Shoulder Injuries In The Athlete

John R. Tuttle, MD, MS

Carilion Clinic Sports Medicine

August 21, 2022

CARILION CLINIC

Objectives

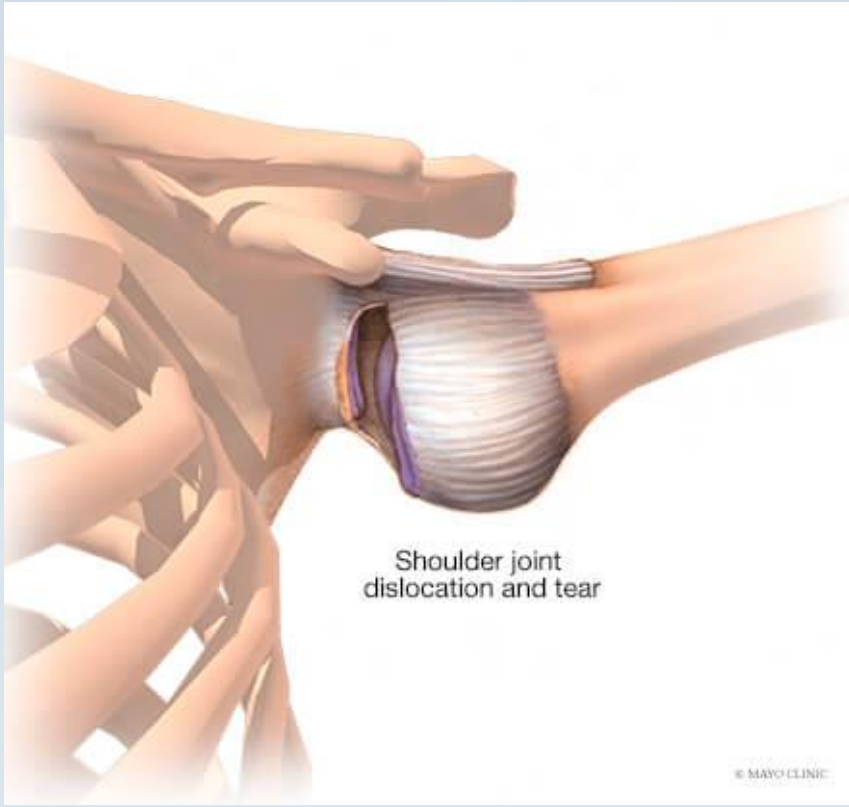
- Identify emergent and common shoulder injuries in athletes
- Make the Diagnosis
- Sideline management
- Return to play timeline

Outline

- Shoulder Dislocation
- AC Joint Separation
- SC Joint Dislocation
- Clavicle Fracture
- Stinger

Outline

- **Shoulder Dislocation**
- AC Joint Separation
- SC joint dislocation
- Clavicle fracture
- Stinger



Shoulder Dislocation

Incidence

- Glenohumeral Joint is the most common joint dislocation in sports (Benjamin) – 54.9% of HS sports dislocations (Skelley)
- Most common direction: anterior inferior (96%) (Walton)
  - Football is a significant contributor of subluxation events (71%) amongst male college athletes (Trojan)

Shoulder Dislocation

Mechanism

- HYPERABDUCTION + EXTERNAL ROTATION w/ elbow extended + additional hyperabduction + external rotation force → humerus slides ANTERIORLY over the ANTERIOR rim of the glenoid, often slightly inferior.

Shoulder Dislocation

Presentation

- Shoulder held in ABDUCTED, EXTERNALLY ROTATED position
- Humeral head and acromion are typically prominent

Shoulder Dislocation

On Field Management

- Evaluate pulse, sensation, and for palpable fractures
- Remove from sport
- Rapid reduction (early to prevent muscle spasm)
- Sling for short period (3-10 days) (Owens)
- Ice

Shoulder Dislocation

Reduction Techniques

- **Countertraction technique**
  - Utilize a towel around torso as countertraction as provider creates longitudinal traction with progressive abduction
- **chair method**
  - Athlete sits in chair, supinate forearm and grab wrist, pull traction, have athlete stand up

Skelley et al.

Schupp et al.

