ANATOMY

SUPERIOR EXTREMITY

The Pectoral Region

Pectoralis Major

Origin ⇒ Medial 2/3rd of the clavicle;
Manubrium & Body of sternum;
2nd – 6th costal cartilage;
External oblique aponeurosis;

Insertion ⇒ Lateral lip of Bicipital groove of Humerus

Action ⇒ Adduction
Flexion
Medial Rotation @ the shoulder joint

N. Supply ⇒ Medial & Lateral Pectoral Nerve (Composite/Hybrid Muc

Blood supply ⇒ Superior thoracic A.
Lateral thoracic A.
Thoracoacromial A.
} → Branches of Axillary A.
Perforating branches of Internal thoracic A
Anterior Intercostal A.

Cruciate Muscle
⇓
Muscle fibre cross in letter "X"
eg ⇒ Pectoralis Major;
Sternocleidomastoid;
Masseter.

Q. M/c muscle to be congenitally absent
⇓
Pectoralis Major (Poland Syndrome)
(Sternocostal part).

eg ⇒ Pectoralis Major
Flexor Pollicis Brevis → Superficial head
↳ supplied
→ Deep head Medi
↳ supplied by deep br of ulnar
Flexor digitorum profundus
Brachialis

Lesser tubercle of Humerus ⇒ "Subscapularis" Muscle attaches

⇓

Medial Rotation @ Shoulder joint

Greater tubercle of Humerus ⇒

① Supraspinatus ⇒ Abduction (0° to 15°)

② Infraspinatus ⇒ } Lateral Rotation

③ Teres Minor ⇒ }

④ Coracohumeral Ligament

QQ

Forgotten Muscle of Rotator cuff ⇒ Subscapularis

Lateral lip of Bicipital groove ⇒ Pectoralis Major

Medial lip of Bicipital groove ⇒ Teres Major Attaches

Floor of
In the V Bicipital groove ⇒ · Latissimus dorsi
· Long head of biceps brachii & the synovial sheath of shoulder joint
· Ascending branch of Anterior circumflex humeral artery

Rotator cuff ⇒ Subscapularis
Infraspinatus
Teres Minor
Supraspinatus (M/C muscle to be damaged in Rotator cuff)

DELTOID

- Anterior fibres / Clavicular fibres ⇓ Flexion & Medial Rotation @ shoulder joint
- Acromian fibres / Middle fibres ⇓ Abduction from 15-90°
- Posterior fibres ⇓ Extension & Lateral Rotation @ shoulder joint

- Axillary Nerve Supplies — Deltoid
  Teres Minor
  - gives some cutaneous branch
    ↓
    Upper Lateral cutaneous N. of Arm
    ↳ "Regimen batch sign"

Abduction @ shoulder joint

0°-15° / initiation of Abduction ⇒ Supra spinatus

15°-90° ⇒ Acromial fibres of deltoid

90° or above / overhead Abduction ⇒ Serratus Anterior
Trapezius (Lower fibres)
Lateral Rotation of scapula

SERRATUS ANTERIOR (Boxer Muscle)

Origin – Arises from the Lateral aspect of upper 8 Ribs as digitation.

Insertion – Costal aspect Medial border of the Scapula

Action – ~~Protraction of Scapula~~
↳ it Means "Abduction"

N. Supply – ~~Long Thoracic Nerve~~ / N. to Serratus Anterior

Q. ~~Winging of Scapula~~ is d/t Paralysis of :⇒

Serratus Anterior (on attempting Movement)
Trapezius (@ Rest)

Q. ~~Retraction of Scapula~~ is done by :⇒

Rhomboides Minor
Rhomboides Major
Middle fibres of Trapezius.

(a, b, c) Q. True about Abduction @ shoulder joint –

a. Musculotendinous cuff Stabilizes Shoulder joint
b. Supraspinatus Initiates Abduction
c. Serratus Anterior & Trapezius also help in Abduction
d. Multipennate deltoid clavicular fibers is Main Abductor
e. Axillary N. injury has No effect on Abduction

Structure Lying In Delto-pectoral groove

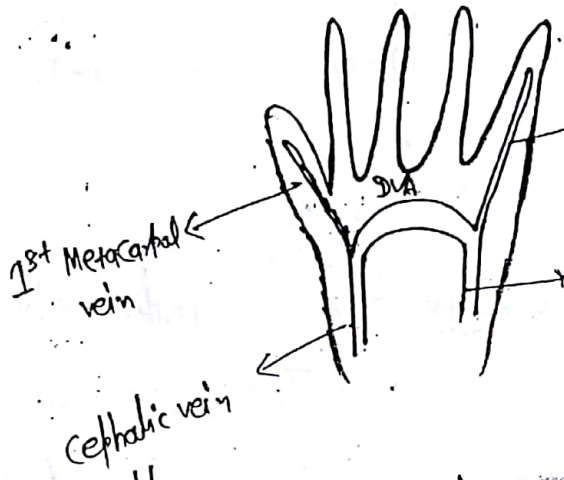
⇓

Cephalic vein

Structure lying in the ilio-psoas groove ⇒ Femoral Nerve

Structure lying in the Tracheo-oesophageal groove ⇒ Recurrent Laryngeal Nerve

Cephalic vein



DVA ⇒ Dorsal venous Ar.

⇓

Formed by joining of Lateral end of dorsal venous arch with the 1st Metacarpal vein

- Lies in the Roof of Anatomical Snuff box.
- Lies in delto-pectoral groove
- Pierces the clavi-pe
- Drains into the Axill

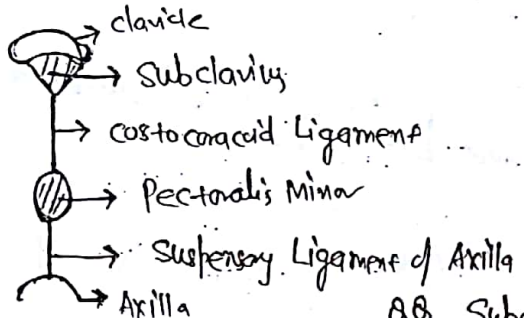
Basilic vein

- Formed by joining of Medial end of dorso-venous arch, & the 5th Metacarpal vein.
- It join & Vene comitans (of a vein) around the brachial artery & form axillary vein.

V.V.Q. Clavi-pectoral fascia

- begins from the clavicle & inserted into the Axilla;
- encloses 2 Muscle — Subclavius
  Pectoralis Minor
- Part of fascia b/w Subclavius & Pectoralis Minor is klas "Costo-coracoid Ligament"
- Part b/w Pectoralis the axilla is klas "Suspensory Ligament of
- derived from "costocoracoid Ligament"

Structure piercing the clavi-pectoral fascia ⇒
- Cephalic vein
- Thoraco-acromial Artery
- Lateral Pectoral Nerve
- Lymphatics from breast



QQ Subclavius protects underlying brachial plexus & subclavian vessels from a broken clavicle.

Coraco-clavicular Ligament ⇒ two parts

conoid (Medial) — trapezoid (Lateral)

The weight of upper limb is transmitted to the medial 2/3rd of the clavicle & then to the axial skeleton through coraco-clavicular Ligament.

THE AXILLA

Boundaries ⇒

Anterior wall

- Pectoralis Major
- Pectoralis Minor
- Subclavius

Posterior wall

- Subscapularis
- Teres Major
- Latissimus dorsi (causes extension, Adduction & Medial Rotation @ the Shoulder joint)
  - also known as "climber's muscle"

Medial wall

- Ribs
- Serratus Anterior

Lateral wall

- Humerus
- Coracobrachialis

Apex of A

- Anteriorly
  - ↳ clavicle
- Medial
  - ↳ Outer border of 1st Rib

- axillary canal

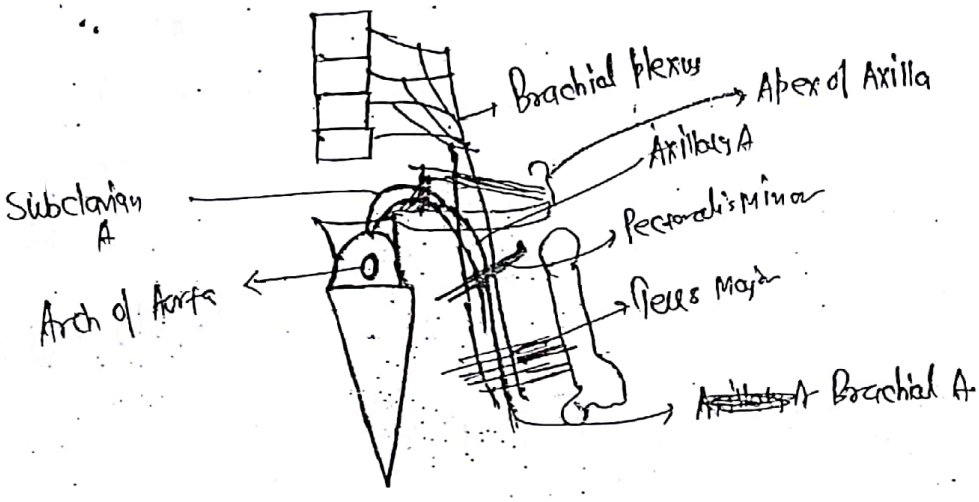
- Posteriorly
  - ↳ Scapula (Subscapular)

* Axillary A. is divided into 3 parts by ⇒ Pectoralis Minor Muscle

Subclavian A. is divided into 3 parts by ⇒ Scalenus Anterior Muscle

Maxillary A. is divided into 3 parts by ⇒ Lateral Pterygoid Muscle

Lingual A. is divided into 3 parts by ⇒ Hyoglossus Muscle



Axillary Artery

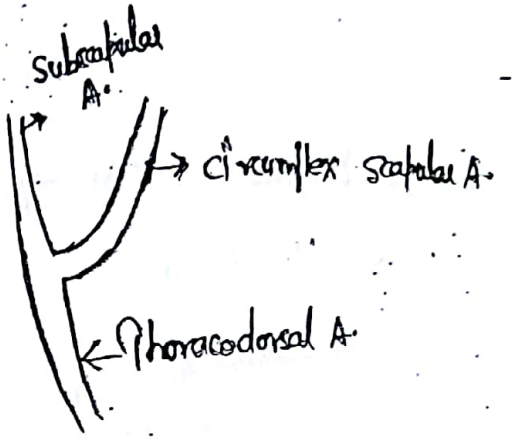
Continuation of the Subclavian Artery at outer border of the 1st Rib

Continues as Brachial Artery below the lower border of Teres Major.

- divided into 3 parts by Pectoralis Minor
- Branches ⇒ 1st part ⇒ Superior thoracic A.
  - 2nd part ⇒ Lateral thoracic A. (Chief A. supplying the breast)
  - Thoracoacromial A.

3rd Part ⇒ Anterior circumflex Humeral A.] → Both, form Anastomosis around surgical Neck (6)
Posterior circumflex Humeral A.]

Subscapular A.
⇓
It gives branches
↙
Circumflex scapular A.
↳ Passes through upper A. Space & takes part in Anastomosis on the dorsal aspect of Scapula.



Continuation of Subscapular A. ⇒ Thoracodorsal A.
⇓
Accompanies the thoracodorsal Ns/N. to Latissimus dorsi
Anastomosis on the dorsal Aspect of Scapula.

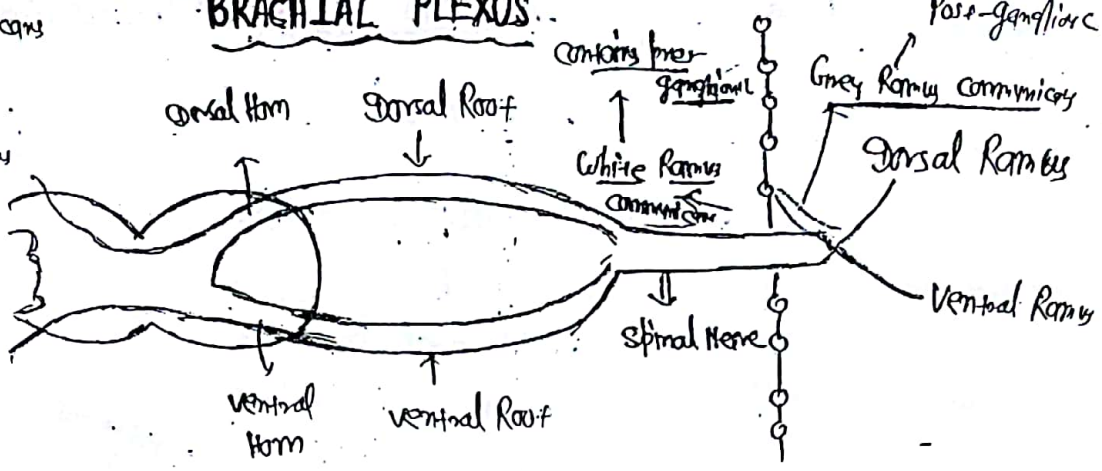
Subclavian
⇓
1st Part
↙ ↘
Suprascapular A. | Deep branch of Transverse cervical A.

Axillary
⇓
IIIrd Part
⇓
Subscapular | circumflex scapular

White Ramus communicans
⇓
⊕ In T_1-L_2

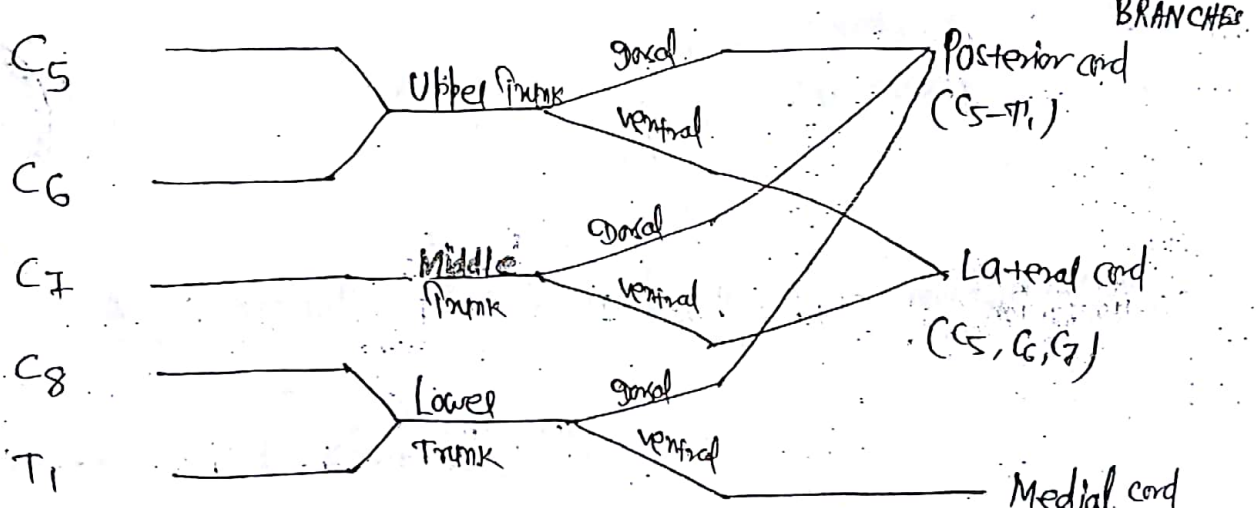
Grey Ramus communicans
⇓
⊕ in all the spinal Nerves

BRACHIAL PLEXUS:



⇒ A plexus is formed by Ventral Ramus of the corresponding spinal Nerve.

⇒



Dorsal division = Posterior division
ventral division = Anterior division

Branches of Lateral cord :→

① Lateral Pectoral N. (C_5, C_6, C_7)

② Lateral Root of Median N. (C_5, C_6, C_7)

③ Musculocutaneous N. (C_5, C_6, C_7)

↳ Damage to Musculocutaneous Nerve
⇓
a) Weakness of flexion of elbow;
b) Loss of supination of semiflexed elbow;
c) Sensory loss along the lateral border of forearm.

Branches of Medial cord ⇒

(7)

① Medial Pectoral N. (C_8, T_1)

② Medial Root of Median N. (C_8-T_1)

③ Medial cutaneous N. of Arm ($C_8 T_1$)

④ Medial cutaneous N. of Forearm ($C_8 T_1$)

⑤ Ulnar Nerve (C_7, C_8, T_1)

Branches of Posterior cord ⇒

"ULNAR"

① Upper Subscapular N. → supplies subscapularis only

② Lower subscapular N. (C_5, C_6) → supplies subscapularis & Teres Major

③ Axillary N. → supplies both Teres Minor & Deltoid

④ N. to Lattismus dorsi / Thoracodorsal N. (C_6, C_7, C_8)

⑤ Radial Nerve ($C_5 - T_1$)

↳ Largest branch of Brachial plexus

Q: Root value of Median Nerve ⇒ $C_5, C_6, C_7, C_8, T_1 (C_5-T_1)$

Branches from the Roots

C_5 Root ⇒ N. to Rhomboides / Dorsal-scapular Nerve

C_5, C_6, C_7 Root ⇒ N. to Serratus Anterior / Long thoracic Nerve (C_5, C_6, C_7)

C_5 Root ⇒ Accessory Phrenic Nerve (Joins the Main Phrenic (receives) & then straight / N. to Subclavius)

C_5, C_6 Roots ⇒ N. to Subclavius

Branches from Upper trunk

① Supra Scapular Nerve – supplies Supraspinatus & Infraspinatus

② N. to Subclavius (occasionally from Roots of C_5, C_6)

* Roots; trunks; & divisions are ⇒ Supraclavicular:

⇓

Lies in Posterior triangle of the Neck between the Scalenus Anterior & Scalenus Medius.

* Cords & Nerves are ⇒ Infraclavicular

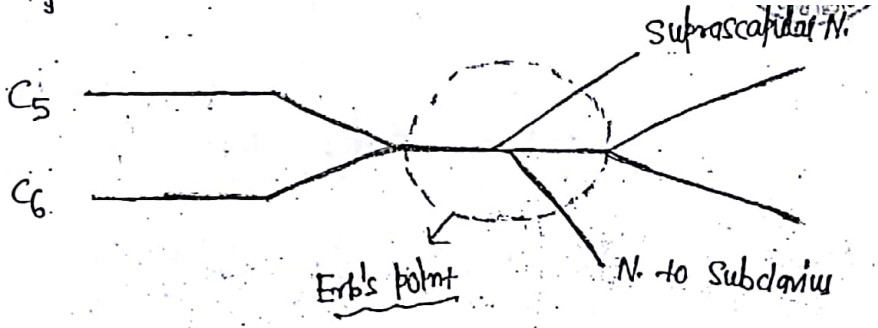
⇓

Lies in the Axilla around the axillary artery.

* Cords are present in the 1st & 2nd part; Nerves are present in 3rd part of Axillary Artery.

* cords are placed in Rfc to their Name in 2nd part of Axillary artery.

Erb's point :⇒



* Pre-fixed Brachial plexus ⇒ Formed from C_{4-8} Spinal Nerve

* Post-fixed Brachial plexus ⇒ Formed from C_{6-8} T_{1-2} Spinal Nerve

FRONT OF THE ARM / FRONT OF THE BRACHIUM

Muscles ⇒ 1. Biceps brachii

- Short head – Arises from Coracoid process along with coracobrachialis
- Long head ⇓ Arises from Supraglenoid tubercle of Scapula.

Insertion ⇒ Posterior aspect of Radial tuberosity

N. Supply ⇒ Musculocutaneous Nerve (C_5, C_6)

No + C_7 (X)

Action ⇒ Supinator @ Radioulnar joint

Flexion @ elbow joint

Flexion @ shoulder joint

* Supination in extended elbow ⇓ Supinator
* Supination in flexed elbow ⇓ Biceps brachii

2. Brachialis ⇒ Arises from the shaft of humerus below the insertion of Coracobrachialis

Insertion ⇒ Ulnar tuberosity.

N. Supply ⇒ Medial half ⇒ Musculocutaneous N. (C_5, C_6)

Lateral half ⇒ Radial N. (C_5, C_6)

Action ⇒ Chief flexor of the elbow joint.

3. Coracobrachialis ⇒ Arises from the coracoid process along with the short head of biceps brachii.

Insertion ⇒ Medial aspect of middle of Shaft of the humerus.

N. Supply ⇒ Musculocutaneous Nerve (C_5, C_6, C_7)

Action ⇒ Weak flexors of the shoulder joint.

**QQ Paralysis after injury to $C_{5,6}$ except ⇒ Coracobrachialis

Musculocutaneous Nerve

Branch of Lateral cord of Brachial plexus.

Prt. on the Lateral aspect of IIIrd part of Axillary A.

- pierces the coracobrachialis.
- Lies b/w biceps & Brachialis.
- Continues as the Lateral cutaneous N. of Forearm.

ERB's PARALYSIS

- Injury to the upper trunk
- N. Roots involved ⇒ C_5, C_6
- Nerves involved ⇒ Axillary N.
  Musculocutaneous N.
  Suprascapular N.
  N. to Subclavius

Muscle Paralysed	Position of Upper Limb
① Axillary Nerve ⇒ Deltoid	⟶ Arm is adducted
Teres Minor	⟶ Arm is Medially Rotated
	⇓
	"Regimen bathsign"
② Musculocutaneous Nerve ⇒ Biceps	⟶ Forearm is pronated
Brachialis	⟶ Forearm is extended
	– Loss of sensation on Lateral aspect of Forearm.

* "coraco-brachialis" is spared b/c it is supplied by C_7 of Musculo-cutaneous

③ Suprascapular N. ⇒	Supraspinatus →	Arm is adducted
	Infraspinatus →	Arm is Medially Rotated

KLUMPKE'S PARALYSIS

– Injury to Lower trunk
– N. Roots Involved ⇒ C_8 T_1
– N. Involved ⇒ Median & Ulnar N.
– Muscle Paralysed ⇒ Intrinsic Muscle of hand (T_1)
Ulnar flexors of the wrist & fingers (C_8)
↳ Flexor carpi ulnaris & Medial half Flexor digitorum profundus
– claw hand & Horner syndrome

FRONT OF THE FOREARM

(Lateral to Medial)

SUPERFICIAL MUSCLE ⇒ 1. Pronator teres

⇓

Origin of all 5 Muscles are from Medial epicondyle of Humerus.

Superficial head / Humeral head

Deep head / Ulnar head

Median N. Passes b/w two heads.

Ulnar A. Passes deep to the deep head.

∴ Deep head separates Median N. from Ulnar A.

2. Flexor Carpii Radialis

Causes Flexion & Abduction @ wrist joint.

3. Palmaris Longus

– Continues in hand as "Palmer Aponeurosis"

4. Flexor digitorum Superficialis

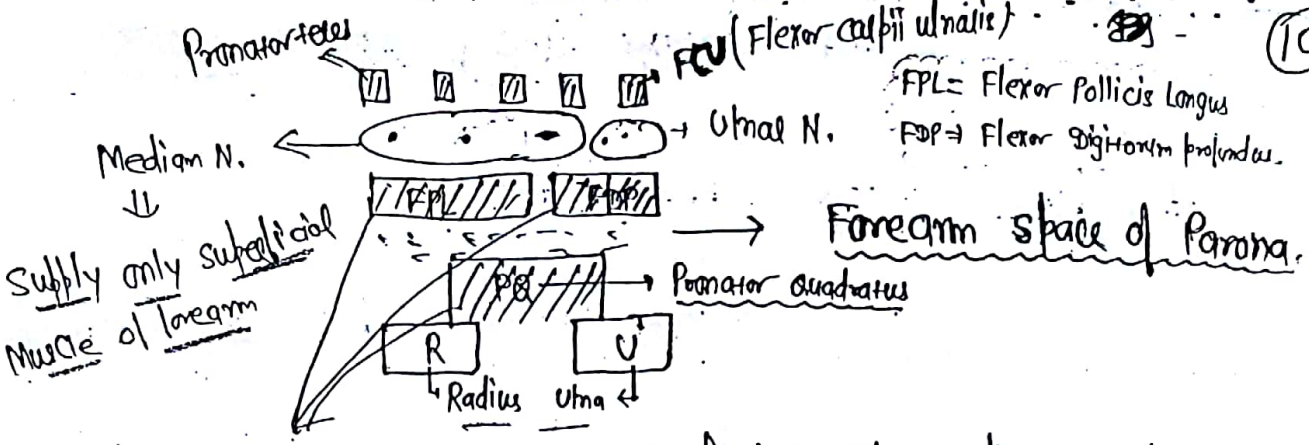
5. Flexor Carpii Ulnaris

– Causes Flexion & Adduction @ wrist joint.

Intermediate Muscle ⇒ 1. Flexor Pollicis longus – Arises from Radius

2. Flexor digitorum Profundus – Arises from Ulna

Deep Muscle ⇒ Pronator quadratus



Anterior Interosseous Nerve ⇒ supply Lateral half of Flexor digitorum profundus.

↳ Deep branch of Median N.
∴ given after it passes b/w 2 heads of Pronator teres.

↳ Flexor pollicis Longus ; Pronator quadratus & Lateral half of Flexor digitorum profundus are supplied by Anterior Interosseus Nerve.

* Carpel-tunnel syndrome ⇒ Seen when Median Nerve is compressed.
⇓
Carpel-tunnel contains → Median Nerves + 9 tendons
⇓
4 FDS + 4 FDP + 1 FPL

Δx ⇒ Phalen's test; Tinel's sign.

* Pronator teres Syndrome ⇒ Uncommon entrapment of the Median Nerve occuring in the elbow Region.

* Ulnar Nerves enter the forearm by passing b/w the two (Humeral & Ulnar) heads of origin of Flexor carpii ulnaris.

* Froment's sign ⇒ For Adductor pollicis → Seen in ulnar N. injury.

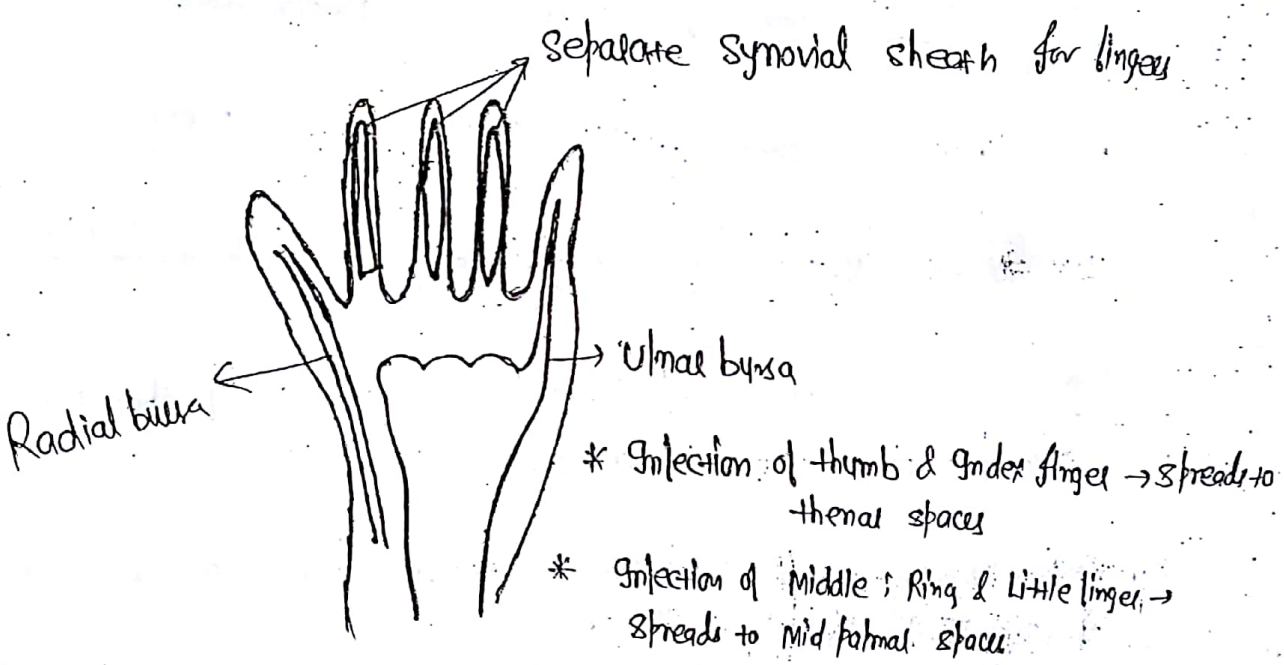
* Card Test ⇒ For Palmer Interossei (Adductors of fingers) → seen in Ulnar N. injury.

* Claw hand is caused by lesion of ⇒ Ulnar N. > Median N.

* Guyon's canal Syndrome / Handlebar Palsy ⇒ caused by entrapment of the Ulnar Nerve in Guyon canal.

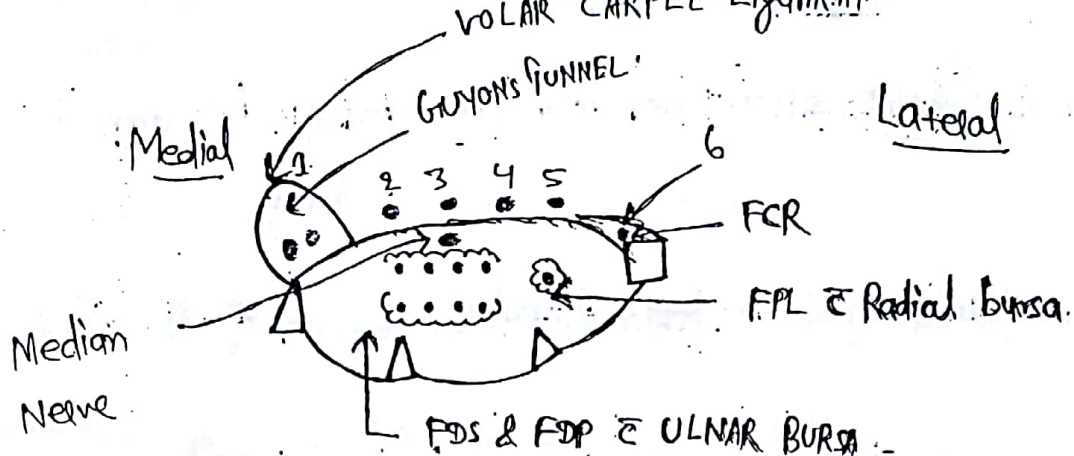
FLEXOR RETINACULUM & CARPEL TUNNEL

- Ulnar bursa encloses the tendon of
  - ↳ Flexor digitorum superficialis & Profundus.
  - ↳ continues ⊂ little fingers.
- Radial bursa encloses the tendon of
  - ↳ Flexor pollicis Longus
  - ↳ continues ⊂ thumb.



* Structures passing Above Flexor Retinaculum ⇨

- 1. Ulnar Nerve & vessels
  - ↳ passes below the volar carpel Ligament through Guyon's canal.
- 2. Palmer cutaneous branch of Ulnar Nerve
  - ↳ Supplies the skin over the hypothenar Eminence



3. Palmaris Longus

4. Palmer cutaneous br

↳ Supplies

5. Superficial palmer branch of

6. Flexor carpi Radialis.

ULNAR ARTERY :⇒ Larger terminal branch of Brachial Artery; arising in cubital Fossa,
↳ enters the palm by Passing superficial to flexor Retinaculum.

Branches → (A) In cubital Fossa ⇒ i) Anterior ulnar Recurrent;
ii) Posterior Ulnar Recurrent;
iii) Common interosseous → Anterior interosseous
→ Posterior interosseous.

B) In Forearm ⇒ i) Palmer carpel branch
ii) Dorsal carpel branch

In Palm ⇒ i) Deep branch;
ii) superficial branch

* REFLEX & ITS ROOT VALUE

Biceps Reflex	→	C_5, C_6
Supinator Reflex	→	C_5, C_6
Triceps jerk	→	C_6, C_7
Knee jerk	→	L_2, L_3, L_4
Ankle Reflex	→	S_1.

