अस्थिशारीरम्

निरुक्ति

अस्यते इति अस्थि

पर्याय

Kulyam = a bone.

Kapala = the skull, cranium, skull bone.

Medojam = which is produced from *meda*.

Kikasa = hard, firm.

अस्थि उत्पत्ति

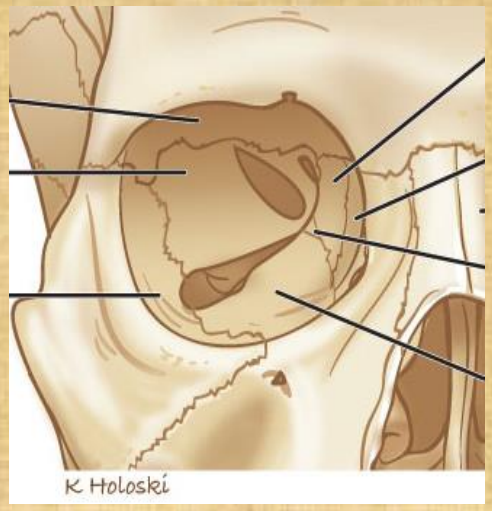
रसाद्रक्तं ततो मांसं मांसान्मेदस्ततोऽस्थि च|
अस्थ्नो मज्जा ततः शुक्रं शुक्राद्गर्भः
प्रसादजः||च.चि.१५\१६

- **अस्थि प्रकार**
- **अस्थ्नां स्थानविशेषेण धर्मविशेषान्नामविशेषः पञ्चविधः ||डल्हण टीका**
- Depending upon size, shape, position of *Asthi* in the body total *Asthi* is divided into five types.
- *Kapala*
- *Ruchaka*
- *Taruna*
- *Valaya*
- *Nalaka*

- ***Kapala-Asthi*** - These are flat in nature. Literally it means bone which covers and protects the brain.
- **उदाहरण :**
- **तेषां जानुनितम्बांसगण्डतालुशङ्खशिरःसु कपालानि**

- ***Valaya-Asthi*** - These are round in shape or particularly hemi circle in shape.
- **उदाहरण पार्श्वपृष्ठोरःसु वलयानि**

- ***Taruna-Asthi*** - These are soft in nature. Literally it means which have either not fully developed i.e. ossified.
- **उदाहरण** **घ्राणकर्णग्रीवाक्षिकोषेषु तरुणानि**



- ***Ruchaka-Asthi*** - The bones which are different from all and are utilized to chew food and enjoy the taste. These are for taste sensation.
- **उदाहरण : दशना दन्ता इत्यर्थः**
- **दशनास्तु रुचकानि**

- ***Nalika-Asthi*** These are long like tubes and hollow from within. They are reed shaped.
- **उदाहरण :शेषाणिनलकसञ्ज्ञानि हस्तपादाङ्गुलितलकूर्चनलकादिषु**

- **अस्थि संख्या**
- ***Charaka Samhita* 360-128,140,92**
- ***Sushruta Samhita* 300- 120,117,63**
- ***Astanga Hrudaya* 360**
- ***Astanga Sangraha* 360**
- ***Bhavaprakasha* 300**
- ***Kashyapa Samhita* 360**
- ***Bhela Samhita* 360**
- **Modern- 206-120,50,36**

अस्थियों के कार्य-

अभ्यन्तरगतैः सारैर्यथा तिष्ठन्ति भूरुहाः।
अस्थिसारैस्तथा देहा ध्रियन्ते देहिनां ध्रुवम॥
तस्मात् चिरविनष्टेषु त्वक् मांसेषु शरीरिणाम्।
अस्थीनि न विनश्यन्ति साराण्येतानि देहिनाम्।
मासान्यत्र निबध्दानि सिराभिः स्नायुभिस्तथा।
अस्थीन्यालम्बनं कृत्वा न शीर्यन्ते पतन्ति वा॥(सु.शा.५/२३,२४,२५)

CLAVICLE

- **Another name-** collar bone
- **Latin**: clavicula=a small key
- **Situation**= anterosuperior of the thorax
- **Special features-**
- It is a long bone that connects the upper limb to the trunk and lies horizontally.
- It has no madullary cavity.
- It is only long bone which ossifies in membrane.
- It is the only long bone which ossifies from 2 primary centres.
- It is first bone to ossify.
- It is subcutaneous and may be pierced by a supraclavicular nerve.

