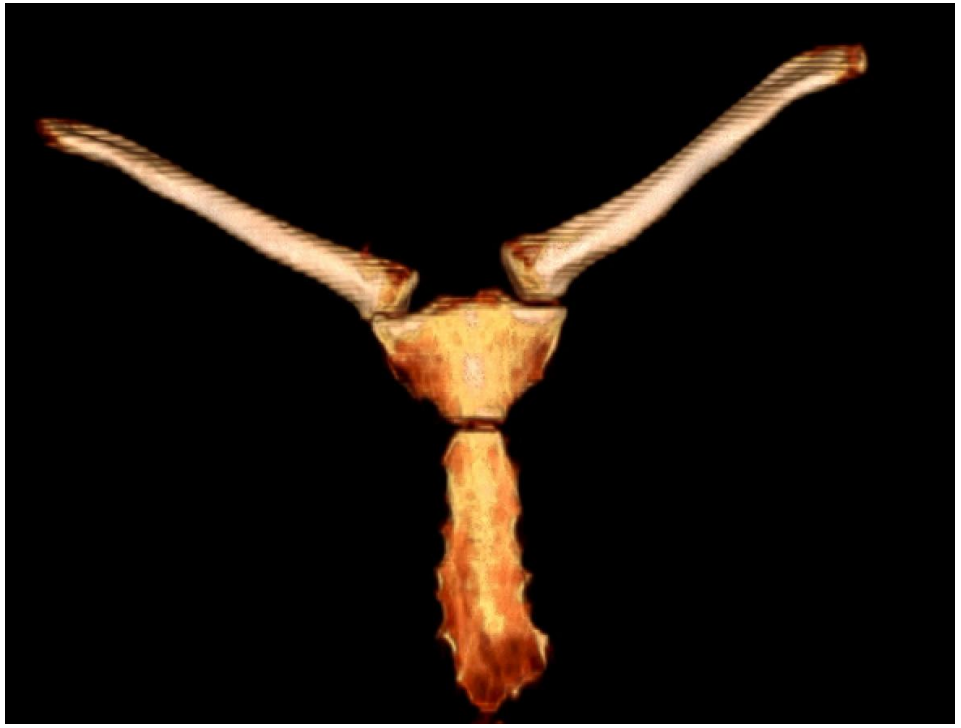
Hesse et al. JOT (2023)

Management of the Acute Dislocation

- Posterior
- Anterior

30F MVC





Posterior Dislocation

- Require urgent attention
- Assess for:
  - Dyspnea
  - Choking
  - Hoarseness
  - Neurologic symptoms (brachial plexus)
  - Weak pulses/venous congestion on ipsilateral arm
- Vascular work-up: CT angiogram

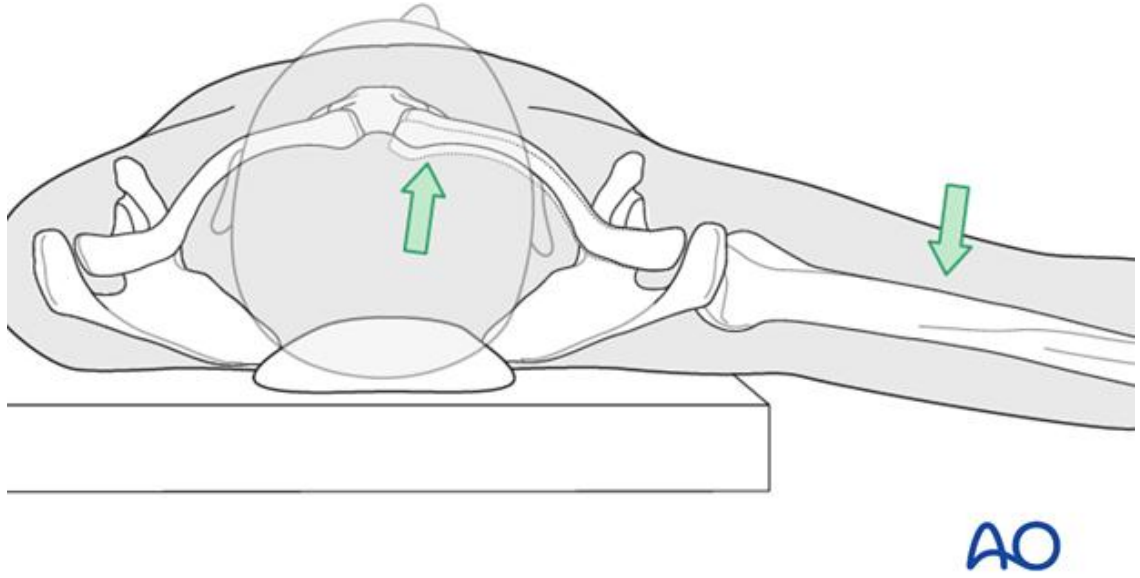
Posterior Dislocation

- Cardiothoracic back-up
- Full chest draping

Bonyun and Nauth. JOT (2023)

Posterior Dislocation

- Closed reduction may be attempted (more likely successful <48h)
  - Supine
  - Bolster under shoulder
  - Traction along arm
  - Shoulder retraction
  - May use sterile sharp towel clip along medial clavicle to grasp clavicle and aid reduction
- 38% success rate *(Groh et al. JSES 2011)*



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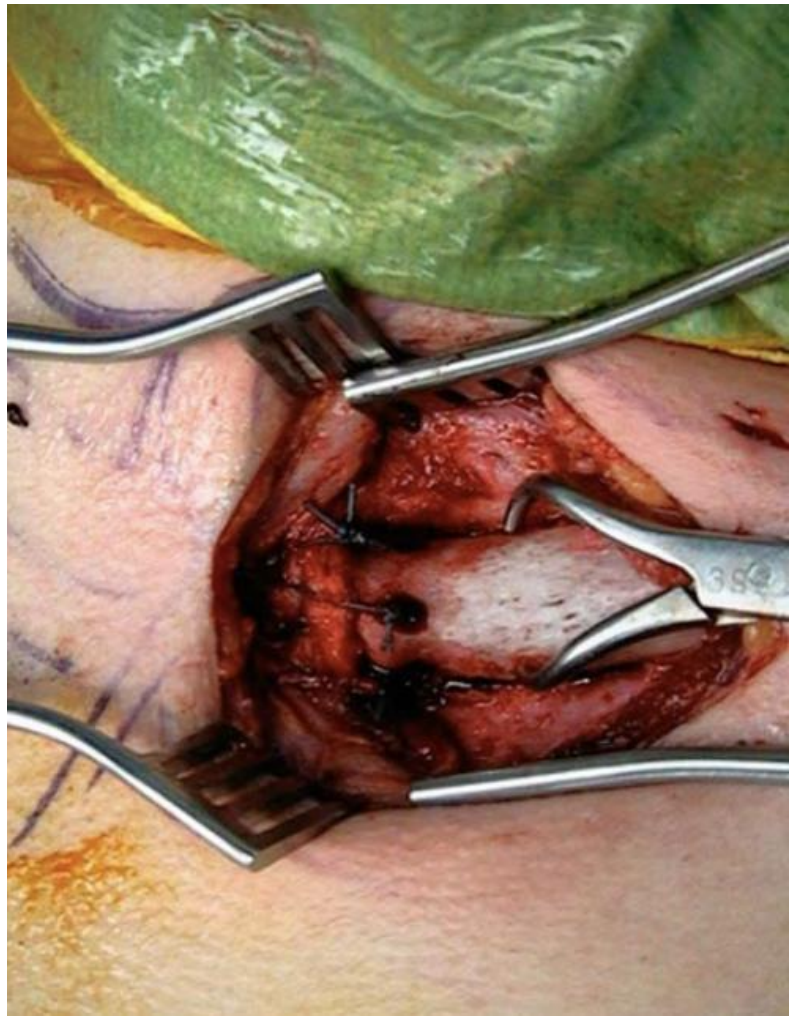
Hesse et al. JOT (2023)