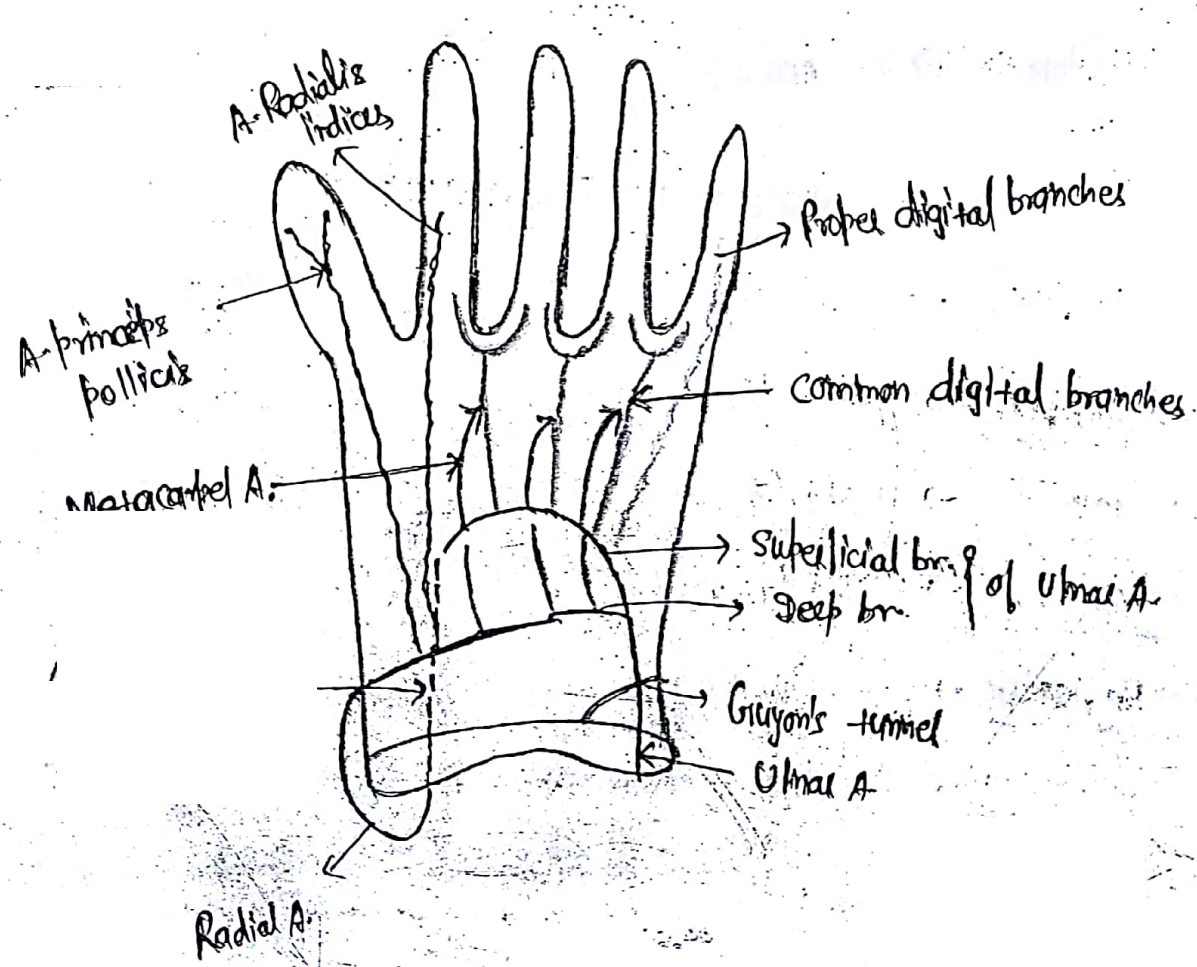
HAND

SUPERFICIAL PALMAR ARCH ⇒ formed by Superficial branch of Ulnar Artery.

Completed by Superficial Palmer branch of Radial A.

- Lies above the flexor tendons (FDS; FDP).
- Lies @ the level of Distal palmar crease.
- Branches ⇒ i) 3 Common digital branches;
  ii) 1 Proper digital branches.

Supplies ⇒ Medial 3½ fingers.



Deep palmar Arch ⇒ Formed by Radial A.
- Completed by deep branch of Ulnar A.
- Lies deep to the tendons of FDS; FDP
- Lies 1 cm proximal to Superficial palmar arch.

Branches ⇒ i) Arteria principalis pollicis;
ii) Arteria Radialis indicis;
iii) 3 Metacarpal Arteria which anastomoses w/ 3 common digital branches of superficial palmar arch.

✱ The tendon of **Flexor digitorum Superficialis** is inserted on either side of base of Middle phalanx of the fingers.
- divides into 4 tendons for 4 fingers opposite to the base of Proximal Phalanx.
- each tendon divides into 2 slips.

✱ The tendon of **Flexor digitorum profundus** is inserted on base of distal phalanx of the fingers.
↳ Causes flexion of DIP joint;

LUMBRICALS ⇒ Flex the Metacarpophalangeal joint & extends Interphalangeal joints.
- Inserted on ⇒ the Lateral aspect of the base of Proximal phalanx of the fingers.
⇒ Dorsal aspect of the base of distal phalanx of fingers.

N. Supply ⇒ 1st & 2nd Lumbricals ⇒ Median N.
3rd & 4th Lumbricals ⇒ Ulnar N. (Deep branch)

Action ⇒ : Flexion @ MP Joint

Extension @ IP Joint

* Paralysis Leads to claw hand.

* Muscles Supplied by Median N. In the Hand ⇒ 5 Muscles

Abductor pollicis brevis

Flexor pollicis brevis (Superficial head)

Opponens pollicis

1st & 2nd Lumbricals.

Grip of the hand is due to ⇒ Flexor tendons (Long)

* Muscles Supplied by Ulnar N. In the Hand ⇒ 15 Muscles

Abductor digiti minimi brevis

Flexor digiti minimi brevis

Opponens digiti minimi

3rd & 4th Lumbricals

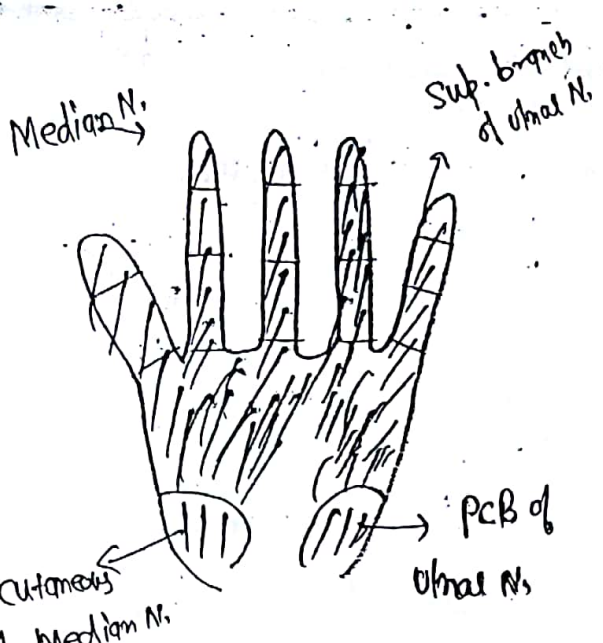
4 Palmer Interossei (Adduction of fingers)

4 dorsal Interossei (Abduction of fingers)

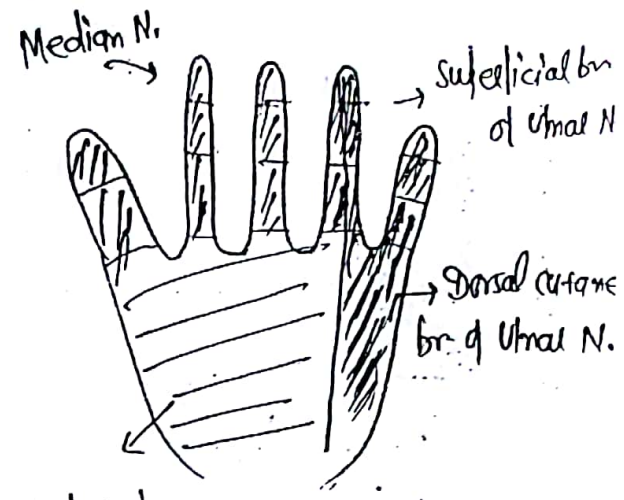
Adductor pollicis (Graveyard of Ulnar N.)

Deep head of Flexor pollicis brevis

* Superficial branch of Ulnar N. supplies ⇒ Palmaris brevis



∴ Palm of Hand



Dorsum of Hand

eye of the Hand is which Nerve ⇒ Median N.

eye finger of Hand ⇒ Index finger
(Max^m Proprioceptor ⇒ ⊕)

Ulnar Nerve ⇒ Musician Nerve

Also "Labourer's Nerve"

- The Superficial & deep branches of Ulnar N. is given in hand.
- The Palmer cutaneous branch & dorsal cutaneous branch are given in the forearm / @ the wrist / before the flexor Retinaculum.

* Wartenberg's sign ⇒ Inability to adduct the Small finger in again the Ring finger d/t weakness of Palmer Interossei Muscle
* All Metacarpels (except 1st) have ⇒ Distal (Head epiphysis)
* 1st Metacarpals & all phalanges have ⇒ Proximal (Base epiphysis).

RADIAL NERVE (Saturday Night Palsy)

- Branch of Posterior cord of Brachial plexus.
- Brn. on Posterior aspect of 3rd part of Axillary A.

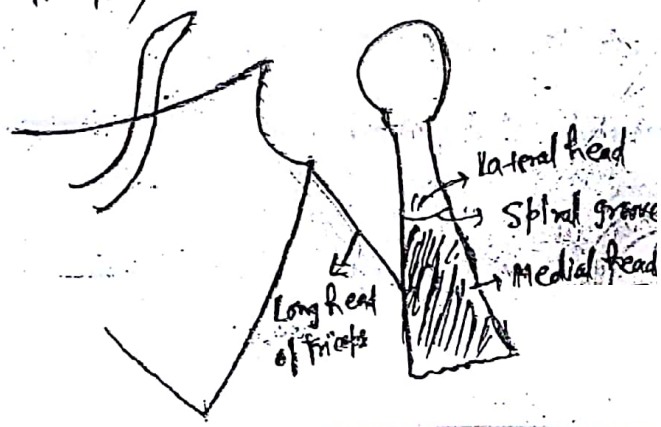
- Branches & Supply

In Axilla

- 2 Muscular
  - Long head of Triceps
  - Medial head of Triceps
- 1 cutaneous
  - Posterior cutaneous Nerve of Arm.

ii) In Spiral groove

- 3 Muscular
  - Lateral head of Triceps
  - Medial head of Triceps
  - Anconeus (Detached part of Medial head of Triceps)
    - help in screwing Movement; helps triceps to extend elbow joint.
- 2 cutaneous
  - Posterior cutaneous Nerve of forearm
  - Lower Lateral cutaneous Nerve of Arm.



iii) Lateral aspect of the Arm

- Brachialis (Lateral half)
- Brachioradialis
- ECRL (Extensor carpii Radialis Longus)

iv) In the cubital fossa (Ant. to Lateral epicondyle; the Radial N. divide in 2 terminal branches)

Radial N. divides

Superficial branch

↓

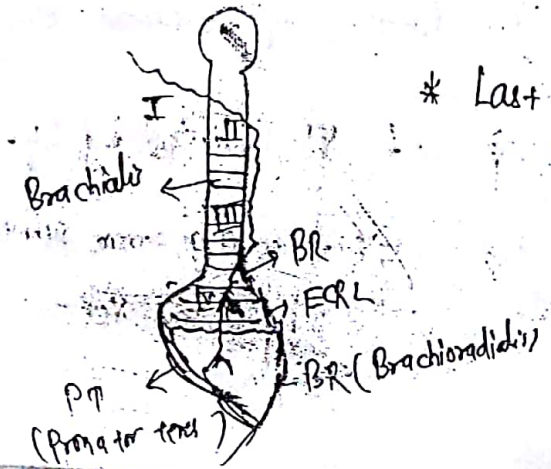
Goes below the Brachioradialis; Lies in the roof of Anatomical Snuff box & supplies the skin on the dorsum of hand & proximal phalanges of Lateral $3\frac{1}{2}$ fingers.

Deep branch / Posterior Interosseous Nerve

↓

pierces the Supinator & suppl all the dorsal aspect

Cheralgia Paresthetica ⇒ Compression of the superficial br. of Radial Nerve @ wrist.



* Last Muscle supplied by Radial N.

↓

ECRL

BACK OF THE FOREARM

DNB'16

- SUPERFICIAL MUSCLE ⇒
  - Anconeus – Radial N. In spiral groove ⟵ Inserted on base of 5th Metacarpal bone.
  - Brachioradialis
  - Extensor carpii Radialis Longus
  - Extensor carpii Radialis brevis
  - Extensor digitorum
  - Extensor digiti minimi.
  - Extensor carpii ulnaris

Radial N. on the Lateral aspect of Arm ⟵ Muscle of extension compartment of forearm that causes flexion of elbow.

Posterior Interosseous Nerve ⟵

- Deep Muscle ⇒
  - Abductor Pollicis Longus
  - Extensor pollicis brevis
  - Extensor pollicis Longus
  - Extensor Indices
  - Supinator

⟵ form Anatomical Snuff box

Wrist drop ⇒ d/t Paralysis of ECRL.

Finger drop ⇒ d/t Paralysis of Extensor digitorum.

Extension @ wrist done by ⇒ ECRL supplied by Radial N.

Extension of digit done by ⇒ Extensor digitorum supplied by Posterior Interosseous Nerve

Lesion of Radial Nerve

High Lesion

- In axilla
- In spiral groove

→ Wrist drop & finger drop

Low Lesion

Type-I

- b/w spiral groove & Lateral aspect of Arm

→ Wrist drop & finger drop

Type-II

- In Cubital fossa

→ Not finger drop & Wrist drop

ANATOMICAL SNUFF BOX

Boundaries :→ Lateral / Anterior :→ Abductor Pollicis Longus
Extensor Pollicis Brevis

Medial / Posterior :→ Extensor pollicis Longus

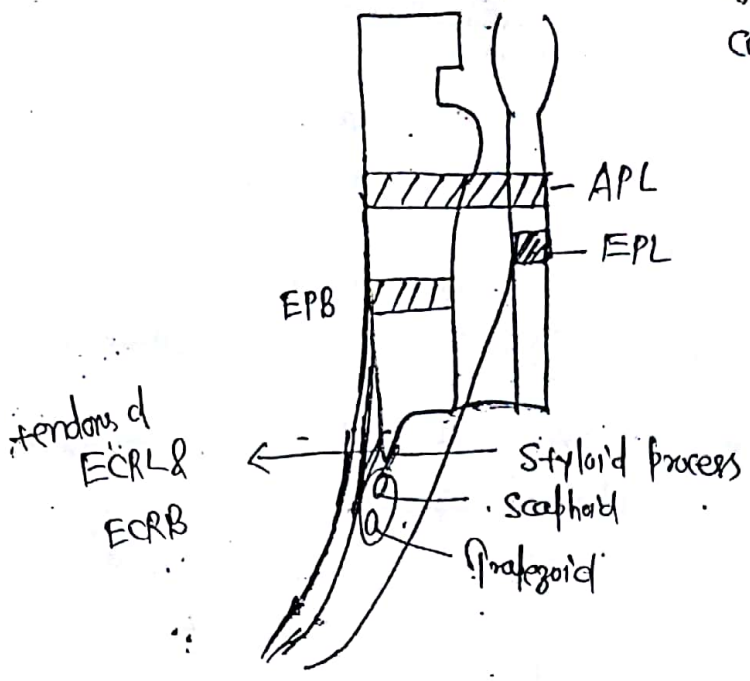
Floor :→ Styloid process of Radius
Scaphoid
Trapezium

- Floor is Caspated by tendons of ECRL & ECRB.

Content :→ Radial A. (only one content)

Roof :→ Cephalic vein
Sup. branch of Radial N.

* finger by which all the Nerves can tested ⇒ Thumb



EXTENSOR RETINACULUM

Lateral to Medial compartment ↳

I st compartment ⇒ Abductor pollicis Longus
Extensor pollicis brevis

II nd compartment ⇒ ECRL
ECRB

III rd compartment ⇒ Extensor pollicis Longus

IV th compartment ⇒ Extensor digitorum
Anterior Interosseous A
Extensor Indicis
Posterior Interosseous N.

V th compartment ⇒ Extensor digiti minimi

VI th compartment ⇒ Extensor carpi ulnaris

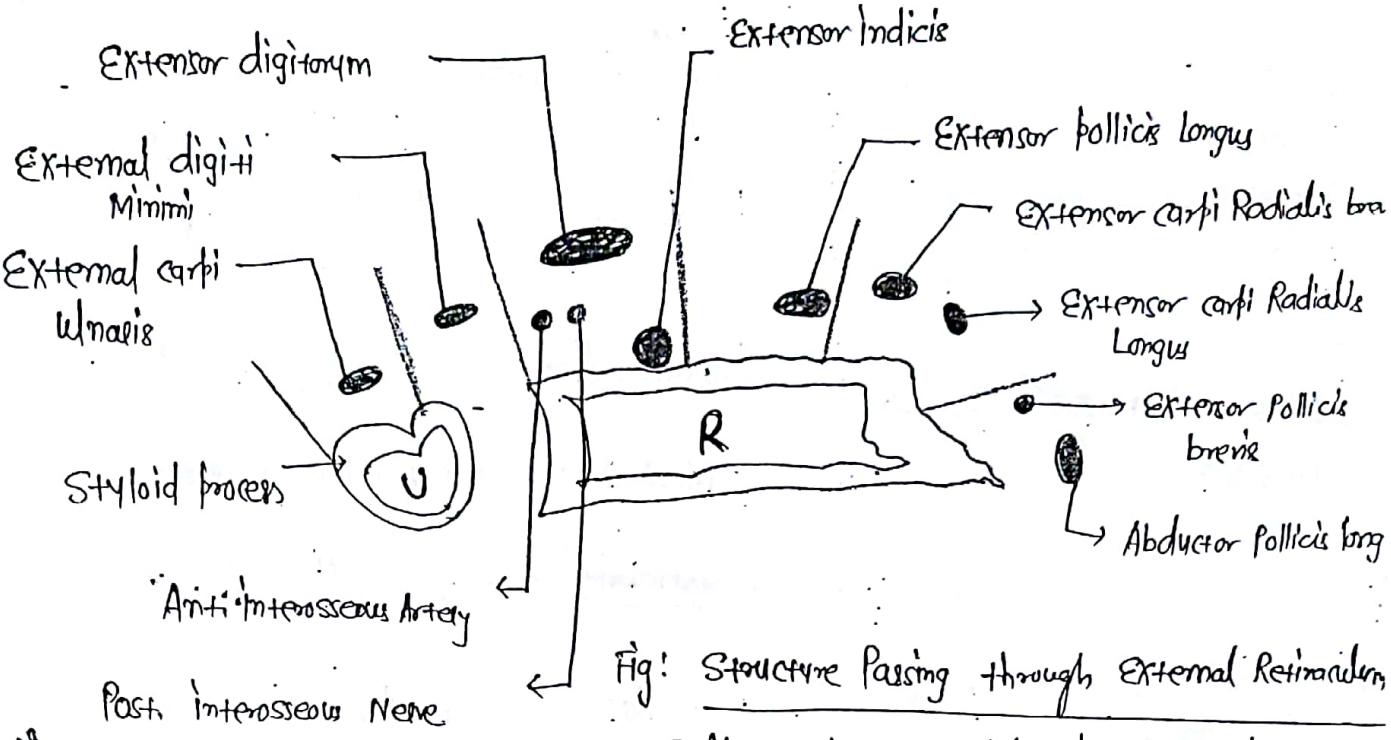
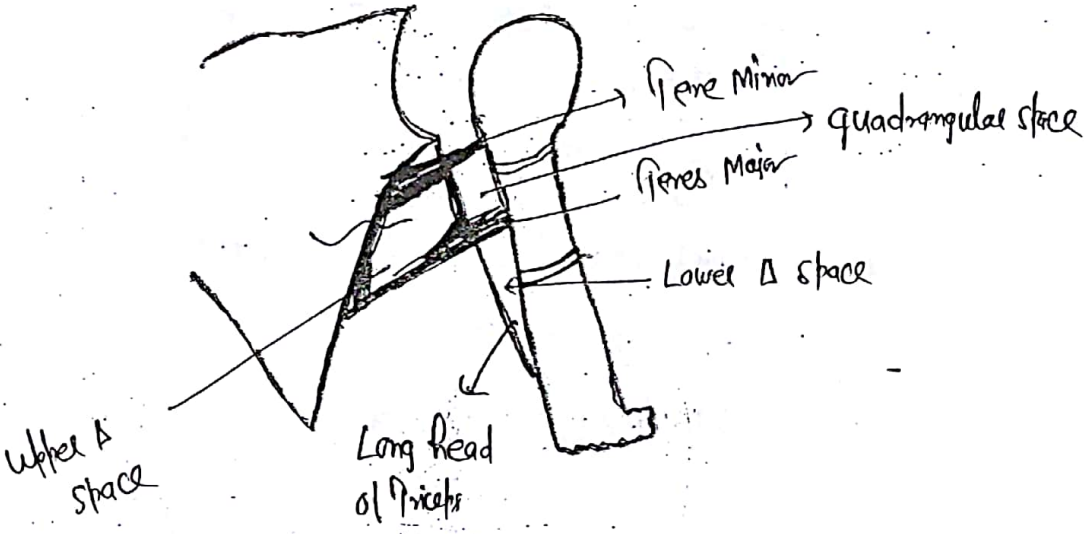


Fig: Structure Passing through External Retinaculum

Viva * De quervain's tenosynovitis :⇒ Inflammation & Nodule formation In the synovial sheath of Abductor Pollicis Longus & extensor Pollicis brevis; Result In Pain over Radial sty

Spaces Around the Arm



Upper Δ space ⇒ content ⇒ circumflex humeral A.

Lower Δ space ⇒ content ⇒ Radial N.
Profunda brachii A.

Quadrangular space ⇒ Content ⇒ Axillary N.
Posterior circumflex humeral vessels.

Region	Boundaries
• Upper Triangular space of Arm ⟹	Superior : Teres Minor Inferior : Teres Major Lateral : Long heads of Triceps
• Lower Triangular space of Arm ⟹	Superior : Teres Major Medial : Long head of Triceps Lateral : Shaft of Humerus
• Quadrangular space of Arm ⟹	Superior : Teres Minor; Inferior : Teres Major; Medial : Long head of Triceps; Lateral : Surgical Neck of Humerus

* DERMATOME :→

THUMB	–	C_6
3 fingers	–	C_7
Little fingers	–	C_8
1st web space	–	C_6-C_7
Last web space	–	C_7-C_8

Chief LymphNode draining the breast ⇒ Ant. Axillary

Chief Artery supplying the breast ⇒ Lateral thoracic Artery.

Involvement of cutaneous Lymphatics — In Ca breast leads to ⇒ Peau-de-orange appearance

Involvement of Lactefferous duct — In Ca breast leads to ⇒ Retraction of Nipple

Involvement of Cooper's Ligament in Ca breast leads to ⇒ Puckering/dimpling of skin of breast.

Triangle of Auscultation

Medial ⇒ Trapezius

Lateral ⇒ Medial border of Scapula

Base ⇒ Latissimus dorsi

Floor ⇒ 6th & 7th Rib & Intercostal space b/w them & Rhomboides Major

* Wrist joint is formed b/w Lower end of Radius & 1st 3 Carpel bones (Scaphoid, Lunate & Triquetral) - Separated by Articular disc

JOINTS OF UPPER LIMB

Sterno clavicular joint ⇒ Saddle type of Synovial joint.

Acromio clavicular joint ⇒ Plain synovial joint
↳ only gliding Movement

Shoulder joint ⇒ Ball & Socket joint

elbow joint ⇒ Hinge joint

Superior & inferior Radio-ulnar joint ⇒ Pivot joint (synovial) (Trochoid)

Middle Radio-ulnar joint ⇒ Syndesmosis type of fibrous joint

wrist joint. ⇒ Ellipsoidal type of joint.

1st carpo Metacarpel joint ⇒ Saddle type of synovial joint (sellar)

Intercarpel joint ⇒ Plain synovial joint

Metacarpophalengeal joint ⇒ condylar type of synovial joint (Ellipsoidal More than condyles).

Interphalengeal joint ⇒ Hinge joint

* Unipinnate Muscle :⇒ Arises from 1 tendon (Eg⇒ 1st & 2nd Lumbricals) or from 1 bone (Eg ⇒ Palmar interossei)

↓ Bipinnate Muscle :⇒ Arises from 2 tendon (Eg ⇒ 3rd & 4th Lumbricals) or from 2 bones (Eg ⇒ Dorsal interossei)

* Most frequently dislocated joint ⇒ Glenohumeral (Most mobile joint).

JOINTS OF FOOT

* Sub-talar joint (Talocalcaneum) → Plain Synovial
* AIIMS NOV 17 Talocalcanonavicular Joint → Ball & Socket
* Calcanocuboid Joint → Saddle
* Smaller Joint of Forefoot → Plain synovial
* Metatarsophalangeal Joint → Condylar Joint
* Interphalangeal Joint → Hinge Joint

TH → Talo-calcaneo Navicular joint
H → Hip joint
I → Ingudostatedial
S → Shoulder joint.

ARCHES OF FOOT

Medial Longitudnal Arch

Bones → Calcaneum, Talus; Navicular; 3 cuneiform; 3 Metatarsal bones

Intersegmental ties → Spring Ligament / Plantar Calcaneo-Navicular Ligament

↓

Supports the head of Talus

Sling → Tibialis Anterior & Tibialis Posterior

Lateral Longitudnal Arch

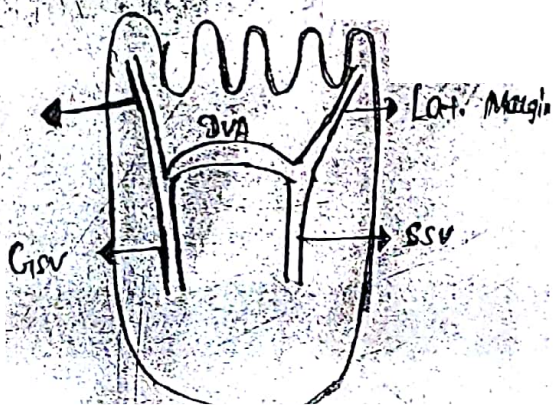
Calcaneum; cuboid; 4th & 5th Metatarsal

Short & long plantar Ligaments

Peroneus Longus & Peroneus Brevis

VENOUS Drainage of LOWER LIMB

1. Dorsal venous Arch
2. Medial Marginal vein
3. Lateral Marginal vein
4. Gsv (Great saphenous vein)
5. Ssv (Short saphenous vein).



Great Sephanous vein (GSV)

- Goes in front of Medial Malleolus
  - 1cm Anterior to Medial malleolus (NEET'16)
- Accompanies the Saphenous N
- Drains into femoral vein
  - Saphenous opening lies 4cm (1.5 inch) below & Lateral to Pubic tubercle where it opens into femoral vein.

Short sephanous vein (SSV)

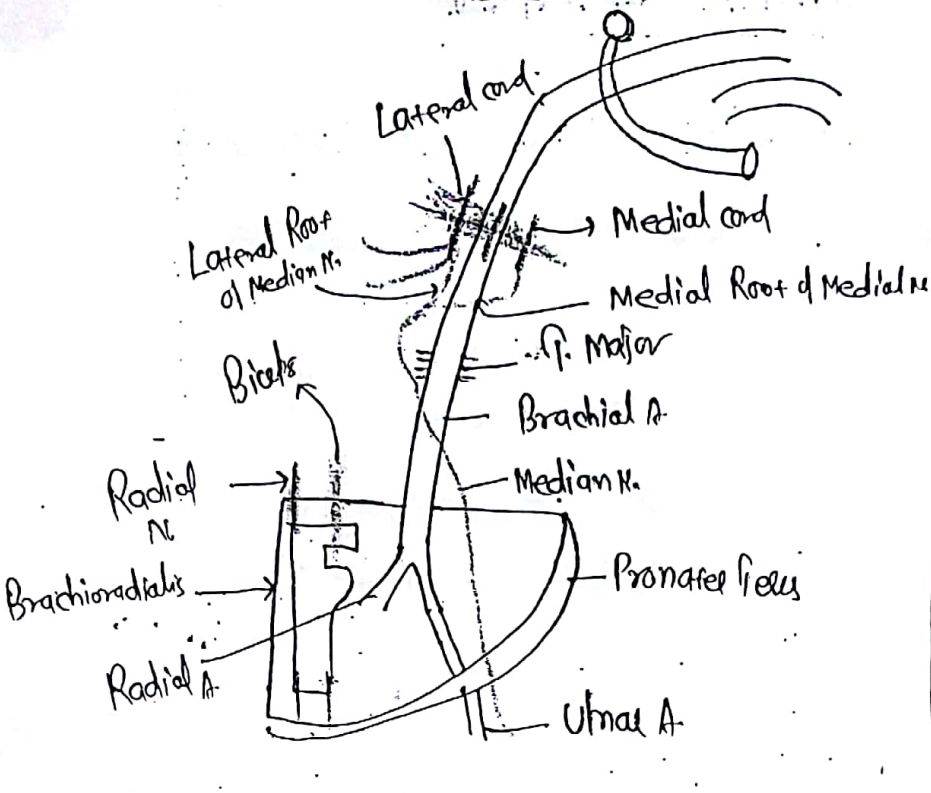
- → Goes behind the Lateral Malleolus
- → Accompanies the Sural N
- Drains into Popliteal/Posterior tibial vein

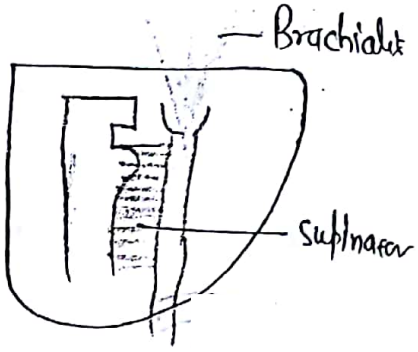
Perforating veins

(They connect the superficial veins & the deep veins)

Location	Connects
Mid-thigh (Dodds) Hunterian	Adductor canal — Great sephanous vein with the femoral vein
Knee Perforator (Boyds)	Just below Knee — Great sephanous with the Posterior tibial V.
Leg - Lateral Ankle	Junction of Middle & Lower third — Short sephanous with the Peroneal vein
Leg - Medial Ankle (Cockett)	Upper Medial - Junction of Middle & lower third of Leg — Posterior Arch vein & the Posterior tibial vein
	Lower Medial - below & behind Medial Malleolus
	Middle - b/w two

CUBITAL FOSSA





Floor

AI-IS ✱ Bicipital Aponeurosis lies over Brachial Artery & Median Nerve in cubital fossa.
↳ Structure over bicipital Aponeurosis in cubital fossa ⇒ Veins.

* Tennis Elbow ⇒ Type of Repetitive Strain injury Resulting from tendon overuse & failed healing of tendon.
  - "Extensor carpii Radialis (brevis)" ... Muscles play a Key Role.
  - Also "Lateral epicondylitis" (NEET 2016)

Boundaries of cubital Fossa ⇒ Superior → Inter-epicondylar line of Humerus
- Medial → Pronator teres;
- Lateral → Brachioradialis;
- Floor → Brachioradialis & supinator
- Roof → Skin; superficial fascia; Median cubital vein; Bicipital Aponeurosis.

Content of cubital fossa (Medial to Lateral) ⇒
- Median Nerve (Medial Most);
- Brachial Artery (Bifurcation of brachial A & initial part of Radial & Ulnar arteries)
- Tendon of biceps brachii
- Radial Nerve
- Some Lymph Nodes

GENERAL EMBRYOLOGY

→ Fertilisation occurs in ⇒ Ampulla of Fallopian tube

→ Zygote divides to form ⇒ 16 celled Morula

⇓

as it enters in Uterine cavity; fluid from the uterus enters the Morula & divides it into → Outer cell Mass/ Trophoblast

→ Inner Cell Mass/ Embryoblast

– Cavity is k/as " Blastocyst "

– This structure is k/as " Blastula ".

→ The outer cell mass/ trophoblast differentiate into → Syncytio-trophoblast

↓

cell walls are abt.; & the Nuclei are scattered

→ Cyto-trophoblast

↓

Cell walls are distinct; there is one Nucleus in each cell

→ The Inner cell Mass/ Embryoblast differentiate into → Epiblast

⇓

Tall columnar cells

→ Hypoblast

⇓

cuboidal cells

- Epiblast grows around the cyto-trophoblast to enclose Amniotic cavity.

- Hypoblast Similarly encloses the Yolk sac.

- The germ disc is ⇒ Bilaminar.

- The Hypoblast / Yolk sac forms "Extra-embryonic Mesoderm"

  ⇓

  which lies b/w amniotic cavity; Yolk sac & cyto-trophoblast.

- Small cavities appear here; which joins to form ~~extra-emb~~ coelom / chorionic cavity; this cavity divides the Mesoderm in

  Extra-embryonic Splanchnopleuric

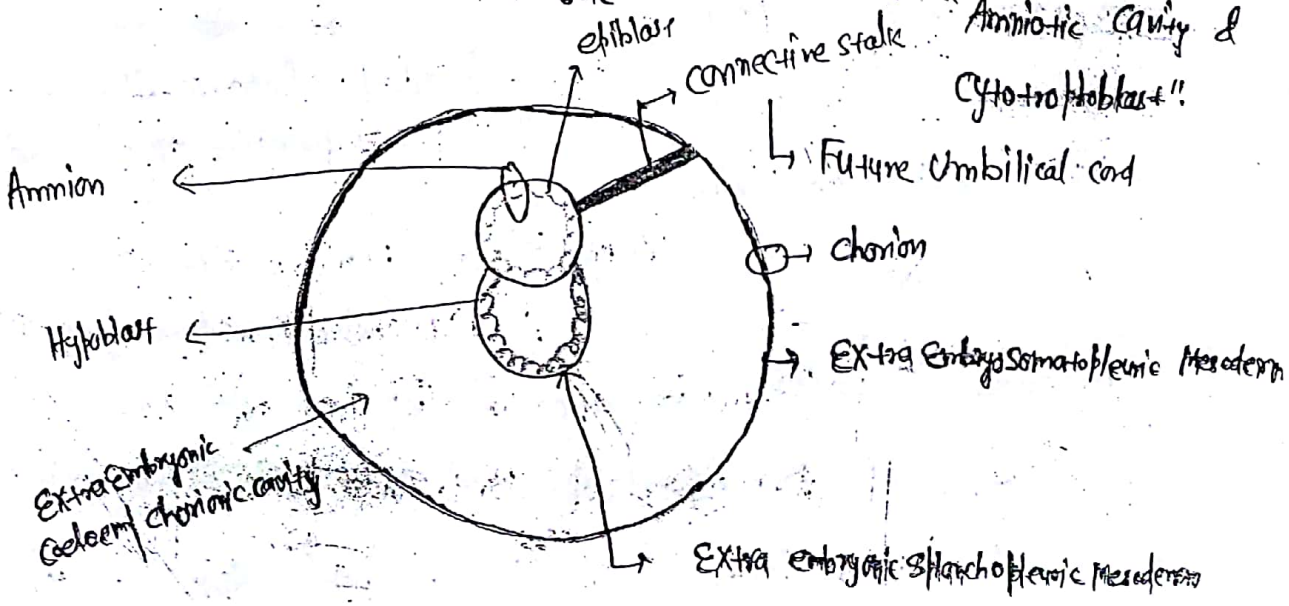
  ⇓

  which lines the "Yolk Sac"

  Extra-embryonic Somatopleuric

  ⇓

  which lines the "Amniotic Cavity & Cyto-trophoblast"



(I) Formation of Pro-chordial plate / Bucco-pharyngeal Membrane :⇒

- The Hypoblast @ one end become columnar.