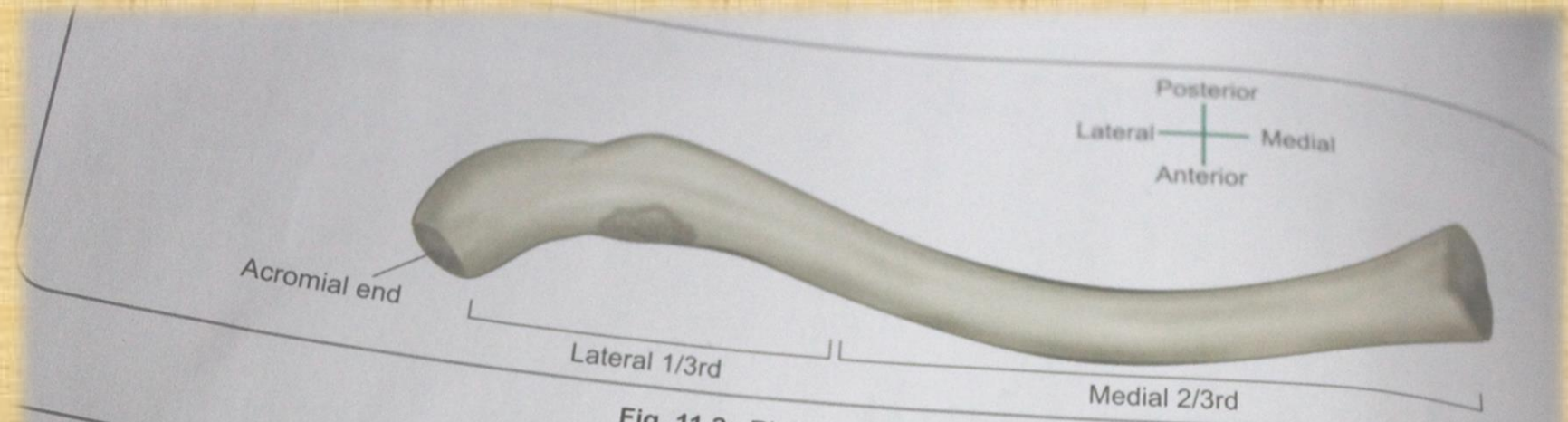


Fig. 11.2: Right clavicle seen from above

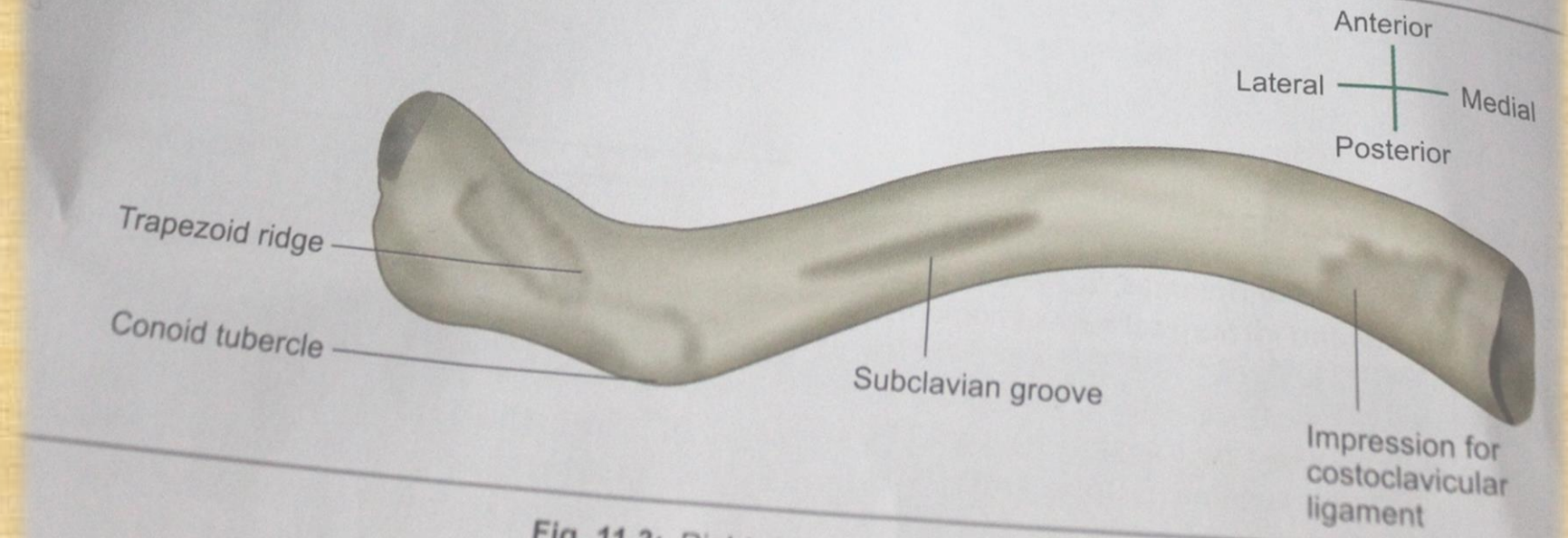


Fig. 11.3: Right clavicle seen from below

- **Side determination-**
  - **The medial part is convex forwards and the lateral part concave forward.**
  - **Lateral end- flat**

    Medial end- cylindrical
  - **The inferior aspect has a shallow groove on the shaft and a rough area near its medial end.**
- **External features-**

Shaft and 2 ends- medial or sternal and lateral or acromial end.

In shaft medial 2/3 part is cylindrical and lateral 1/3 part is flattened

- **Lateral 1/3- flattened from above downwards and has 2 surfaces, i.e., superior and inferior.**

  2 borders- anterior and posterior.

The anterior border is concave and shows a small thickened area called the deltoid tubercle.

The inferior surface shows a prominent thickening called the conoid tubercle. Lateral to the tubercle is a rough ridge called the trapezoid line.

- **Medial 2/3- cylindrical or prismatic and has 4 surfaces – ant. , post. , sup. , inf.**

The meddle third of the inferior aspect shows a longitudinal groove called the subclavian groove.

Nutrient foramen lies at the lateral end of this groove.

- **The lateral or acromial end bears a smooth facet for articulation with the acromion of the scapula to form the acromioclavicular joint.**
- **The medial or sternal end articulates with the manubrium sterni and also with the first costal cartilage.**

Attachments

- **Muscular insertions-**
  - **The subclavius is inserted into the groove on the inferior surface of the shaft.**
  - **The trapezius is inserted into the posterior border of the lateral one third of the shaft.**
- **Muscular origins-**
  - **The clavicular head of pectoralis major muscle arises from the anterior surface of the medial half of the shaft.**

- The clavicular head of the sternocleidomastoid muscle arises from the medial part of the superior surface of the medial 2/3rds of the shaft.
- The lateral part of sternohyoid arises from the lower part of the posterior surface just near the sternal end.
- The deltoid arises from the anterior border of the lateral 1/3 of the shaft.
- Joint capsule of acrominoclavicular joint attach to the lateral end.