Posterior Dislocation

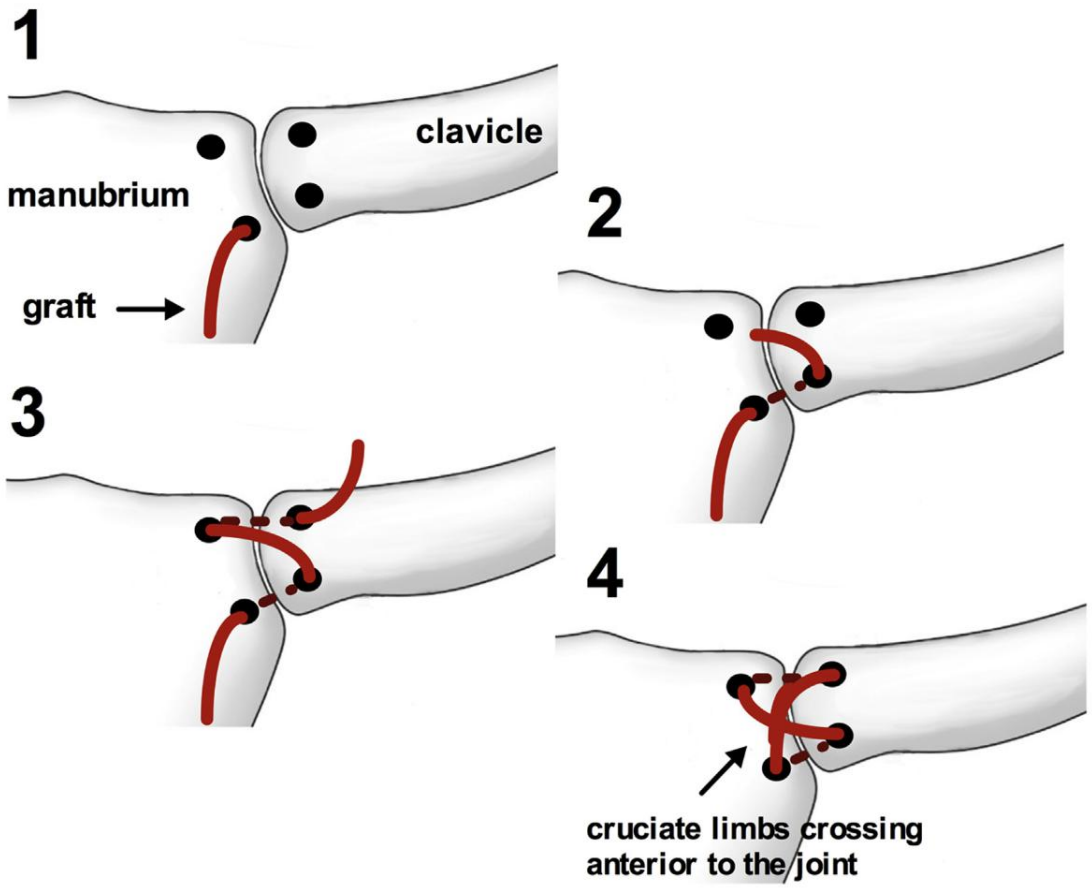
- If irreducible - Open reduction
  - Clamp medial clavicle



Hesse et al. JOT (2023)

Posterior Dislocation

- Many different stabilization options:
  - Transosseous suture fixation
    - Figure-of-eight
    - Fiberwire, mersilene tape
    - Suture-anchor



Wang et al. Arthroscopy Techniques (2017)

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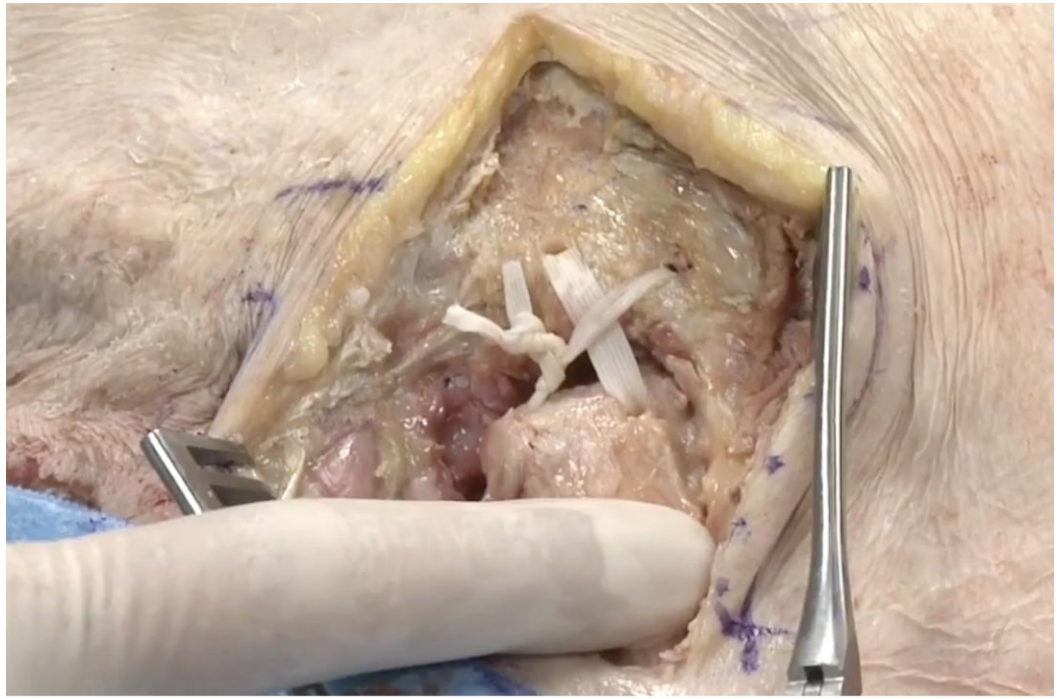