⇓

they form an elevation in the Amniotic cavity

⇓

K/a "Prochordial plate"

⇓

forms future Mouth

→ determines cephalic end & central axis of embryo.

(II) Formation of Primitive streak :⇒

- The epiblastic cells @ caudal end grows rapidly

⇓

they form an elevation in the amniotic cavity

⇓

K/a "Primitive streak"

⇓

Rounded Anterior structure is K/a "Primitive Knot / node"

⇓

Depression in Primitive Knot is K/a "Blastopore / Primitive Pit"

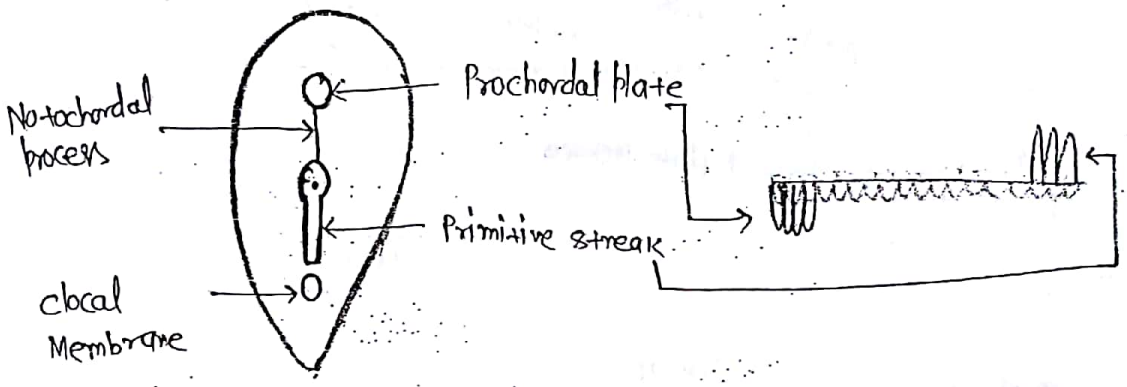
* cell Responsible for formation of 3 germ layers in an embryo is ⇒ Epiblast;
* 1st germ layer to be formed in embryo is ⇓ Endoderm > Mesoderm > Ectoderm

Functions ⇒ (1) Formation of all the germ layers;
(2) formation of Notochordal process

Fate ⇒ It disappears ; but if persists form " Sacro-coccygeal teratoma "

(III) Formation of Notochord ⇒

- derived from Notochordal process (derived from primitive streak)
- The blastopore inside this process to form a Notochordal canal.
- Lies in Mesoderm.
- extents from primitive knot to prochordal plate
- It disappears except ⇒ Nucleus pulposus of intervertebral disc, Apical Ligament of Dense



(IV) Intra-embryonic Mesoderm ⇒ It Migrates b/w Ectoderm & Endoderm

at all the sites except → Prochordal Plate

→ Cloacal Membrane

At this two ends the ectoderm & endoderm are fused

→ Intra-embryonic Mesoderm

- Paraxial Mesoderm ⇓ forms "Somites"
- Intermediate plate Mesoderm ⇓ Forms the "Genitourinary System"
- Lateral plate Mesoderm ⇓ encloses a cavity ⇓ Intra-embryonic coelom ↳ form Pleural cavity, Peritoneal cavity

Form ⇒ a) Nephrogenic Ridge
b) Gonadal Ridge
c) Mesonephric duct
d) Paramesonephric duct

Also form Smooth Muscle lining the blood vessels except Aorta ⇓ derived from Paraxial Mesoderm

Dermomyotomes

Sclerotomes → Forms vertebral column & Ribs

1 Formation of Neural tube ⇒ Derive from ectoderm.

↳ Forms the Brain & Spinal cord;

↳ Ant. Neuropore (cranial) closes by 25th day of IUL.

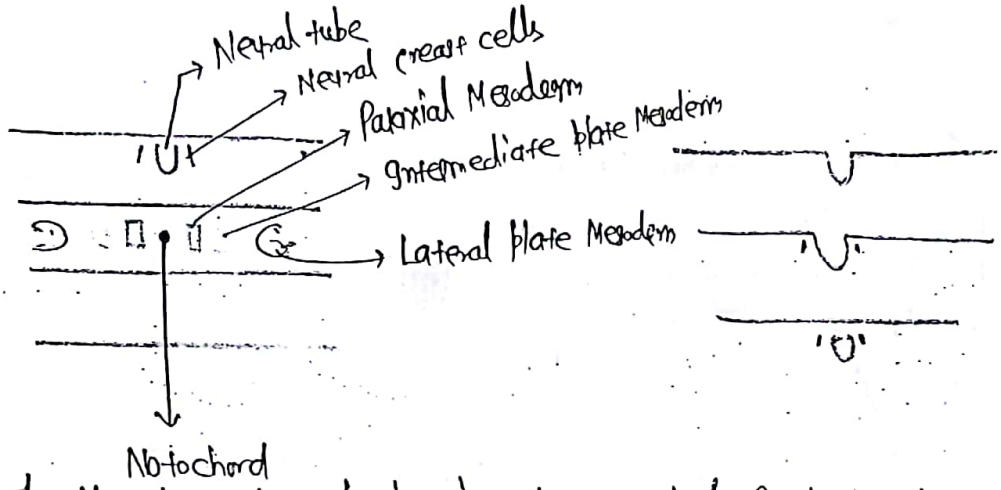
↓

Fail to close ⇒ Anencephaly

Post. Neuropore (caudal) closes by 27th day of IUL

↓

Fail to close ⇒ Spinal bifida



closure of Neural tube begins in the cervical Region; then extends cranially & caudally.

* Derivative of Neural crest cells ⇒

① Adrenal Medulla (88 NEET 16)

② Leptomeninges (Piameter + Arachnoid)

③ odontoblast (teeth forming cells)

④ Melanocytes

⑤ Schwann cells (form Myeline in Peripheral Nervous system)

⑥ Dorsal Root ganglion

⑦ Autonomic ganglion

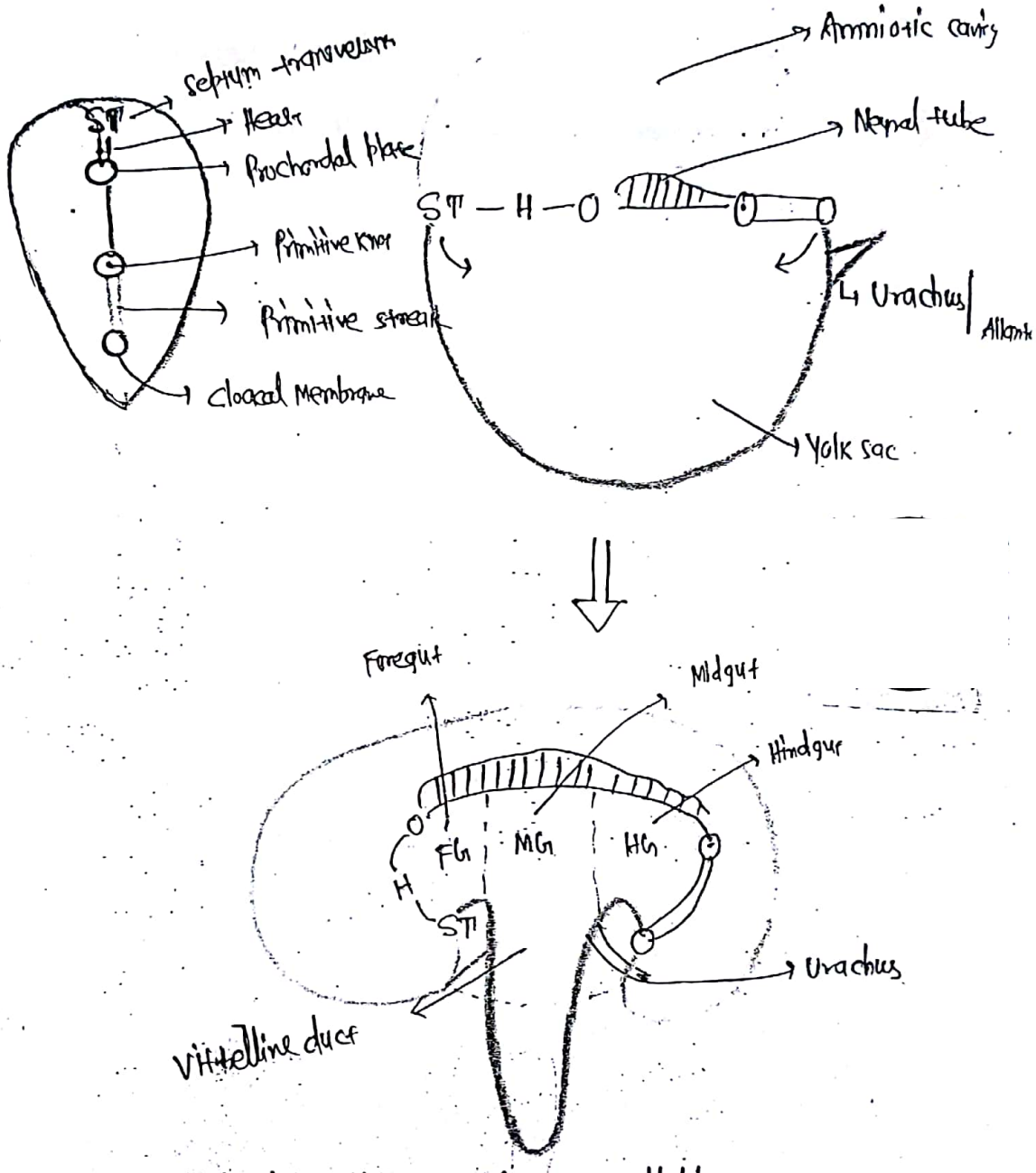
⑧ Skeleton of Face;

⑨ Nerves of the Pharyngeal Arches

(10) Endocardial cushion of the heart;

(11) Aortico-pulmonary septum;

(12) Para-follicular "C" cells of thyroid.



1° villus ⇒ Syncytiotrophoblast & cytotrophoblast

2° villus ⇒ Syncytiotrophoblast + cytotrophoblast + Extra-Embryo Mesoderm

3° villus ⇒ Syncytiotrophoblast + cytotrophoblast + Extra-Embryonic M + B. vessels.

* Feto-placental barrier ⇒

① Endothelial cells of maternal B. vessels;
② Syncytio-trophoblast;
③ Cyto-trophoblast;
④ Extra-Embryonic Somatopleuric Mesoderm;
⑤ Endothelium of fetal blood vessels.

INFERIOR EXTREMITY

- Pelvifemoral space ⇒ Lies below the Inguinal Ligament;
  - Similar to apex of axilla,

  ↳ Also "Subinguinal space"

Meralgia Paresthetica ⇒ Compression of Lateral femoral cutaneous N. of thigh (Branch of Lumbar plexus), against the Inguinal Ligament.

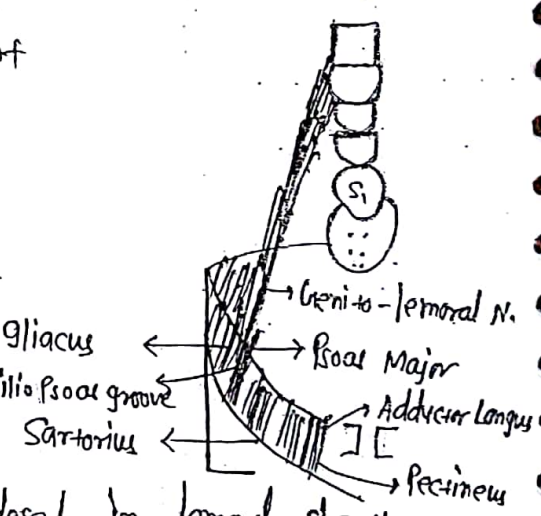
- Femoral triangle ⇒ Boundaries ⇒

Laterally ⇒ Medial border of sartorius

Medially ⇒ Medial border of Adductor Longus

Base ⇒ Inguinal Ligament

Floor ⇒ Iliacus;
(Lateral to Medial) Psoas Major;
Pectineus;
Adductor Longus



Contents ⇒ Femoral vessels enclosed in femoral sheath;
Femoral Nerve.

* Femoral Hernia ⇒ Below & Lateral to Tubercle (Pubic)
  Inguinal Hernia ⇒ Above & Medial to Pubic tubercle

Femoral sheath ⇒ Funnel shaped fascial sheath enclosing upper 3-4 cm of Femoral vessels.

Anteriorly ⇒ Fascia transversalis

Posteriorly ⇒ Fascia iliaca

Femoral sheath

- **Lateral compartment** ⇓ Contain ⇒ Femoral A.; Femoral branch of Genitofemoral N.
- **Intermediate compartment** ⇓ Contain Femoral vein
- **Medial compartment / Femoral canal** ⇓ Upper part of Femoral canal known as Femoral Ring

→ **Boundaries of Femoral Ring** ⇒

- **Anterior** ⇒ ~~Inguinal Ligament~~ / Poupart's Ligament
- **Medially** ⇒ ~~Lacunar Ligament~~ / Gimbernat's Ligament
- **Posteriorly** ⇒ ~~Pectineal Ligament~~ / Cooper's Ligament
- **Laterally** ⇒ ~~Septum separating it from Femoral vein~~

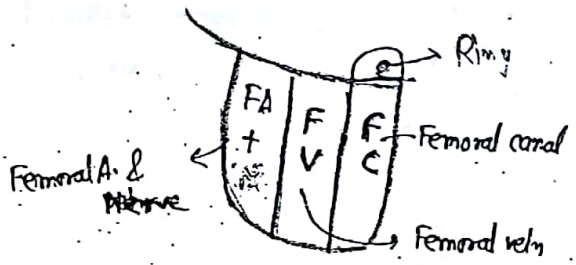
* Femoral Ring is closed by "Lymph Node of cloquet / Rosenmuller's ⇓ drain by glans penis or glans clitoris.

* Femoral Ring is widen in females d/t wider pelvis & Smaller size of blood vessels.

⇓

Occassionally Abnormal obturator artery (Branch of Inferior epigastric A.) lies on Lacunal Ligament; leading to hemorrhage

CE'16 * Femoral Nerve lies outside the Femoral sheath



	Anterior Superior iliac spine (ASIS)	Ant. Inferior iliac spine (AIIS)
Muscle –	Sartorius	Straight head of Rectus femoris.
Ligament –	Inguinal	ilio-femoral Ligament

Anterior compartment of thigh

SARTORIUS ⇒ Origin ⇒ Ant. Superior iliac spine

↓

Longest Muscle of the body. Insertion ⇒ Medial aspect of shaft of tibia along with gracilis & semitendinosis

↓

Gray Robes (Pes Anserinus)

Action ⇒ Abduction; Lateral Rotation & Flexion @ Hip joint

Flexion & Medial Rotation @ Knee joint

— Also known as "Tailor's Muscle OR Honeymoon Muscle"

Quadriceps femoris ⇒ Rectus Femoris + Vastus Medialis + Vastus Intermedius + Vastus Lateralis

Rectus Femoris ⇒

- Straight head ↓ arises from Ant. Inferior iliac spine
- Reflected head ↓ arises above the Acetabulum

Action ⇒ extension @ Knee joint & flexion @ Hip joint.

Vastus Medialis
Vastus Intermedialis
Vastus Lateralis
→ Vastus Medialis stabilizes Patella & prevent its Lateral dislocation.

Insertion of Quadraceps femoris ⇒ Base of the patella

↓

Continues as Ligamentum patellae

↓

Action ⇒ extension @ the knee joint; Rectus femoris also causes flexion @ the hip joint.

- Locking of the knee joint (Medial Rotation of Femur during the final stages of extension; When the foot is on the ground)

⇓

When foot is on the ground → Tibia Rotates Laterally

Femoral Nerve

- Largest branch of Lumbar plexus;
- formed by the dorsal division of Ventral Rami of L_2, L_4.
- Lies In the ilio-Psoas groove.
- Lies outside the femoral sheath,
- It has a trunk; Anterior & Posterior division.
- Branches from Trunk ⇒ N. to Iliacus;
  N. to Pectineus; (Lateral half)

CET July 16 N. to Pectineus passes Medialward behind the femoral Artery.

- Branches from Ant. division ⇒

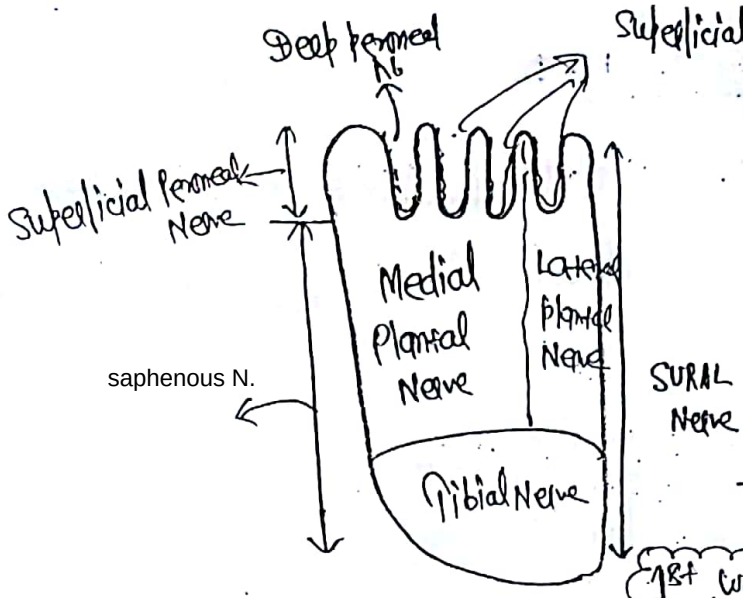
1 Muscular ⇓ Sartorius

2 cutaneous ⇓ Medial & Ant. / Intermediate femoral cut Nerve of thigh

- Branches from Post. division ⇒

4 Muscular ⇓ Quadriceps femoris

1 cutaneous ⇓ Saphenous Nerve (Longest cutaneous N.)
↳ Supplies the skin on Medial aspect of Leg & foot upto great toe.



Mortons Neuroma

- Entrapment of 3rd common digital Nerve (Br. of Medial plantal Nerve).

Baxter's Nerve

- 1st branch of Lateral plantal Nerve

Lateral aspect of Little finger ⇓ By sural Nerve

1st web space is supplied by ⇓ Deep peroneal N. Rest all other web space is supplied by ⇓ Superficial Peroneal N.

Femoral Artery

- Continuation of external iliac; below Inguinal Ligament.
- Continues as Popliteal artery; after piercing Adductor Magnus (@) Hiatus Magnus.
- Branches in the femoral A ⇒

Superficial ⇓

Superficial epigastric A.
Superficial circumflex iliac A.
Superficial external pudendal A. ⇓ supplies external genitalia

Deep ⇓

Deep external Pudendal
Muscular branches
Profunda femoris ⇓
Medial circumflex femoral A.
Lateral circumflex femoral A.
Perforating branches ⇓ pierces Adductor brevis &
Retinacular branches; which

Total No of Perforators ⇒ 4

↳ 2nd Perforating branches gives Nutrient A. to femur

- Branches In Adductor Canal ⇒

Descending Grenicular Artery

↳ Last branch given by the femoral before it pierces the adductor Magnus

Extra edges

* Coronary Ligament :⇒ Attaches the Medial & Lateral Meniscus to the Medial & Lateral condyle of tibia.

* Menisco-femoral Ligament :⇒ attaches the posterior part of Lateral Meniscus to the Femur.

ⓐ Anterior Menisco-Femoral Ligament / Ligament of Humphery :⇒

Goes Anterior to PCL.

ⓑ Posterior Menisco-Femoral Ligament / Ligament of Wrisberg :⇒

Lies behind the PCL

N. of Wrisberg ⇒ Nervus Intermedius (Sensory br. of Facial Nerve)

Medial compartment of Thigh (Adductor of Thigh)

Obturator Nerve ⇒ Branch of Lumbar plexus

- Formed by ventral division of ventral Rami of L_2, L_3, L_4.
- Related to Ala of the Sacrum;
- Forms the lateral boundry of "Ovarian fossa"
- Emerges out through obturator foramen & divides into

Anterior Division

- Adductor Longus
- Adductor brevis
- Gracilis
- Medial half of Pectineus

Posterior Division

- Adductor Magnus
  - Obturator externus
  - Longest Muscle Among Adductor of thigh.

Action ⇒ Adduction & Medial Rotation @ Hip joint;

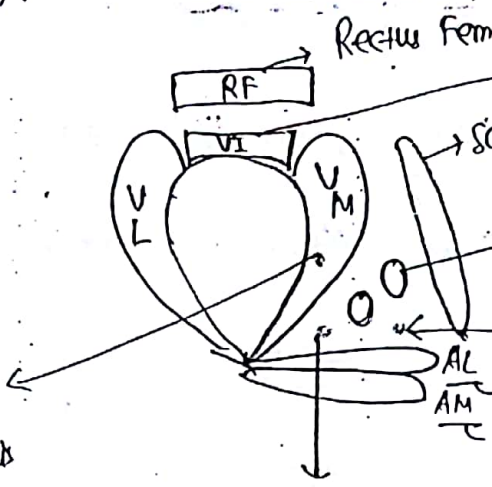
Gracilis also causes Flexion & Medial Rotation @ Knee joint
(Anti-Rapist Muscle)
(Custodian of virginity)

Obturator externus causes Lateral Rotation of the hip joint.

* Obturator N. Supplies both Hip & Knee joints. In case of disease of hip joint May be referred to Knee joint

Lies beneath the Sartorius Muscle, (UP07).

Adductor Canal | Subsartorial Canal | Hunter's canal



- Starts at the apex of the femoral Δ & extends distally as far as the distal attachment of the tendon of adductor Magnus

Post. division of obturator Nerve

DNB 16 * Saphenous Nerve is Anterior to femoral A. in Adductor Canal.

Boundaries ⇒ Anterior ⇒ Sartorius;
Lateral ⇒ Vastus Medialis;
Posterior ⇒ Adductor Longus & Adductor Magnus.

CONTENT OF ADDUCTOR CANAL ⇒ Femoral Artery;
Femoral vein;
N. to vastus Medialis;
Saphenous Nerve (largest cutaneous br. of Femoral);
Descending genicular Artery
Muscular br. of Femoral Artery
Few lymph vessels

* Bursa which communicates ∈ cavity of Knee Joint ⇒ Suprapatellar bursa
* Inflammation of Pre-patellar bursa ⇒ Housemaid's Knee
* Inflammation of Infrapatellar bursa ⇒ Clergyman Knee
* Inflammation of bursa over Ischial tuberosity ⇒ Weaver's bottom | Tailor's | Student's
* Anserine bursa ⇒ Separate Insertion of Sartorius, Gracilis & semitendinosus from tibia

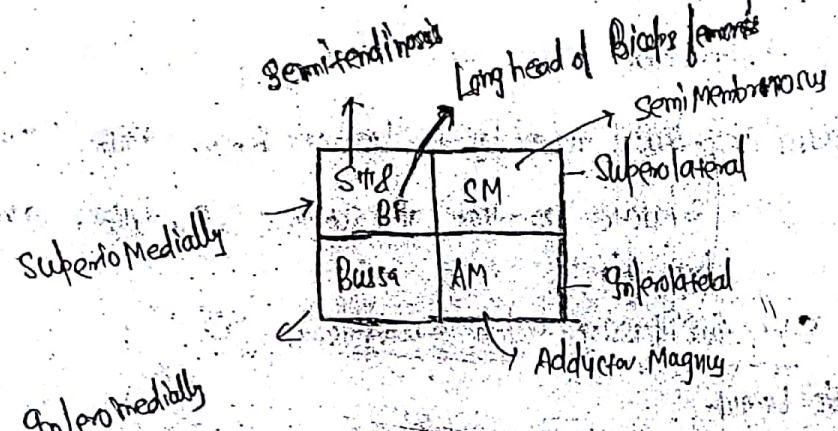
Structure passing below Subtalar Joint

- Flexor Hallucis Longus
* Most stable position of Ankle joint is ⇒ Dorsiflexion.
* Deltoid Ligament
  - Tibiocalcaneal
  - Tibiotalar
  - TibioNavicular

POSTERIOR COMPARTMENT OF THIGH

Hamstring Muscle ⇒
- Semi-tendinosus
- Semimembranosus (Inserted on the Medial condyle of tibia; continues as the oblique popliteal Ligament; which lies in the floor of popliteal fossa)
- Adductor Magnus (Ischial head)
- Biceps femoris

Biceps femoris
- Long head: Arises from the Ischial tuberosity
- Short head: Arises from Linea Aspera of Femur.



* Adductor Magnus not fulfill the Hamstring criteria b/c of its insertion in femur (Not in Tibia/Fibula) but still its degenerated part it is considered as "Hamstring Muscle".

↓

Tibial collateral Ligament

Criteria for Hamstring ⇒ origin ⇒ Ischial tuberosity

Insertion ⇒ Tibia & fibula

N. supply ⇒ Tibial part of Sciatic Nerve

Action ⇒ Extension @ Hip joint & flexion @ the knee joint.

Degenerative Parts

* Tibial Collateral Ligament :⇒

↳ degenerated part of Adductor Magnus

* Fibular Collateral Ligament

↳ degenerated part of Peroneus Longus

* oblique popliteal Ligament

↳ degenerated part of Semimembranosus.

↳ pierced by Middle genicular N. & vessels and the posterior division of obturator N.

* Sacrotuberous Ligament :⇒

↳ degenerated part of Long head of Biceps femoris

↳ gives origin to Gluteus Maximus.

* Sacrospinous Ligament :⇒

↳ degenerated part of Coccygeus.

* Articular disc of TM joint ⇒ degenerated part of Lateral Pterygoid

* Articularis genu ⇒ detached part of Vastus Intermedius.

↳ Holds the apex of Supra-patellar bursa.

* The short head of biceps is not hamstring b/c ⇒

(a) Arises from Linea Aspera of femur;

(b) Supplied by Common Peroneal part of Sciatic N.

- Biceps Femoris is inserted on head of fibula.

Glio-tibial tract

- Formed by splitting of Fascia lata;

Muscle inserted ⇒ Gluteus Maximus

Tensor fascia lata.

- This tract is attached to anterior aspect of Lateral condyle of tibia

- Action ⇒ Abduction & flexion @ hip joint.

extension @ Knee joint.

Gluteus Maximus

Origin ⇒ a) Gluteal surface of ilium behind the posterior gluteal line;

b) Dorsal aspect of iliac crest

c) Sacrum & coccyx

d) sacro-tuberous Ligament

* site of i.m. injection in buttock ⇒ Upper outer quadrant (Supero-lateral) site of Gluteal Region.

Insertion ⇒ a) Glio-tibial tract

b) Gluteal tuberosity of femur.

N. Supply :⇒ Inferior gluteal Nerve

Action :⇒ Extension
Lateral Rotation } @ Hip Joint
Abduction

Gluteus Medius & Minimus

Action :⇒ Abduction & Medial Rotation @ Hip Joint

↓ Mainly by G. Medius

↳ Mainly by G. Minimus

- They support the pelvis when one foot is off the ground
- The superior gluteal Nerve supply ⇒ Gluteus Medius
  Gluteus Minimus
  Tensor fascia lata

Insertion of Gluteus Medius ⇒ Lateral surface of greater trochanter of Femur.

Insertion of Gluteus Minimus ⇒ Anterior surface of greater trochanter of Femur.

* Key Muscle of gluteal Region ⇒ Pyriformis

PELVI-FEMORAL MUSCLE

↳ Lateral Rotators of hip. QQ

1. Pyriformis
2. Superior gemellus
3. Obturator Internus
4. Inferior gemellus
5. Quadratus femoris

2, 3 → N. to obturator Internus

4, 5 → N. to Quadratus femoris

* Structure Passing Above the Pyriformis :⇒ ① Superior gluteal Nerve
② Superior gluteal vessels

Sciatic Bed – It is formed by ⇒

1. Superior gemellus
2. Obturator Internus
3. Inferior gemellus
4. Quadratus femoris
5. Adductor Magnus

Popliteal Fossa

Boundaries ⇒ Superolateral ⇒ Biceps Femoris

Superomedial ⇒ Semitendinosis & Semimembranosus assisted by Sartorius & gracilis

Inferolateral ⇒ Lateral head of Gastrocnemius

Inferomedial ⇒ Medial head of Gastrocnemius

Floor ⇒ Popliteal surface of Femur.
Capsule of the Knee joint
Oblique popliteal Ligament
Popliteus Muscle
Fascia covering the Popliteus Muscle

Contents ⇒ Popliteal Artery (deepest)

Popliteal vein

Sciatic Nerve ⊂ the tibial & common Peroneal Nerve

* Popliteal artery is difficult to palpate d/t

⇓

it is Not superficial & doesn't pass over any bony prominence..

POSTERIOR COMPARTMENT OF LEG

SUPERFICIAL MUSCLE ⇒ Gastrocnemius, Soleus, Plantaris → Tendo Achillis → Inserted on Middle 1/3rd of posterior surface of calcaneum.

Gastrocnemius + Soleus → "Triceps surae"

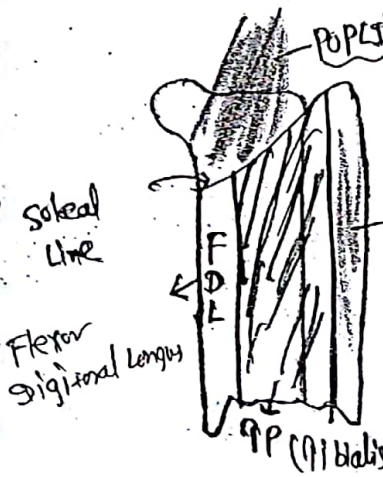
Also "Peripheral heart" bcz it helps in venous Return from Lower Limb

Plantaris → Feeble & Rudimentry Muscle; which can Rupture during sudden dorsiflexion of Ankle joint.

Action ⇒ Plantar flexion @ Ankle Joint

DEEP MUSCLE ⇒

Muscle	Action
Popliteus	Unlocking of the Knee joint
Tibialis posterior, Flexor hallucis Longus, Flexor digitorum Longus	⇒ Plantarflexion & Inversion



POPLITEUS
- Origin ⇒ Lateral surface of Lateral condyle of Femur (Intra-capsular)
- Insertion ⇒ Posterior surface of shaft of tibia over soleal Line
- N. Supply ⇒ Tibial Nerve
- Artery ⇒ Post. tibial artery

Structure passing behind the Flexor Retinaculum through Tarsal tunnel (Ant to Posterior)

- Tibialis Posterior
- Flexor digitorum Longus
- Post. tibial A.
- Tibial nerve

Mnemonic ⇒ The Doctors Are Not Here

ANTERIOR COMPARTMENT OF LEG

1. Tibialis Anterior;
2. Extensor hallucis Longus;
3. Extensor digitorum Longus;
4. Peroneus tertius.

Action ⇒ Dorsiflexion at ankle joint;

- Tibialis anterior also causes Inversion & acts as a sling for the Medial Longitudinal Arch.

Nerve ⇒ Deep peroneal N.

Artery ⇒ Ant. tibial A. — after piercing the Interosseus Membrane

Structure passing behind the Extensor Retinaculum

Medial to Lateral ⇒ Tibialis Anterior
Extensor hallucis Longus
Anterior tibial A.
Deep peroneal Nerve
Extensor digitorum Longus;
Peroneus tertius

Mnemonic :
The Himalayas Are Not Dry Plateau

LATERAL COMPARTMENT OF LEG

Muscle ⇒ Peroneus Longus
Peroneus brevis

Nerve ⇒ Superficial peroneal N.

Artery ⇒ Peroneal A. — branch of Posterior tibial A.

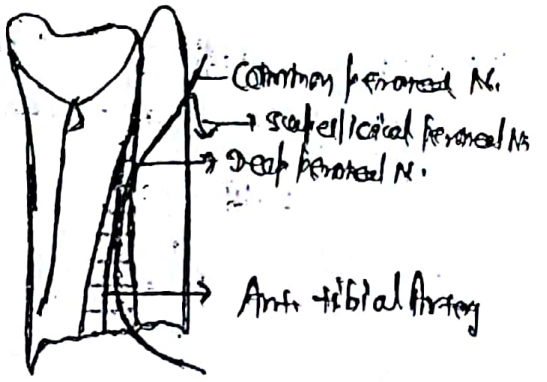
Action ⇒ Eversion of foot.

- Act as a sling for the Lateral Longitudinal arch.

* ~~Foot drop occurs due to~~ Common peroneal Nerve / Deep peroneal Nerve
* ~~"High Stalling Stamping Marching" GAIT~~

Nervi Heltans

- Deep peroneal Nerve
  ⇓
  It hesitates to cross the Anterior tibial Artery.