- **Medial end gives attachment to-**

  - Fibrous capsule of sternoclavicuar joint all around

  -Articular disc posterosuperiorly

  -Interclavicular ligament superiorly

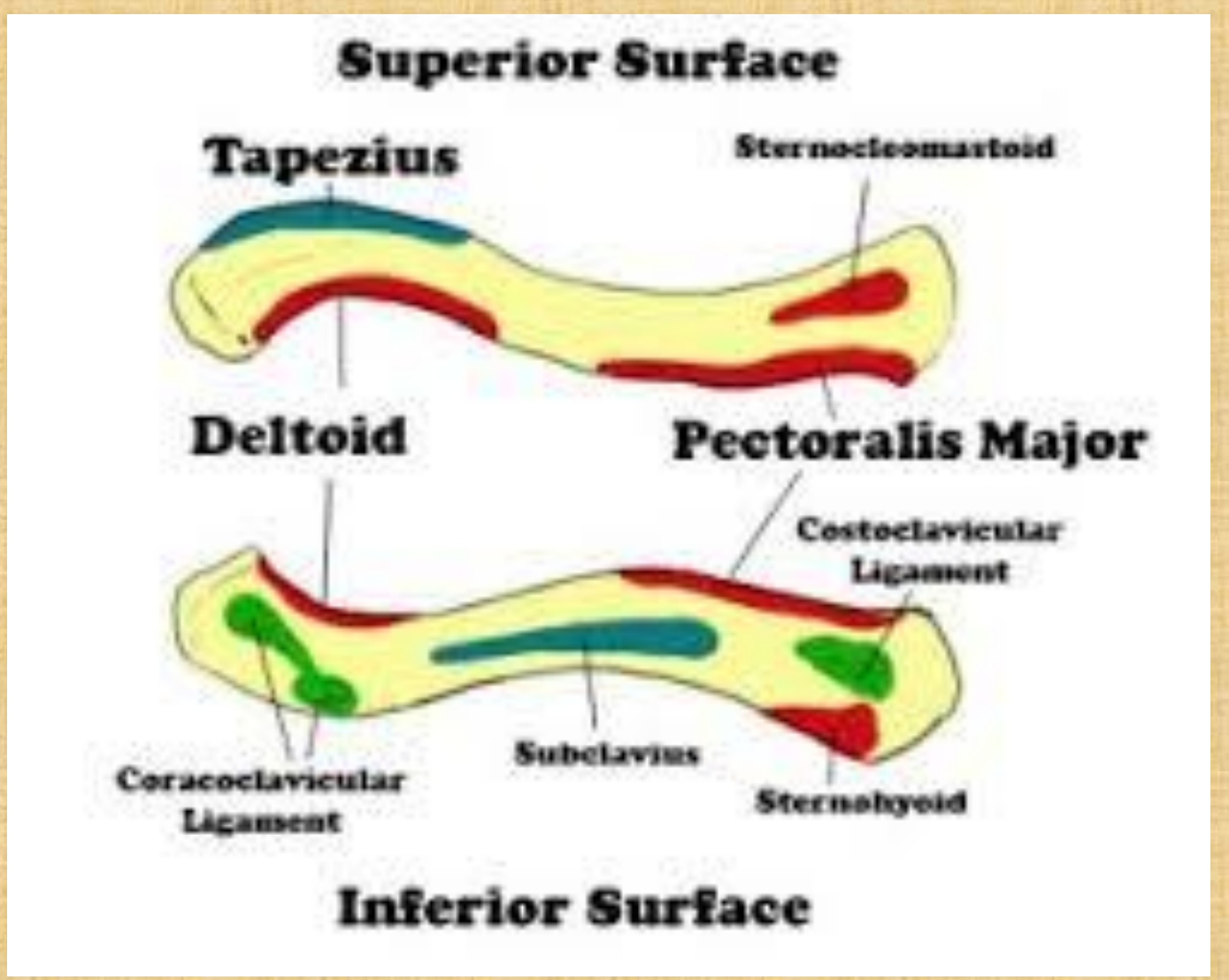
  -oval impression on the inferior surface gives attachment to the costoclavicular liga.

- **Conoid tubercle and trapezoid ridge gives attachment to the conoid and trapezoid parts of the coracoclavicular ligament.**

- **The subclavian vessels and cords of brachial plexus pass towards the axilla lying between the inferior surface of the clavicle and upper surface of the 1st rib.**

Ossification- 2 primary centre

1 seconadary centre


Superior Surface
Tapezius
Sternocleomastoid
Deltoid
Pectoralis Major
Costoclavicular Ligament
Subclavius
Coracoclavicular Ligament
Sternohyoid
Inferior Surface