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Posterior Dislocation

- Many different stabilization options:
  - Allograft/autograft tendon reconstruction
    - If unstable or substantial ligament disruption
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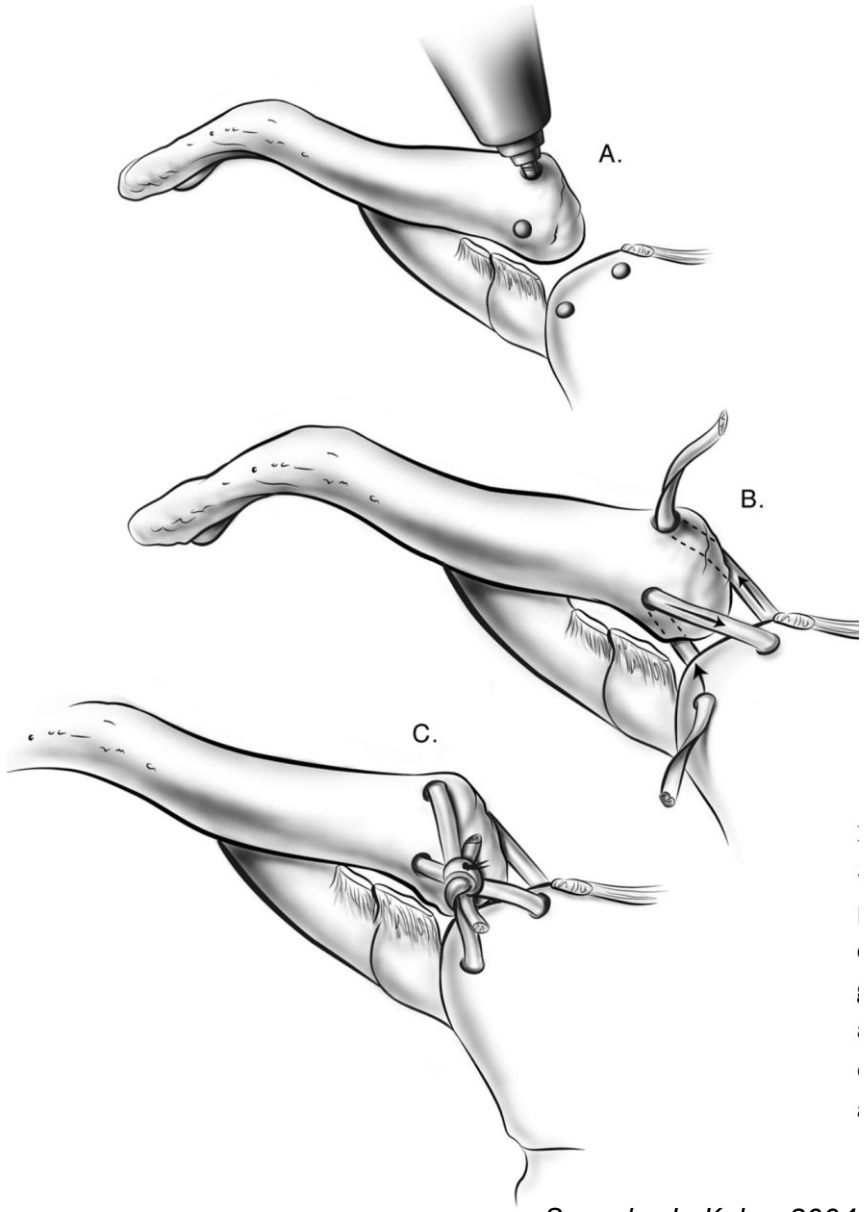

Spender Jr, Kuhn. 2004

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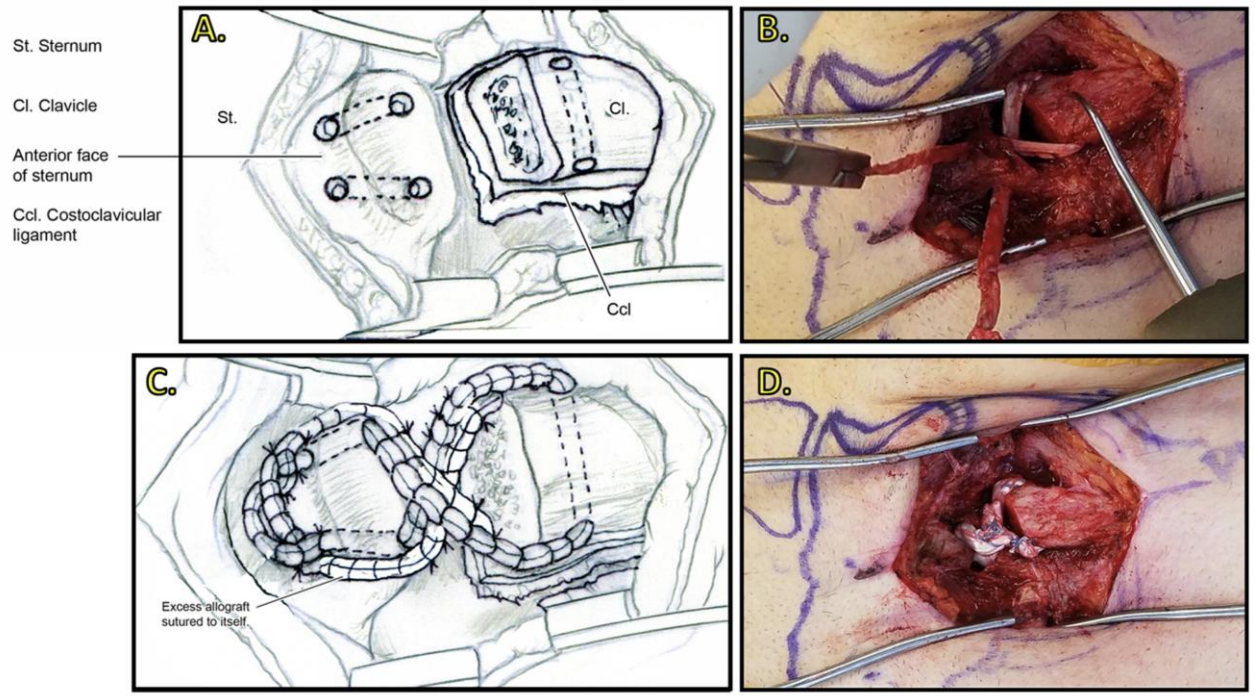