Shoulder Dislocation

Reduction Techniques

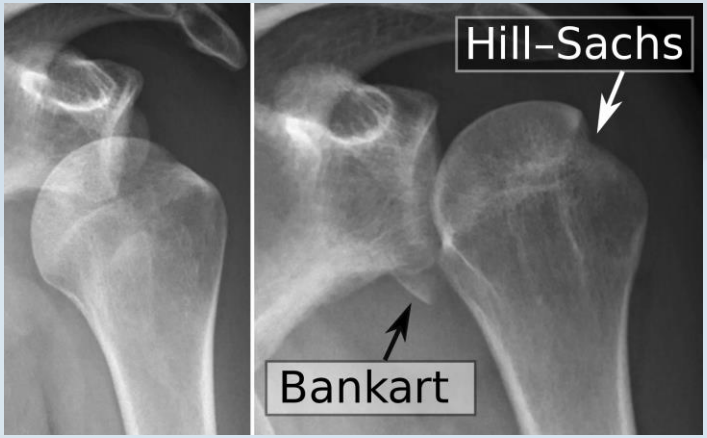
- **Milch Method**
  - Grab forearm with one hand, place thumb of opposite hand on humeral head. Abduct arm to 90 while stabilizing humeral head, pull traction on arm and reduce humeral head with thumb

Schupp et al.

Shoulder Dislocation

Hospital management

- XR (true AP, axillary lateral)
- If unable to obtain on field reduction, sedated reduction done
- Eval reduction AND for Bankart/ Hill-Sachs lesions
  - Seen at >90% incidence (Watson)



Shoulder Dislocation

Return to Play

- Rehabilitation ~ 2-3 weeks (average) (Buss)
- Criteria: Full strength / ROM / No pain
- 73% of NCAA athletes able to RTP 5 days following instability episode (Dickens)

Shoulder Dislocation

When to consider surgery

- 2 categories of criteria (Watson)
  - Absolute:
    - Rotator cuff tear
    - Glenoid or humeral head osseous defect >25%
    - Proximal humerus fx requiring surgery
    - Irreducible dislocation
    - Interposed tissue or nonconcentric reduction
    - Inability to perform sport-specific drills without instability
  - Relative:
    - Recurrent dislocations
    - Overhead or throwing athletes
    - Contact sport athletes
    - Injury near end of season
    - Age<20 years

Outline

- Shoulder Dislocation
- **AC Joint Separation**
- SC joint dislocation
- Clavicle fracture
- Stinger

AC Joint Separation

Incidence

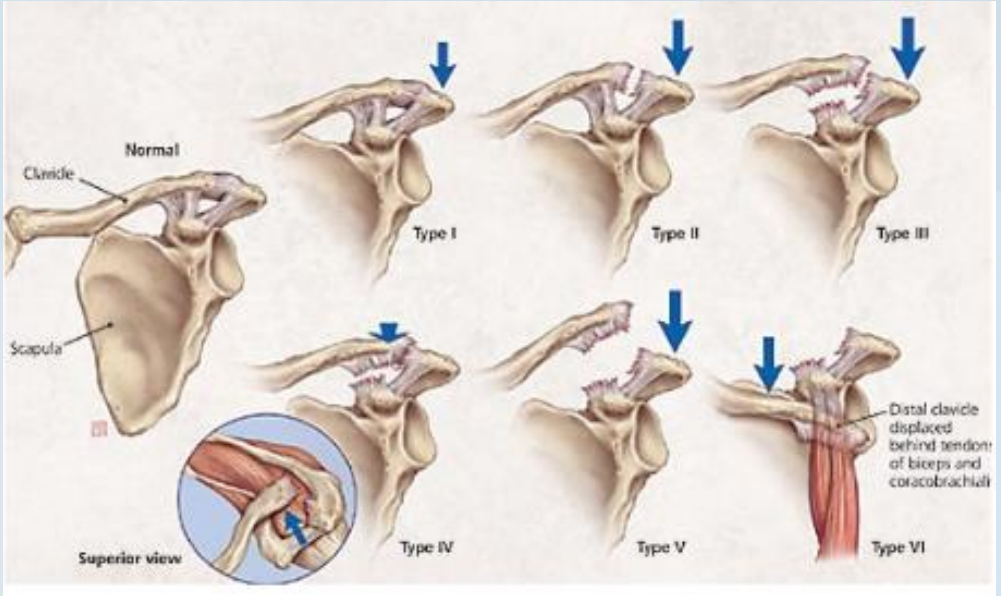
- Most common shoulder injury in contact sports