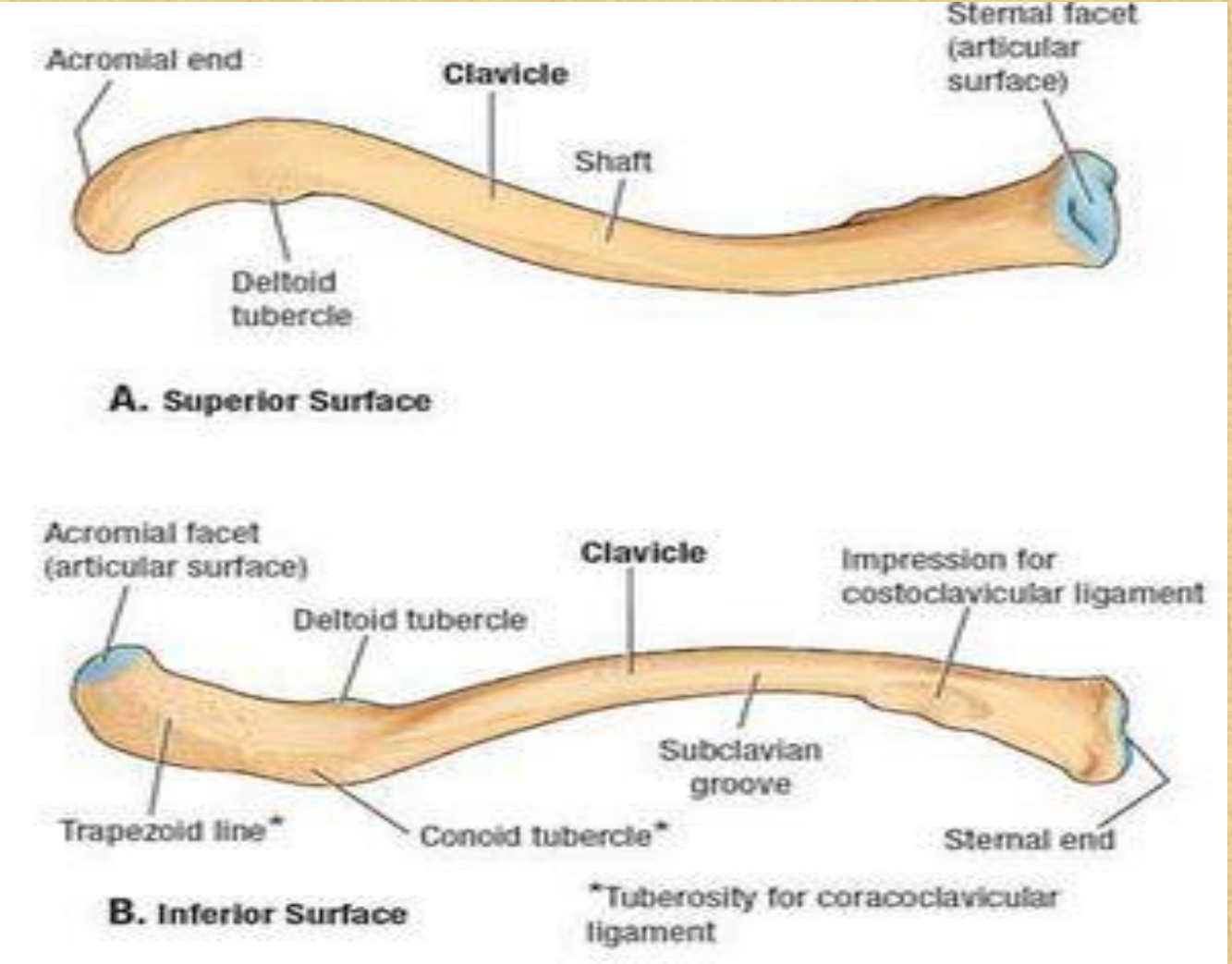
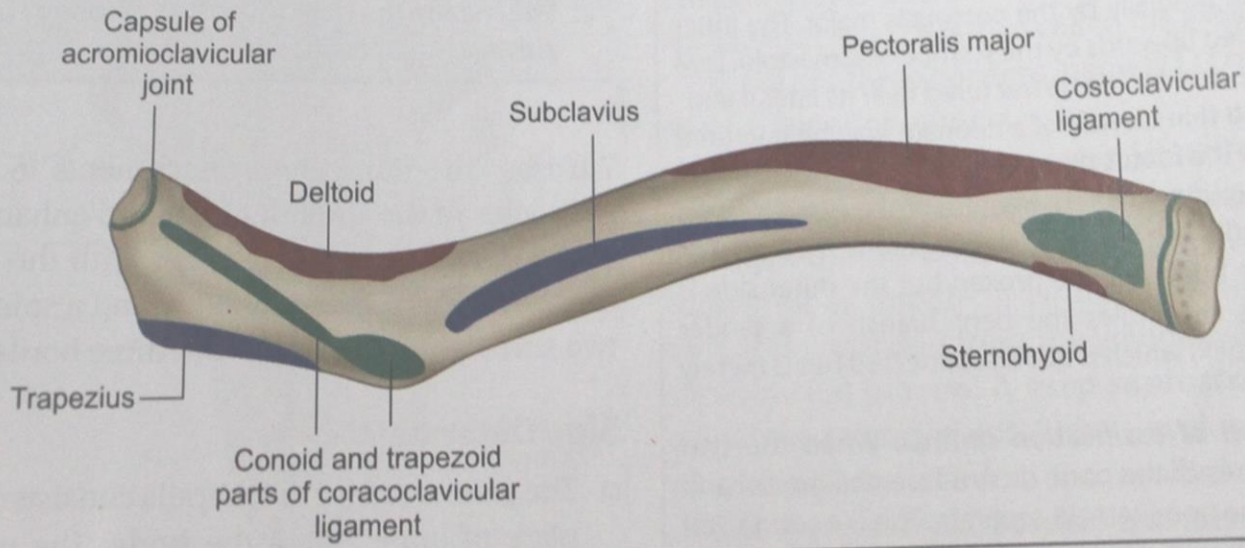

Acromial end
Clavicle
Sternal facet (articular surface)
Shaft
Deltoid tubercle
A. Superior Surface
Acromial facet (articular surface)
Clavicle
Impression for costoclavicular ligament
Deltoid tubercle
Subclavian groove
Trapezoid line*
Conoid tubercle*
Sternal end
B. Inferior Surface
*Tuberosity for coracoclavicular ligament

