Upper Limb (2)
Axillary Region

The *axilla* is a pyramidal region framed by the:
- clavicle
- scapula characterized by
- humerus its *inlet & floor*.
- supporting muscles

Floor (base) of axilla formed by:
- skin
- fascia (subcutaneous)
- deep fascia (axillary)

Armpit formed by axillary fossa (contours of fascia)

The axilla is a conduit for all structures entering & leaving the upper limb.
- through openings in muscle & connective tissue
Axillary Inlet

Superior opening to axillary region:
- horizontal triangular region framed by:
  - rib I (medially)
  - clavicle (anteriorly)
  - scapula (posteriorly)

Transitional structures:
- subclavian artery -->
  axillary artery at rib 1
- axillary vein -->
  subclavian vein at rib 1 (to neck)

Arrangement from anterior to posterior:
- axillary vein
- axillary artery
- brachial plexus trunks

https://web.duke.edu/anatomy/lab10/images/Student/20Grays/207.115C.jpg
CATHETERIZATION
ANTERIOR WALL OF AXILLA

pectoralis major m.
- 2 heads: clavicular & sternocostal
- insertion: intertubercular sulcus of humerus
- flex, adduct, medially rotate humerus at shoulder
- innervated by pectoral nerves (lateral & medial) from brachial plexus

pectoralis minor m.
- thoracic wall to coracoid process (scapula)
- protracts & depresses portions of scapula
- innervated by medial pectoral nerve from brachial plexus

subclavius muscle
- extends from rib 1 to clavicle
- probably stabilizes sternoclavicular joint

clavipectoral fascia
- connective tissue linking clavicle to axillary floor
- ensheaths subclavius & pectoralis minor muscles
- apertures permit structures to pass from axillary region to anterior wall:
  - cephalic vein, thoraco-acromial artery, lateral pectoral nerve
- innervated by medial pectoral nerve
**ANTERIOR WALL OF AXILLA**

*serratus anterior m.*
- multiple muscles extending from ribs I to IX (and intercostal regions) to scapula
- flat sheet of muscle adjacent to thoracic wall
- for anterior & rotational movement of scapula
- innervated by *long thoracic nerve* (from brachial plexus)
- prone to trauma as it lies immediately beneath subcutaneous fascia along *serratus anterior*
- injury tends to draw medial border of scapula away from thoracic wall -- causing impaired elevation of the arm & ‘winging’ of the scapula when arm is extended forcefully

*thoracic wall*
- ribs & intercostal tissues

*intercostobrachial nerve* passes through medial wall into axilla
- cutaneous branch of 2nd intercostal nerve
- innervates skin on upper arm (part of T2 dermatome)

[Image: https://web.udek.edu/anatomy/Lab10/Imgs/5student/20Grays/207.115C.jpg]
LATERAL WALL OF AXILLA
- intertubercular sulcus of the humerus
- *pectoralis major* attaches to lateral sulcus
- *teres major* attaches to medial lip of sulcus
- *latissimus dorsi* attaches to floor of sulcus
POSTERIOR WALL OF AXILLA

- proximal long head of triceps brachii
- subscapularis m.
- distal latissimus dorsi
- distal teres major
- scapula

Note:
the long head of triceps brachii m. separates quadrangular space from triangular space
Axillary Contents
- arteries, veins, nerves to upper limb
- axillary process of breast
- lymphatics to upper limb & chest wall
- proximal *biceps brachii* & *coracobrachialis*
Axillary Vein

- continuation of basilic v. at teres major subclavian v. at rib 1
Brachial Plexus
- Confluence of anterior rami of spinal nerves C5-T1 (roots of plexus)
- From neck, through scalenes, over rib I into axilla
- Forming: roots -> trunks -> divisions -> cords
Brachial Plexus

Roots 3 Trunks:
- superior: C5 + C6
- middle: C7
- inferior: C8 + T1

Trunks -> Divisions -> 3 Cords
**Brachial Plexus**

**Roots (5)** arise from ventral rami of C5-T1
- roots & trunks enter posterior triangle in neck
- through *scalene mm.*

**Trunks (3)** arise from
roots to enter axilla:
- superior: C5 & C6
- middle: C7 root
- inferior: C8 & T1

**Divisions (6)**
- each trunk forms anterior & posterior divisions:
  - anterior divisions (3) form parts of brachial plexus
    that branch into peripheral nerves of anterior
    compartments of arm & forearm
  - posterior divisions (3) give rise to
    nerves of posterior compartments
**Brachial Plexus**