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BIOMECHANICAL ANALYSIS OF RECONSTRUCTIONS FOR STERNOCLAVICULAR JOINT INSTABILITY

BY EDWIN E. SPENCER JR., MD, AND JOHN E. KUHN, MD

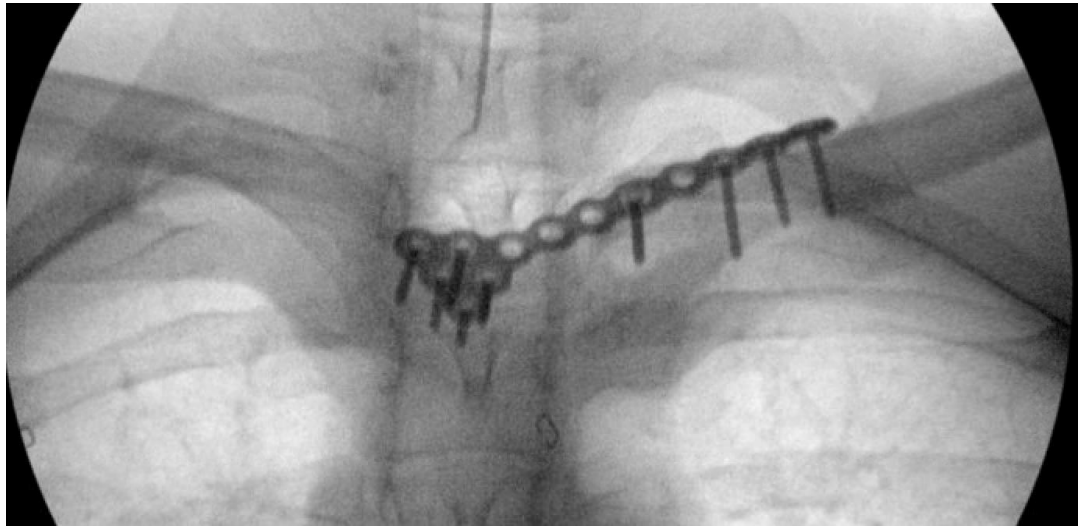
Investigation performed at the University of Michigan, Ann Arbor, Michigan

- 36 cadavers
- 3 reconstruction techniques:
  - Semi-tendinosus figure-of-eight
  - Intramedullary ligament reconstruction
  - Subclavius tendon reconstruction
- Determine stiffness with anterior and posterior translation

- **Semitendinosus figure-of-eight: Superior initial biomechanical properties**
  - Anterior translation stiffness: 230.3 ± 146.1 N
  - Posterior translation stiffness: 241.4 ± 49.7 N

Posterior Dislocation

- Many different stabilization options:
  - ORIF – plate/screw fixation
    - Planned removal?



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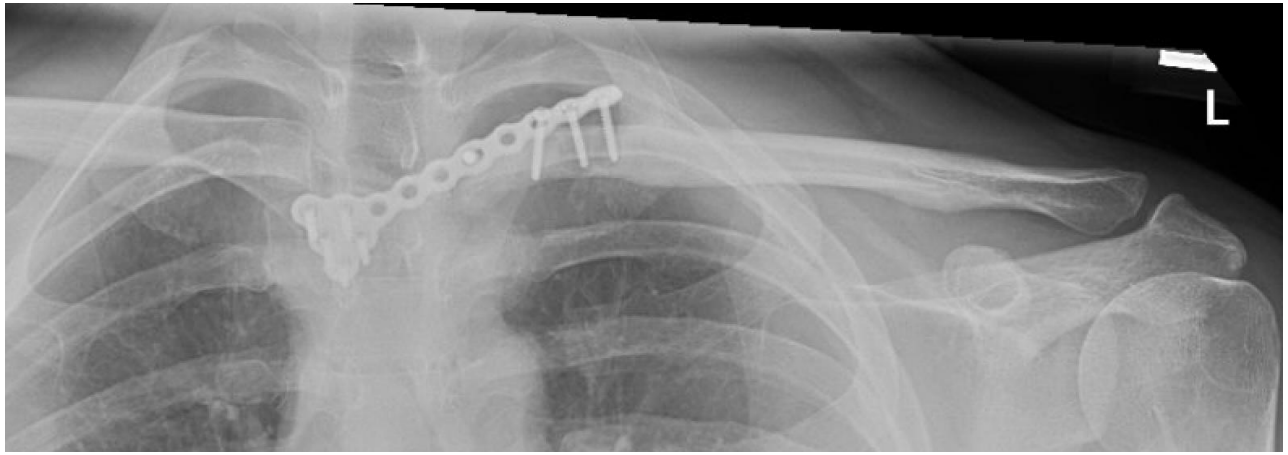

Posterior Dislocation

- **Outcomes**

Treatment of Sternoclavicular Joint Dislocations: A Systematic Review of 251 Dislocations in 24 Case Series

Ericka R. Glass, MD, James D. Thompson, BS, Peter A. Cole, MD, Trenton M. Gause II, BA, and Gregory T. Altman, MD

- All retrospective case series

Excellent/good:
DASH score <35
Constant score <80

TABLE 1. Functional Results by Treatment for Anterior and Posterior Dislocations

	Nonoperative: Excellent/Good	Closed Reduction: Excellent/Good	Open Reduction After Failed Closed Reduction: Excellent/Good	Open Reduction: Excellent/Good
Anterior	69% (36/52; 95%CI, 55–81)	85% (17/20)	80% (4/5)	75% (30/40; 95%CI, 59–87)
Posterior	N/A (0/0)	100% (41/41; 95%CI, 91–100)	88% (14/16)	91% (21/23)

N/A, not applicable.