Tibialis Posterior

- winds around the Medial Malleolus
- chiefly inserted on Navicular tuberosity.
- sends slips to all the tarsals & Metatarsals except → Talus, 1st & 5th Metatarsal

- the tendon which winds around Lateral Malleolus
  ↳ Peroneus brevis
  ⇓
  inserted on base & tuberosity of 5th Metatarsal bone

Peroneus Longus

- goes behind the Peroneus brevis till the cuboid; then turns @ Right angle; grooves the cuboid; passes below the bases of Metatarsal bones.

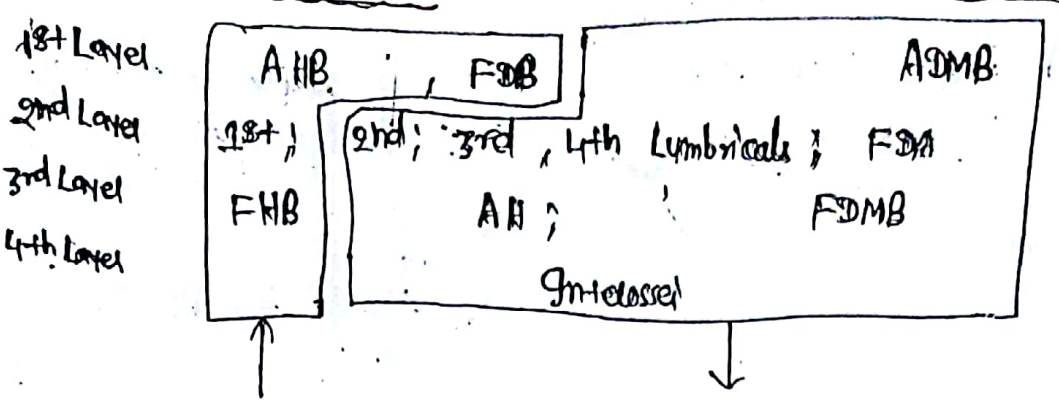
Tibalis Anterior

- inserted on Lateral aspect of base of the 1st Metatarsal & Medial cuneiform
- → Medial cuneiform bone Receives the Insertion of → Tibialis Anterior
  Tibialis Posterior
  Peroneus Longus

LAYER OF SOLE

	Great toe		Little finger
1st Layer ⇒	Abductor hallucis brevis	Flexor digitorum brevis	Abductor digiti minimi brevis
2nd Layer ⇒	FHL; FDL; Lumbricals		Flexor digitorum accessorius/ Quadratus plantae
3rd Layer ⇒	Flexor hallucis brevis	Adductor hallucis	Flexor digiti minimi brevis
4th Layer ⇒	Tibialis Posterior; Peroneus Longus	Interossei (7)	4 Dorsal, 3 Plantar

Great Toe — Little finger



Medial Plantal N. → Medial 3½ fingers on plantal aspect

Lateral Plantal N. → Lateral 1½ fingers on plantal aspect

* Stronger Ligament @ hip joint ⇒ Glio-femoral / Ligament of Bigelow

⇓

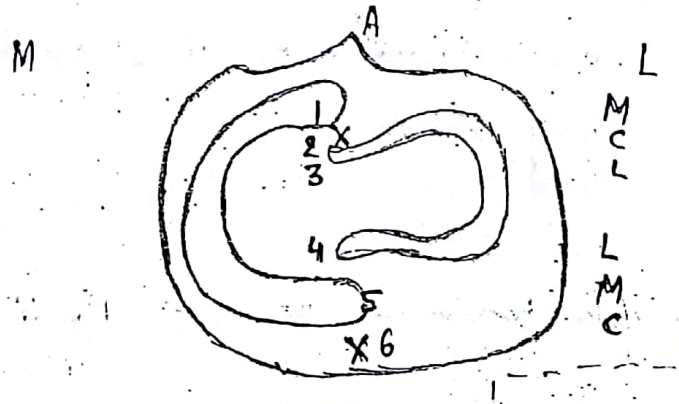
← Inverted "Y" shaped

the stem of "Y" is attached to Anterior Inferior Iliac spine ; two limbs are attached to Intertrochentric line

↳ prevents hyperextension @ Hip joint

prevents trunks to be falling down backward.

* Structure attached to Intercondylar eminence of Tibia !⇒



① Anterior horn of Medial Meniscus

② Anterior cruciate Ligament

③ Anterior horn of Lateral Meniscus

④ Posterior horn of Lateral Meniscus

⑤ Posterior horn of Medial Meniscus

⑥ Posterior cruciate Ligament

ACL (Intracapsular & Extra-synovial)

↳ Attach to the Posterior aspect of Medial surface of Lateral condyle

↳ Prevents Anterior displacement of tibia on Femur

↳ Get tort during extension

PCL (Intracapsular & extrasynovial)

↳ Attach to Anterior aspect of Lateral surface of Medial condyle

↳ prevents the posterior displacement of tibia on Femur

See page 1 & Last Page after this page

THORAX

- Head of the Rib articulates ē the body of thoracic vertebra
  ⇓
  via "costo-vertebral joint"
- Tubercle of the Rib articulates ē transverse process
  ⇓
  "costo-transverse joint"
- Shaft of the Rib articulates ē costal cartilage
  ⇓
  "costochondral joint"

Bucket-handle movement changes ⇒ Transverse diameter of thorax
Pump-handle movement changes ⇒ AP diameter of thorax
Contraction of diaphragm changes ⇒ vertical diameter of thorax.

* Ossification of Ribs begins Near the Angle towards the end of 2nd Month (Aroung 8th week) of Fetal Life & is seen firstly in 6th & 7th Ribs.

Intercostal space

Intercostal Muscles ⇒ EICM
IICM
Transverse thoracicus

- Sterno-costalis ⇓ Anteriorly part
- Innermost intercostal ⇓ Laterally
- Subcostalis ⇓ Posteriorly

* The Neurovascular plane of thorax lies b/w internal & innermost intercostal in the costal groove along inferior border of the Rib (Vein → Artery → Nerve)

→ This sequence is Reversed in 1st Rib (N→A→V)

* Neurovascular plane of body ⇒

Neck	Scalenus Posterior	Scalenus Medius	}	Scalenus Anterior
Thorax	External intercostal	Internal Intercostal	}	Innermost Intercostal
Abdomen	External oblique	Internal oblique	}	Transverse Abdominis

NEET Dec 12

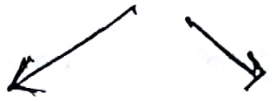
* Structure pierced during pleural tapping in Mid-axillary line ⇒

Skin
↓
Superficial fascia
↓
Deep fascia
↓
Serratus Anterior
↓
External Intercostal
↓
Internal Intercostal
↓
Innermost Intercostal
↓
Endothoracic fascia
↓
Parietal pleura

AIIMS * While doing thoracocentesis; it is advisable to introduce Needle along – Upper border of the Rib.

Internal thoracic Artery

- Branch of 1st part of Subclavian A.
- Lies on either side of the sternum;
- At the six i.c space divides into :-



Superior epigastric

- enters the abdomen through "Foramen of Morgagni | Space of Larry".

Musculophrenic

- Supplies the Intercostal muscle & diaphragm
- gives Anterior i/c arteries in Lower spaces

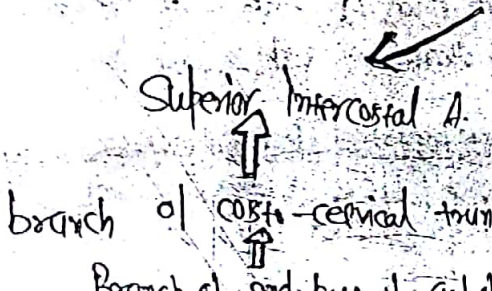
- Anastomosis ∈ the Inferior epigastric A. ; which is the branch of external iliac A.

Anterior Intercostal Artery

- In the upper six i/c spaces a branches of Internal thoracic Artery.
- In the Lower spaces (i.e 7th - 9th i/c spaces) the branches of Musculophrenic Artery.
- There are two Anterior Intercostal arteries in each space.

Posterior Intercostal Artery

- In the Lower (3rd - 11th) i/c spaces are branches of descending thoracic Aorta
- In the upper two spaces they are branches of



Superior Intercostal A.

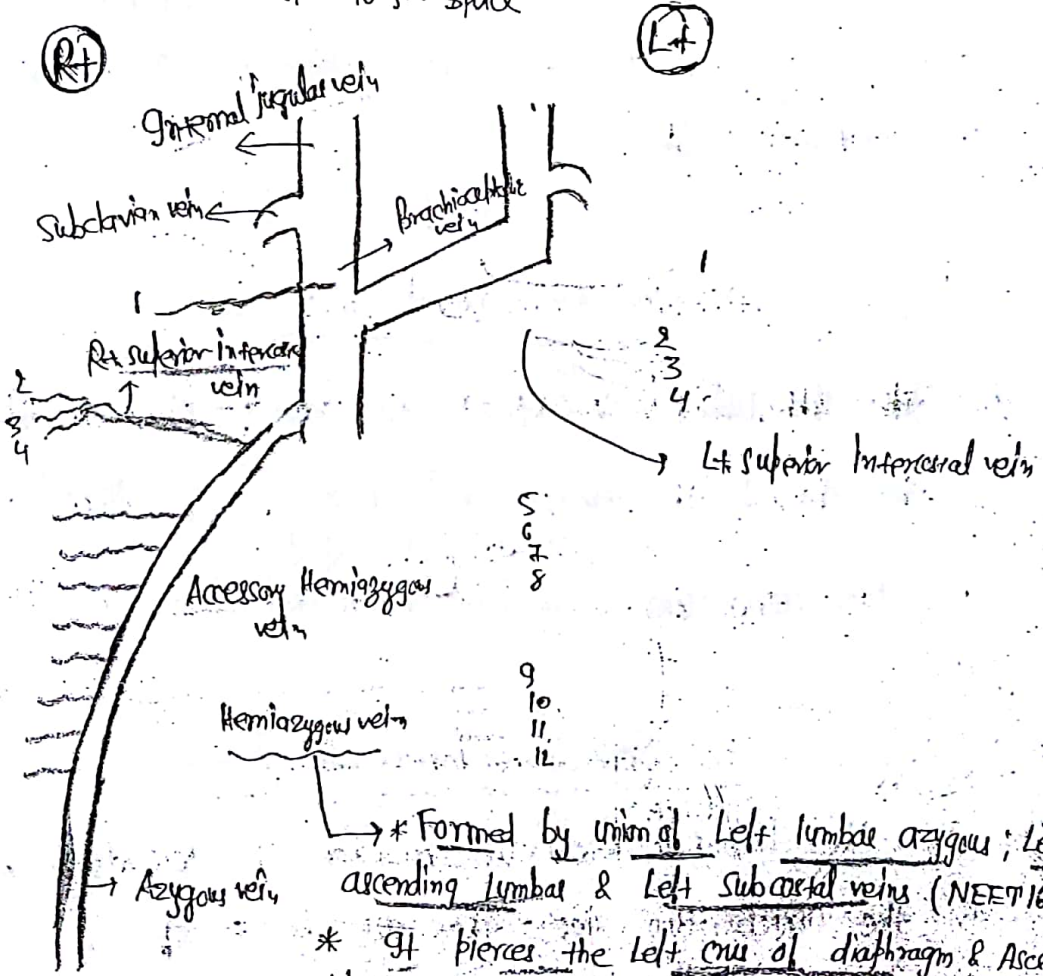
branch of costo-cervical trunk

Branch of 2nd part of Axillary A.

- There is one Posterior i/c Arteries in each space.
- At the angle of Rib ; it gives a collateral branches.
- The two Posterior i/c Arteries anastomoses ∈ two Anterior i/c Arteries @ the costo-chondral junction;
- Rt. Posterior ikc artery are longer than the Left.

Anterior Intercostal veins

- In the upper six spaces drains into → Internal thoracic vein
- In the Lower spaces drains into → Musculophrenic vein
  - 7th to 9th space



→ * Formed by union of Left lumbar azygous ; Left ascending lumbar & Left Subcostal veins (NEET 16)

* It pierces the Left crus of diaphragm & Ascends upto 8th level ; where it turns to Right & joins Azygous vein.

NEET It drains 9th to 11th Left Posterior i/c vein & esophageal veins

* Rt. bronchial veins drains into Azygous vein & Left bronchial veins drain into Left superior intercostal or hemiazygous vein

Q9 Internal thoracic veins are tributaries of ⇒ Brachiocephalic vein

Obstruction to the SVC above the opening of Azygous vein ⇒

Internal thoracic vein

Ant. Intercostal vein
↓ Anastomosis with
Post. Intercostal vein
↓
Azygous vein
↓
SVC
↓
Rt. Atrium

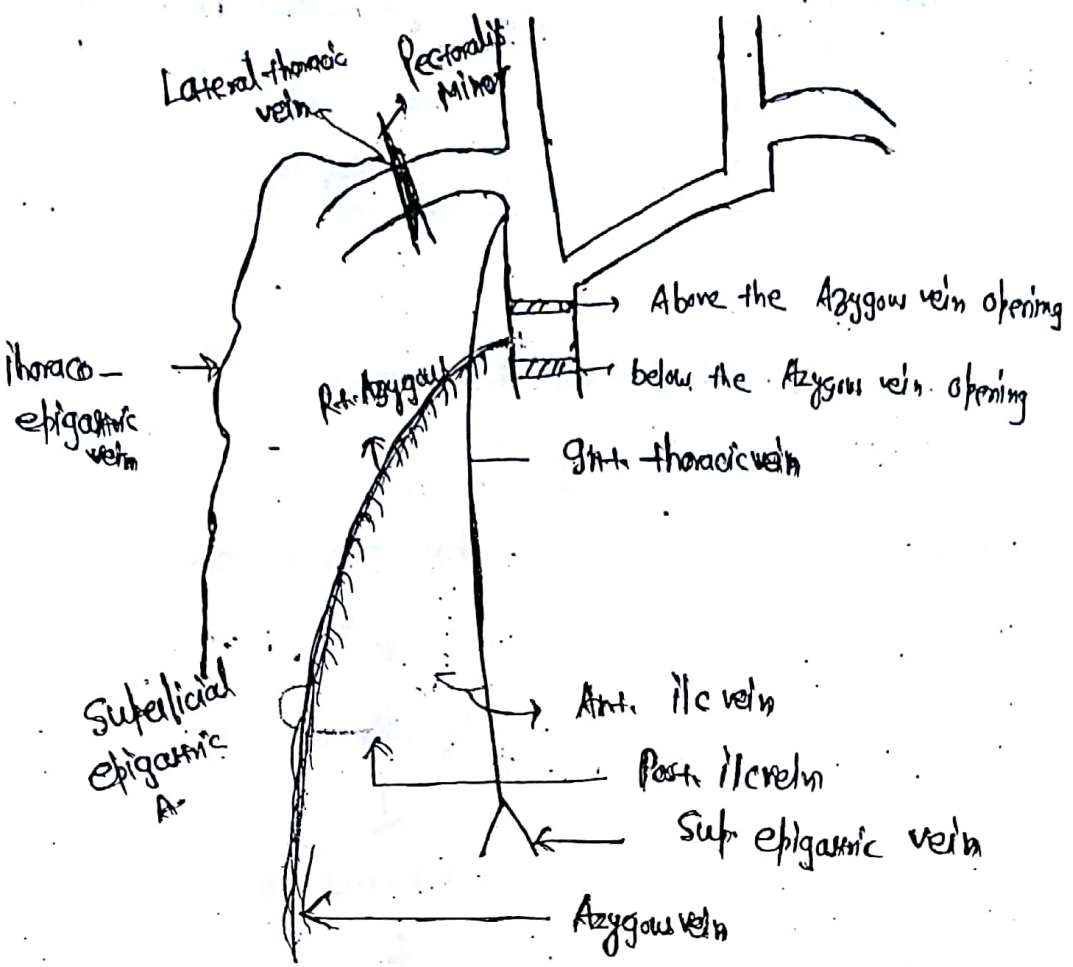
Sup. epigastric vein
↓ Anastomosis c
Inf. epigastric vein
↓
external iliac
↓
common iliac
↓
IVC
↓
Rt. Atrium

Obstruction to the SVC below the opening of Azygous vein ⇒

Brachiocephalic vein
↓
Subclavian vein
↓
Axillary vein
↓
Lateral thoracic vein
↓
Thoraco epigastric vein
↓
Superficial epigastric vein
↓
Great Saphenous vein
↓
Femoral vein → external iliac vein

Internal thoracic vein
↓
Sup. epigastric vein
↓
Inf. epigastric vein
↓
external iliac
↓
common iliac
↓
IVC
↓
Rt. Atrium

Rt. Atrium
↑
IVC
↑
common iliac vein



* Trachea & Bronchii have cartilage (hyaline cartilage) in their walls; while wall of bronchioles & terminal bronchioles don't contain cartilage.

Intercostal Nerve

- It is the ventral Ramus of a thoracic spinal Nerve
- Branches ⇒ Antero-cutaneous branch; } Anything else if it is
  Lateral-cutaneous branch; } supplying; it is ⇒ Atypical
  Muscular branch
- Typical Intercostal Nerves are ⇒ T_3-T_6
- Atypical Intercostal Nerve ⇒ T_1 ⇒ Joins the brachial plexus & supplies the upper limb.
  T_2 ⇒ Lateral cutaneous Branch of T_2 joins & Medial cutaneous Nerve of Arm via

→ The Lower i/c Nerves supplies the Muscle of Anterior Abdominal wall (T_7-T_{12}).

* Parietal pleura is pain sensitive & supplied by i/c & Phrenic Ne
* visceral pleura is pain insensitive & supplied by Autonomic Nerv

PLEURA & LUNG

	Mid-clavicular	Mid-axillary	Mid-scapular
LUNG →	6th Ribs	8th Ribs	10th Ribs
PLEURA →	8th Ribs	10th Ribs	12th Ribs

* Pulmonary / visceral pleura is supplied by Symphathetic (T_2-T_6 segm & Parasymphathetic (Vagus N.)
* The Mediastinal & diaphragmatic pleura are supplied by phrenic Nerve
* The costal & cervical pleura are supplied by Intercostal Nerve
* Apex of the Lungs projects 5 cm above the 1st Rib & 2.5 cm ab the clavicle. ↳ covered by Cervical Pleura
  ↳ Further covered by Sibson's fascia / cervic fascia

diaphragm / supphrenic

NEET'18

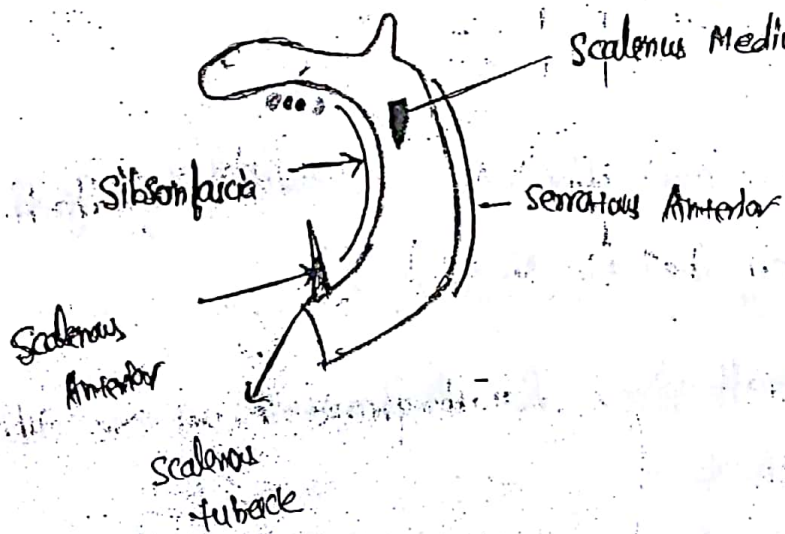
Sibson's fascia ⇒ extends from transverse process of C7 to inner border of 1st Rib laterally.

Oral-diaphragm ⇒ Formed by Mylohyoid;

Pelvic-diaphragm ⇒ Formed by Levator Ani;

Urogenital-diaphragm ⇒ Formed by Sphincter Urethrae
Deep transverse perinei

→ Structure attaches to the 1st Rib :⇒



CHASSAIGNAC TUBERCLE ⇒ Ant. tubercle of transverse process of C6 Vertebrae

Relation of the Neck of 1st Rib ⇒ ① Sympathetic chain
② 1st Posterior I/C vein
③ Sup. Intercostal Artery
④ 1st thoracic Nerve

SVAN (Med → Lateral)

Relation of Ala of Sacrum ⇒ Sympathetic chain
Lumbosacral trunk
Iliolumbal Artery
Obturator Nerve

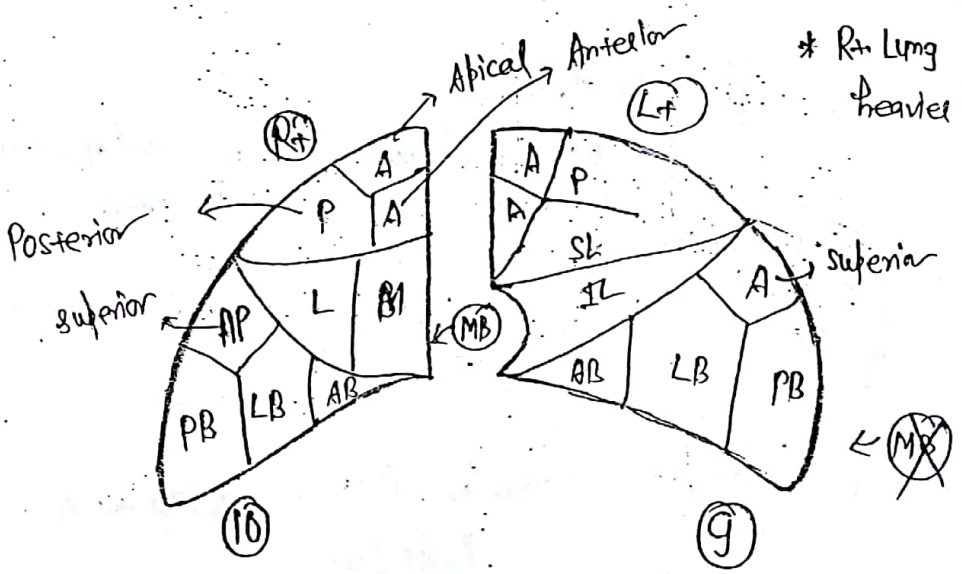
SLIO (Med + Lateral)

* TRUE RIBS :→ Directly articulates ~ sternum through costal cartilage eg = 1st to 7th Ribs
* FALSE RIBS :→ 8th to 12th Ribs don't articulate directly ~ the sternum.

NEEDS ⇒ 8th, 9th & 10th Ribs are attached to 7th Ribs by ⇒ Synovial joints.
* 11th & 12th Ribs have No costal cartilage & they have Anterior ends (Floating Ribs).
↳ Surgically Resectable.

BRONCHOPULMONARY SEGMENT ⇒ Largest Subdivision of a Lobe

- Part of the Lung supplied by one Tertiary branches.



* Rt Lung is shorter; wider & heavier (625gm) than Left Lung (565g

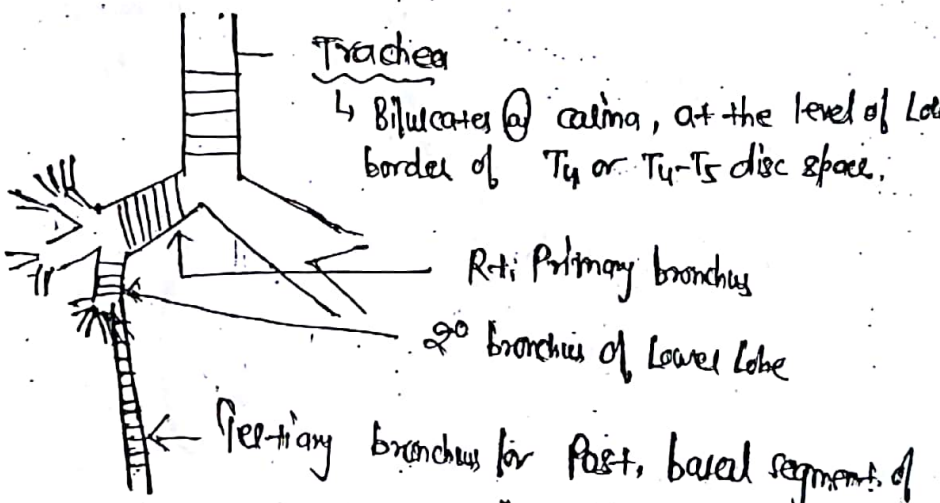
→ Each broncho pulmonary segment is conical in shape

- It has its — Pulmonary Artery & Tertiary bronchus.

- The Pulmonary veins are — Intersegmental.

- A foreign body entering the Nose ; enters into Posterior basal segment of the Right Lung.

- Aspiration Pneumonia is common in ⇒ (Apical segment of Lower Lobe / superior segment of Lower lobe OR Posterior segment of upper Lobe) ← b/c of Most dependent part of Lung while in supine position.



* Structure which arches ē the hilum of Rt. Lung ⇒ Azygous vein
Structure which arches ē the hilum of Lt. Lung ⇒ Arch of Aorta

Nerve in front of hilum ⇒ Phrenic N.
Nerve Behind hilum ⇒ Vagus N.

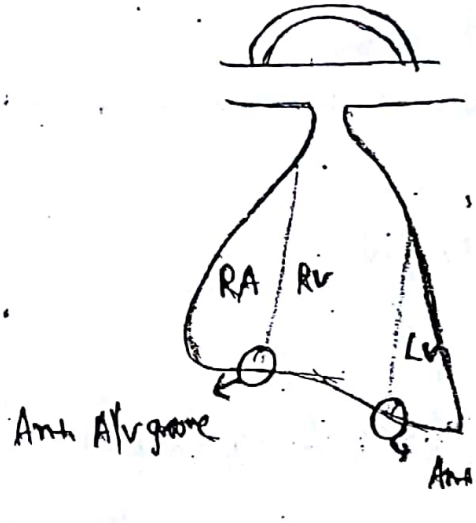
QQ * Bronchial Arteries supply the Lung till the begining of Respiratory bronchiole (conducting Part) & then Anastomose ē Pulmonary arteries.

HEART & PERICARDIUM

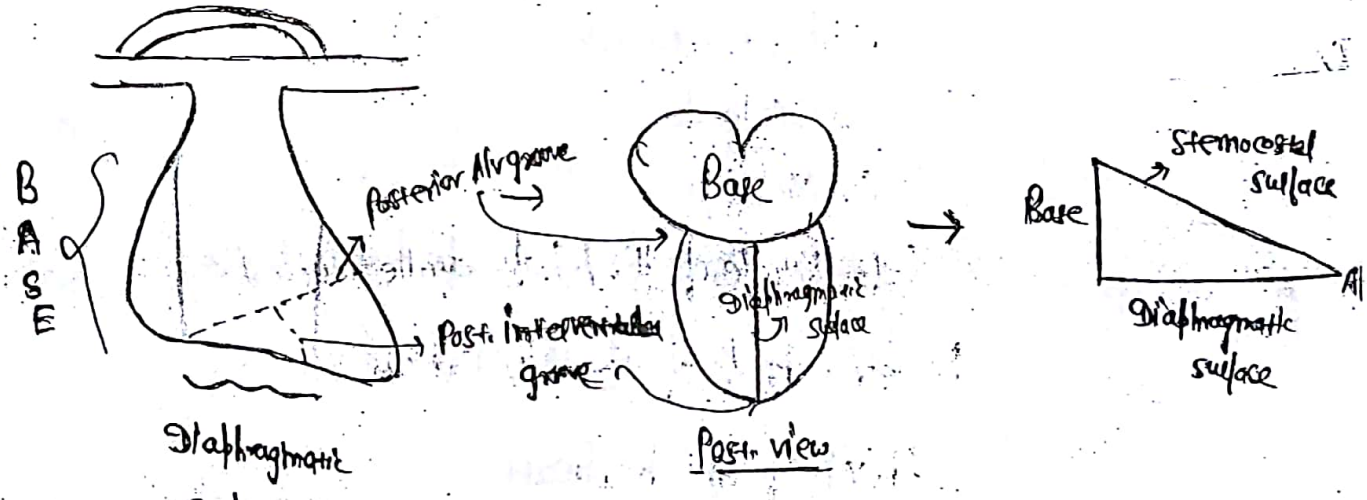
↳ Sympathetic innervation of heart
↳ $T_1 - T_5$ (cardiostimulatory)

* Parasympathetic innervation of heart
↳ Vagus Nerve (cardioinhibitory)

Sternocostal surface of heart :⇒



Sternocostal surface of heart
⇓
Main part ⇒ "Rt. ventricle"



Diaphragmatic surface — Ant. view

* Base of the heart is formed by ⇒ Both the Atria (Major part by Left Atria)

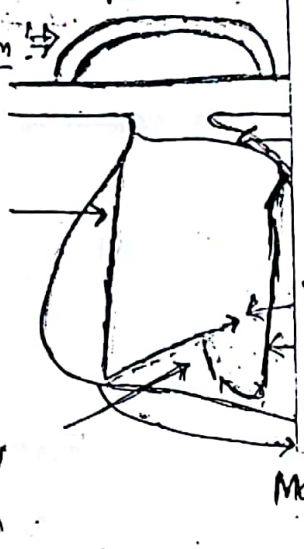
* The groove which separate Base from Diaphragmatic surface
⇓
Posterior A/V groove

* Apex of the heart is formed by ⇒ Left ventricle

Right ventricle ⇒ • Most Anterior (sternocostal) surface of heart; it forms inferior border of heart.
• Triangular in shape, on cross section it appears like a crescent.
• wall thickness ⇒ 3-5 mm

* Trigonum Fibrosum Sinistrum ⇒
Fibrous tissue b/w Aortic & Mitral Rings

* Trigonum Fibrosum Dextrum ⇒
Fibrous tissue b/w AV Rings & Aortic Rings



Heart Valve	Surface Marking	Auscultatory Area
• MITRAL →	Sternal end of Left 4th costal cartilage	cardiac Apex.
• TRICUSPID →	Right half of sternum along 4th & 5th intercostal spaces	Right Lower end of sternum.
• AORTIC →	Sternal end of Left 3rd costal cartilage	Right 2nd intercostal space
• PULMONARY →	Sternal end of Left 3rd costal cartilage (upper end)	Left 2nd intercostal space

Right Coronary Artery (RCA)

Supplies ⇒ Right Atrium ;
Right ventricle ;
SA Node ;
AV Node
Left Bundle of His (Left bundle branch)
Posterior 1/3rd of the i/v septum
Apex of the heart

LCA (Left coronary Artery)

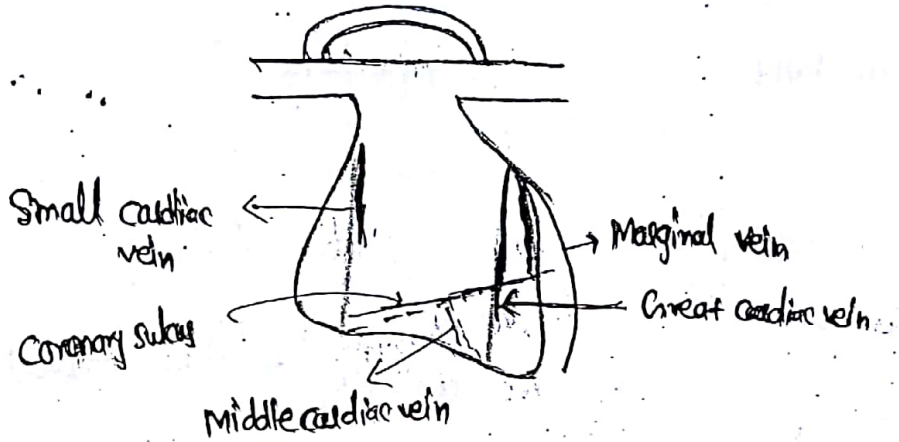
Supplies ⇒ Left Atrium
Left ventricle
Left & Right Bundles of His
Anterior 2/3rd of i/v septum
Apex of the Heart

* The Posterior i/v artery is the branch of Rt. coronary
In 85% of the cases ⇒ Rt. coronary dominance

* if it is a branch of circumflex ⇒ Lt. coronary dominance

* if both gives this branch ⇒ Co-dominance

VEINS OF HEART



QQ Coronary Sulcus is ⇒ Posterior A/V groove

QQ All the veins drain in coronary sinus except

↓

Anterior Cardiac vein
Vene cordae Minimi (Thebasian vein)

↓ drain into

Rt. Atrium

* Oblique sinus of the pericardium lies behind Lt. Atrium.
↳ to accommodate more blood coming from Pulmonary veins

Right Atrium

- The Line joining SVC to IVC from outside is k/a "Sulcus terminalis"
- The same Line from inside is k/a "Crista terminalis"
- It divides Rt Atrium

Rough part

↓

Shows structure similar to teeth of comb

↓

k/a "Musculus Pectinati"

Soft part

↓

Shows the opening of
- SVC & guarded by Eustachian valve
- IVC
- Coronary sinus – guarded by Thebasian valve

- Fossa ovalis is Represented by "Septum primum"
- Limbus Fossa ovalis is Represented by "Septum secundum"
- **Triangle of Koch** –

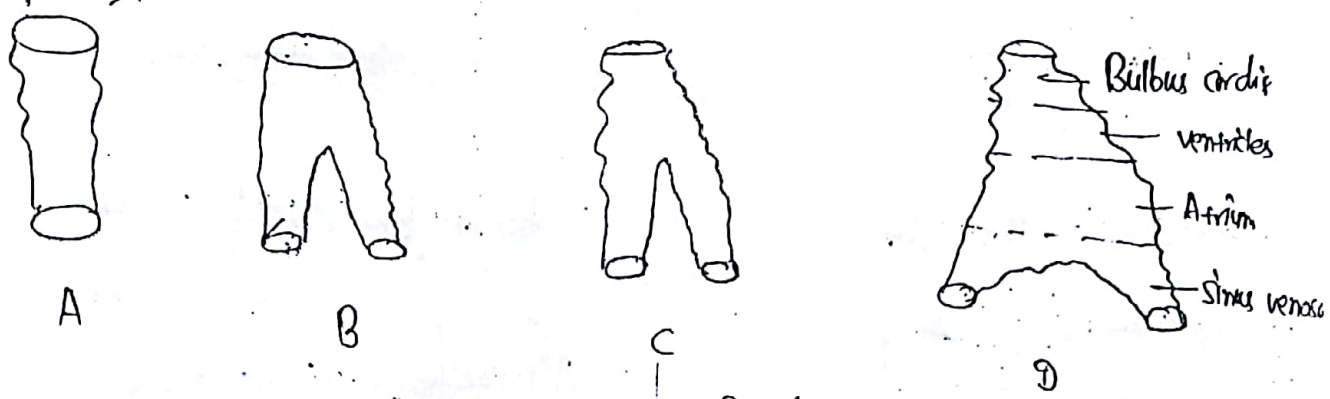
Boundaries – ① Septal Leaflet of Tricuspid valve
② Opening of Coronary sinus
③ Tendon of Todaro

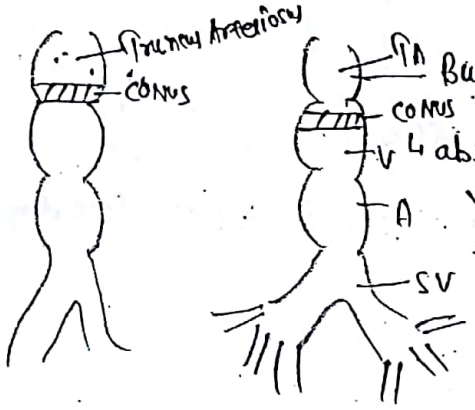
- AV Node is lies in this triangle
- SA Node Lies in the Junction of SVC & Rt. Atrium

Embryology of Heart & Blood vessels

Heart tube is formed by Hyaluronic acid secreted by Myocardium (NEET'16)

Heart tube or Tubular heart is formed at ⇒ 3 weeks (NEET'16)





- Development of Right Atrium ⇒

PART	DERIVED FROM
• Smooth Posterior wall	→ Right horn of Sinus venc
• Rough Anterior wall	→ Primitive Atrial chamb
Interatrial septum	→ Septum Primum & Second

vein forms ⇒ Portal vein, Hepatic vein, enteric vein & hepatic segment of IVC

, develops from ⇒ Right vitelline vein); Left vitelline vein & Dorsal Anastomosis b/c two.