Mechanism

- Direct hit / fall on apex of shoulder

Symptoms

- Tenderness (+/- swelling / deformity) at AC joint, +/- painful ROM



AC Joint Separation

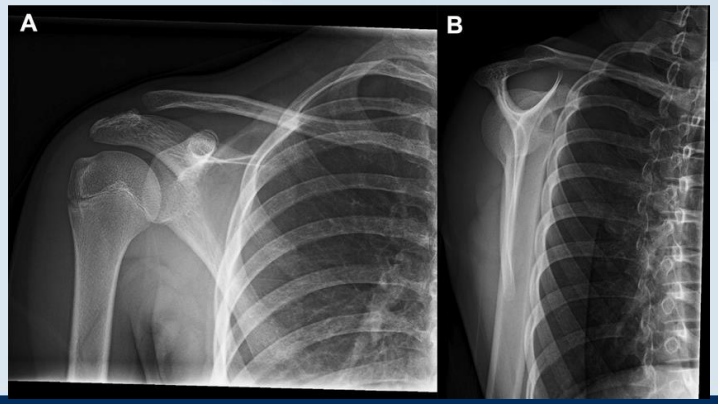
On Field Management

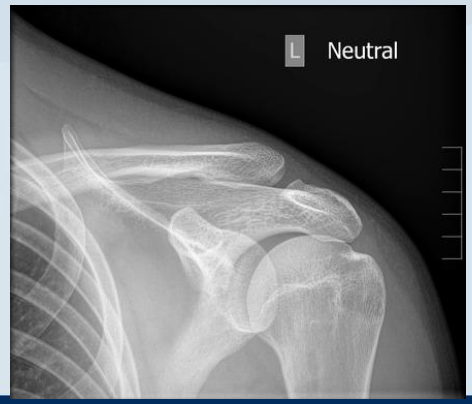
- Treatment / Return To Play
  - Evaluate for fracture / high grade separation?
  - If no …
    - Consider RTP (full strength / ROM)
    - At high level, consider AC joint injection (anesthetic only)