Fig. 11.4: Right clavicle showing attachments-seen from above



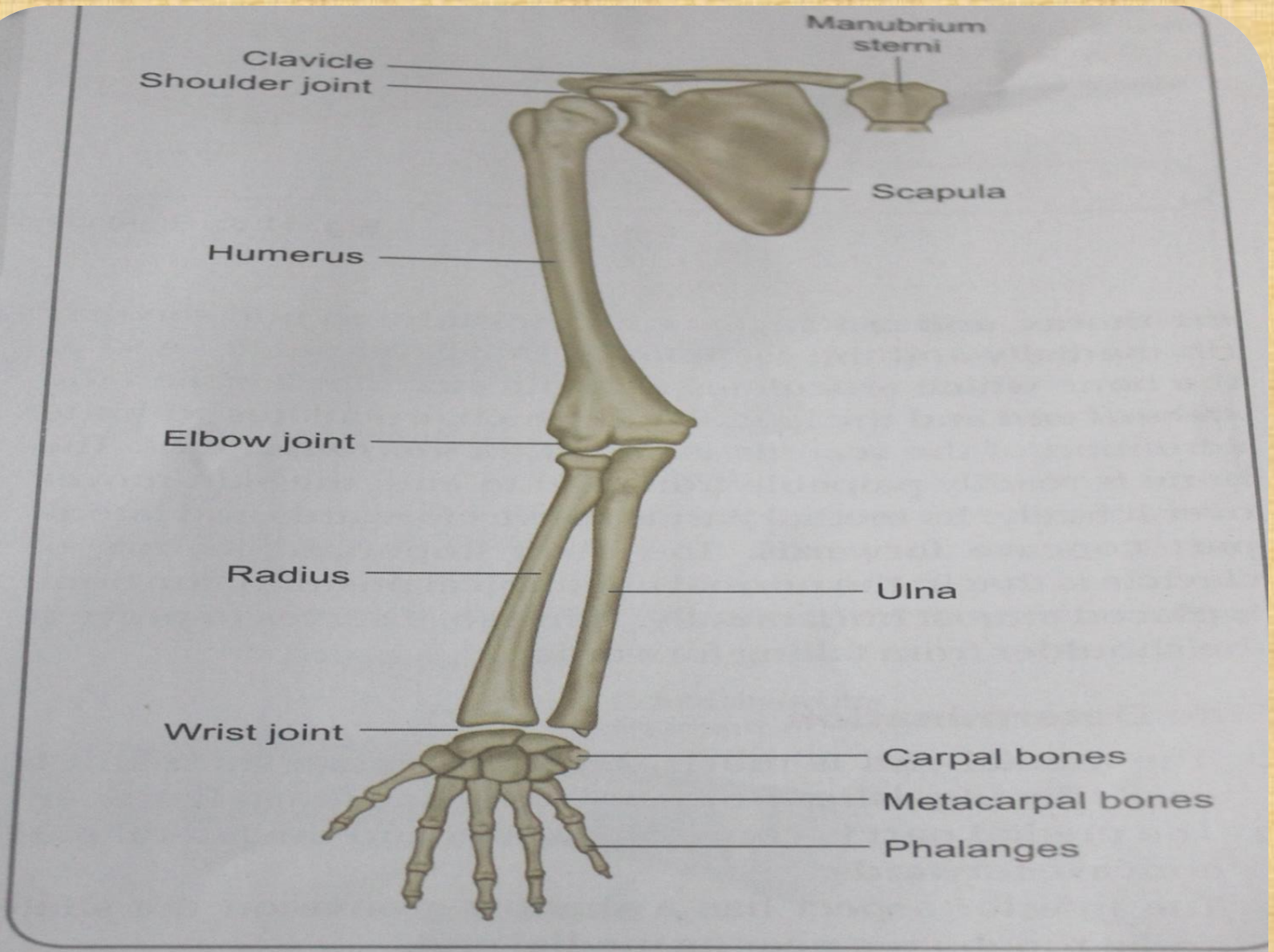


Fig. 11.1: Drawing showing bones and joints of upper extremity

scapula

- **Latin name-shoulder**
- **It is a thin bone placed on the posterolateral aspect of the thoracic cage. The scapula has 2 surfaces, 2 borders, 3 angles and 3 processes.**
- **Features-**
- **Surfaces- costal surface or subscapular fossa-**
  - **it is concave and is directed medially and forwards.**
  - **It is marked by three longitudinal ridges.**

- **Dorsal surface-**
  - **It gives attachment to the spine of the scapula which divides the surface into a smaller supraspinous fossa and a larger infraspinous fossa. These fossae are connected by the spinoglenoid notch, situated lateral to the root of the spine.**

Borders-

Superior border- it is thin and shorter. Near the root of the coracoid process it presents the suprascapular notch.

Lateral border- thick, at the upper end it presents the infraglenoid tubercle.

- **Medial border-** thin, it extends from the superior angle to the inferior angle.

- **Angles-**

Superior angle is covered by the trapezius.

Inferior angle is covered by the latissimus dorsi

Lateral or **glenoid angle** is broad and bears the glenoid cavity or fossa, which is directed forwards, laterally and slightly upwards.

Processes-

- **The spine or spinous process-** it is triangular plate of bone with 3 borders and 2 surfaces.

It divides the dorsal surface of the scapula into the supraspinous and infraspinous fossae.

Its posterior border is called the crest of spine. The crest has upper and lower lips.

The acromion- it has 2 borders, medial and lateral; 2 surfaces, superior and inferior; and a facet for the clavicle.

The coracoid process- it is directed forwards and slightly laterally. It is finger like.