80 posterior dislocations

Posterior Dislocation

- **Outcomes**

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TABLE 3. Functional Results for Acute and Chronic Dislocations

	Excellent/Good Results	Fair/Poor Results
Acute	87.5% (70/80; 95% CI, 78–94)	12.5% (10/80; 95% CI, 6–22)
Chronic	73% (52/71; 95% CI, 61–83)	27% (19/71; 95% CI, 17–39)

Posterior Dislocation

Clinical Outcomes and Complications Following Surgical Management of Traumatic Posterior Sternoclavicular Joint Dislocations

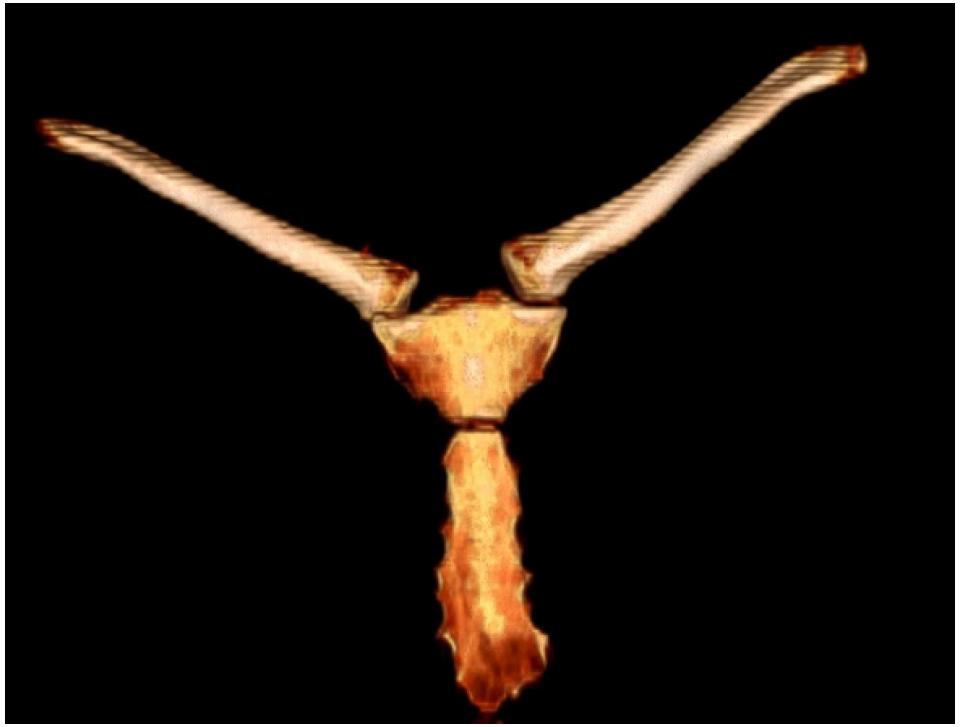
A Systematic Review

Joseph K. Kendal, MD
Katie Thomas, MD
Ian K.Y. Lo, MD, FRCSC
Aaron J. Bois, MD, MSc, FRCSC

Investigation performed at the Section of Orthopaedic Surgery, Department of Surgery, University of Calgary, Calgary, Alberta, Canada

- 108 cases of operatively managed posterior dislocations (40 studies)
- **Complication rate 16%**
  - Recurrent instability
  - Post-traumatic arthritis
  - Implant removal (ORIF)
  - No cases of neurovascular or mediastinal injury injury

30F MVC



Utku Kandemir MD

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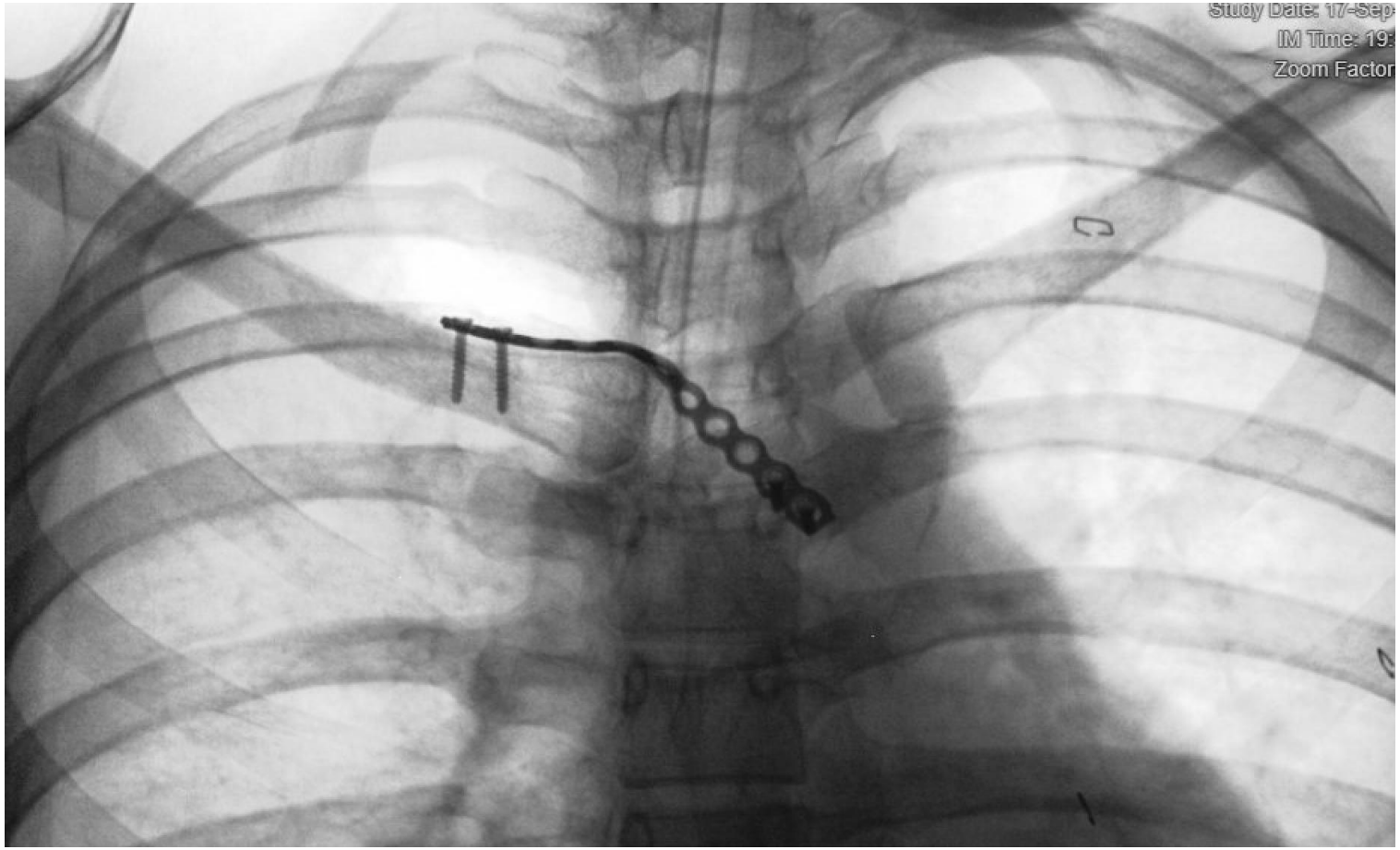

Utku Kandemir MD

- Open reduction
- Semitendinosus allograft reconstruction
- Suture tape augmentation
- Minifragment plate

