Sternoclavicular and Acromioclavicular Joints

TERMINOLOGY

Abbreviations

- Sternoclavicular (SC) joint
- Acromioclavicular (AC) joint

GROSS ANATOMY

Sternoclavicular Joint

- Between medial end of clavicle & manubrium
  - Synovial sellar-type (saddle) joint
  - Medial end of clavicle = large & bulbous
  - Much larger than manubrial concavity
  - < 1/2 of medial clavicle articulates with manubrium
    - Stability through capsuloligamentous structures
  - Intraarticular disc
    - Attached to joint capsule anteriorly & posteriorly
    - Complete or incomplete ± perforations
    - Thickest posterosuperiorly (3 mm)
  - Ligaments of SC joint
    - Capsular ligaments
      - Cover anterosuperior & posterior aspects of SC joint
      - Prevent upward displacement of medial clavicle, which may be caused by downward force on shoulder
      - Anterior stronger than posterior portion
    - Intercapitular ligament
      - Connects superomedial aspect of clavicle to capsular ligaments & upper manubrium
      - Covers anterosuperior & posterior aspects of joint
      - Prevents excessive upward motion of clavicle
  - Costoclavicular ligaments
    - Unite inferior surface medial end clavicle to upper surface of 1st rib
    - Anterior fibers arise from anteromedial surface of 1st rib & resist upward motion
    - Posterior fibers arise lateral to anterior fibers & resist downward motion
  - Muscle attachments to medial clavicle & sternum
    - Pectoralis major from anterior aspect medial 2/3 clavicle (clavicular head)
    - Sternocleidomastoid from posterior surface medial 1/3 of clavicle (clavicular head)
    - Sternohyoid & sternothyroid muscles separate great vessels from SC joint

Acromioclavicular Joint

- Synovial joint between lateral end of clavicle & medial end of acromion
  - Articular surface of clavicle oriented posterolaterally whereas articular surface of acromion oriented anteromedially
    - Angle of inclination between opposing articular surfaces varies with clavicle overriding acromion (50%), vertical orientation between acromion & clavicle (25%), clavicle underriding acromion (5%), & mixed pattern (20%)
    - Maximum width of normal joint on US = 5 mm if < 35 years & < 4.4 mm if > 35 years
    - Maximum thickness of capsule from bony surface = 2.7 mm if < 35 years & < 3.6 mm if > 35 years
  - Intraarticular disc

- Undergoes rapid degeneration beginning in 2nd decade → marked degeneration of disc by 4th decade
- Ligaments of AC joint
  - Superior AC ligament
    - Stronger & thicker (2.0-5.5 mm) than thin or absent inferior AC ligament
    - Inserts along lateral clavicle (8 mm) & medial acromion (10 mm)
  - Coracoclavicular ligaments
    - Conoid & trapezoid ligaments
    - Vary significantly in length & width
    - Conoid ligament located posteroseriously
    - Inserts to conoid tubercle, which is located where middle 1/3 of clavicle curves into lateral 1/3 of clavicle
    - Mainly prevents upward movement of clavicle
    - Trapezoid ligament located anterolaterally
    - Inserts to trapezoid ridge, which runs along inferior surface of lateral 1/3 of clavicle
    - Mainly prevents lateral compression of clavicle against acromion
  - Muscle attachments to lateral clavicle
    - Deltoid attached to anterior surface lateral 1/3 of clavicle
    - Trapezius attached to posterior surface lateral 1/3 of clavicle

ANATOMY IMAGING ISSUES

Imaging Recommendations

- High-resolution linear transducer
- Align transducer transversely along SC or AC joints
- AC joint laxity can be assessed by pulling down on arm while observing change in joint width on US
  - Compare with contralateral side
- Main clinical presentation of SC joint is painless lump
  - Mild degrees of capsular thickening is readily apparent clinically since joint just beneath skin surface
    - Clinical swelling often due to relative forward positioning of apparently swollen SC joint due to axial rotation of upper trunk
    - Occasionally due to mild capsular swelling ± mild subluxation secondary to SC osteoarthritis
  - Main clinical presentation of AC joint is pain due to osteoarthritis, AC joint impingement, inflammatory arthropathy, & subluxation/dislocation