* Veins draining in the Sinus venosus

② Vitelline from Yolk sac;

③ Common cardinal from body wall

* Fate of Sinus venosus ⇒ The Rt. & Left horn of Sinus venosus opens in the Atrium through Sino atrial orifice

- The Left horn becomes small in size; gets detached from the atrium forms Coronary Sinus and now opens into the Rt. horn.
- The Right horn is absorbed into the atrium ⇒ Septum Spurium

It is bounded by Left & Rig Venous valve

- The Left fuses with Interatrial septum &

Interventricular septum

Muscular part ⇓

Grows in the floor of the ventricular cavity

Membranous part ⇓

derived from ⇒ ① Bulbar septum ⇓ Formed in conus

② Proliferation of AV cushion.

- Final closure of foramen ovale occurs d/t fusion of "Septum primum & septum secundum"

Truncus Arteriosus ⇒ The Aortico-pulmonary septum divides the truncus arteriosus into Ascending aorta & Pulmonary trunk.

- Failure of Migration of Neural crest cells in this segment Results in —

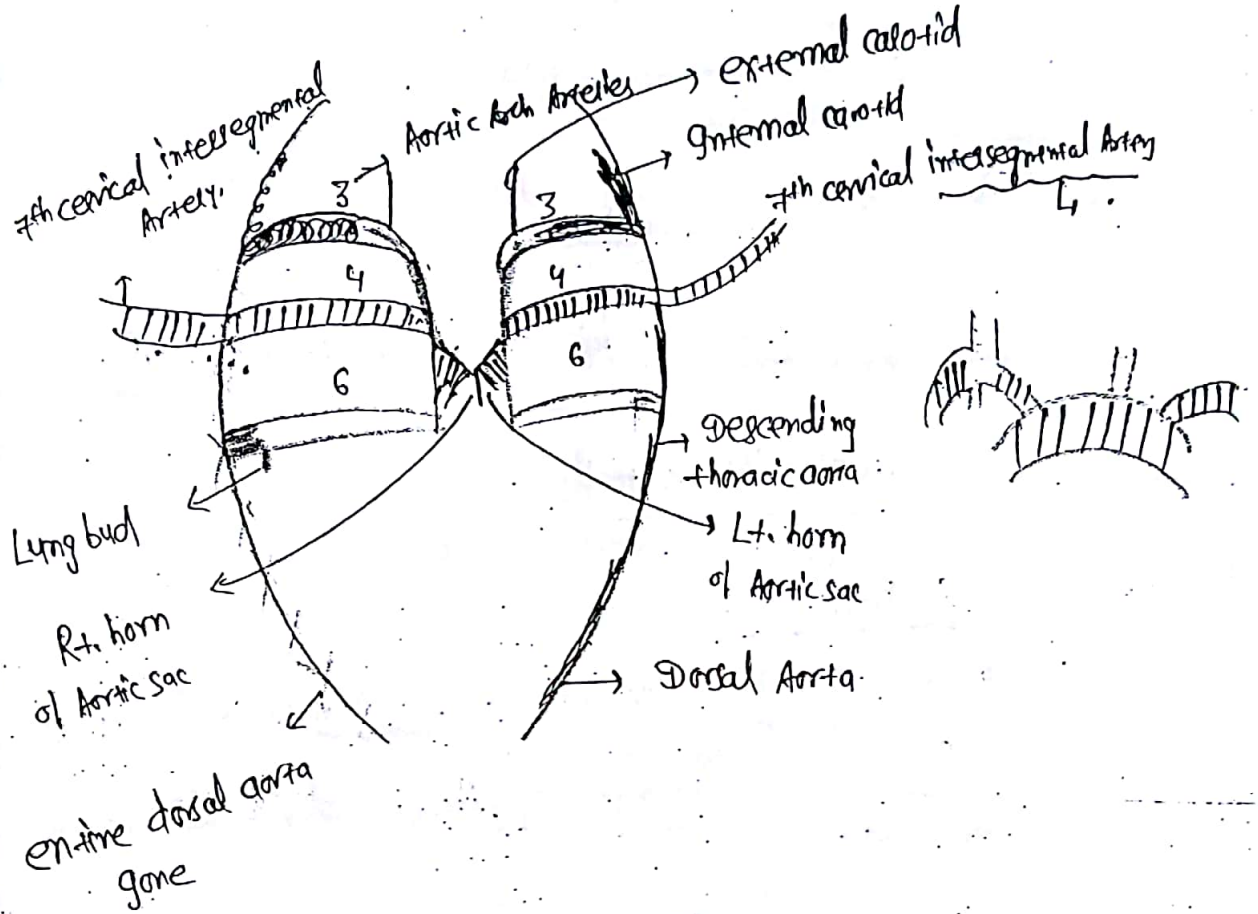
① **TOF** :⇒ M/c cyanotic congenital heart defects
↳ occurs when septum shift Anterior & to the Right ; leading to ⇒ Pulmonary stenosis
RVH;
Membranous i/v septal defect;
Overriding of Aorta.

② **Transposition of great vessel** ⇒
↳ occurs when Septum fails to develop into Spiral Manner
↳ Aorta Arise from → Rt ventricle

M/cc of cyanosis immediately after birth

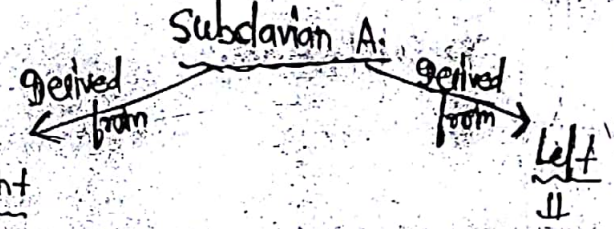
③ Persistant truncus Arteriosus ⇒

↳ occurs when septum fails to develop, a single vessel carry blood from both ventricles.



ARCH OF AORTA

derived from → Left horn of Aortic Sac & the left 4th arch Artery



Rt. 4th Arch arteries
Rt. 7th cervical intersegmental A.

Left 7th cervical Intersegmental A.

Brachiocephalic trunk

derived from ⇒ Rt. horn of Aortic sac

Pulmonary Arteries

derived from - 6th arch arteries

Ductus Arteriosus

derived from - Left 6th arch arteries b/w Lung bud & the dorsal Aorta

Common carotid

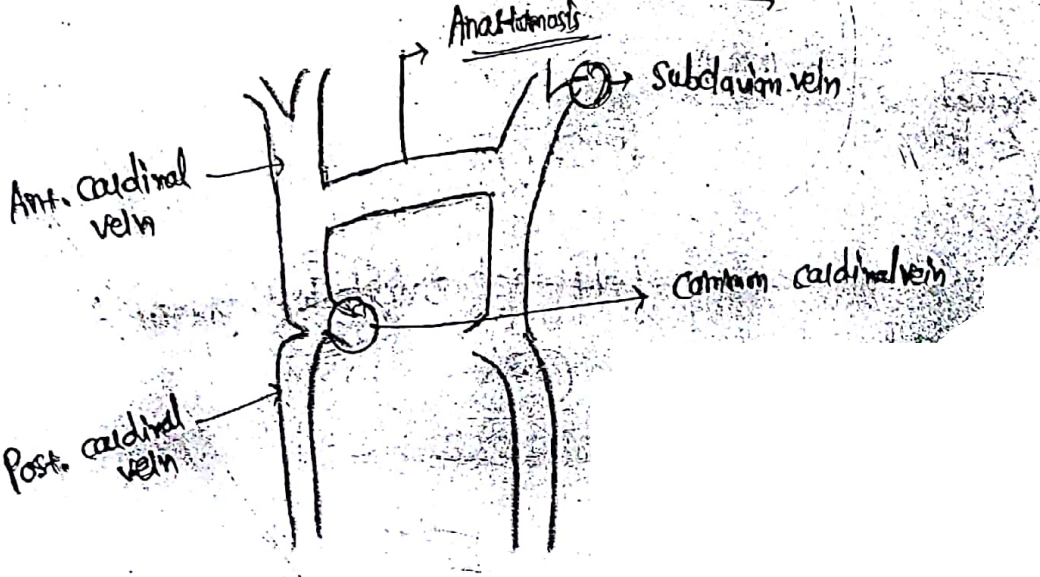
derived from - 3rd Arch arteries

- it gives a bud for external carotid & itself continues as internal carotid along with dorsal Aorta

Descending thoracic Aorta

- derived from Left dorsal Aorta

Development of vein



Internal Jugular vein

- derived from Ant. cardinal veins above the attachment of subclavian vein.

Right Brachiocephalic vein

Derived from ⇒ Rt. Ant. cardinal vein b/w subclavian vein & Anastomosis

Lt. Brachiocephalic vein

Derived from ⇒ Lt. Ant. cardinal vein subclavian vein & Anastomosis & Anastomosis itself

Superior Vena Cava

derived from ⇒ Rt. Anterior cardinal vein below Anastomosis;
- Rt. common cardinal vein

- A left sided SVC drains into ⇒ Coronary Sinus

Develops from ⇒ Coronary Sinus
- Lt. common cardinal vein
- Lt. horn of Sinus venosus

* Left. superior i/c veins ⇒ derived from left Anterior cardinal vein below the anastomosis
  Proximal part of left posterior cardinal vein.

Diaphragm

derived from ⇒
Septum transversum

- Dorsal & ventral Mesentry of oesophagus;
- Body wall
- Pleuro-peritoneal Membranes

- Muscles are derived from ⇒ Cervical Myotomes

- Bochdalac's Hernia ⇒ A Postero lateral defect in the development of diaphragm d/t Non-fusion of pleuro-peritoneal Membrane.

Root of

- Lies opposite to T5
- Arrangement of Structures
  - Anterior to Posterior → (V-A-B)

Relations of the Hilum of the Lung

Anterior ⇒ common on both side ⇒ • Phrenic Nerve
• Pericardiophrenic vessels
• Anterior pulmonary plexus
on Rt. side ⇒ • SVC
• Part of Rt. Atrium.

Posterior ⇒ common on both side ⇒ • Vagus Nerve
• Posterior pulmonary plexus
on left side ⇒ • Descending Thoracic Aorta

Superior ⇒ on Rt. side ⇒ Terminal part of Azygous vein
on left side ⇒ Arch of Aorta

Inferior ⇒ Pulmonary Ligament

Bronchus

- Superior to Inferior →

Right	Left
AIIMS 07 • Pulmonary Artery	• Epiarterial bronchus (Superior Most) NEET 16
AIIMS 15 • Bronchus (1° Bronchus)	• Pulmonary Artery
• Pulmonary vein	• Hyparterial bronchus
	• Inferior pulmonary vein (Inferior Most)

MEDIASTINUM

- Middle space left in thoracic cavity in b/w the Lungs.
- divides into Superior & Inferior by a imaginary line from Sternal Angle to lower border of T_4. (NEET'16)

(I) Superior Mediastinum ⇒

Retrosternal
- Sternohyoid Muscle
- Sterno-thyroid Muscle
- Thymus

Intermediate
- Formation of SVC
- Arch of Aorta & its branches
- Vagus & Phrenic N.

Pre-vertebral
- Trachea (10–15 cm Long)
- Esophagus
- Left Recurrent Laryngeal N.
- Thoracic duct

(II) Inferior Mediastinum ⇒

Anterior
- Superior & Inferior sterno-pericardial Ligaments

Middle
- Heart & pericardium
- Bifurcation of Trachea
- Ascending Aorta
- Rt. & Lt. Pulmonary veins
- Phrenic Nerve

Posterior
- Esophagus
- Thoracic duct
- Descending thoracic Aorta
- Azygous vein
- Splanchnic Nerve from lower 8 thoracic ganglia
- Hemiazygous vein & Accessory he...

* ESOPHAGEAL CONSTRICTIONS

NUMBER	Distance from Incisor	Bony Level	Anatomical Landma...
1	15 cm (6 inch)	C_6	At its beginning (Pharyngo-esophageal junctio...
2	22.5 cm (9 inch)	T_4	crossing of Aortic Arch
3	27.5 cm (11 inch)	T_6	crossing of Left Main Bro...
4	37.5 cm – 40 cm (15-16 inch)	T_{10}	Piercing diaphragm (At LE...

* INTER-ATRIAL SEPTUM

- Septum primum grows from the wall of the Atrium towards the A-V cushion.
- opening b/w them is klas → "Foramen Primum".
- Septum primum fuses c the A-V cushion & breaks off
  ⇓
  this opening is klas "Foramen Secundum"
- Another septum starts to grow from wall of the Atrium
  ⇓
  klas "Septum Secundum"
  ⇓
  - Lies Next to septum primum.
  - opening b/w them is klas "Foramen ovale"
- Final closure of Foramen ovale occurs d/t fusion of Septum primum & Septum Secundum.

ASD (Atrial septal Defect)

1. Septum Secundum type of ASD ⇒ M/c ASD
   - occurs d/t excessive Resorption of septum primum or Underdevelopment or Reduced size of septum Secundum.
2. Septum primum type of ASD ⇒
   - Failure of Septum primum to fuse c endocardial cushion.
   - May be combined c defects of endocardial cushion.

NEET '16

* BLOOD SUPPLY OF ESOPHAGUS

PART OF ESOPHAGUS	ARTERIAL SUPPLY	VENOUS DRAINAGE
Cervical →	Inferior thyroid Artery	Inferior thyroid veins
Thoracic →	Esophageal branch of descending thoracic Aorta, Bronchial Arteries	Azygous veins
Abdominal →	Left gastric Artery	Left gastric veins

ABDOMEN & PELVIS

DIAPHRAGM

Origin :-

- **Sternal** ⇓ **Xiphoid process**
- **Costal** ⇓ Inner aspect of Lower 6 Ribs.
- **Vertebral** ⇓
  - i) Rt. & Lt. crus ;
  - ii) Medial arcuate Ligament (Thickening of Psoas fascia)
  - iii) Lateral arcuate Ligament (Thickening of Ant. layer of thoraco-lumbar fascia)

Insertion ⇒ Central tendon

* AIIMS NOV17 Caval opening @ the level of T_8 vertebral passes through the "central tendon of Diaphragm

Openings of diaphragm :-

			Part of diaphragm
T_8	⇒	IVC ; Rt. Phrenic Nerve	• Central tendon (AIIMS 1
T_{10}	⇒	Esophagus c Rt. & Lt. vagus	• Muscular portion derived from Right crus
T_{12}	⇒	Aorta c Azygous vein & thoracic duct	• B/w Right & Left crus (Posterior to diaphragm,

* The Sympathetic chain enters the Abdomen behind Medial Arcuate Ligament
* The Subcostal Nerve & vessels enters behind — Lateral Arcuate Ligament.
* Foramen of Morgagni / space of Larrey — A Small defect b/w sternal & costal origins of diaphragm, the Superior epigastric vessels enters the abdomen through this gap

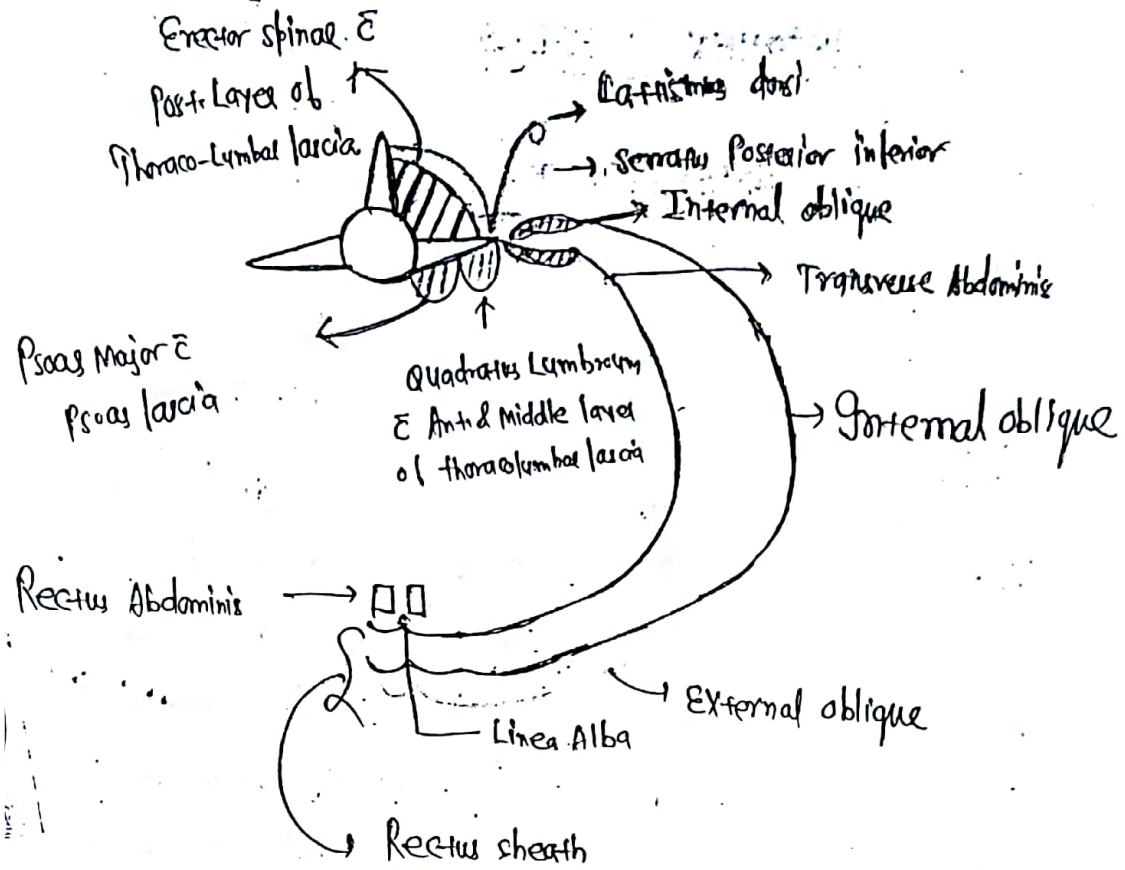
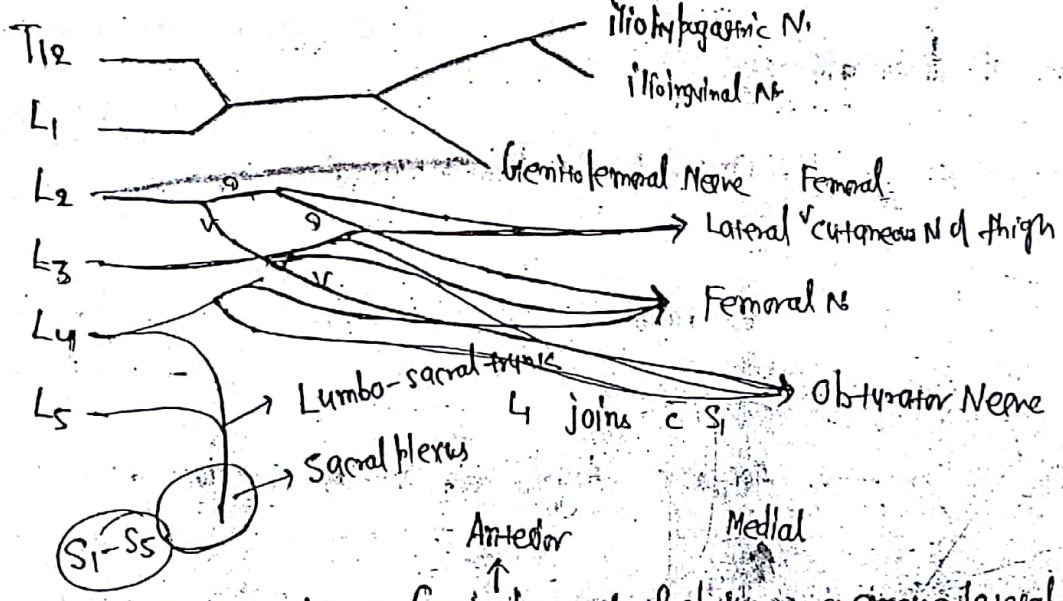


Fig: Posterior Abdominal wall (cut section of Abdomen)

LUMBER PLEXUS

↳ Formed from Anterior Rami of L_1-L_4; inside Psoas Major Muscle & also from T_{12}.



* All the Nerve except → Genitofemoral & obturator emerge lateral to Psoas Major.
* Nervus fugalis → L_4 (takes part in the formation of Lumbar & Sacral plexus)
* Largest branch of Lumbar plexus → Femoral N.
* N. lying in Ilio-Psoas groove → Genitofemoral N.

Abdominal Aorta & its branches (2,3,4,5)

2 → Terminal branches at L_4 — Common iliacs

3 → Ventral branches

- Coeliac trunk (T_{12}) ⇓ Supplies the foregut
- Superior Mesenteric (L_1) ⇓ Midgut
- Inferior Mesenteric ⇓ Hindgut.

4 → Lateral branches → all in Pairs

- Inferior phrenic
- Middle supra-renal
- Renal
- Gonadal

5 → Dorsal branches

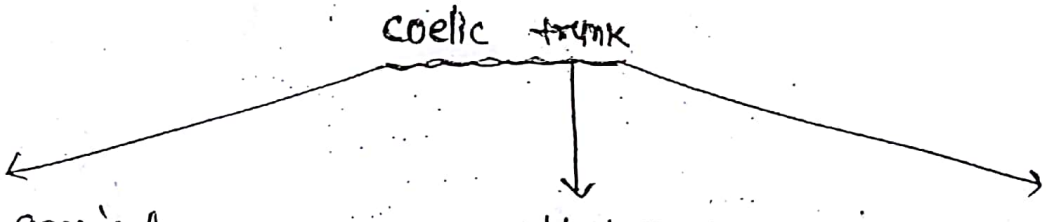
- 4 Pairs of Lumbar arteries
- 1 Median Sacral Artery.

* Nut Cracker sign's refer to ⇒ Left Renal vein.
* L_5 vertebrae is supplied by ilio-lumbar artery, branch of posterior division of Internal iliac Artery

Foregut ⇒ extends from Mouth to upper half of 2nd part of duodenum upto the opening of the bile duct
- Also includes Liver, Pancreas & Spleen.

Midgut ⇒ extends from Lower half of 2nd part of duodenum to Rt. 2/3rd of transverse colon.

Hindgut ⇒ extends from Left 1/3rd of transverse colon to Anal canal.



Left gastric A.
- Runs along the lesser curvature in the lesser omentum & anastomoses c Rt. gastric arteries

Splenic A
Branches →
① Pancreatic branches
② Short gastric branches
③ Left gastro epiploic A.
→ Runs along the superior border of body of Pancreas to enter the hilum of spleen.
- Lies in Lieno-Renal Ligament

common hepatic A
↓↓
3 branches

QQ "Arteria Pancreatica Magna" ⇒ Branch of Splenic A
QQ "Posterior gastric Artery" ⇒ Branch of Splenic A

Common hepatic A.

Rt. gastric | Gastro-duodenal | Hepatic Artery Proper

Gastro-duodenal → Rt. gastro-epiploic Artery | Sup. Pancreatico duodenal Artery

Sup. Pancreatico duodenal Artery ↓

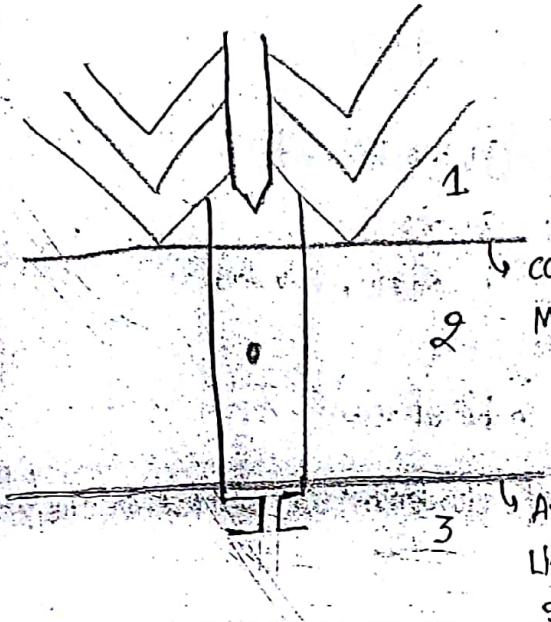
enters the Pancreatico-duodenal groove & Anastomosis c the Inferior pancreatico-duodenal which is the 1st branch of Sup. Mesentric Artery.

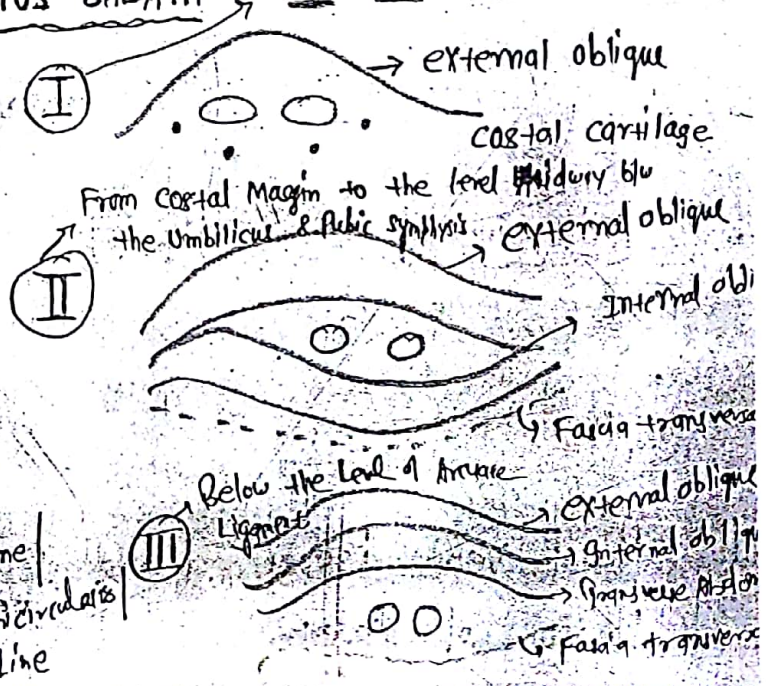
* Grillith's point (Junction of Right 2/3rd & Left 1/3rd of transverse colon)
↳ watershed Line

⇒ Anastomosis b/w Superior Mesenteric Artery (Middle colic) c Inferi Mesenteric Artery (Left colic).

* Sudeck's point → @ Recto-sigmoid junction; Anastomosis b/w Inf. Mesentry artery (superior Rectal) c Internal iliac (Middle & Inf. Rectal Artery).

* RECTUS SHEATH





Portal vein

- Length ⇒ 8cm & Formed by Union of Superior Mesenteric vein & splenic vein behind the Neck of Pancreas.

i) Supra-duodenal part ⇒ Anterior & Right ⇒ Bile duct

Anterior & Left ⇒ Hepatic artery

Posterior ⇒ IVC separated by epiploic foramen.

ii) Retro-duodenal part ⇒

Anterior & Right ⇒ Bile duct

Anterior & Left ⇒ Gastro-duodenal a.

Posterior ⇒ IVC

iii) Infra-duodenal part ⇒

Anterior ⇒ Neck of the Pancreas

Posterior ⇒ IVC

* Tributaries of Portal vein ⇒ Left gastric vein,
Right gastric
Superior pancreatico-duodenal;
cystic
Para-umbilical vein

* Portal vein passes behind 1st part of duodenum; so; divided on the Location of duodenum.

Bile duct ⇒ Formed by Union of cystic & common hepatic duct.

Length ⇒ 8cm

↳ Gall bladder ⇒ Lies on the Inferior surface of Liver close related to segment IV or the quadrate lobe

i) **Supra-duodenal part** ⇒ Left ⇒ Hepatic Artery

Posterior ⇒ Portal vein

ii) **Retro-duodenal part** ⇒

Left ⇒ Gastroduodenal A.

Posterior ⇒ IVC

iii) **Infra-duodenal part** ⇒

Anterior ⇒ Head of the Pancreas.

Posterior ⇒ IVC

NEET PG Q Canal of Hering/Intrahepatic bile ductules ⇒ Part of outflow system of excreting bile products from the Liver.

Superior Mesenteric Artery

Branches ⇒ Inferior Pancreatico-duodenal A.

Jejunal & ilial branches

Middle colic

Rt. colic

Ilio colic → Ascending branch

→ Descending branch

↓

a) Ant. cecal

b) Post. cecal

c) Appendicular Q Q

d) Iliac - supply last part of ilium,

Recurrent appendicular Artery

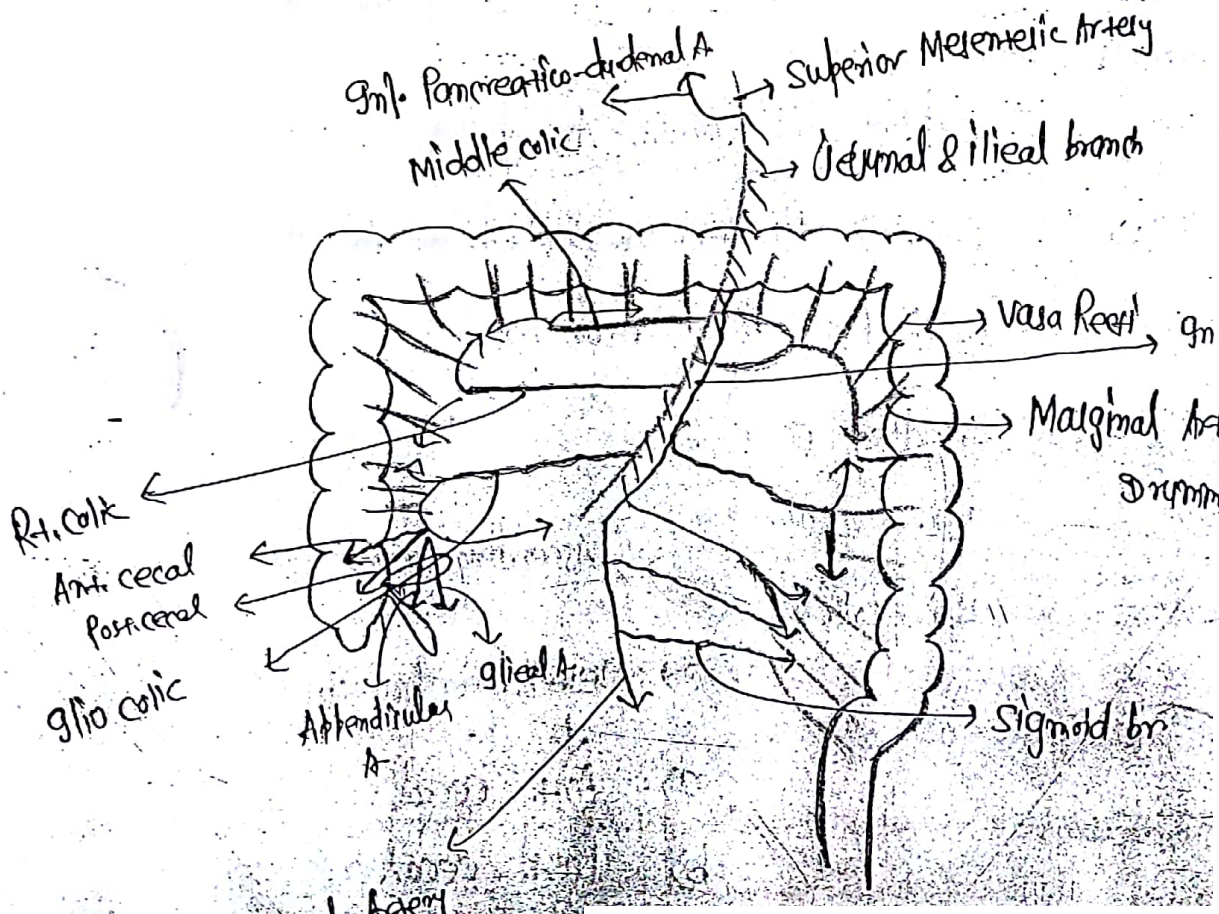
↳ Branch of Appendicular / Post. cecal Artery

Accessory appendicular Artery of SHESHACALAM

↳ Branch of Post. cecal Artery

* Inferior Mesenteric Artery

Branches – Left colic
– Sigmoid branches
– Superior Rectal arteries (continuation of Inf. Mesenteric A.)