Attachments-

1. **subscapularis- from the medial 2/3rd of the subscapular fossa**
2. **supraspinatus- from the medial 2/3rd of the supraspinous fossa including the upper surface of spine.**
3. **Infraspinatus- from the medial 2/3rd of the infraspinous fossa, including the lower surface of the spine.**
4. **deltoid- from the lower border of the crest of the spine and from the lateral border of the acromian.**
5. **trapezius- into the upper border of the crest of the spine and into the medial border of the acromian.**

6. **serratus anterior- medial border of the costal surface. 1 digitation to the superior angle to, 2 digitation to the medial border and 5 digitation to the inferior angle.**
7. **The long head of the biceps brachii arises from the supraglenoid tubercle and the short head from the lateral part of the tip of the coracoid process.**
8. **coracobrachialis- from the medial part of the tip of the coracoid process.**
9. **Pectoralis minor- into the medial border and superior surface of the coracoid process.**
10. **Long head of the triceps brachii- from the infraglenoid tubercle.**

11. **Teres minor- from the upper 2/3 of the rough strip on the dorsal surface along the lateral border.**
12. **Teres major- from the lower 1/3 of the rough strip on the dorsal aspect of the lateral border.**
13. **Levator scapulae- along the costal aspect of the medial border, from the superior angle up to the root of the spine.**
14. **Rhomboid minor- into the medial border(dorsal aspect)opposite the root of the spine.**
15. **Rhomboid major- into the medial border(dorsal aspect) between the root of spine and the inferior angle.**
16. **Inferior belly of the omohyoid- from the upper border near the suprascapular notch.**

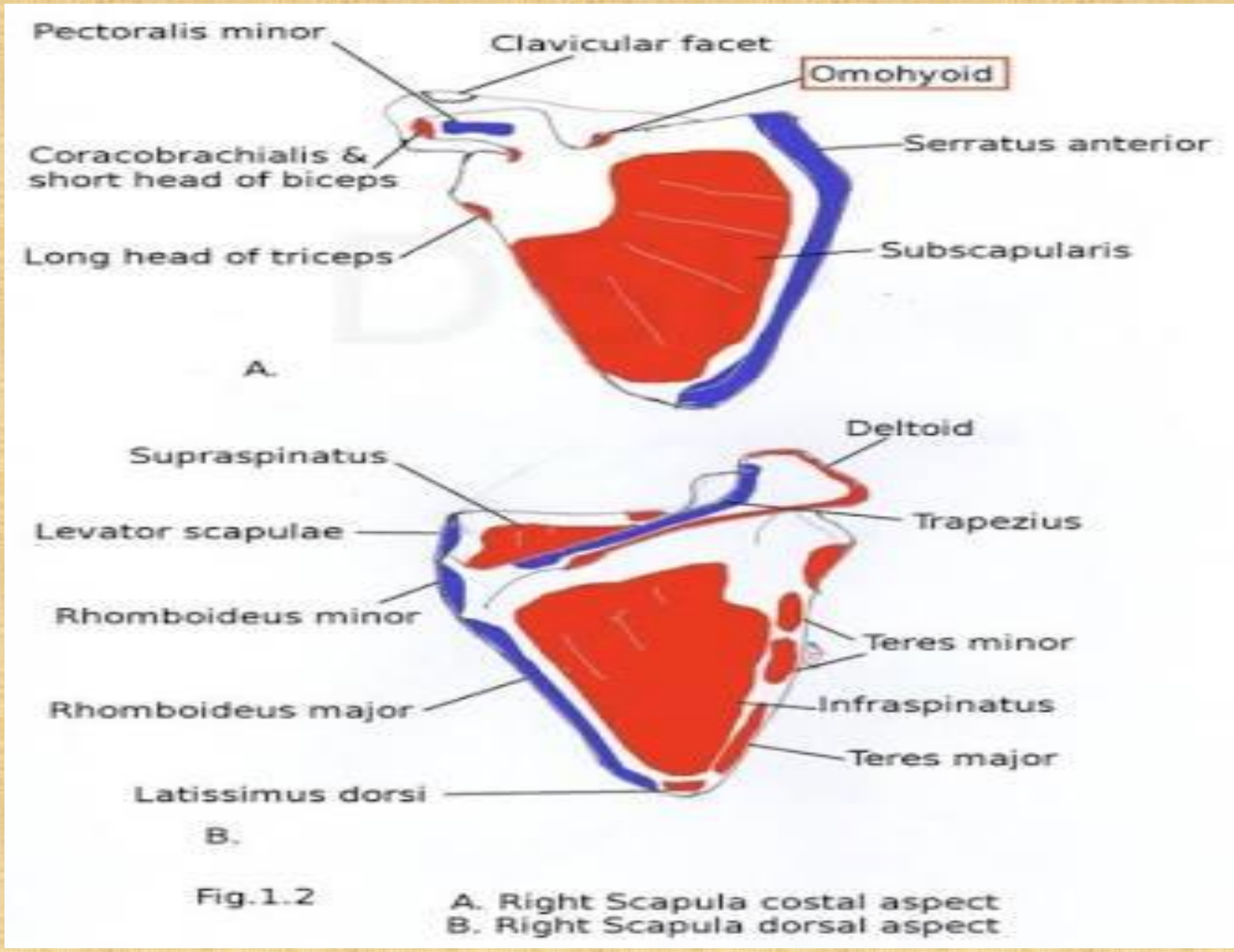
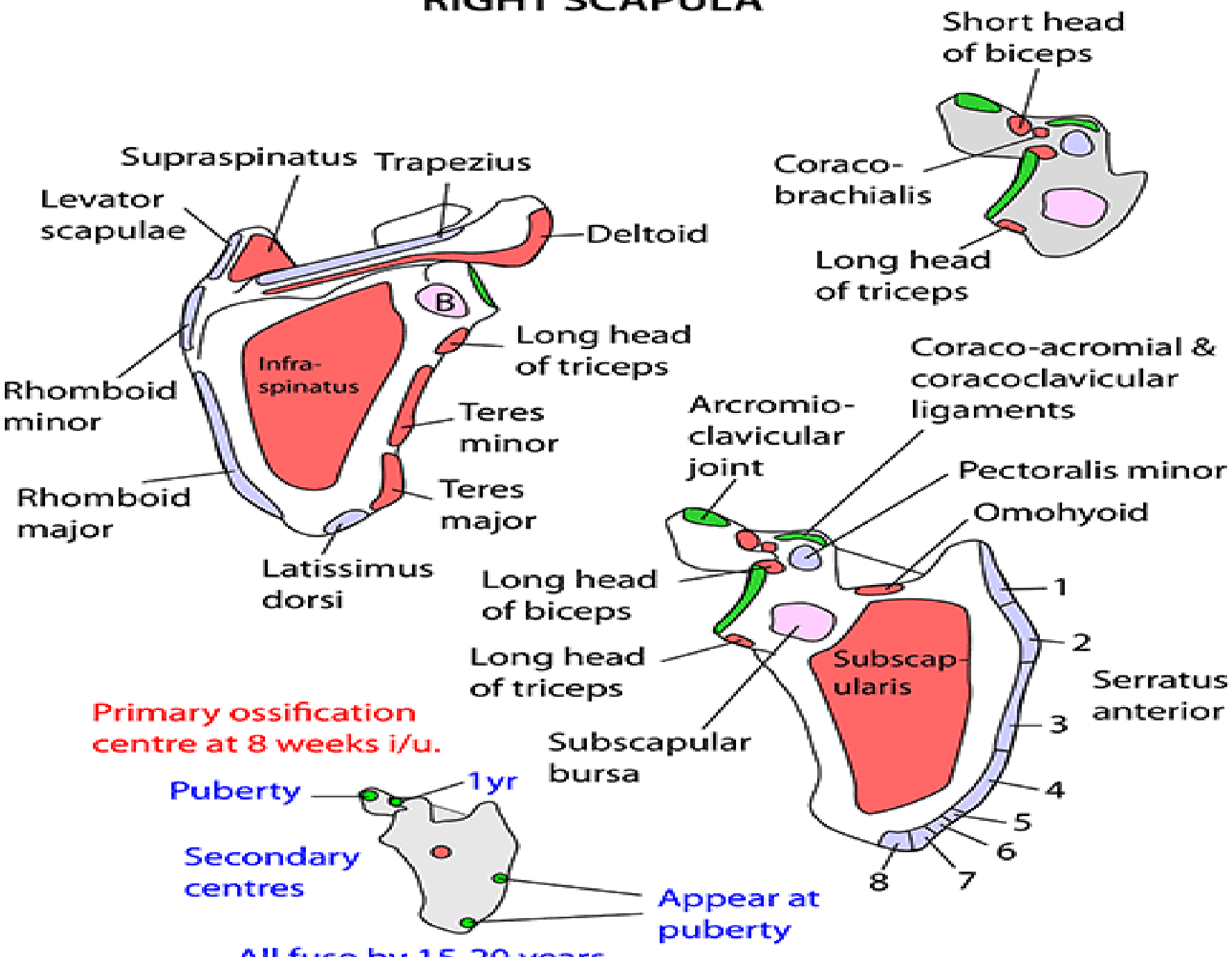