AC Joint Separation

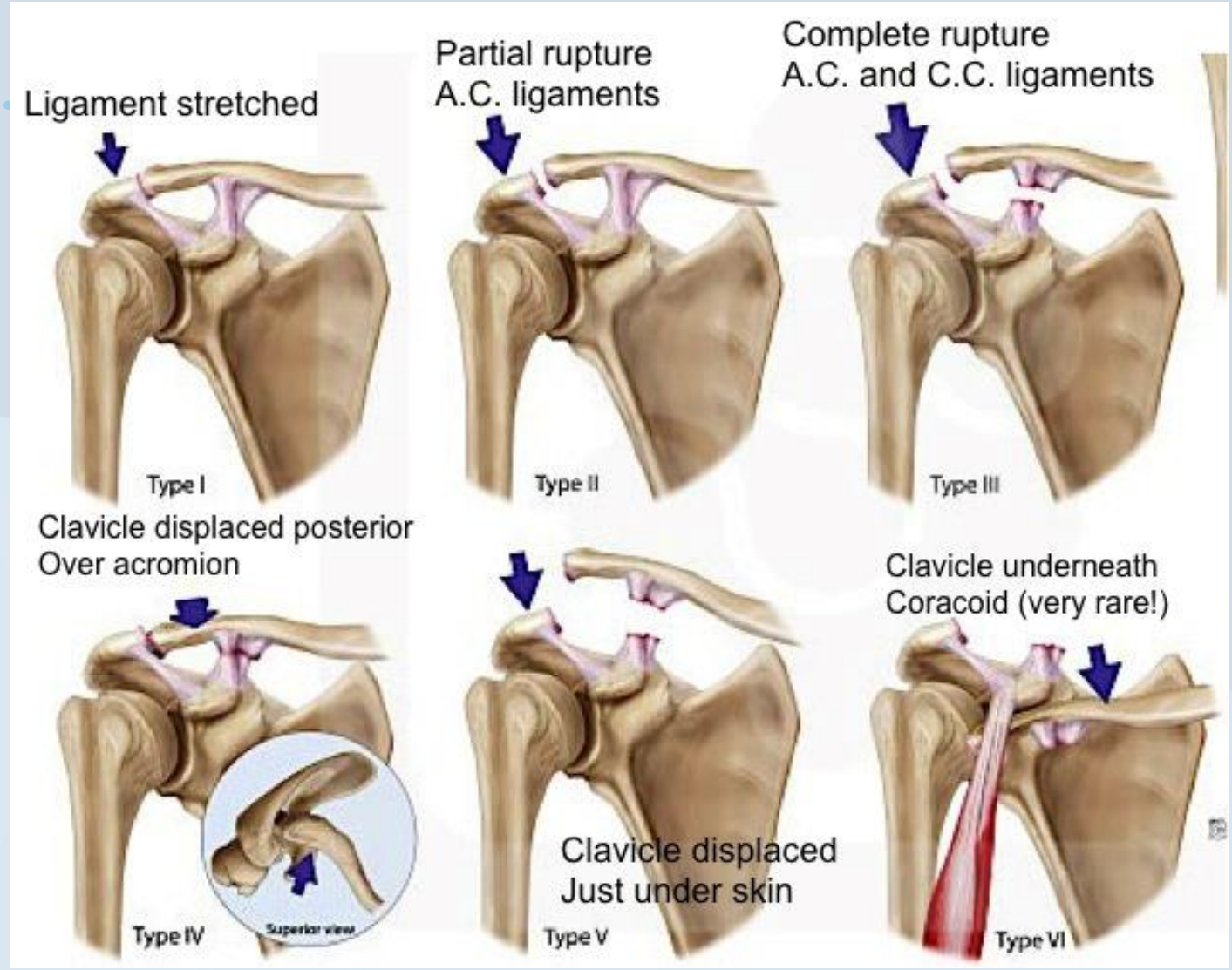
Hospital management

- When High grade separation or fracture suspected:
- XR (standard AP, axillary, scapular Y, and Zanca films)





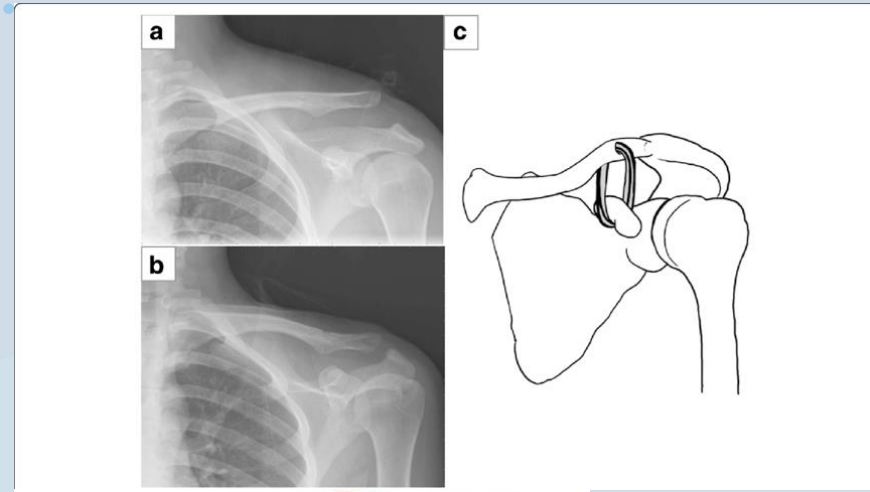
Left to right:
AP, Y, Zanca


Ligament stretched
Type I
Partial rupture
A.C. ligaments
Type II
Complete rupture
A.C. and C.C. ligaments
Type III
Clavicle displaced posterior
Over acromion
Type IV
Superior view
Clavicle displaced
Just under skin
Type V
Clavicle underneath
Coracoid (very rare!)
Type VI