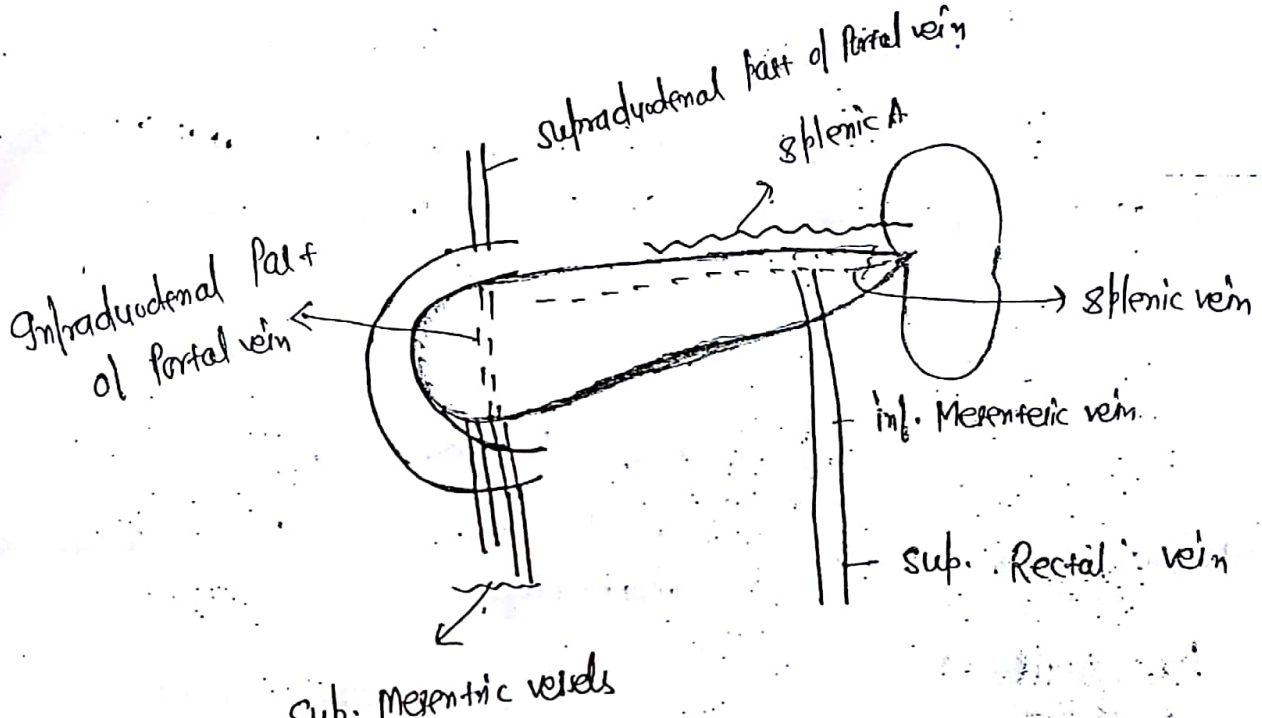
* Blood vessels Related to Pancrease ⇨

Along the Superior border of the body → Splenic Artery
→ Splenic vein

Behind the Body → Sup. Mesenteric vessels

On the Uncinate process → Portal vein

Behind the Neck of Pancreas →



Inferior vena cava

- Formed at L_5 by two common iliacs.
- Tributeries ⇒ common iliacs
  - Rt & Lt Renal
  - Rt Suprarenal
  - Rt Gonadal
  - Hepatic veins
  - Inferior phrenic veins
  - 3rd & 4th Lumbar veins

ANTERIOR ABDOMINAL WALL

Layers ⇒ i) Skin;
ii) Superficial fascia: → Superficial Fatty Layer (Fascia of camper or camper's fascia)
→ Deep Membranous Layer (Fascia of Scarpa or scarpa's fascia)
Superficial to Deep
iii) External oblique Muscle;
iv) Internal oblique Muscle;
v) Transversus Abdominis Muscle;
vi) Fascia transversalis;
vii) Extraperitoneal tissue;
viii) Parietal Layer of Peritoneum.

* Deep Fascia is absent in the Anterior Abdominal wall to allow the bulging of abdominal wall after Meal; during Pregnancy etc

Inguinal canal (Length = 4-6cm)

↳ extends from deep Inguinal Ring to superficial Inguinal Ring.

Boundaries ⇒

Ant. wall ⇒

On its entire extent → External oblique

On its lateral part → Internal oblique & transverse abdominis

Post. wall ⇒

On its entire extent → Fascia transversalis

On its Medial part ⇒ Conjoint tendon

Roof ⇒ Conjoint tendon

Floor ⇒ External oblique & Inguinal Ligament.

AI+B

* Superficial Inguinal Ring ⇒ defect in External oblique Aponeurosis,
* Deep Inguinal Ring ⇒ defect in Fascia transversalis,
* Conjoint tendon is formed by Fusion of Aponeurotic fibres of internal oblique & Transversus Abdominis.

Coveing of testis

External spermatic Fascia → derived from external oblique Aponeurosis,

Cremastric Fascia ⇒ derived from cremaster/ Internal oblique

Internal Spermatic Fascia ⇒ derived from fascia transversalis

Tunica vaginalis ⇒ derived from Peritoneum (Mainly Parietal)

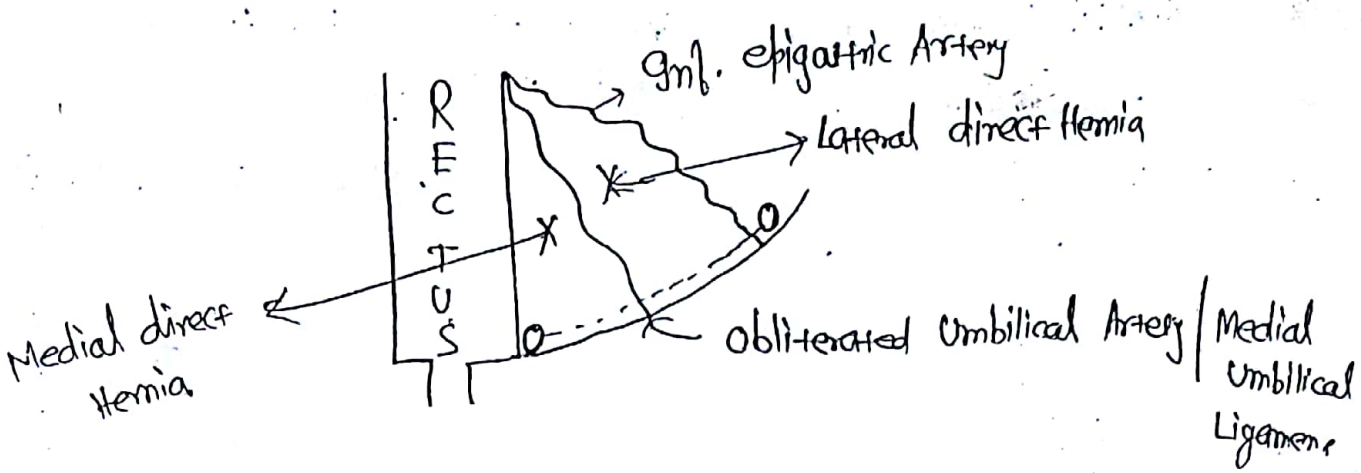
Tunica Albuginea ⇒ covering of connective tissue

Tunica vasculosa ⇒ covering of Blood vessels

CONTENTS OF SPERMATIC CORD

- Vas deferens (Ductus deferens)
- Artery to the vas (Branch of Superior vesical Artery)
- Cremastric Artery — Branch of Inferior epigastric Artery
- Testicular Artery — Branch of Abdominal aorta
- Pampiniform plexus of veins
- Genital br. of Genitofemoral Nerve
- Lymphatics from the testis
- Sympathetic Nerve fibres

Mnemonics ⇒ Pills Don't Contribute To Good sex Life



Median Umbilical Ligament ⇒ Obliterated Urachus / Allantois

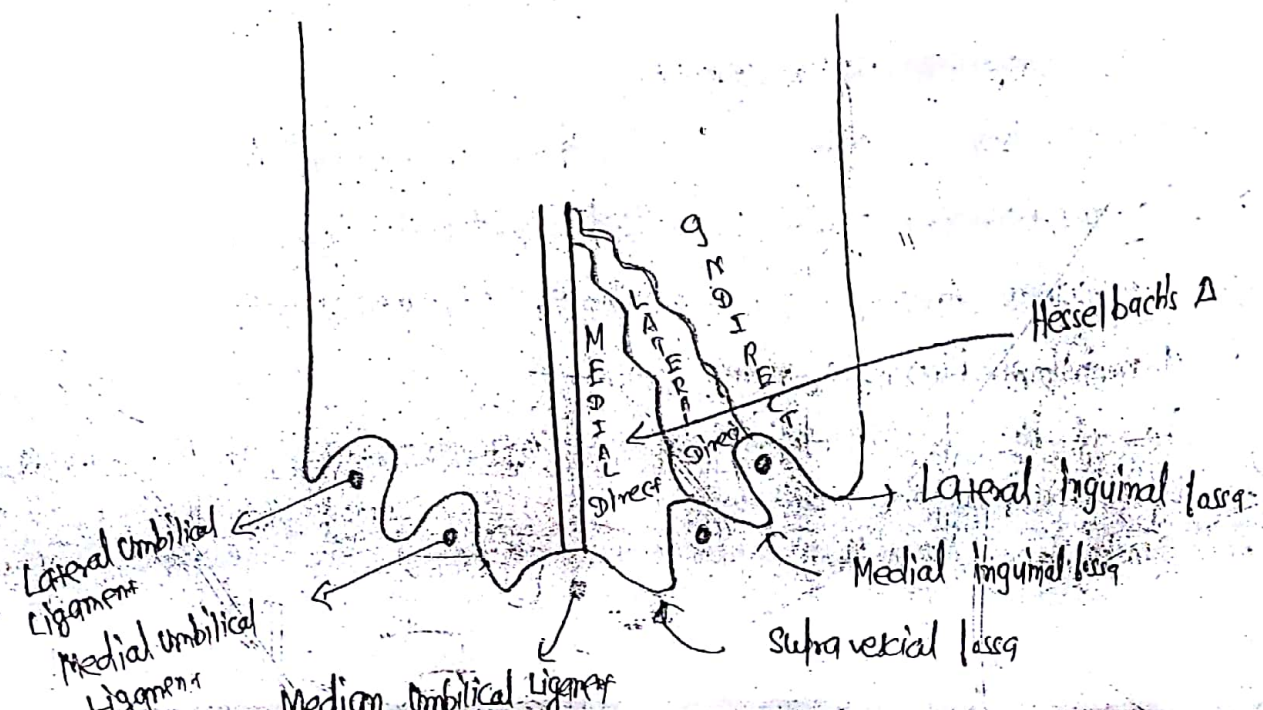
⇓

if it doesn't obliterate

→ Weeping Umbilicus

Medial Umbilical Ligament ⇒ obliterated Umbilical Artery

Lateral Umbilical Ligament ⇒ It is fold of Peritoneum ; which covers inferior epigastric Vessels.



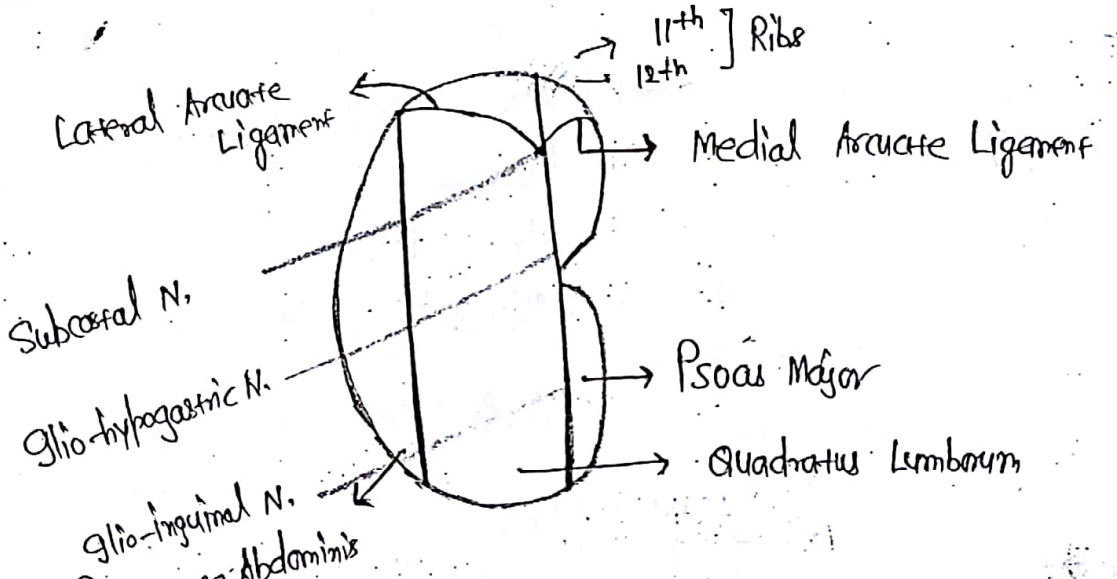
* Hesselbach's Δ → Medial Border → Lateral Margin of Rectus sheath (Linea Semilunaris);

Superolateral Border → Inferior epigastric vessels.

Inferior Border → Inguinal Ligament (Poupart's Ligament).

KIDNEY

Posterior Relations of Kidney ⇒ of both kidney are same except Rt. Kidney is Related to only 12th Rib; while Left Kidney related to both 11th & 12th Ribs.



Left Kidney

* Venous drainage of Kidney → (both Left & Right) • Renal veins drains into IVC;
  - Left Renal vein is Longer & passes in front of Abdominal Aorta; behind origin of Superior Mesenteric Artery.
  - Left Renal vein also receives Lt. Inferior phrenic vein; Lt. gonadal vein & Lt. Suprarenal (Adrenal gland);
  - Each Renal vein begins beneath the true capsule as "Stellate vein".

* Anterior Relation of ⇒ (A) Right Kidney ⇒

- Rt. Supra Renal gland
- Liver
- 2nd part of duodenum
- Ascending colon
- Hepatic flexure of the colon:
- Small Intestine

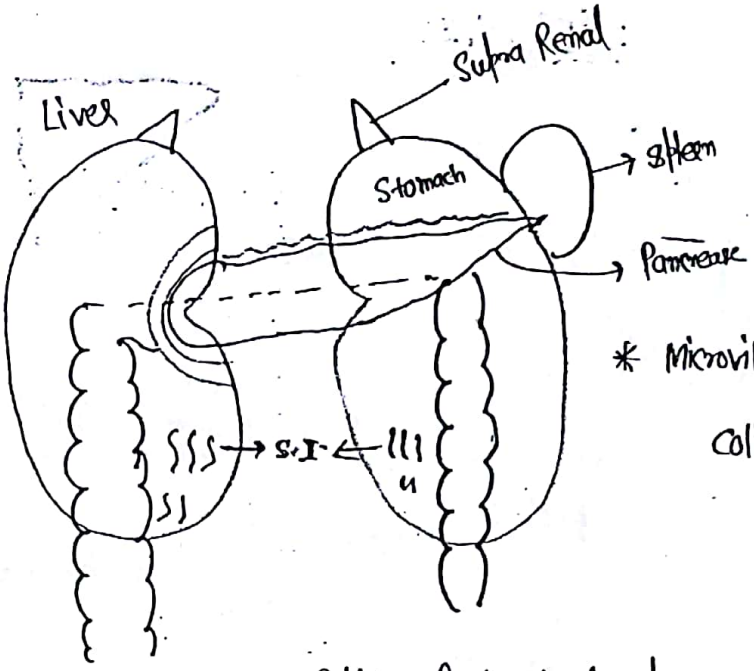
(B) Left Kidney ⇒

- Lt. Supra Renal gland
- Stomach
- Spleen
- Splenic Artery
- Pancreas
- Splenic flexure
- Descending colon
- Small Intestine

STOMACH BED

Formed by ⇒

- Lt. SupraRenal
- Lt. kidney
- Spleen
- Splenic Artery
- Pancreas
- Transverse Colon
- Left cru of diaphragm



* Microvilli are abt. in
⇓
Collecting duct

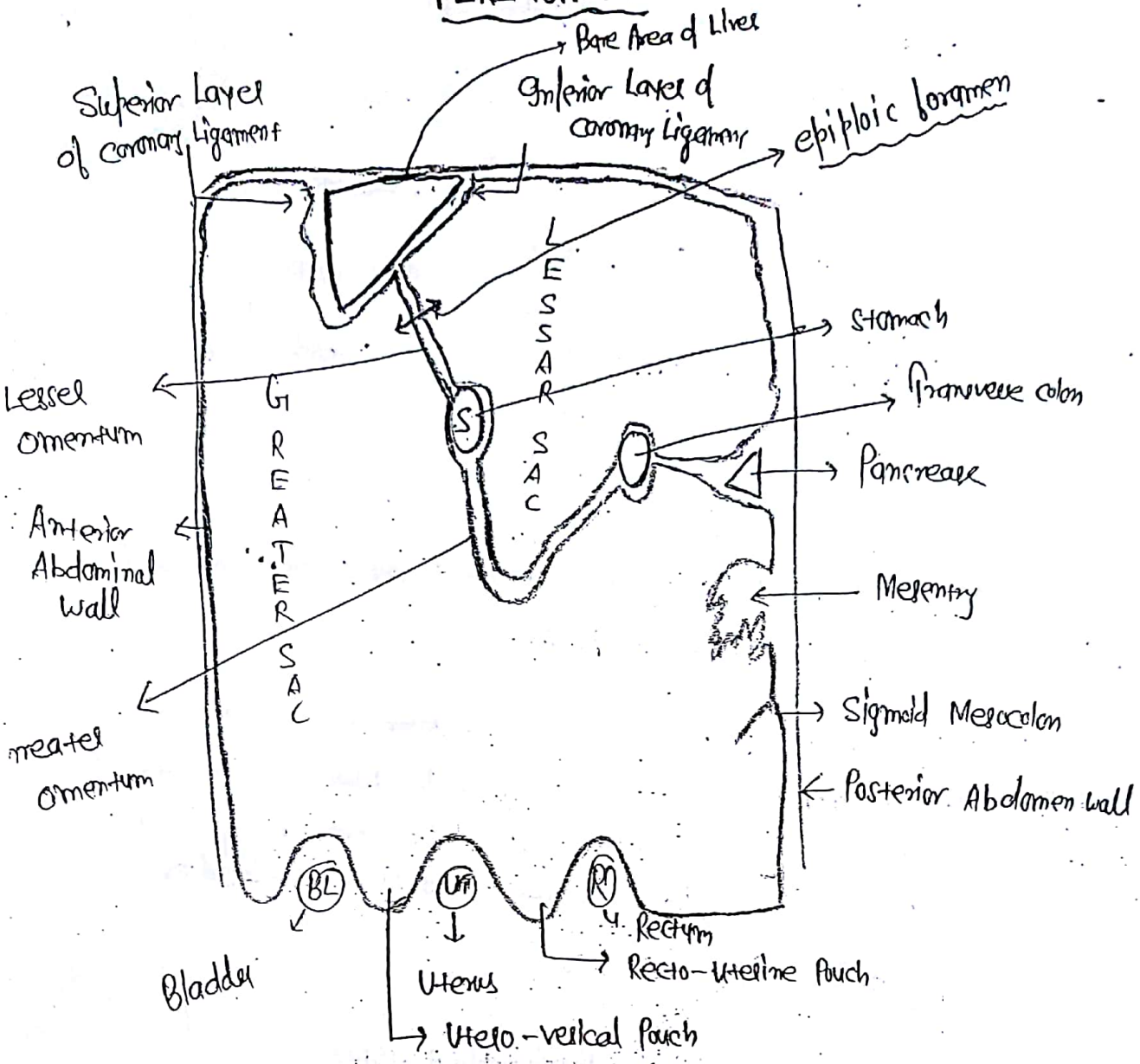
* QQ(NEEFIC) ... DUCTS OF BELLINI ⇒ Papillary (collecting) ducts are Anatomical structures of kidney; K/as "DUCTS OF BELLINI".

QQ* CAUDATE LOBE OF LIVER ⇒ Anatomically situated on Posterior surface of Right l
- It belongs physiologically to both Right & Left lobes b/c it receives blood from Right & left hepatic arteries; Right & Left branches of Portal vein & dr bile into both Right & Left hepatic duct. Thus it is considered as "Physiological Independent lobe".
→ "Segment I"

* SPACE OF DISSE ⇒ K/as "Perisinusoidal space".
- Space b/w Hepatocytes & Hepatic sinusids.
- Exchange of substance b/w hepatocytes & blood takes place in the space of Disse
- Microvilli of hepatocytes extend into this space; ↑ surface area for Absorption;
- Major constituents of space of Disse ⇒ Blood plasma

* RENAL VASCULATURE ⇒ Each kidney is supplied by Renal Artery (Branch of Abdominal Aorta) & is drained by Renal vein to IVC;
- Rt. Renal Artery is longer & passes behind IVC;
- Renal Artery divides into → (A) Posterior division ⇒ Supplies Posterior segm
(B) Anterior division ⇒ 4 branches → Apical; Upper Anterior; Middle Anterior & Lower
- Branches of Renal artery are end arteries.

PERITONEUM



Retroperitoneal organs ⇒

1. Kidneys
2. Supra-Renal
3. duodenum except a small area of the 1st & 4th part.
4. Pancreas.
5. Ascending & descending colon
6. Aorta & IVC
7. Ureters.

↳ Set of tissue ; which is formed by the double fold of Peritoneum that attaches the Intestine to the wall of Abdomen.

Root of Mesentry ⇒ extends from D-J flexor (Left transverse proc of L_2) to Right Sacro-iliac joint.

↳ duodeno-jejunum flexor.

— QQ Structures crossing by the Root of Mesentry. !⇒

- 3rd Part of duodenum
- Aorta
- IVC
- Rt. Psoas Major
- Rt. Ureter.

↳ Also "Foramen of Winslow" ⇒ Passage b/w greater sac & lesser sac

Epiploic foramen (Boundaries)

Anteriorly ⇒ Lesser omentum containing hepatic artery ; Portal & Bile duct

Posteriorly ⇒ IVC
Rt. Suprarenal gland
Body of T_{12} vertebrae

Superiorly ⇒ Caudate lobe of Liver (caudate process)

Inferiorly ⇒ 1st part of duodenum

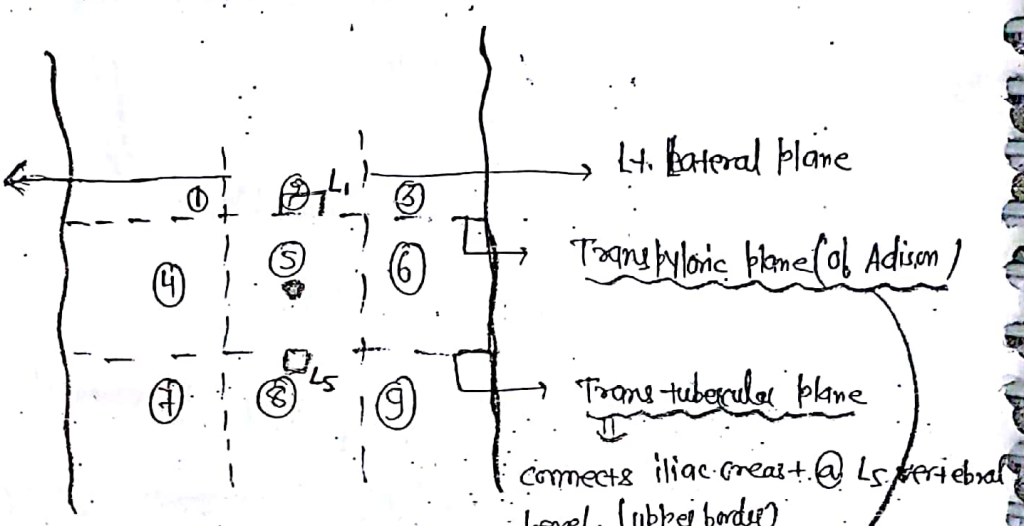
* Length of epiploic foramen ⇒ 4-6 cm

NEET'16 ⇒ A Posterior gastric ulcer May perforate Into the Lessar Sac (omental bursa). The leaking fluid passes out through epiploic foramen to Reach hepatorenal pouch.

⇓

Sometimes; in these cases the epiploic foramen is closed by Adhesion; the lesser sac become distended & can be drained by a tube passed through Lesser omentum.

*



① → Rt. Hypochondrium
② → Epigastrium
③ → Lt. Hypochondrium
④ → Rt. Lumbar Region
⑤ → Umbilicus
⑥ → Lt. Lumbar Region
⑦ → Rt. iliac Fossa
⑧ → Hypogastrium
⑨ → Lt. iliac Fossa

- Passes Anteriorly through tips of 9th costal cartilage & Posteriorly through Lower border of L_1 vertebrae.
- Organs @ ① this Level ⇒ Hilum of kidney; Pylorus of stomach; Beginning of duodenum; Neck of Pancreas; Fundus of Gall bladder & origin of Superior Mesentric vessels

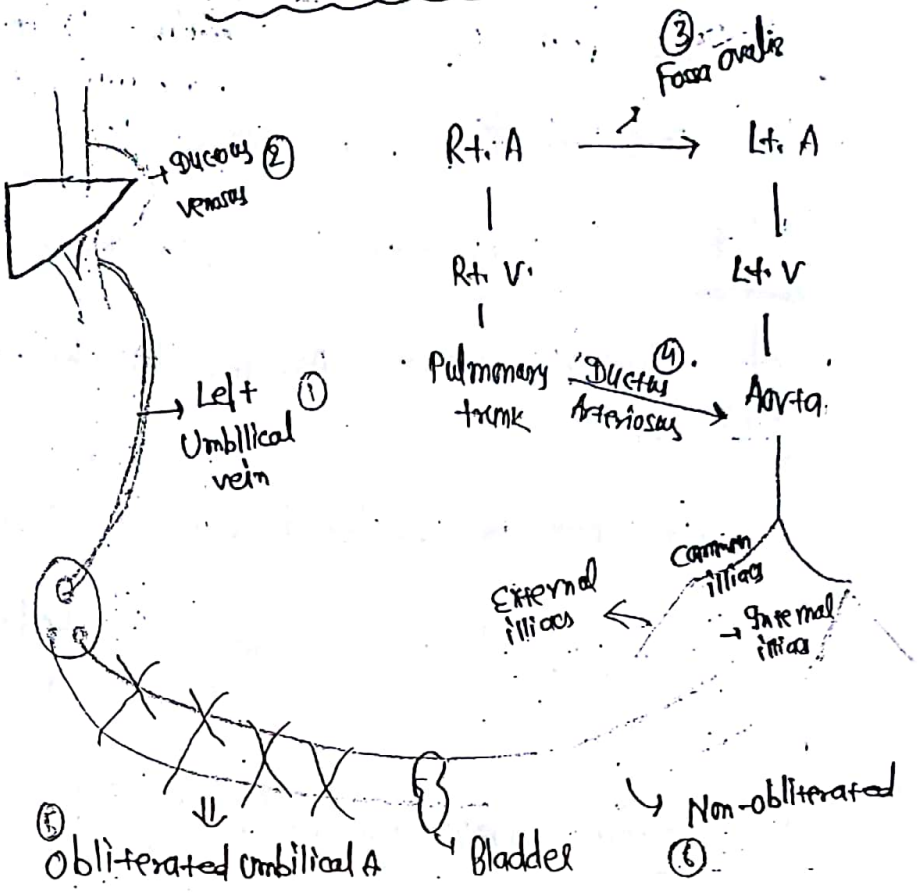
* Renal Angle ⇒ Angle b/w Last Rib & outer border of erector spinae.

* Umbilicus ⇒ Lies b/w L_3 & L_4 vertebrae

* Highest point of iliac crest lies @ L_4 vertebrae. The supracristal plane is Indicated by a Horizontal line through the highest points of iliac crests

* Umbilicus is watershed; Lymph flows upwards to drain into Axillary Lymph Nodes; Below the level of Umbilicus lymph flows downwards to drain into Superficial Inguinal Lymph Node

FETAL CIRCULATION



* Uterine A. & ovarian A. together form Arcuate Artery Anastomosis; which the give all the Radial arteries & finally branches into basal & spiral Arteries

Uterine Artery ⟶ Arcuate artery ⟶ Radial Artery ⟶ Spiral Artery

① Obliterated Left Umbilical vein ⇒ Ligamentum teres

② Ductus Venosus ⇒ Ligamentum Venosum

③ Foramen ovale ⇒ Fossa ovalis

④ Ductus Arteriosus ⇒ Ligamentum arteriosum

⑤ Obliterated Umbilical Artery / Distal part of Umbilical Artery ⇒ Medial Umbilical Ligamen

⑥ Non-obliterated part of Umbilical Artery / Proximal part of Umbilical Artery ⇒ Superior vesical Artery

DEVELOPMENT OF STOMACH

- develops from Foregut
  - Length = 10 inches
  - At birth capacity = 30ml; Adults ⇓ 1500–2000 ml
- It has Rt. & Lt. Surface; Ant. & Post. borders

i) 1st Rotation Along vertical Axis :⇒

Left Surface becomes Anterior & the Right becomes Posterior

- The Anterior border becomes → Right
- Posterior border becomes → Left

ii) 2nd Rotation Along Antero-posterior axis :⇒

Pylorus comes to lie @ a higher level

- The left border grows rapidly to form greater Sac
- during Rotation the dorsal Mesogastrium also turns to the left; thus forming lesser Sac

* Derivatives of ventral Mesogastrium :⇒

i) Falciform Ligament —contains→ Ligamentum teres & Paraumbilical vein

ii) Lesser omentum

iii) Superior & Inferior Layers of coronary Ligament

iv) Rt. & left. triangular Ligaments

The Main Support of Liver is :- Hepatic vein draining into IVC

* Derivatives of Dorsal Mesogastrium :⇒

i) Gastro-splenic Ligament ⇒ Contains short gastric vessels & Left gastroepiploic vessels

ii) LinoRenal Ligament ⇒ Contains splenic vessels & tail of the pancreas

iii) Greater omentum

iv) gastro-phrenic Ligament.

* Blood Supply of Stomach :⇒

Along the Lesser curvature → Lt. & Rt. gastric Arteries;

Along the Greater curvature → Lt. & Rt. gastro-epiploic arteries;

Fundus → Short gastric Arteries

* Venous drainage :⇒

Lt. & Rt. gastric veins → drains into the portal vein;

Lt. gastro-epiploic & short gastric veins → drains into splenic vein;

Rt. gastro-epiploic vein → drains into Superior Mesenteric vein.

NEET16 → The prepyloric vein of Mayo is a tributary of the Rt. gastric vein & is the external Landmark of Gastroduodenal junction.

Development of Pancreas

Dorsal Pancreatic bud forms → Upper part of head; Neck & tail of the Pancreas

ventral Pancreatic buds forms → Lower part of head & Uncinate process

Annular Pancreas is dt defective Migration of Ventral Pancreatic bud.

Non-fusion of two buds Result in ⇒ Pancreatic divisum

↓ Dorsal & ventral buds.