Imaging Pitfalls

- SC or AC joints
  - Normally step-off between medial clavicle & manubrium & to lesser degree, between lateral clavicle & acromion
  - Should not be interpreted as subluxation
  - Acromion normally elevates from rest position during arm adduction
  - AC joint index = AC joint width of uninjured side/AC joint width of injured side = 1.0 normally
  - Determine whether AC joint is
    - Not subluxed (similar to opposite side): Grade 1
    - Partially subluxed (clavicle subluxed < 50% depth of AC joint): Grade 2
    - Severely subluxed or dislocated (clavicle subluxed > 50% depth of AC joint): Grade 3
Anatomy

Sternoclavicular and Acromioclavicular Joints

(Top) Graphic shows the anterior aspect of the sternoclavicular joint. Note the joint capsule, articular disc, and interclavicular ligament.

(Middle) Transverse grayscale US shows the anterosuperior aspect of the sternoclavicular joint. The medial clavicle is much larger than the articulating surface of the manubrium. The thin interclavicular ligament is closely applied to the superior aspect of manubrium, and its connection with the medial ends of both clavicles is depicted.

(Bottom) Transverse grayscale US shows the superior aspect of the sternoclavicular joint. The costoclavicular ligament prevents upward movement of the medial clavicle when the lateral clavicle or shoulder is depressed.
Sternoclavicular and Acromioclavicular Joints

LONGITUDINAL US, STERNOCLAVICULAR JOINT

(Top) Longitudinal grayscale US shows sternoclavicular joint. Costoclavicular ligament prevents upward movement of the medial clavicle when shoulder is depressed. Pectoralis major muscle arises from the medial 1/2 of the anterior surface of the clavicle as well as from the sternum, upper costal cartilages, and upper part of external oblique aponeurosis. (Middle) Longitudinal grayscale US shows the sternoclavicular joint region. The sternocleidomastoid is attached to the upper surface of the medial end of the clavicle as well as the upper anterior surface of the manubrium. The sternohyoid and sternothyroid are attached to the posterior aspect of the sternum as well as the clavicle and 1st costal cartilage. (Bottom) Longitudinal grayscale US shows the sternoclavicular joint. Great vessels lie posterior to the sternoclavicular joint and may get injured in posterior dislocation. All tendinous attachments should be assessed if dislocation is present, as they may also be injured.
Anatomy

Sternoclavicular and Acromioclavicular Joints

(Top) Anterior graphic shows the shoulder in superficial dissection. (Middle) Longitudinal grayscale US shows the acromioclavicular joint region. The coracoclavicular ligament is demonstrated but is not as clearly depicted on US as it is on MR exam. These ligaments prevent upward and lateral movement of the clavicle. (Bottom) Transverse grayscale US of the acromioclavicular joint region shows the coracoacromial ligament. The supraspinatus tendon and intervening bursa can impinge against the coracoacromial ligament during arm abduction.
(Top) Transverse grayscale US shows the anterior aspect of the acromioclavicular joint. The joint capsule of the acromioclavicular joint is thin with a strong supporting superior acromioclavicular ligament. (Middle) Transverse grayscale US shows the anteroinferior acromioclavicular joint. Separation of the clavicle and acromion can be readily appreciated. Note how opposing bone margins are not vertically aligned. (Bottom) Transverse grayscale US shows the superior aspect of the acromioclavicular joint. In this image, the clavicle slightly overrides the acromion. This is a normal configuration.
(Top) Transverse grayscale US shows the anterosuperior aspect of the acromioclavicular joint with the arm positioned by the side of the body. Note that the clavicle slightly overrides the acromion. (Middle) Transverse grayscale US shows the acromioclavicular joint with the arm in abducted position. The acromion is now level with the lateral aspect of the clavicle. Note how the joint capsule bulges superiorly, and the opposing bones are approximated with the arm abducted. (Bottom) Transverse grayscale US shows the acromioclavicular joint with the arm in an abducted position. The acromion is now depressed relative to this lateral end of the clavicle.