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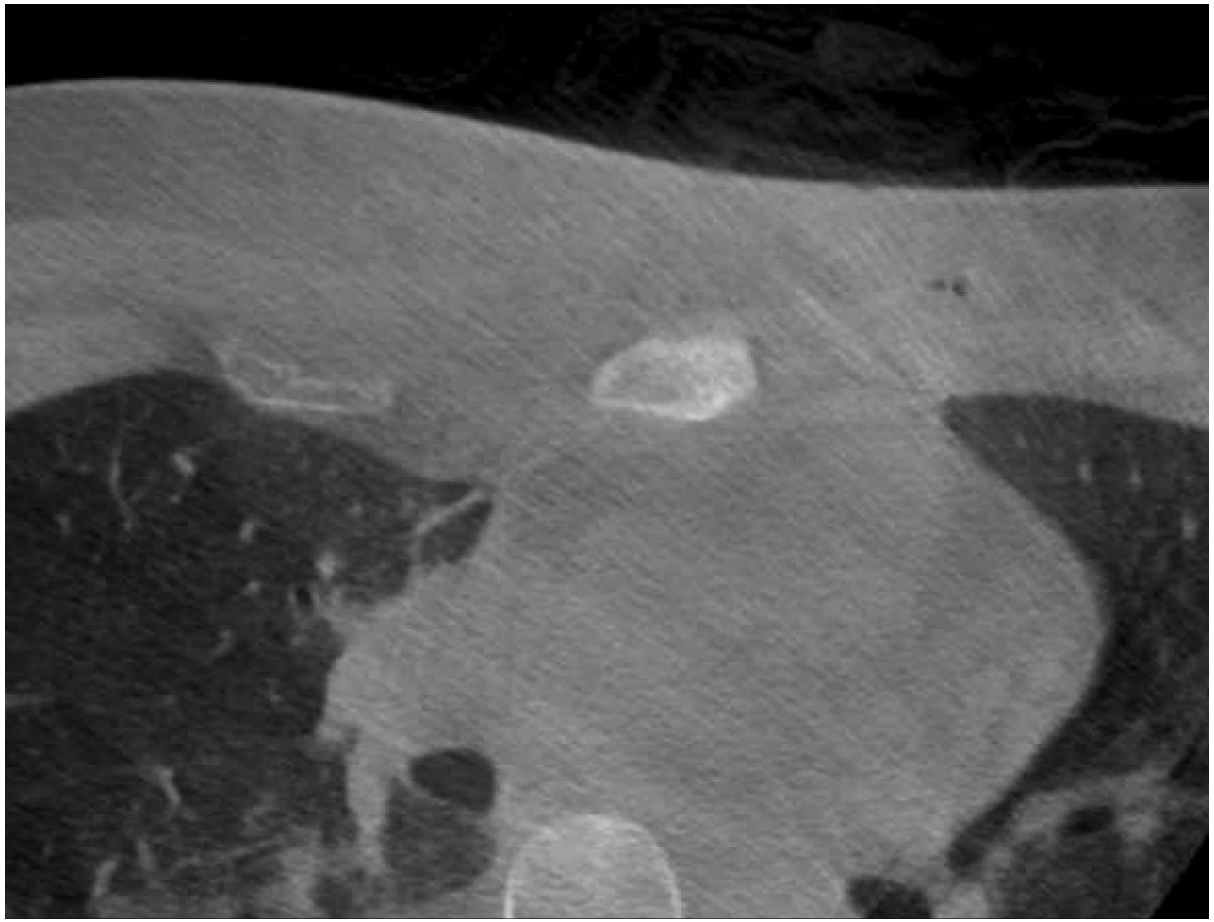
30F MVC



Postoperative:

- 0-2 weeks: Brace at all times, NWB
- 2-4 weeks: pendulum
- 4 weeks: gradual increase passive ROM
- 6 weeks: gradual increase PWB 5lbs , ROM, AAROM, AROM, wean off brace

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30F MVC

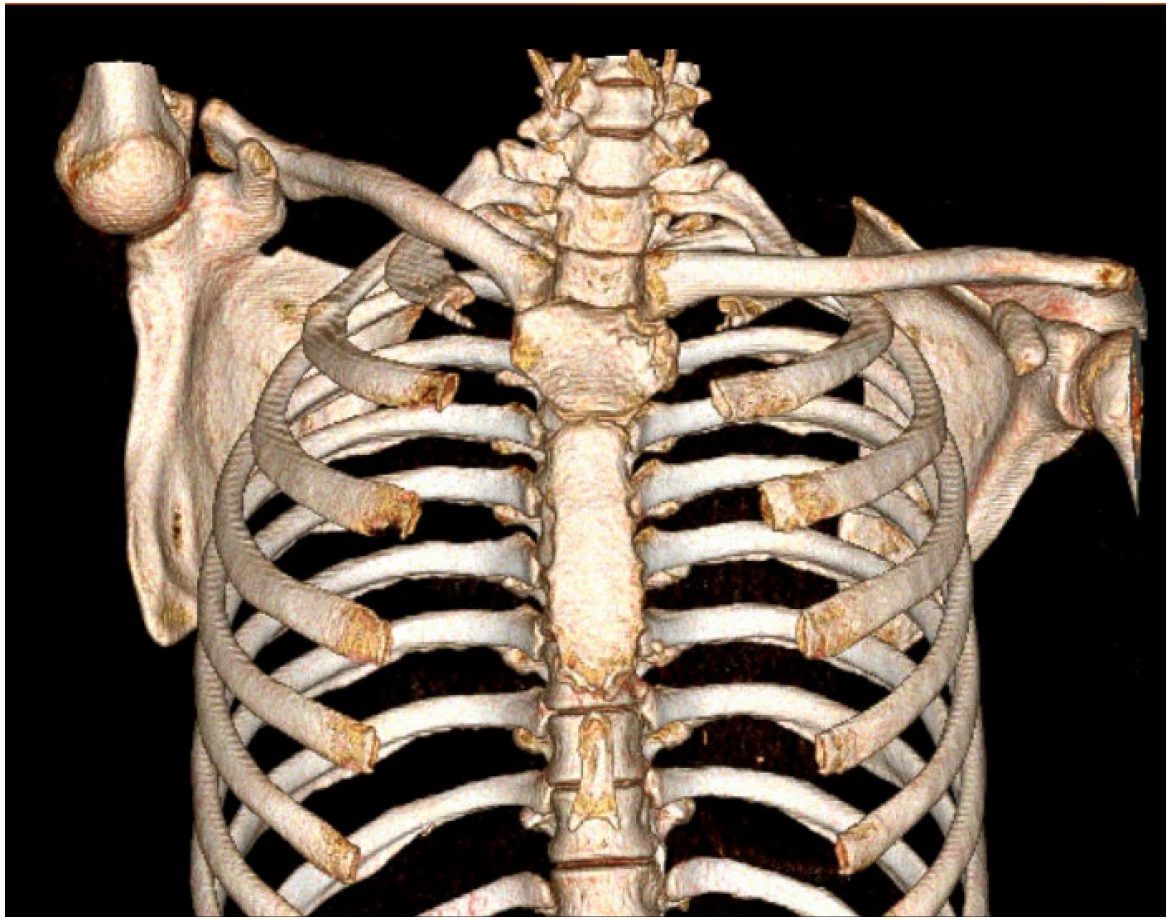
7 months:

- Doing well
- Minimal pain
- No functional restrictions

Anterior Dislocation

20M MVC

Left anterior SC joint dislocation



Utku Kandemir MD

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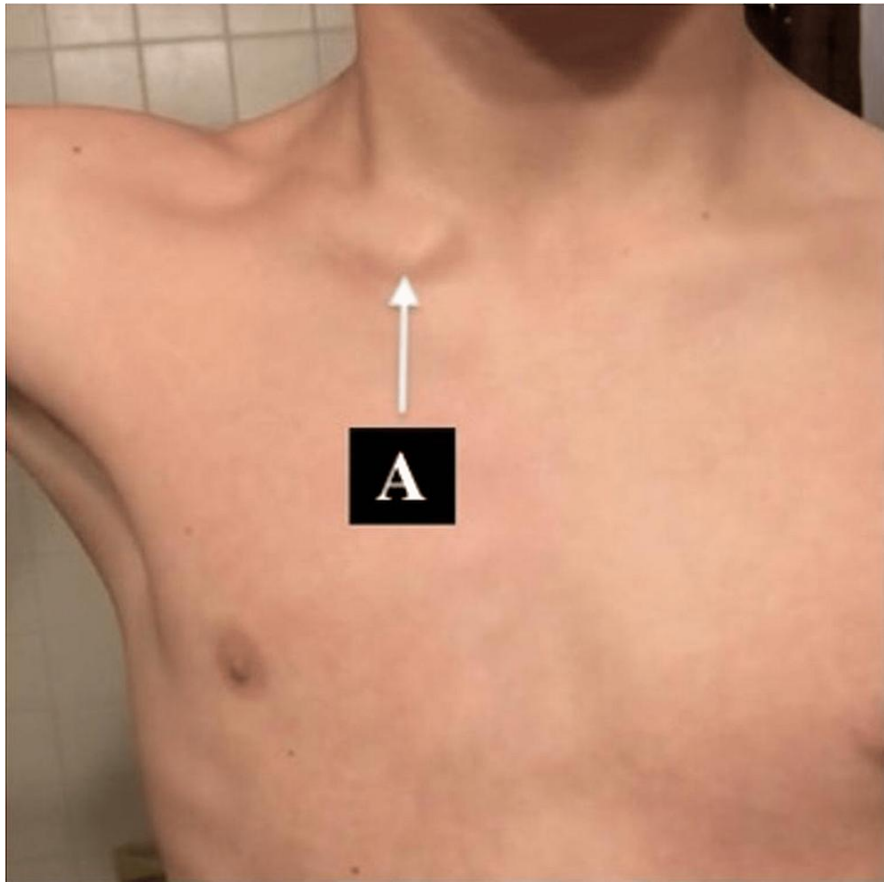
Anterior Dislocation

- Typically treated conservatively
- Closed reduction may be attempted *(often difficult to maintain reduction)*
  - Sedation or GA
  - Supine
  - Bolster between shoulders
  - Traction on arm in 90 degrees abduction
  - Direct posterior pressure on medial clavicle
  - Sling/figure-8



Romeo et al. Cureus (2023)

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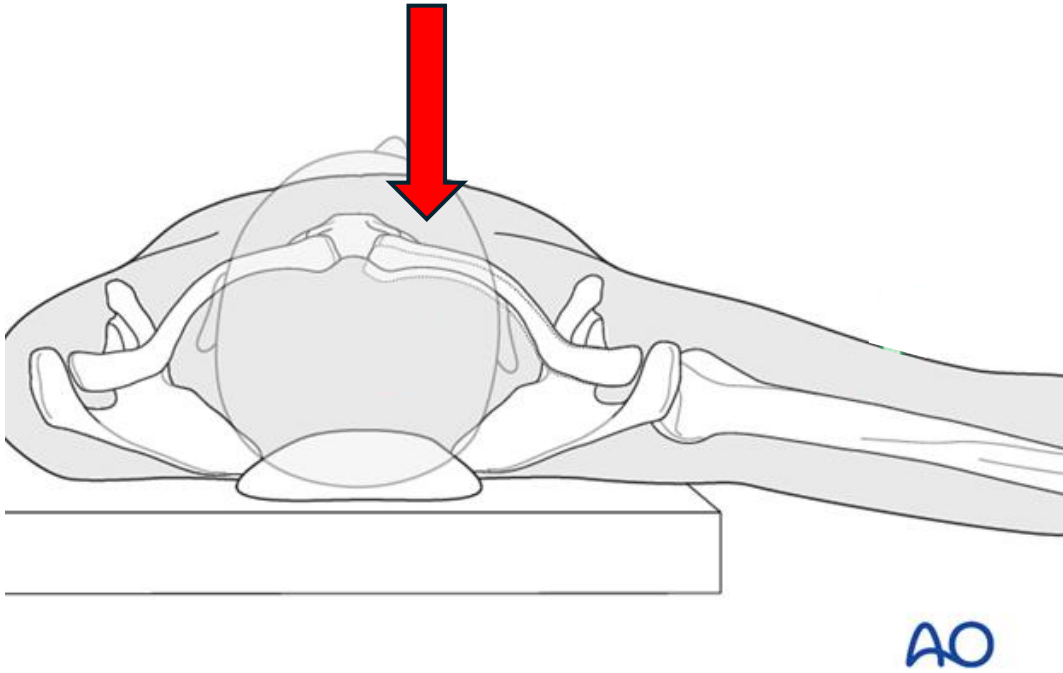