↓ M/c congenital Anomaly of Pancreas

Main Pancreatic duct / Duct of Wirsung :⇒

- derived from the duct of dorsal bud; ventral bud & the anastomosis b/w them.
- opens @ Major duodenal papillae; 8 to 10 cm from the Pylorus

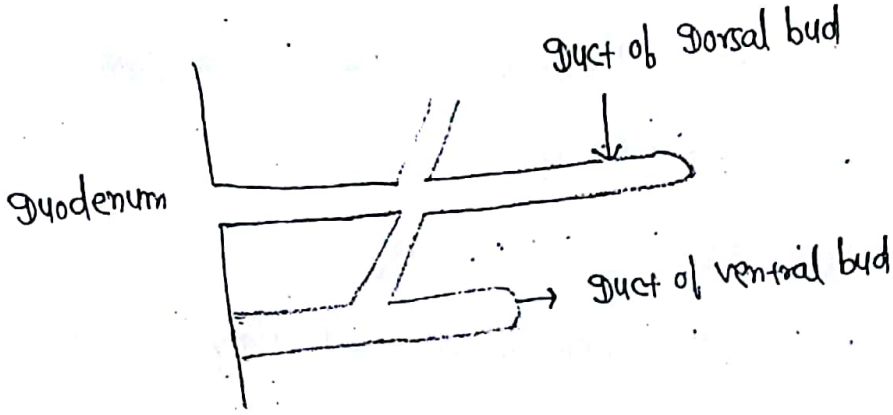
Accessary Pancreatic duct / Duct of Santorini :⇒

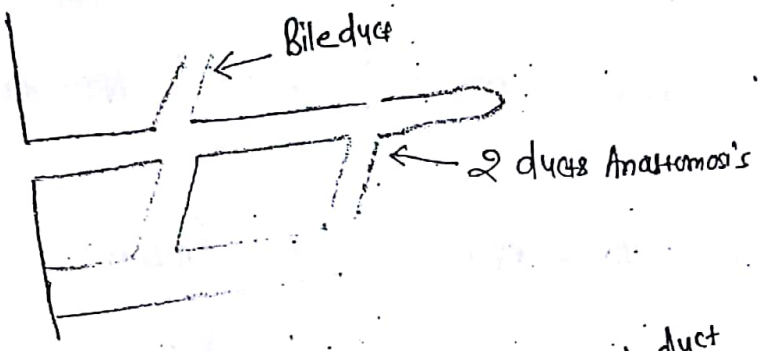
- formed from duct of dorsal bud
- opens @ Minor duodenal papillae; 6 to 8 cm from the pylorus

Accessory Pancreatic tissue May be found in :⇒

(A) Wall of Stomach; Duodenum; Jejunum or Ileum

(B) Meckel's diverticulum.





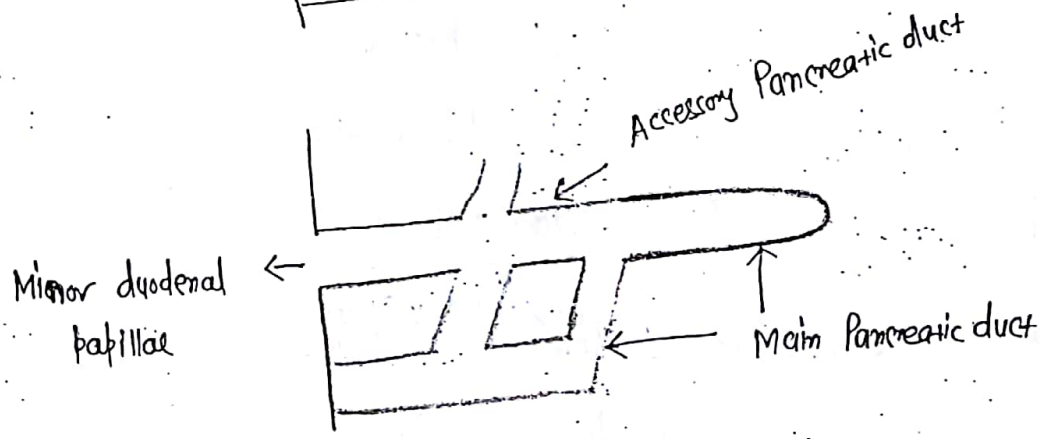


Fig: Development of Pancreatic duct

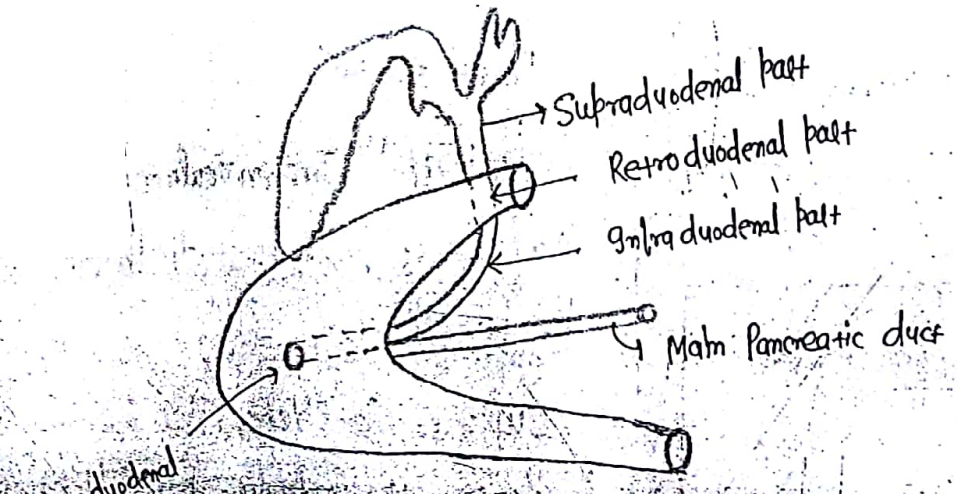


Fig: Part of Bile duct in Relation to diaphragm

SPLEEN (1, 3, 5, 7, 9, 11, 10)

- 1 X 3 X 5 — dimension of spleen (in Inches)
- 7 ounces of wt (250 gm)
- ⊕nt b/w the 9th & 11th Ribs
- Long axis of the spleen is directed along 10th Rib
- Spleen Makes an angle of 45° ∈ the Hz plane
- It projects into the greater Sac

∴ Superior border of spleen is Notched.

* Impression on spleen — a) Gastric
b) Renal
c) Pancreatic
d) colic
e) Diaphragmatic

* Ligaments of spleen — a) Gastro-splenic
b) Lieno-Renal
c) Phrenico-colic
↳ Also "Sustentaculum Lienis".
↳ extends from the diaphragm to splenic flexure of colon
↳ Supports the spleen
↳ prevents the downward displacement of spleen.

QQ

Accessory spleen can be found in →

Hilum

Tail of Pancreas

Derivatives of dorsal Mesogastrium

Broad Ligament of Uterus

Spermatic cord

* PALS (Periarteriolar Lymphoid sheath) is a histological feature of ⇒ White pulp of the spleen

ROTATION OF GUT

- The pre-arterial segment lies — Superiorly
  Post-arterial segment lies — Inferiorly

i) 1st Rotation (90°) ⇒

- the pre-arterial segment lies on Rt. side
- it forms the Small Intestines
- as it Returns back to the Abdominal cavity, 2nd Rotation occurs

ii) 2nd Rotation (90°) ⇒

- the post-arterial segment lies superiorly
- → cecum lies in the midline

iii) 3rd Rotation → 90°

Cecum lies on Rt. side – Subhepatic cecum

* Herniation of Midgut loop occurs by ⇒ 6 weeks
* Herniation of Midgut loop Reduced by ⇒ 10 weeks

* MALROTATIONS :⇒

1. Mixed Rotation :⇒ The pre-arterial segments alone rotates by 90°.
   - The Post arterial segment rotates by 180°

   QQ cecum lies in the Midline behind the stomach.

2. Non-Rotation :⇒ 1st Rotation is Normal
   - Further Rotation doesn't occur
   - cecum lies on Left side
   - Left sided colon

3. Reverse Rotation :⇒ 1st Rotation is Normal
   - 2nd Rotation occurs by 180° in the Reverse direction
   - Transverse colon lies behind small Intestine

HIND-GUT (Urachus Fistula ⇒ Patent Allantois)

- Part of the hind-gut below the attachment of Allantois

⇓

Cloaca

- The Uro-Rectal septum divides the cloaca into

↙ ↘

Urogenital sinus Anteriorly

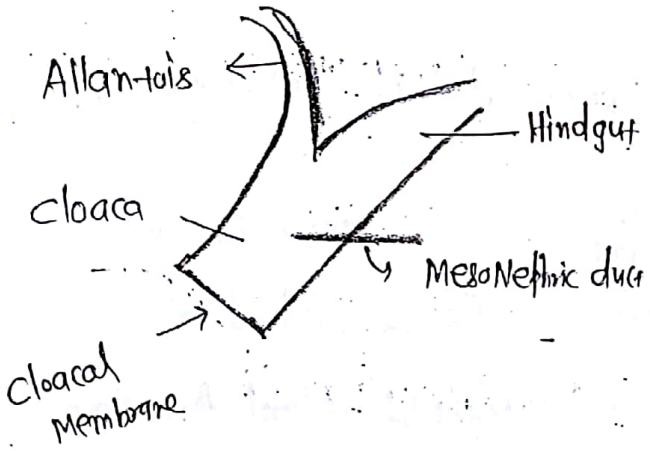
Rectum & Anal canal Posteriorly

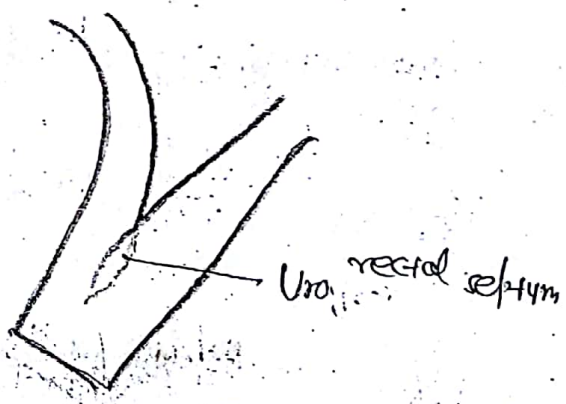
- The cloacal Membrane divides into

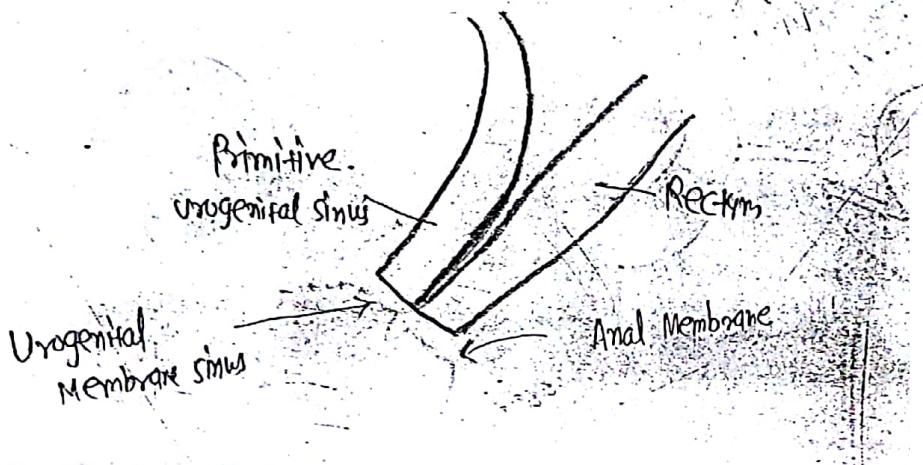
↙ ↘

Urogenital Membrane Anteriorly

Anal Membrane Posteriorly





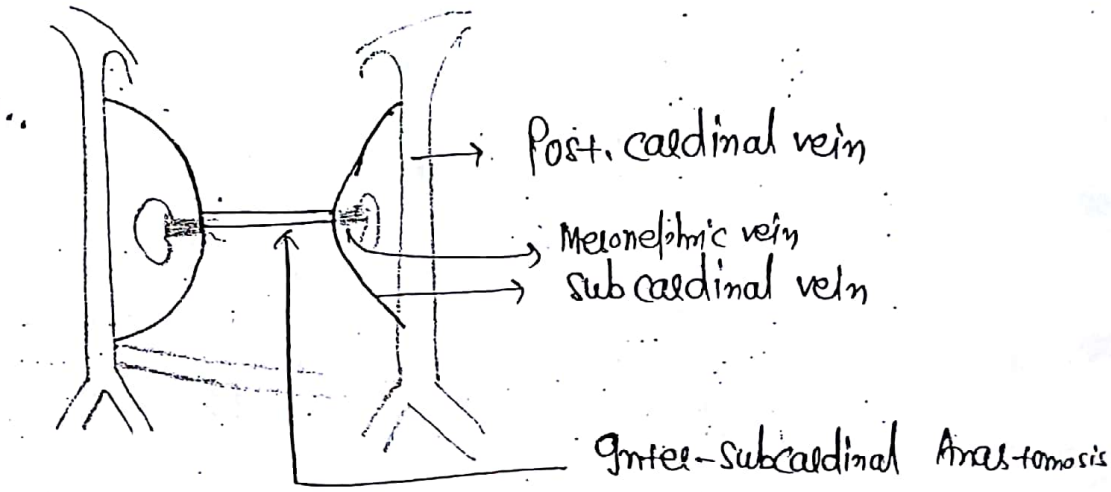


* Blood supply of Supra-Renal gland :⇒

(1) Superior Supra-Renal Artery → Branch of Inferior phrenic Artery

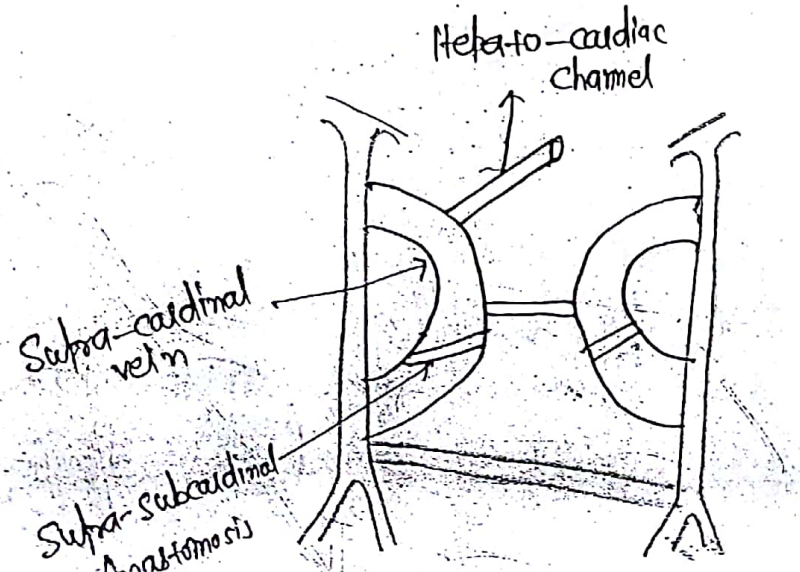
(2) Middle supra-Renal Artery → Branch of Abdominal Aorta

(3) Inferior supra-Renal Artery → Branch of Renal Artery



Rt. Renal vein ⇒ derived from Rt. Mesonephric vein

Lt. Renal vein ⇒ derived from – Lt. MesoNephric vein
Lt. Subcardinal vein
Inter Subcardinal Anastomosis



* clinical sign of different Porto-systemic circulation :⇒

esophageal varices (Bleeding)

Hemorrhoids → PORTAL HYPERTENSION

Caput Medusae

NEET'16

1. TEMPORARY MUCOSAL FOLDS :⇒ Mucosal fold ; which are Obliterated by distension.
eg ⇒ Gastric Rugae of stomach & Longitudnal fold.

2. PERMANENT MUCOSAL FOLDS :⇒ eg :⇒ Plica circularis (valves of Kerkri of Small Intestine ;
- Crescentric Mucosal folds of cystic duct (Spiral valve of Heister)
- Transverse (Horizontal) Rectal folds (Houston's valve or plica transversalis) ;
- Permanent Longitudnal Rectal columns or folds (Found in Lower Rectum. Anal canal).

PETIT TRIANGLE (Inferior Lumbar triangle)

NEET'16

Boundaries :⇒ Base ⇒ Iliac crest.
Anterior Boundary (Abdominal Boundary) ⇒ Posterior border of External oblique Mu
Posterior Boundary (Lumbar Boundary) ⇒ Anterior border of Latissimus dorsi
Floor ⇒ Internal oblique Muscle

PELVIS

* Structures winding Around Ischial spine →

P → : Pudendal Nerve

I → Internal Pudendal vessels

N → N. to obturator Internus

they leave the pelvis through Greater sciatic foramen and enters the perineum through Lesser sciatic foramen.

- The tendon of obturator Internus emerges out through lesser sciatic foramen.

* Blood supply of Pelvis :⇒

- Internal iliac Artery – Small terminal branch of common iliac A.

Anterior division

- Superior vesical Artery
- Inferior vesical Artery (Supplies the prostate)
- Middle Rectal Artery
- Obturator Artery ; While Accessory (Aberrant) obturator Artery is the branch of Inferior epigastric Artery ⇓ it is the branch of external iliac Artery → Inferior epigastric A. / Femoral A. / Deep circumflex iliac A.
- Uterine & Vaginal Artery
- Inferior Gluteal Artery
- Internal Pudendal Artery

→ In female it is Replaced by " Uterine & Vaginal Artery ".

Posterior division

- Superior Gluteal Artery
- Lateral Sacral Artery
- Ilio-Lumbal Artery ⇓ it supplies L5 vertebrae

URETER

- Length ⇒ 25 cm (10 inches)
- completely Retroperitoneal organ.

Abdominal Part -

Post. Relation → Transverse process of Lumbar Vertebra
Psoas Major
Genito-femoral Nerve

Ant. Relation of Right Ureter → 3rd Part of duodenum
- Rt. colic vessels
- ilio-colic vessels
- Root of Mesentry
- Gonadal vessels
- Terminal part of ileum

Ant. Relation of Left Ureter → Left colic vessels
Sigmoid vessels
Sigmoid Mesocolon
Gonadal vessels

Pelvic part - goes backwards along greater Sciatic Notch alo
c internal iliac vessels behind it.
- turns anteriorly at ischial spine & enters the Supero-lateral angle of Trigone of bladder
- In Males; the ureter is crossed by vas deferens
- In Female; the ureter is crossed by Uterine ar

Blood supply of Ureter :⇒

① At its beginning → Renal Artery;

② Below it → Abdominal Aorta;

③ Little below it → Gonadal Artery;

④ At the Pelvic inlet → Internal iliac / common iliac

⑤ Near the base of bladder →
- Superior vesical
- Inferior vesicle
- Middle Rectal

Constriction of Ureter :⇒ Diameter = 3mm

① Pelvi-Ureteric junction

② Crossing of the pelvic brim / bifurcation of common iliacs / crossing of external iliac

③ Crossing by the ductus differens / Broad Ligament

④ Entry into the bladder (Narrowest part of Ureter)
↳ K/as "vesicoureteric junction"

⑤ Opening into the Trigone

URINARY BLADDER

QQ Retropubic space of Retzius:
↳ Lies behind the Pubic symphysis
‖
contains vesicle venous plexus

* except → Trigone; Rest all are derived from "Vesicourethral canal" (endodermal)
* 1st desire of Micturation usually appears @ 150–250 ml/litre

OVARY

- Suspended from posterior leaflet of broad Ligament by Mesovarium
- Attached to cornu of the uterus by Ligament of ovary and Lateral pelvic walls by Suspensory Ligament of ovary/ Infundibulo-pelvic Ligament.
- drains into the para-aortic Lymph Nodes.

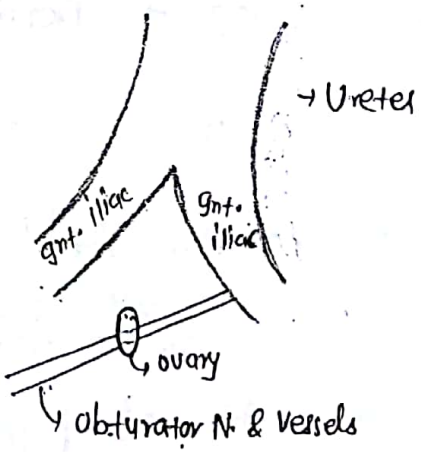
OVARIAN FOSSA

Boundaries →

Superiorly → external iliac vessels

Posteriorly → Ureter & Internal iliac vessels

Laterally & the floor → Obturator Nerve & vessels



UTERUS

FUNDUS ← BODY → CERVIX (2.5 cm Long)

Round Ligament of Uterus is attached to → i) CORNU;
ii) Labia Majora

* Base of the bladder :⇒

In Males →

– Separated from the Rectum in the upper part is by Recto-vesicle pouch

– Related to vas deference, Ampulla of vas, Seminal vesicle & ejaculatory duct.

In Females – Related to Supra-vaginal part of the cervix & vagina

Fascia of Dennonvillees ⇒ extends from Rectoveside pouch to the perineal body

↳ Separates the Rectum from Seminal vesicle & prostate in Males.

* N. Supply :⇒ Sympathetic :⇒ $T_{10} - L_2$

↳ Contracts the sphincter & Relaxes the Muscle

Parasympathetic :⇒ $S_{2,3,4}$

↳ Contracts the Muscles & Relaxes the sphincter

* epithelium of Bladder Mucosa :⇒ Transitional

URETHRA

Male urethra on section → At bulb → Trapezium

In the Penis → Horizontal slit

At base of glans → Inverted "T" shape

At external urethral orifice → Vertical slit

Epithelial Lining

→ Above the opening of ejaculatory duct → Transitional

→ Middle of gland → Columnar

Lymphatic drainage of Uterus !⇒

Fundus & Upper part → Paraaortic Lymph Node

Middle Part → external iliac Lymph Node

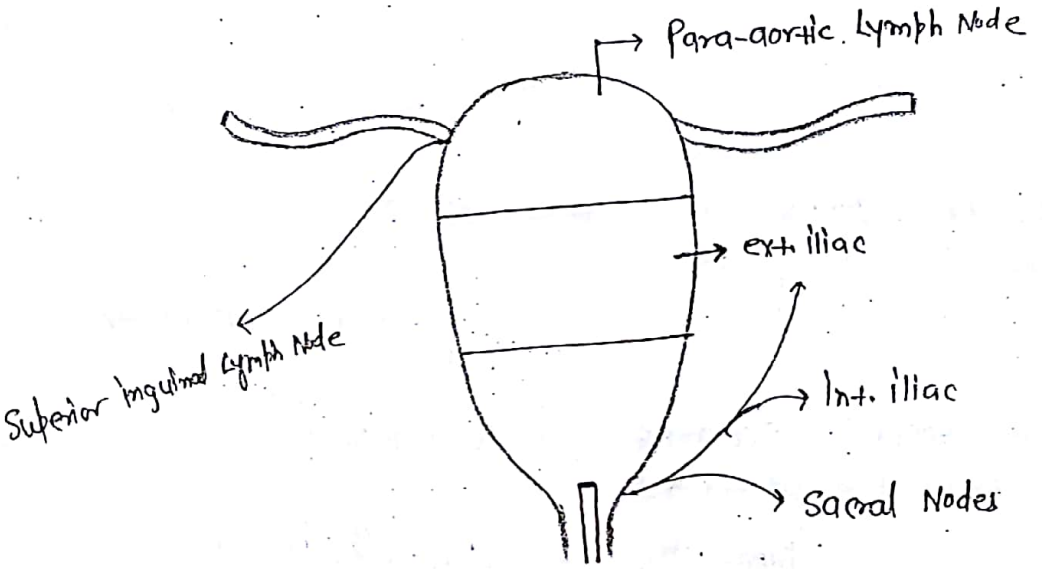
Lower Part → In all direction

Anteriorly ⇒ External iliac L.N.

Laterally ⇒ Internal iliac L.N.

Posteriorly ⇒ Sacral L.N.

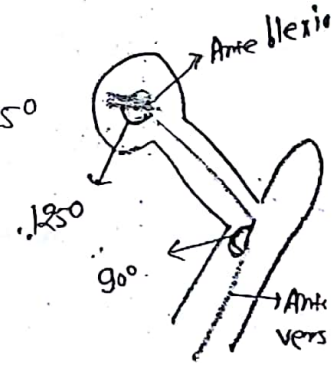
Cornu → Superficial Inguinal Lymph Node



* Uterus c̄ vagina ⇒ 90° ; Uterus c̄ cervix ⇒ 125°

⇓ ⇓

Anteversion Antiflexion



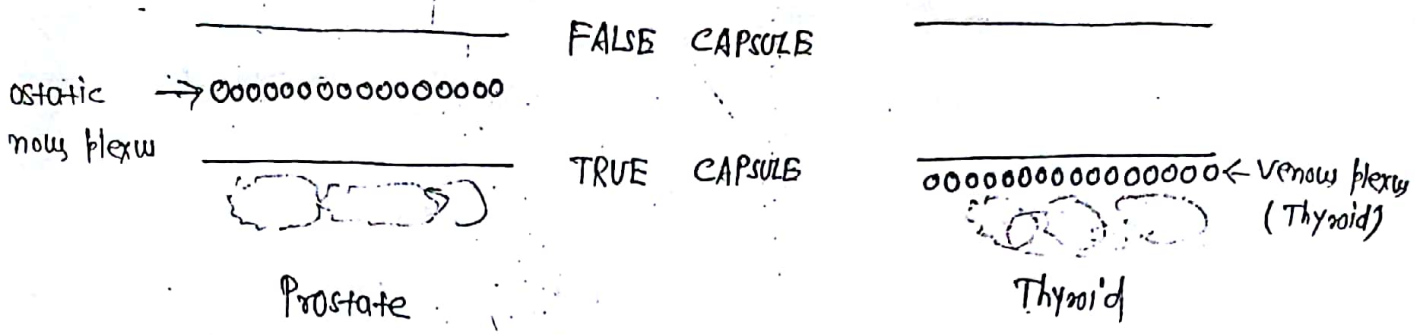
* Uterine cavity ⇒ Lined by ciliated columnal epithelium;

Cervical canal ⇒ Lined by Non- ciliated simple columnal epithelium;

* Nerve Supply → Sympathetic :→ From T_{12} ; L_1 segments & carry painful sensation from the body of Uterus.

Parasympathetic → From $S_{2,3,4}$ & carry painful sensation from cervix.

PROSTATE



- Prostatic venous plexuses communicates c ⇒ vesicle venous plexus
  ↓
  Dorsal vein of penis
- this further communicates c vertebral venous plexus
  ↓ valveless communication
  Batson's plexus
  ⇒ through it the prostatic carcinoma can spread to vertebral column & skull.
- Medial Lobe is More prone to hypertrophy (BPH)
- Posterior lobe is More prone to Cancerous changes (Prostatic cancer)
- Anterior lobe → Devoid of glandular tissue hence Adenoma seldom occurs.

* Prostate ⇒ is also klas "Fibro-Muscular-glandular organ".

4 Surfaces

Anterior
⇓
ies behind Pubic Symphysis; Separated from it by extra-peritoneal fat in Retropubic Space (Cave of Retzius)

Posterior
- Separated by Fascia of Denonvilliers from Rectum
- Palpated on P/R examination

& Anterolateral

{ Peripheral Zone ⇒ Posterior Lobe
Central Zone ⇒ Median Lobe }

PROSTATIC URETHRA

- Shows an elevation in Midline ⇒ Urethral crest
  ⇓
  Form d/t continuation of Trigonal Muscle the bladder.

- Another elevation in the Middle of Urethral crest
  ⇓
  VERUMONTANUM / COLLICULUS SEMINALIS

- Opening of Prostatic utricle in the centre and ejaculatory du on the either side of verumontanum

- Opening of Prostatic gland / Prostatic Sinuses along Posterior Cu

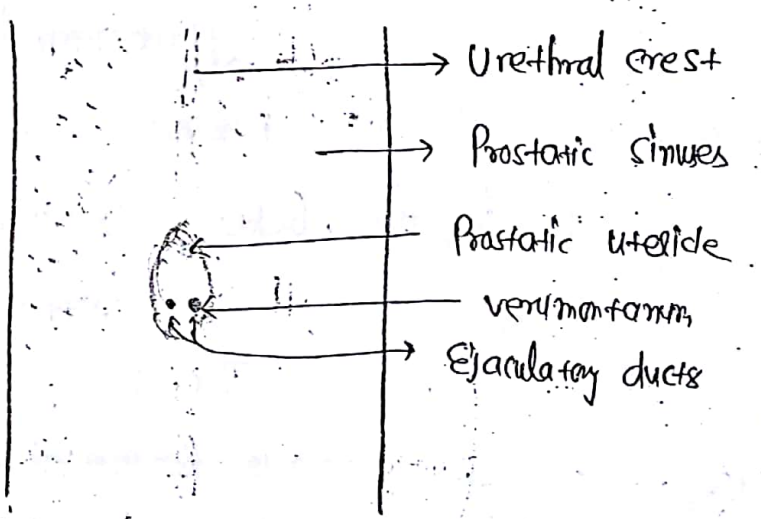


Fig: Prostatic Urethra ⇒ Ant & the junction of Ant. 1/3rd Post. 2/3rd of gland

* Corpora Amylacea (Amyloid bodies) → Prostate
* Corpora Arenacea → Pineal gland

RECTUM

Length – 12 cm

Sacculations; Appendes epiploicae & Taenia coli are absent.
↳ Characteristics of Large Intestine

* Horizontal folds | Plica transversalis :⇒

1st → Rt. wall → 12–14 cm Above Anal canal

2nd → Lt. wall → 7.5 cm Above Anus

3rd → (valve of Houston)

Anterior & Right wall → At the upper end of Rectal Ampulla; Above Anus

* Development of Rectum :⇒

Part of Rectum Above the houston valve

↓ developed from

Hindgut

Part of Rectum below the houston valve

↓ developed from

Cloaca

* Waldeyer's Fascia ⇒ connects Rectum to Sacrum.

* B. Supply of Rectum :⇒ a) Superior Rectal Artery (Major supply) ⇒ Continuation of Inferior Mesenteric Artery.
b) Middle Rectal Artery ⇒ Branch of Anterior division of Internal iliac Artery;
c) Median Sacral Artery ⇒ Branch of Aorta

* venous drainage :⇒ a) Superior Rectal vein → Drains into Inferior Mesenteric vein
b) Middle Rectal vein → Drains into Internal iliac vein;
c) Median Sacral vein → Joins Lt. common iliac vein.