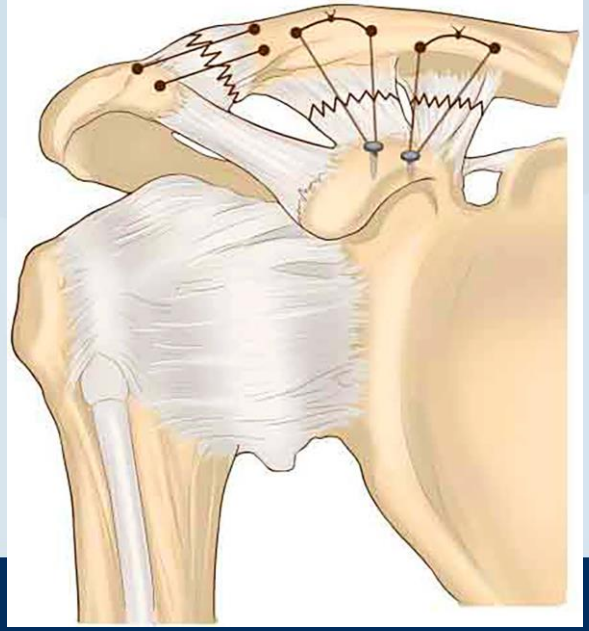
AC Joint Separation

Surgical Management

- Indicated for type IV, V, VI
- Controversial for type III, but may speed up RTP
- Methods
  - Coracoclavicular fixation
  - Ligamentous repair vs reconstruction



Huang et al.



Liu et al.

Outline

- Shoulder Dislocation
- AC Joint Separation
- **SC joint dislocation**
- Clavicle fracture
- Stinger

Sternoclavicular joint dislocation

Incidence

- Strong ligamentous support protects against dislocation
- One of the least commonly dislocated joints
- Exception: high impact athletics (Sanchez)

Mechanism

- Direct trauma is applied to anteromedial clavicle--> posterior dislocation
- Posterolateral shoulder force--> anterior dislocation (Sanchez)

Mohapatra et al.

SC joint dislocation

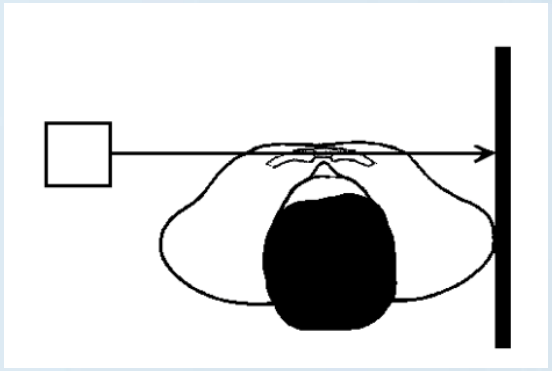
On Field Management

- **Visualize for asymmetry**, palpate joint, assess ROM, strength, and sensation
- Patients with severe sprains and dislocation will hold the affected extremity adducted with head tilted towards side of injury
- Ligament sprain but joint stable--> Sling
- Anterior dislocation--> attempt closed reduction but often unstable, recurrent dislocation is high
- Posterior dislocation--> immediate reduction in OR, especially if breathing compromised (from tracheal compression)

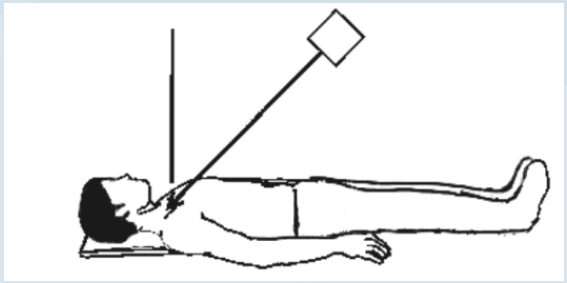
SC joint dislocation

Hospital management

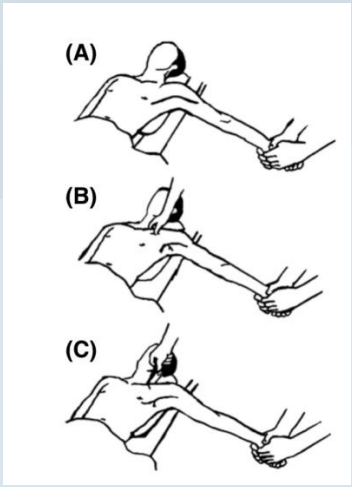
- Confirmatory XR with AP, Hobbs view, Heinig view, and Rockwood view (Sanchez)
- Reduction under general or local if needed



Heinig (Sanchez)



Rockwood (Sanchez)



Closed reduction technique (Sanchez)

SC joint dislocation

Return to play

- Figure-of-eight brace or sling for 3-6 weeks
- PT starting at week 3
- Gradual return-to-play by 3 months (Sanchez)
- Continued evaluation for recurrent dislocation

Clavicle Fracture

Incidence

- Very common, account for 2-12% of all fractures sustained and as many as 44% of all shoulder injuries (Rabe)
- Midshaft clavicle is most common location
- Occur in bicycle injuries (15%) Football (11%) Soccer (4%) and snowboarding (2.5%) (DeFroda)