Fig.1.2

A. Right Scapula costal aspect
B. Right Scapula dorsal aspect

RIGHT SCAPULA



17. **Ligaments-**

Glenoid labrum

Capsule of the acromioclavicular joint

Coracoacromial

Coracohumeral

coracoclavicular

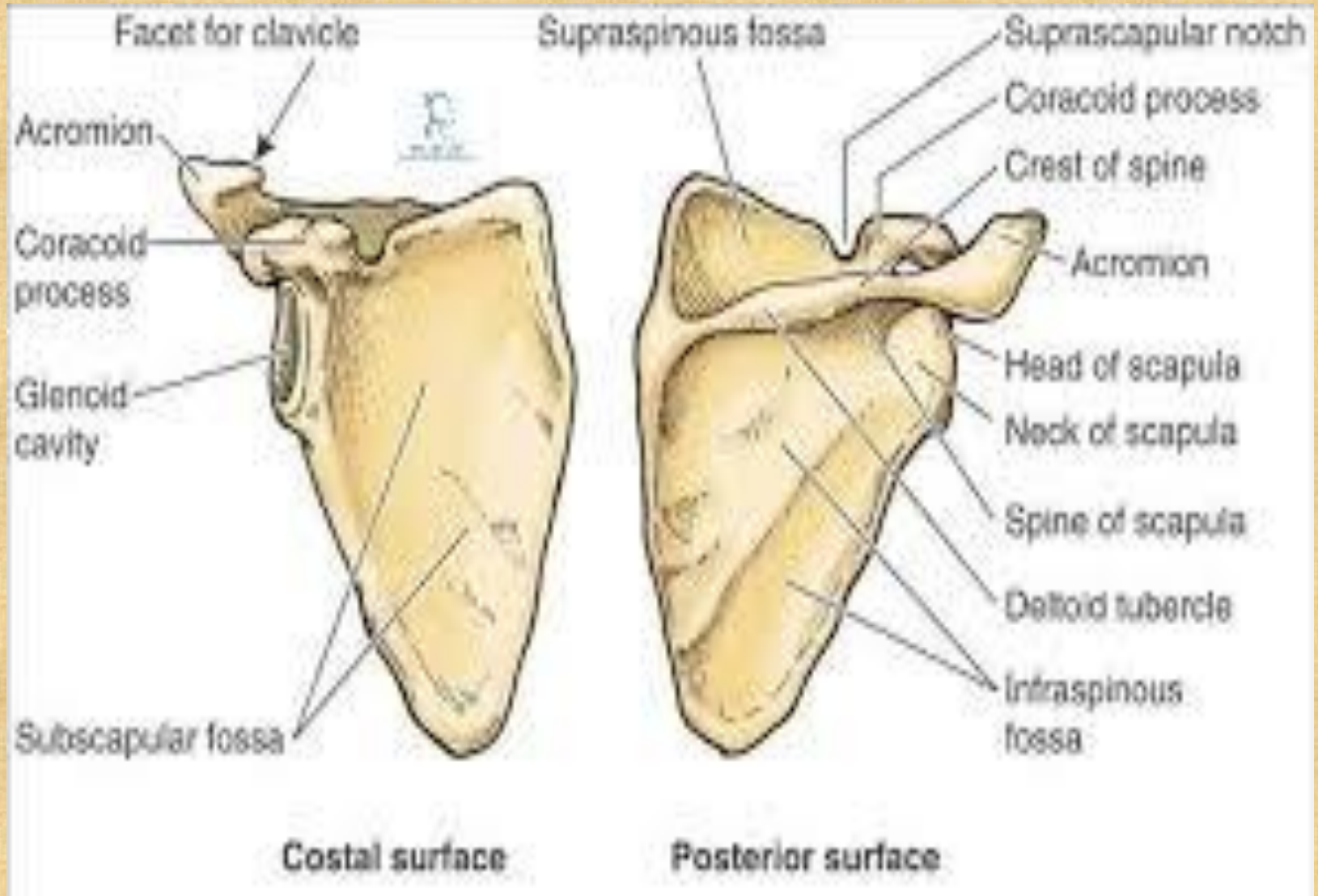
Transverse ligament bridges across the suprascapular notch and converts it into a foramen which transmits the suprascapular nerve. The suprascapular vessels lie above the ligament.