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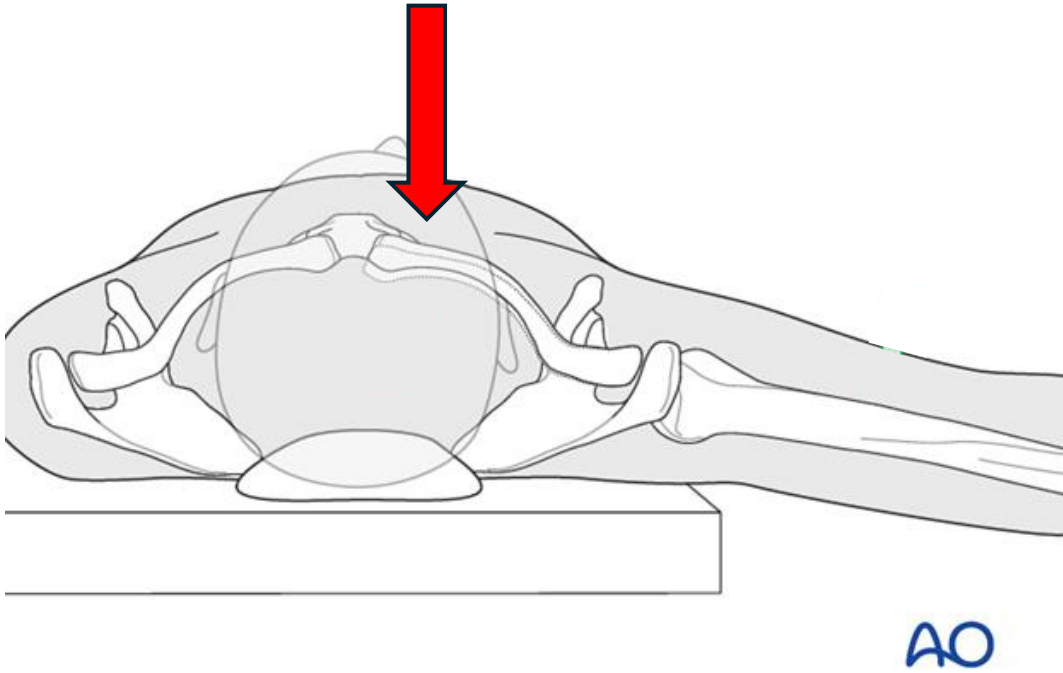

- If the patient becomes symptomatic (prominence, persistent instability), surgical intervention can be considered

Anterior Dislocation

Anterior Sternoclavicular Dislocation: A Long-Term Follow-Up Study

JOT 1990

Koert P. de Jong and Dinesh M. K. S. Kaulesar Sukul

Department of Traumatology/General Surgery, University Hospital Rotterdam-Dijkzigt, Rotterdam, The Netherlands

TABLE 1. *Data on patients with sternoclavicular dislocations and the results of treatment*

Case no.	Age (yrs)	Sex	Other injuries	Shoulder injuries	Treatment	Interval (months)	Score
1	66	F	minor	—	sling	12	12
2	25	F	CF + TH	—	analg.	—	—
3[a]	17	F	—	—	—	180	12
4[b]	22	M	CF + LB	AVP	analg.	96	7
5	31	M	—	cl/sc	tape	21	11
6	63	M	TH + VERT	—	analg.	63	10
7	32	M	—	—	sling	55	12
8	18	F	CF + PELVIS	—	analg.	100	12
9	35	F	CF + TH	—	analg.	—	—
10	28	F	TH	—	analg.	79	9
11	44	M	CF + TH	—	analg.	—	—
12	24	M	CF + TH	—	sling	10	12
13	66	M	CF + TH + LB	cl/sc sh.disloc.	analg.	16	6

CF, craniofacial trauma; TH, thoracic trauma; analg., analgesics; LB, long bone fracture; AVP, brachial artery, vein, and plexus injury; cl/sc, clavicula/scapula fracture; VERT, vertebral fracture; PELVIS, pelvic fracture; sh.disloc., shoulder dislocation.

[a] First hospital admission 18 months after injury.

[b] Associated brachial artery, vein, and plexus injury responsible for bad function of arm and shoulder.

- 13 pts: 10 with f/u data
- Mean f/u: 63 months (5.25 years)
- Functional outcome:
  - Subjective result, pain, displacement, strength of abduction, ROM
    - Good: 10-12
    - Fair: 7-9
    - Poor <7
  - Study results:
    - 7/10 pts- good outcome
    - 2/10 pts - fair outcome
    - 1/10 pts – poor outcome
- 7 patients: no complaints about SC joint

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Anterior Dislocation

Treatment of Sternoclavicular Joint Dislocations: A Systematic Review of 251 Dislocations in 24 Case Series

Ericka R. Glass, MD, James D. Thompson, BS, Peter A. Cole, MD, Trenton M. Gause II, BA, and Gregory T. Altman, MD

TABLE 1. Functional Results by Treatment for Anterior and Posterior Dislocations

	Nonoperative: Excellent/Good	Closed Reduction: Excellent/Good	Open Reduction After Failed Closed Reduction: Excellent/Good	Open Reduction: Excellent/Good
Anterior	69% (36/52; 95%CI, 55–81)	85% (17/20)	80% (4/5)	75% (30/40; 95%CI, 59–87)
Posterior	N/A (0/0)	100% (41/41; 95%CI, 91–100)	88% (14/16)	91% (21/23)

N/A, not applicable.

- 117 anterior dislocations
- Most common treatment – non-operative
- Excellent / good results achieved with nonoperative tx in 69% of patients

Excellent/good:
DASH score <35
Constant score <80

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Anterior Dislocation

Sternoclavicular Joint Dislocation: A Systematic Review and Meta-analysis

Haley Sernandez, MS and John Riehl, MD†*

(*J Orthop Trauma* 2019;33:e251–e255)

- 38 articles (No Level I, II, or III studies)
- Non-reduced anterior dislocation: **38-42% complication rate**:
  - Persistent pain
  - Decreased functionality
  - Post-traumatic arthritis
  - Cosmetic deformities
  - Inability to return to sports
- Recommendation:
  - In young healthy individuals with an anterior SC joint dislocation, consider closed reduction (if failed, open reduction)

Summary – Management of the Acute Dislocation

- Don’t miss an SC dislocation!
  - CT, (assess mediastinal structures)
  - Possible physeal injury if <25yo

Summary – Management of the Acute Dislocation

- **Anterior dislocation:**
  - Typically treated conservatively
  - Can consider closed reduction if within 48 hours *(can be difficult to maintain)*
  - Surgical intervention can be considered if the patient becomes symptomatic (prominence, persistent instability)
    - ?Consider acute stabilization in young, athletic individuals

Summary – Management of the Acute Dislocation

- **Posterior dislocation:**
  - Closed or open reduction
  - Should be done in the operating room
    - Vascular/Cardiothoracic surgeon on standby, drape chest
  - Many open stabilization techniques:
    - Transosseous suture fixation (figure-of-eight)
    - Allograft/autograft ligament reconstruction if unstable or substantial ligament disruption
    - Medial clavicle articular resection (with stabilization) if articular degeneration
    - Plate/screw, hook plate – implant removal

Thank you!

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Sternoclavicular Joint Injuries: Management of the Acute Dislocation

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