Mechanism

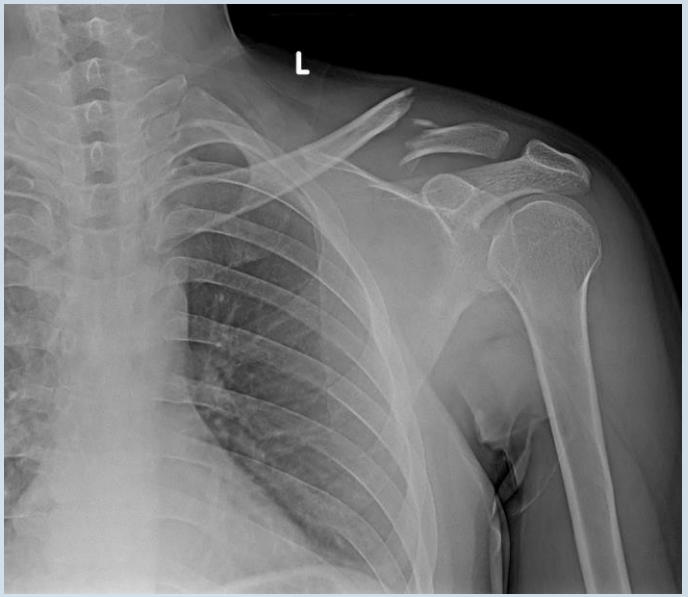
- Fall onto ipsilateral shoulder
- Large force to clavicle, the loadbearing bone stabilizing the GH joint (DeFroda)

Clavicle Fracture

On Field Management

- Evaluate for urgent fracture first
  - Open fracture
  - Skin tenting
  - Displacement infringing on neurovascular structures
- Immobilization/sling
- ER then OR immediately if urgent fracture
- Otherwise x-rays to confirm fracture pattern within 24 hours

Clavicle Fracture



Hospital Management

- 2 views of the clavicle

Surgical management:

- Open fracture
- Severe angulation
- Displacement causing skin or neurovascular compromise

Clavicle Fracture

Return to play

- 8-12 weeks average healing time
- Athlete in sling for 4 weeks then wean
- 6-12 weeks PT including progressive ROM
- Strengthening can begin at early union (~6 weeks)
- Risk of re-fracture if RTP too early
- Surgery may decrease RTP time

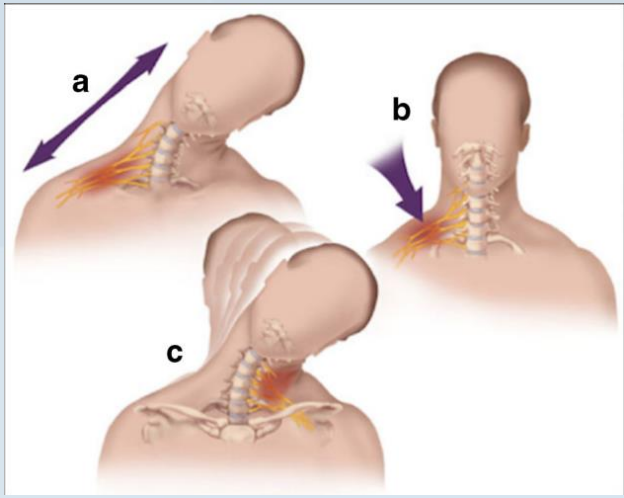
Stinger

Incidence

- Most common cervical injury among NCAA football players (1.87 per 10,000 exposures) (Bowles)
- 23-50% of incoming D1 college football players report a lifetime prevalence (Bowles)

Mechanism

- “Stinger” or “burner” occurs after forceful contact to neck or upper extremity
- Results in temporary sensory and motor deficits down one arm (Bowles)
- Occur following direct contact in high energy sports (football, rugby, hockey)
- Neck lateral bend or direct compression to brachial plexus