**Cords** (3) arise from divisions:
- *lateral cord*
- anterior divisions of upper & middle trunks (C5-C7)
- *medial cord*
- anterior division of inferior trunk (C8-T1)
- *posterior cord*
- confluence of all 3 posterior divisions
- portions from all roots (C5-T1)

**In general:**
- *medial & lateral cords* -> nerves feeding anterior compartment of upper limb
- *posterior cord* -> nerves innervating posterior compartment

**Branches:**
- segmental branches C5-C8 neck muscles
- C5 branch phrenic nerve
- also dorsal scapular n. & long thoracic n.
Brachial Plexus
Clavicle divides brachial plexus into:
- supraclavicular part:
  - roots & trunks
    - accessed via neck
 - infraclavicular part:
  - cords
    - accessed via axilla
Axillary Nerves from Brachial Plexus
Branches of lateral cord (3):

- *lateral pectoral nerve*: innervates pectoralis major
- *musculocutaneous nerve*: innervates flexors in anterior compartment of arm (ending as *lateral cutaneous nerve of forearm*)
- *lateral & medial cords*: give rise to **median nerve**

![Diagram showing the axillary nerves and their branches.](image-url)
Axillary Nerves from Brachial Plexus

Branches of medial cord (5)

1. medial pectoral nerve: pectoralis minor & major
2. medial cutaneous nerve of arm: skin of distal third of arm, upper medial arm & floor of axilla
3. medial cutaneous nerve of forearm: skin along anterior forearm
4. median nerve
5. ulnar nerve: all intrinsic muscles of hand (except 3 thenar & 2 lumbricals); flexor carpi ulnaris; medial flexor digitorum profundus; some skin of little finger, palm, wrist & medial hand

Median nerve:
- from lateral & medial roots
- innervates muscles of anterior compartment of forearm (except flexor carpi ulnaris & medial flexor digitorum profundus innervated by ulnar nerve)
- innervates 3 thenar muscles (thumb)
- innervates 2 lateral lumbricals (index & middle fingers)
- skin of lateral 3.5 digits, lateral palm & central wrist
Axillary Nerves from Brachial Plexus

Branches of posterior cord (5):

1. *superior subscapular nerve*: innervates subscapularis muscle
2. *thoracodorsal nerve*: latissimus dorsi
3. *inferior subscapular nerve*: subscapularis & teres major
4. *axillary nerve*: exits axilla via quadrangular space to innervate deltoid, teres minor muscles & long head of triceps
   - accompanied by posterior circumflex humeral artery
   - gives rise to superior lateral cutaneous nerve of arm that supplies skin near posterior deltoid
5. *radial nerve*: from axilla via triangular interval to innervate all muscles in posterior compartments of arm & forearm, skin of posterior arm/forearm, lower surface of arm & dorsal lateral surface of hand
Axillary Region
Posterior Cord

Figure 6.15C
Posterior wall of the axilla: posterior cord of the brachial plexus and its branches.
Axillary Nerves from Brachial Plexus

Dorsal scapular nerve
- from C5 root, down medial scapula to innervate rhomboid mm.

Long thoracic nerve
- anterior rami of C5-C7 extends down neck into axillary inlet to supply serratus anterior m.

Suprascapular nerve
- from superior trunk of brachial plexus (C5-C6)
- descends through posterior triangle of neck & suprascapular foramen into posterior scapular region
- innervates supraspinatus & infraspinatus mm.; accomp. by suprascapular a.
Brachial Plexus Injury

Clinical assessment of injuries requires extensive examination, tests & evaluation (e.g. nerve conduction, electromyography, etc.)
- injuries often impair upper limb function & require extensive rehab.
**Lymphatic Drainage of Axilla**

**Axillary nodes** receive lymph from:
- lymphatics in upper limb
- proximal trunk (shoulder, upper back, chest, etc.)
- much of mammary gland and are localized to:
  - humeral nodes
  - pectoral nodes
  - subscapular nodes
  - central nodes
  - apical nodes

Apical nodes -> **subclavian trunk**

To empty into venous circulation:

*right*: near right **subclavian vein & internal jugular vein**

*left*: subclavian trunk empties into **thoracic duct (to brachiocephalic v.)**
Axillary Region

Upper Limb

Figure 6.15D

Transverse section of the shoulder and axilla