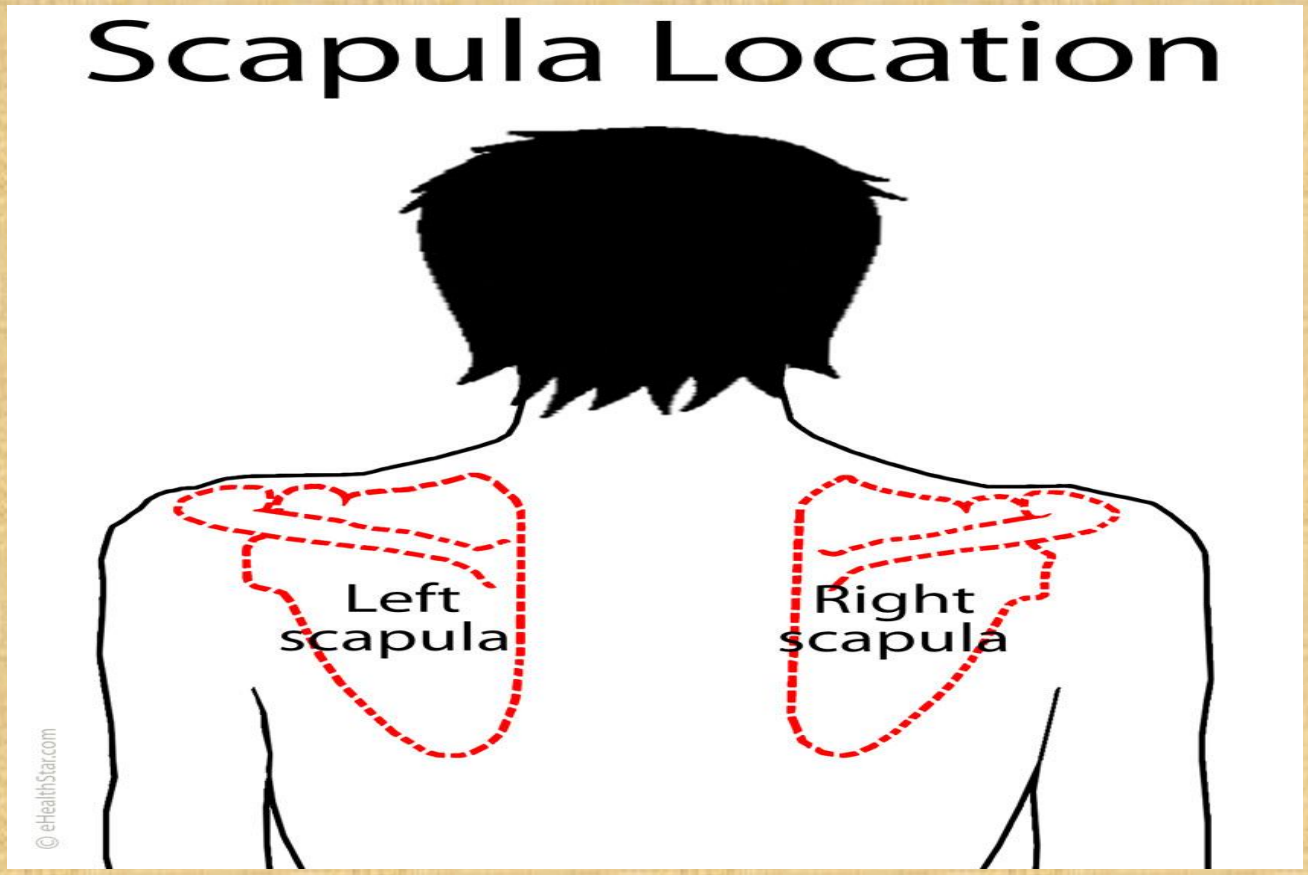
Spinoglenoid ligament may bridge the spinoglenoid notch. The suprascapular vessels and nerve pass deep to it.

Ossification-

1 primary centre

7 secondary centre


Facet for clavicle
Acromion
Coracoid process
Glenoid cavity
Subscapular fossa
Costal surface
Supraspinous fossa
Suprascapular notch
Coracoid process
Crest of spine
Acromion
Head of scapula
Neck of scapula
Spine of scapula
Deltoid tubercle
Infraspinous fossa
Posterior surface


Scapula Location
Left scapula
Right scapula
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HUMERUS

The humerus is the bone of the arm. It is the longest bone of the upper limb. It has an upper end, a lower end and a shaft.

Side determination

- **The upper end is rounded to form the head. The lower end is expended from side to side and flattened from before backwards.**
- **The head is directed medially, upwards and backwards.**
- **The lesser tubercle projects from the front of the upper end and is limited laterally by the intertubercular sulcus or bicipital groove.**

External fea