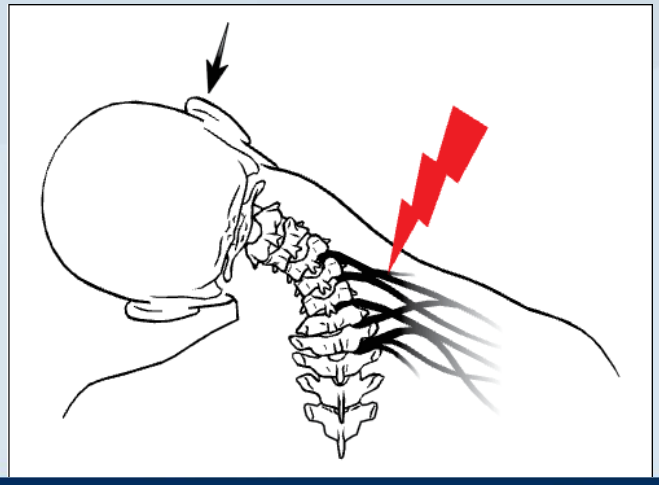


Bowles et al.

Stinger

Symptoms

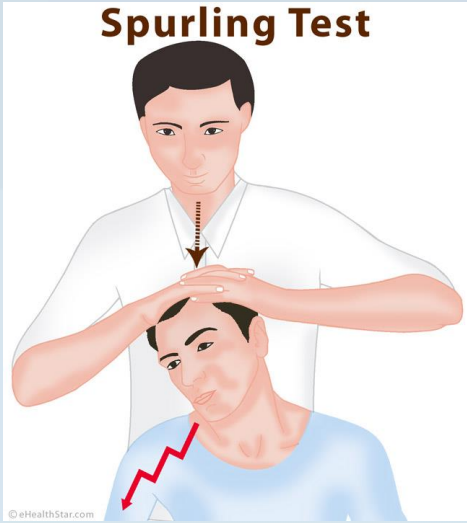
- Sharp pain, reduced range of C-spine motion, supraclavicular pain followed by non-dermatomal pain radiating down arm
- Weakness and paresthesias may last up to 24 hours
- Of football players experiencing stingers (Charbonneau)
  - 77% of reported tingling
  - 61% reported numbness
  - 44% reported weakness
  - 17% reported neck pain



Stinger

On field management

- Due to potential C-spine involvement
  - Ensure airway, breathing, circulation using ATLS algorithm
- Inspect and palpate C1-T1
- Motor exam including
  - Supraspinatus, infraspinatus, deltoid, biceps, brachioradialis, triceps, serratus anterior, wrist flexors, wrist extensors, grip strength
- Cervical spine range of motion with Spurling's test
- Suspect brachial plexus stretch if C-spine ROM is painless and negative spurling test (Bowles)
- Remove from play with persistent weakness, neck pain, or suspected secondary head trauma



Stinger

Return to play

- 85% of collision athletes do not miss subsequent practices(Tosti) as symptoms typically resolve within 24 hours
- Contraindications to RTP
  - Second stinger in same game
  - Persistent neurological deficit
  - Lack of full cervical ROM or neck pain
  - Bilateral symptoms
  - Suspicion of neck injury or neural involvement

Questions?

References

- Benjamin HJ, Hang BT. Common acute upper extremity injuries in sports. Clin Pediatric Emerg Med. 2007;8(1):15-30.
- Skelley NW, McCormick JJ, Smith MV. In-game Management of Common Joint Dislocations. *Sports Health*. 2014;6(3):246-255. doi:10.1177/1941738113499721
- Walton J, Paxinos A, Tzannes A, Callanan M, Hayes K, Murrell GA. The unstable shoulder in the adolescent athlete. Am J Sports Med. 2002;30:758-767.
- Trojan JD, Meyer LE, Edgar CM, Brown SM, Mulcahey MK. Epidemiology of Shoulder Instability Injuries in Collision Collegiate Sports From 2009 to 2014. *Arthroscopy*. 2020;36(1):36-43. doi:10.1016/j.arthro.2019.07.008
- Owens BD, Dickens JF, Kilcoyne KG, Rue JP. Management of mid-season traumatic anterior shoulder instability in athletes. J Am Acad Orthop Surg. 2012;20:518-526.
- Watson S, Allen B, Grant JA. A Clinical Review of Return-to-Play Considerations After Anterior Shoulder Dislocation. *Sports Health*. 2016;8(4):336-341.
- Buss DD, Lynch GP, Meyer CP, Huber SM, Freehill MQ. Nonoperative management for in-season athletes with anterior shoulder instability. Am J Sports Med. 2004;32:1430-1433
- Schupp, Christian M., et al. “Sideline Management of Joint Dislocations.” Current Sports Medicine Reports, vol. 15, no. 3, June 2016, pp. 140–53. PubMed, doi:10.1249/JSR.0000000000000266.
- Dickens JF, Owens BD, Cameron KL, et al. Return to play and recurrent instability after in-season anterior shoulder instability: a prospective multicenter study. Am J Sports Med. 2014;42:2842-2850.
- Mehta JC, Sachdev A, Collins JJ. Retrosternal dislocation of the clavicle. Injury. 1973;5(1):79-83.
- Sanchez, G., Frank, R. M., Sanchez, A., Provencher, M., & Romeo, A. A. (2016). *Sternoclavicular Joint Injuries in the Contact Athlete. Operative Techniques in Sports Medicine, 24(4), 262–272.* doi:10.1053/j.otsm.2016.09.005
- Rabe SB, Oliver GD. Clavicular fracture in a collegiate football player: a case report of rapid return to play. J Athl Train. 2011;46:107-111.
- Fanter, N. J., Kenny, R. M., Baker, C. L., & Baker, C. L. (2015). Surgical treatment of clavicle fractures in the adolescent athlete. *Sports Health: A Multidisciplinary Approach*, *7*(2), 137–141. https://doi.org/10.1177/1941738114566381
- DeFroda, S. F., Lemme, N., Kleiner, J., Gil, J., & Owens, B. D. (2019). Incidence and mechanism of injury of clavicle fractures in the neiss database: Athletic and non athletic injuries. *Journal of Clinical Orthopaedics and Trauma*, *10*(5), 954–958. https://doi.org/10.1016/j.jcot.2019.01.019

References Continued

- Hutchinson, M., & Tansey, J. (2003). *Sideline Management of Fractures. Current Sports Medicine Reports, 2(3), 125–135.* doi:10.1249/00149619-200306000-00004
- Charbonneau RME, McVeigh SA, Thompson K. Brachial neuropraxia in Canadian Atlantic University sport football players: what is the incidence of “stingers”? Clin J Sport Med. 2012;22(6):472–7.
- Weinstein SM. Assessment and rehabilitation of the athlete with a “stinger”. A model for the management of noncatastrophic athletic cervical spine injury. Clin Sports Med. 1998 Jan;17(1):127–35.
- Bowles, D. R., Canseco, J. A., Alexander, T. D., Schroeder, G. D., Hecht, A. C., & Vaccaro, A. R. (2020). The prevalence and management of Stingers in college and Professional Collision Athletes. *Current Reviews in Musculoskeletal Medicine*, *13*(6), 651–662. https://doi.org/10.1007/s12178-020-09665-5
- Tosti R, Rossy W, Sanchez A, Lee SG. Burners, stingers, and other brachial plexus injuries in the contact athlete. Oper Tech Sports Med. 2016;24(4):273–7.
- Boffano, M., Mortera, S., Wafa, H., & Piana, R. (2017). The surgical treatment of acromioclavicular joint injuries. *EFORT Open Reviews*, *2*(10), 432–437. https://doi.org/10.1302/2058-5241.2.160085
- Single coracoclavicular suture fixation with Mersilene tape versus hook plate in the treatment of acute type V acromioclavicular dislocation: A retrospective analysis - Scientific Figure on ResearchGate. Available from: https://www.researchgate.net/figure/Coracoclavicular-CC-suture-fixation-with-Mersilene-tape-for-a-type-V-AC-dislocation_fig1_325180046 [accessed 24 Aug, 2022]
- Liu, T., Bao, F., Jiang, T., Ji, G., Li, J., & Jerosch, J. (2020). Acromioclavicular joint separation: Repair through suture anchors for coracoclavicular ligament and nonabsorbable suture fixation for acromioclavicular joint. *Orthopaedic Surgery*, *12*(5), 1362–1371. https://doi.org/10.1111/os.12771
- Gandhi, Darshan & Ahuja, Kriti & Sawhney, Harpreet & Songmen, Swachchhanda & Gupta, Nishant & Kier, Ruben. (2020). Roca disease: An osteochondrosis of the inferior pole of the scapula with review of the literature. Radiology Case Reports. 15. 1523-1527. 10.1016/j.radcr.2020.06.042.
- Mohapatra A, Choudhury P (January 05, 2022) Anterior Dislocation of the Sternoclavicular Joint – A Case Report. Cureus 14(1): e20974. doi:10.7759/cureus.20974