	MALE		FEMALE
① Mesonephric Duct (Wolfian duct) ⇒	COMMON (Collecting tubules; Minor calyx; Major calyx; Pelvis, Ureter & Trigone of the bladder)		
	– Epididymis – Vas-deferens – Seminal vesicles – Ejaculatory duct – Mesoderm of Prostate		– Gartner's duct (Remnant)
② Paramesonephric Duct (Mullerian duct) ⇒	Prostatic Utricle Appendix of Testis		• Fundus • Body • Cervix • Upper 2/3rd of vagina • Fallopian tubes (Lower 1/3rd of vagina is derived from Sinovaginal bulbs formed from "Urogenital sinus") ↳ endodermal in origin. ↳ Also "organ of Rosen"
③ Mesonephric tubules ⇒	Paradidymis (Not functional)		Epophoron & Para-ophoron
④ Genital tubercle ⇒	Penis		Clitoris
⑤ Genital swelling ⇒	Scrotum		Labia Majora
⑥ Genital fold ⇒	Ventral aspect of Penis		Labia Minora

PERINEUM

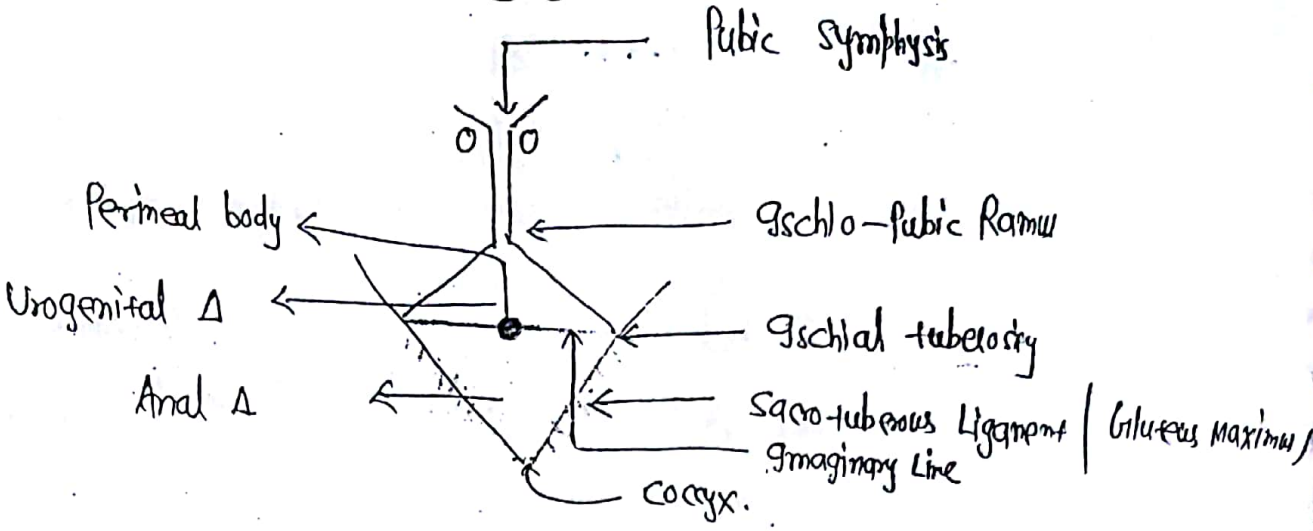
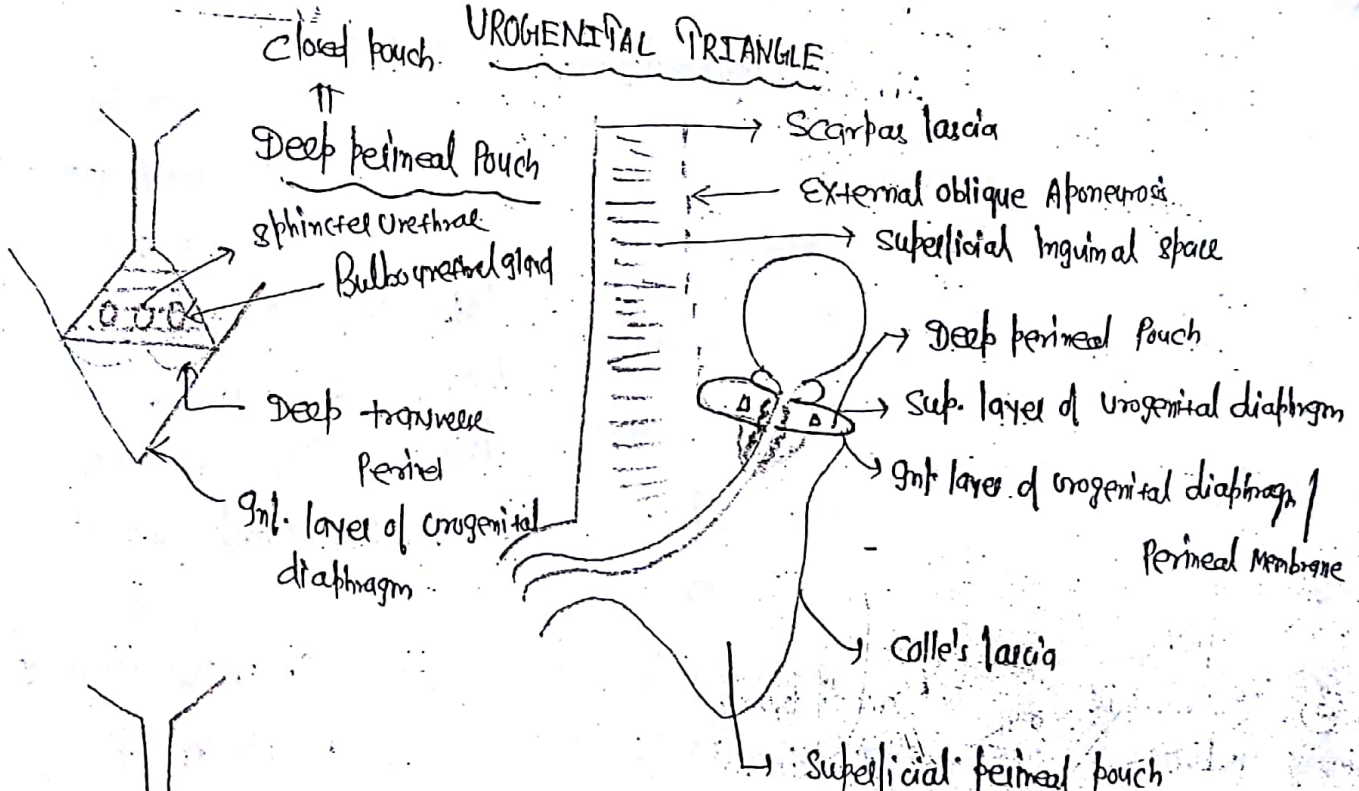
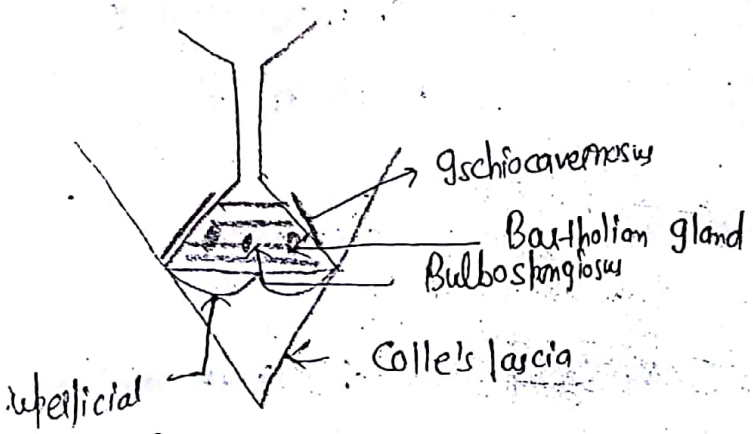


Fig.: Boundaries of Perineum In Litho-tomy Position

UROGENITAL TRIANGLE





Superficial perineal pouch

Deep perineal Pouch ⇒

Contents ⇒ i) Sphincter Urethrae Muscle } (common in ♂/♀)
ii) Deep transverse Perinei }

In Males ⇒ i) Bulbourethral gland / cowper's gland
ii) Dorsal Nerve of Penis;
iii) Membranous Urethra

Superficial perineal Pouch ⇒

Contents ⇒ i) Ischio-cavernosus } (common in ♂/♀)
ii) Bulbo-spongiosus }
iii) Superficial transverse Perinei }

In Females ⇒ Bartholin glands / greater vestibular glands
In Males ⇒ Root of Penis (Bulb & crura); Posterior scrotal Nerve; Urethra

* Chief Nerve of Perineum → Pudendal Nerve (Mixed Nerve)
⇓
Arises from Sacral plexus ($S_2 S_3$).

* PERINEAL BODY ⇒ Ten Muscle converge →

a) External Anal Sphincter; } → Unpaired
b) Fibres of Longitudinal Muscle coat of Anal canal }

c) Bulbospongiosus; } → Paired.
d) Superficial transverse Perinei;
e) Deep transverse Perinei;
f) Levator Ani

Holden's Line ⇒ A Line drawn Laterally from Pubic tubercle;

↳ Urine doesn't cross this line d/t firm attachment of Fascia lata along this line

* Length of Prostatic urethra ⇒ 4cm (Most dilatable part of Male Urethra)
Length of Membranous urethra ⇒ 1.5–2cm (Narrowest part of urethra) NEET'16
Length of Penile urethra ⇒ 15–20cm

Least ∵ dilatable part ⇒ External Urethral Meatus
Membranous urethra

Anal canal ⇒ Length ⇒ 38mm (3.8 cm)

15
15
8

Dentate/Pectinate Line ⇒ Represents the Lower end of Anal columns

White line of Hilton ⇒ Represents the Muco-cutaneous junction of Anal canal

Extravasation of Urine/Rupture of Urethra in the Superficial perineal Pouch

⇓

→ Urine collects in the scrotum, Penis & enters the superficial Inguinal space;

→ Urine doesn't cross the Holden's Line;

* ALCOCK's CANAL ⇒ Also "Pudendal canal"

⇓

It is fascial canal in the Lateral wall of ischiorectal fossa; enclosing Pudendal Nerve & Internal Pudendal vessels (Artery & veins);

· It is space b/w obturator fascia & Lunate fascia.

* MESORECTUM (MESENTRY OF THE RECTUM) & ITS CONTENTS ⇒

- Superior Rectal Artery & its branches;
- Superior Rectal vein & Tributaries;
- Superior Rectal & Pararectal Nodes and lymphatics along the Superior Rectal Artery;
- Branches from the Inferior Mesenteric plexus & descend to Innervate the Rectum.

SOME EXTRA EDGE

→ Gubernaculum in Male forms ⇒ Gubernaculum Testis;
In Female forms ⇒ Ligament of ovary;
Round Ligament of Uterus.

* Differentiation of Genital Ridge; into Lineage of Female or Male gonads i.e. ovary or Testis occurs @ 6-10 weeks. By 12 weeks this differentiation has occured in all fetus.

* Prostate Analog in ♀ ⇒ Skene gland (Periurethral gland);

* Uterus & vagina Analog in ♂ ⇒ Prostatic Utricle

* Lower 1/3rd of vagina derived from ⇒ Urogenital Sinus.

* Upper 1/3rd of Rectum ⇒ covered by Peritoneum on the front & sides

* Middle 1/3rd of Rectum ⇒ covered by Peritoneum on the sides only.

* Lower 1/3rd of Rectum ⇒ devoid of Peritoneal Attachment.

ISCHIO-RECTAL FOSSA

Boundaries -

- Anteriorly - Imaginary line joining two Ischial tuberosities.
- Posteriorly - Sacrotuberous Ligaments & Coccyx
- Laterally - Ischial tuberosity & obturator Internus
- Medially - Anal canal
- Roof - Levator Ani
- Floor - Perianal skin

Contents - ① Pudendal Nerve & vessels
② Inferior Rectal Nerve & vessels

TRIGONE OF BLADDER

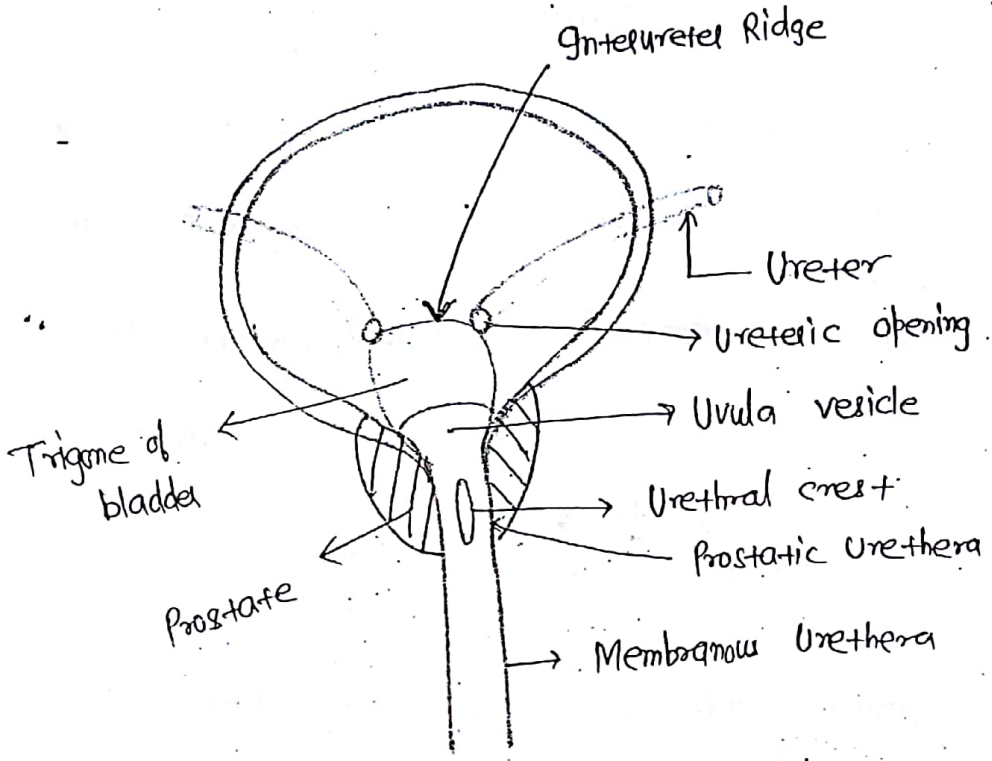
- Lined by "Transitional epithelium"
- Mucosa is smooth & firmly Adherent;
- Ureters opens at lateral Angle of base & Internal urethral orifice Lies at Apex;
- Has Trigonal Muscle of bell (Smooth Muscle Layer just beneath Mucosa)

NEET'16 Derived from Absorbed part of Mesonephric duct (wolffian duct)

- In the Region of Trigone, Muscular coat (Detrusor Muscle) is Separated from Trigonal Muscle of Bell by "Fascia of Waldeyer" .Q9
  - Layer of Smooth Muscle just beneath the Mucosa of Trigone.
  - It Replaces "Submucous coat in Trigone Area".

* Interureter Ridge ⇒ Also "Mercier's bar"
→ Length → 2.5 cm; when empty &
5 cm; when Full

* Micturation centre ⇒ Cerebral cortex → Medial frontal cortex
Brain stem → Pons (Barrington's cortex).



Coronal section of Bladder

* LAYER OF SCROTUM :⇒ i) Skin;

ii) Dartos Muscle (Smooth Muscle Layer) ⇒ Continues c Colle's Fascia of Perineum posteriorly - and Scrapa's fascia & camper Fascia Anteriorly.

iii) The external Spermatic Fascia ⇒ Extension from external oblique.

iv) The cremastric Muscle ⇒ Continues c fascia from Internal Oblique;

v) The internal Spermatic Fascia ⇒ continues c fascia from Fascia transversalis

HEAD, FACE, NECK

NERVES OF THE PHARYNGEAL ARCH

1st Pharyngeal Arch ⇒ Mandibular

2nd Pharyngeal Arch ⇒ Facial

3rd Pharyngeal Arch ⇒ Glossopharyngeal

4th Pharyngeal Arch ⇒ Superior Laryngeal

6th Pharyngeal Arch ⇒ Recurrent Laryngeal

(5th Arch ⇒ Disappears)

FACE → each half of the face is supplied by 14 Nerves; 1 Motor & 13 sensory.

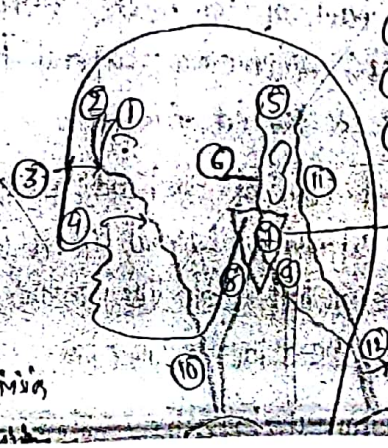
Motor Nerve supply ⇒ By Facial Nerve through its 5 branches

- Temporal
- Zygomatic
- Buccal
- Marginal Mandibular
- Cervical (supplies the platy

→ Facial N. Supplies all facial Muscles except ⇒ Levator palpebrae superior ⇓ By 3rd C.N

Venous drainage of Face ⇒

1. → Supra-orbital vein
2. → Supra-trochlear vein
3. → Angular vein
4. → Facial vein
5. → superficial temporal vein
6. → Maxillary vein
7. → Retro Mandibular vein → 8. Ant. division



DANGEROUS AREA OF FACE

- Upper lip & in lower part of Nose

↓ Infection from Dangerous Area

Facial vein

↓

Angular vein

↓

Superior ophthalmic vein

↓

Cavernous Sinus

Deep Facial vein

↓

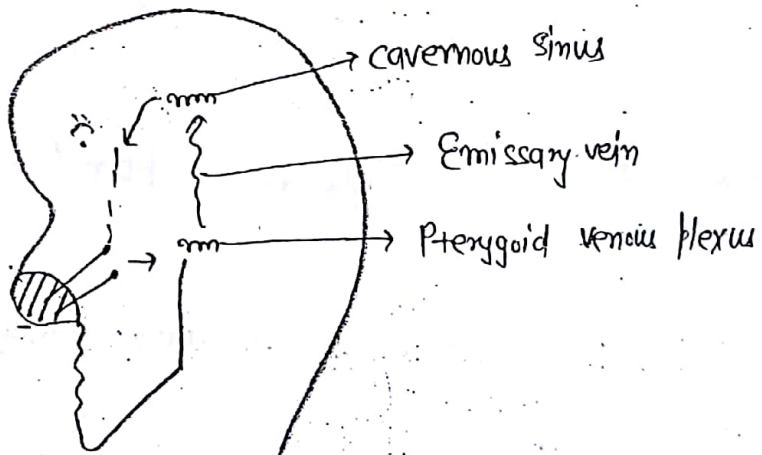
Pterygoid venous plexus

↓

emissary vein

↓

Cavernous Sinus



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* Lymphatic drainage of Face :⇒ I. Upper Area :→ By Pre-Auricular Parotid Nodes / superficial Parotid Nodes

II. Middle Area :→ By Sub Mandibular Nodes

III. Lower Area ⇒ By Sub-Mental Nodes

Upper Area ⇒ Greater part of Forehead; Lateral ½ of eyelids; conjunctiva; Lateral part of cheek & Parotid Area.

Middle Area ⇒ Central part of Forehead; External Nose; Upper lip; Lateral part of Lower lip; Medial half of eye-lids; Medial part of cheek & greater part of Lower jaw

Lower Area → Central part of Lower lip & chin

* Sensory Nerve supply of the Face :⇒

is by Trigeminal Nerve through its three division :⇒

Ophthalmic ← | ↓ | → Mandibular

Maxillary

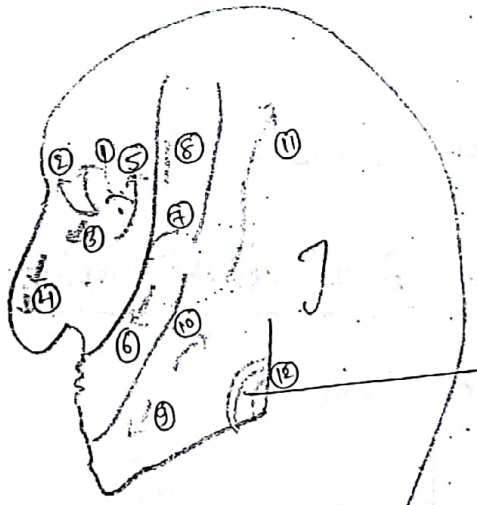
except ⇒ Skin over Angle of Mandible

⇓

Supplied by Greater Auricular Nerve

⇓

Branch of cervical plexus.



1. Supra-orbital N.
2. Supra-trochlear N.
3. Infra-trochlear N.
4. External Nasal N.
5. Lacrimal N.

"Tip of Nose & Lower part of Dorsum of Nose" are supplied by this.

6. Infra-orbital
7. Zygomatico-facial N.
8. Zygomatico-temporal N.

9. Mental N.
10. Buccal N.
11. Auriculo-temporal N.

* Structure piercing Buccinator :⇒

① Parotid duct / stenson duct

② Duct of Molar gland;

③ Buccal branch of Mandibular Nerve

* Structure pierced by Parotid Ducts Are :⇒

1. Buccal Pad of Fat;
2. Buccopharyngeal Fascia;
3. Buccinator Muscle;
4. Mucous Membrane of cheek opposite to 2nd upper Molar teeth;

AIIMS QQ ⇒ Buccal branch of Facial Nerve supplies Buccinator but doesn't pierce it.

* Artery supply of Face :⇒

Anastomosis @ the Medial Angle of eye ⇒

External carotid A. → Facial A.

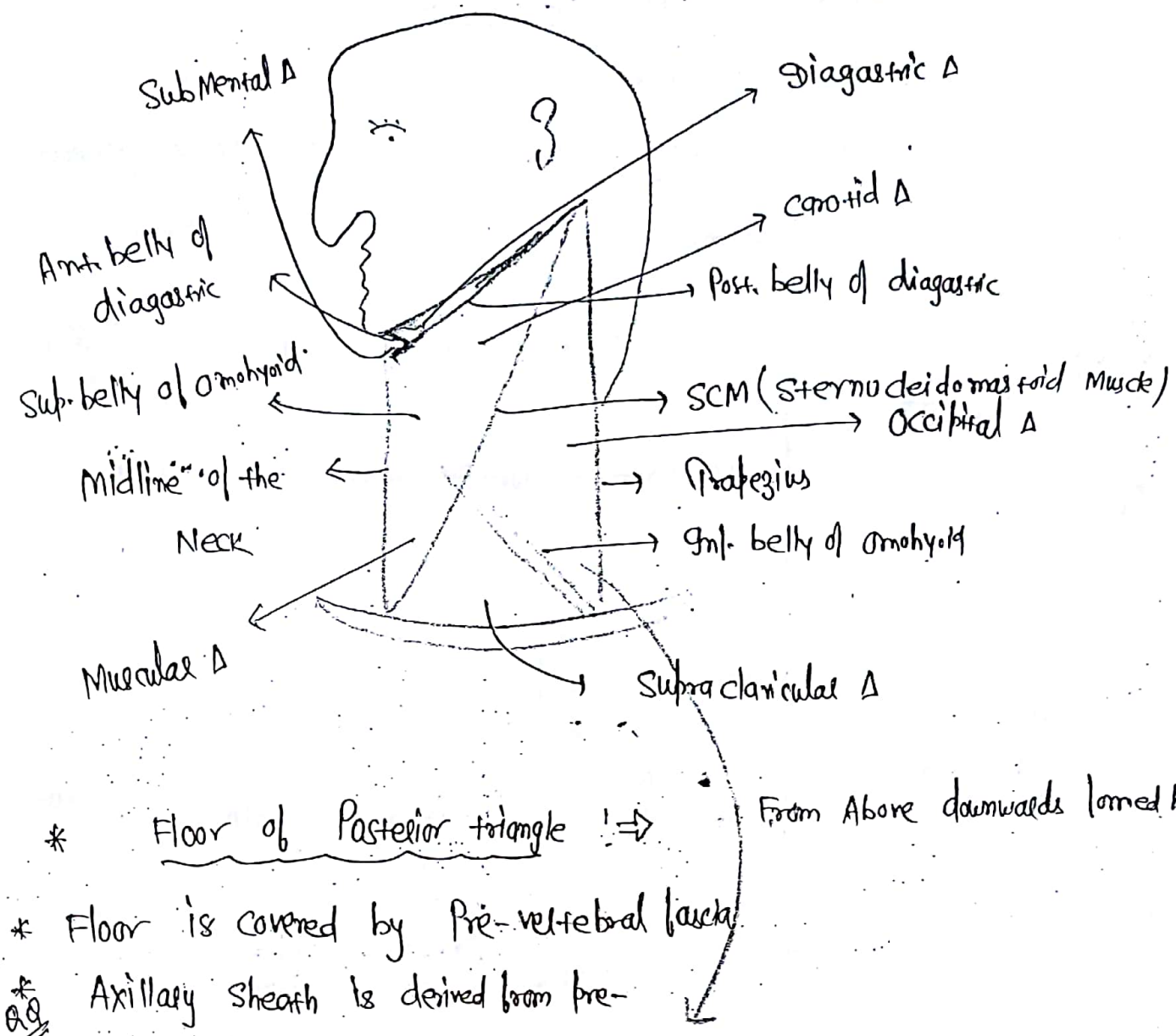
Internal carotid A. → Ophthalmic A. → Dorsal Nasal branch

* Tortus Arteries → ⇓

This arteries are twists & winds in a "tortous" path.

1. Splenic Artery;
2. Uterine Artery;
3. Facial Artery;
4. PICA (Post. inf. cerebellar A.)

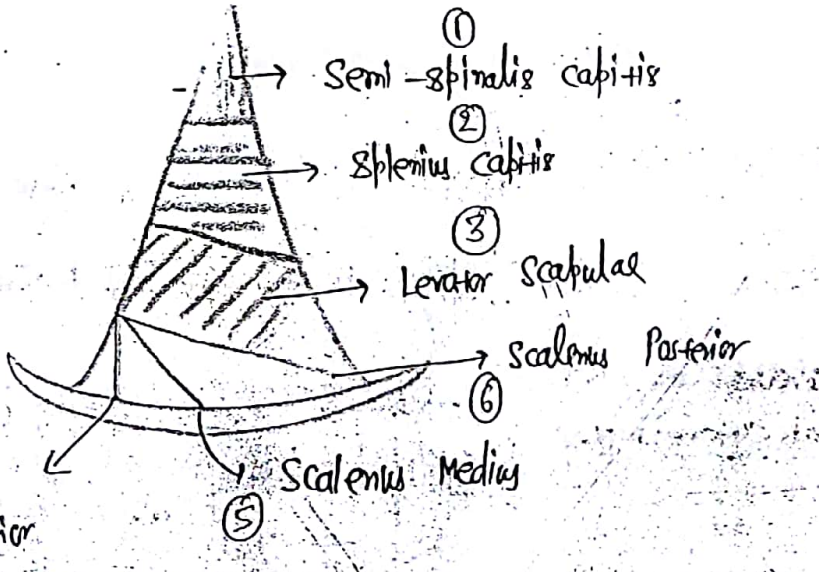
TRIANGLES OF THE NECK



* Floor of Posterior triangle :⇒ From Above downwards formed by

* Floor is covered by Pre-vertebral fascia

* Axillary Sheath is derived from pre-vertebral fascia.



* Danger space in the Neck :⇒

Superiorly ⇒ Skull Base

Anteriorly ⇒ Alar Fascia

Posteriorly ⇒ Prevertebral Fascia

Contents of Posterior A ⇒

a) Supra-clavicular part of brachial plexus;

b) Subclavian artery;

c) Spinal Accessory Nerve – Lies on the Levator Scapulae;

d) cervical plexus

- a) Lesser occipital Nerve (winds around the spinal accessory Nerve).
- b) Greater Auricular Nerve;
- c) Transverse cervical cutaneous N.;
- d) Supraclavicular Nerve
  - Medial
  - Intermediate / Middle
  - Lateral

Intermediate / Middle → Pierces the clavicle ♀♀

Damage to it in the Posterior A of Neck leads to →

Paralysis of Trapezius

- difficulty in shruging of shoulder;
- difficulty in overhead Abduction;
- winging of Scapula).

e) occipital artery.

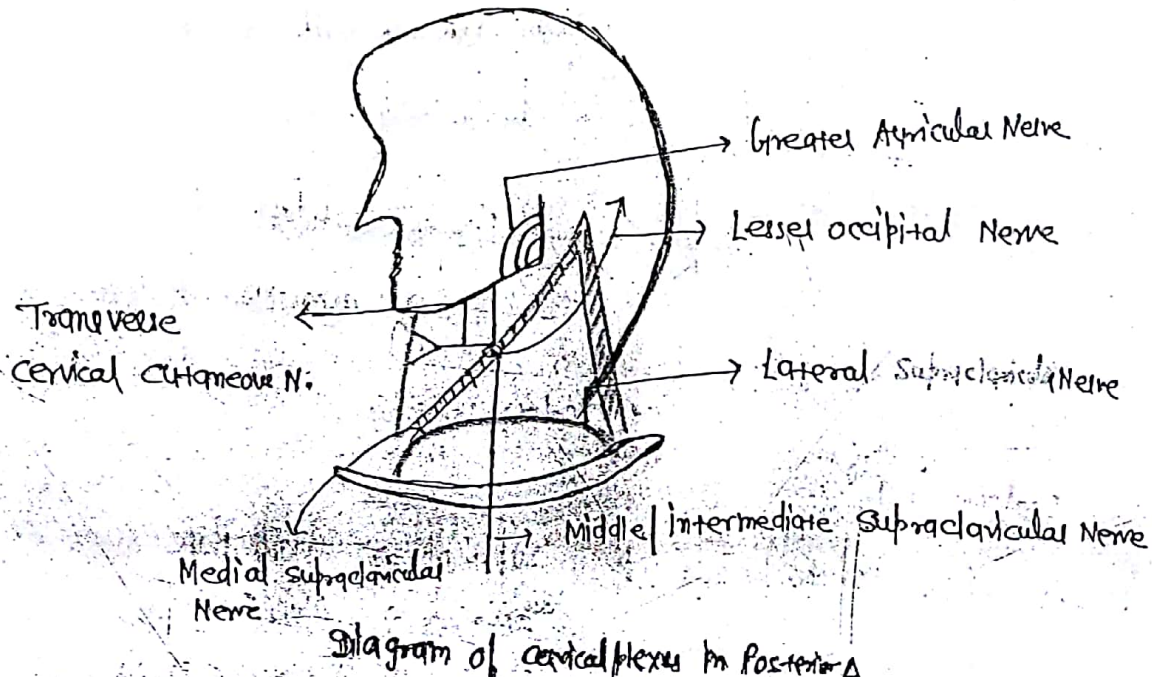


Diagram of cervical plexus in Posterior A

* Clinical sign of different Porto-systemic circulation :⇒

esophageal varices (Bleeding)

Hemorrhoids → PORTAL HYPERTENSION

Caput Medusae

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1. TEMPORARY MUCOSAL FOLDS :⇒ Mucosal fold ; which are Obliterated by distension.
eg :- Gastric Rugae of stomach & Longitudnal fold.

2. PERMANENT MUCOSAL FOLDS :⇒ eg :- Plica circularis (valves of Kerkri of Small Intestine ;
- Crescentric Mucosal folds of cystic duct (spiral valve of Heister)
- Transverse (Horizontal) Rectal folds (Houston's valve or plica transversalis) ;
- Permanent Longitudnal Rectal columns or folds (Found in Lower Rectum. Anal canal).

PETIT TRIANGLE (Inferior Lumbar triangle)

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Boundaries :⇒ Base ⇒ Iliac crest.
Anterior Boundary (Abdominal Boundary) ⇒ Posterior border of External oblique Mu
Posterior Boundary (Lumbar Boundary) ⇒ Anterior border of Latissimus dorsi
Floor ⇒ Internal oblique Muscle

PELVIS

* Structures winding Around Ischial spine →

P → : Pudendal Nerve

I → Internal Pudendal vessels

N → N. to obturator Internus

they leave the pelvis through Greater sciatic foramen and enters the perineum through Lesser sciatic foramen

- The tendon of obturator Internus emerges out through lesser sciatic foramen.

* Blood supply of Pelvis :⇒

- Internal iliac Artery - Small terminal branch of common iliac A.

Anterior division

- Superior vesical Artery
- Inferior vesical Artery (Supplies the prostate)
- Middle Rectal Artery
- Obturator Artery ; While Accessory (Aberrant) obturator Artery is the branch of Inferior epigastric Artery ⇓ it is the branch of external iliac Artery → Inferior epigastric A. / Femoral A. / Deep circumflex iliac A.
- Uterine & Vaginal Artery
- Inferior Gluteal Artery
- Internal Pudendal Artery

→ In female it is Replaced by " Uterine & Vaginal Artery.

Posterior division

- Superior Gluteal Artery
- Lateral Sacral Artery
- Ilio-Lumbal Artery ⇓ It supplies L5 vertebrae

URETER

- Length ⇒ 25 cm (10 inches)
- completely Retroperitoneal organ.

Abdominal Part -

Post. Relation → Transverse process of Lumbar process
Psoas Major
Genito-femoral Nerve

Ant. Relation of Right Ureter → 3rd Part of duodenum
- Rt. colic vessels
- ilio-colic vessels
- Root of Mesentry
- Gonadal vessels
- Terminal part of ileum

Ant. Relation of Left Ureter → Left colic vessels
Sigmoid vessels
Sigmoid Mesocolon
Gonadal vessels

Pelvic part - goes backwards along greater Sciatic Notch alo
& internal iliac vessels behind it.
- turns anteriorly at ischial spine & enters the
Supralateral angle of Trigone of bladder
- In Males: the ureter is crossed by vas defer
- In Female: the ureter is crossed by Uterine a

Blood supply of Uretel :⇒

① At its beginning → Renal Artery;

② Below it → Abdominal Aorta;

③ Little below it → Gonadal Artery;

④ At the Pelvic inlet → Internal iliac / common iliac

⑤ Near the base of bladder →
- Superior vesical
- Inferior vesicle
- Middle Rectal

Constriction of Uretel :⇒ Diameter = 3mm

① Pelvi-ureteric junction

② Crossing of the pelvic brim / bifurcation of common iliacs / crossing of external iliac

③ Crossing by the ductus dilleence / Broad Ligament

④ Entry into the bladder (Narrowest part of uretel)
↳ K/as "vesicoureteric junction"

⑤ Opening into the Trigone

URINARY BLADDER

QQ Retropubic space of Retzius:
↳ Lies behind the Pubic symphysis
⇓
contains vesicle venous plexus

* except→ Trigone; Rest all are derived from "Vesicourethral canal" (endodermal)
* 1st desire of Micturition usually appears @ 150–250 ml filling

* Base of the bladder :⇒

On Males →

- Separated from the Rectum in the upper part is by Recto vesicle pouch
- Related to vas deferences, Ampulla of vas, Seminal vesicle Ejaculatory duct.

On Females - Related to Supra-vaginal part of the cervix & vag.

Fascia of Dennonvillies ⇒ extends from Rectovesicle pouch to the perineal body

↳ Separates the Rectum from Seminal vesicle & prostate in Males.

* N. Supply :⇒ Sympathetic :⇒ $T_{10} - L_2$
↳ contracts the sphincter & Relaxes the Mus

Parasympathetic :⇒ $S_{2,3,4}$
↳ contracts the Muscles & Relaxes the sp

* epithellum of Bladder Mucosa :⇒ Transitional

URETHRA

Male urethra on section → At bulb → Trapezium
On the Penis → Horizontal slit
At base of glans → Inverted "T" shape
At external urethral orifice → vertical slit

Epithelial Lining
→ Above the opening of ejaculatory duct → Transitional
Upto middle of gland → columnal

OVARY

- Suspended from posterior leaflet of broad Ligament by Mesovarium
- Attached to cornu of the uterus by Ligament of ovary and Lateral pelvic walls by Suspensory Ligament of ovary/ infundibulo-pelvic Ligament.

drains into the para-aortic Lymph Nodes.

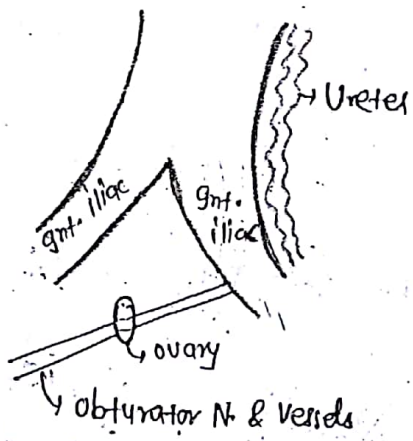
OVARIAN FOSSA

Boundaries →

Superiorly → external iliac vessels

Posteriorly → Ureter & Internal iliac vessels

Laterally & the floor → obturator Nerve & vessels



UTERUS

FUNDUS ← BODY → CERVIX (2.5 cm Long)

* Round Ligament of Uterus is attached to → i) CORNU
  ii) Labia Majora

* **Roof of Posterior triangle** :⇒

Investing Layer of Deep cervical fascia -

It encloses :⇒

2 Muscles ⇒ a) Sterno-cleido-Mastoid
b) Trapezius.

2 spaces ⇒ a) Supra clavicular
b) supra-sternal

2 Glands ⇒ a) Sub-Mandibular
b) Palotid

Form Roof for 2 triangles → Posterior
→ Anterior

Anterior Triangle

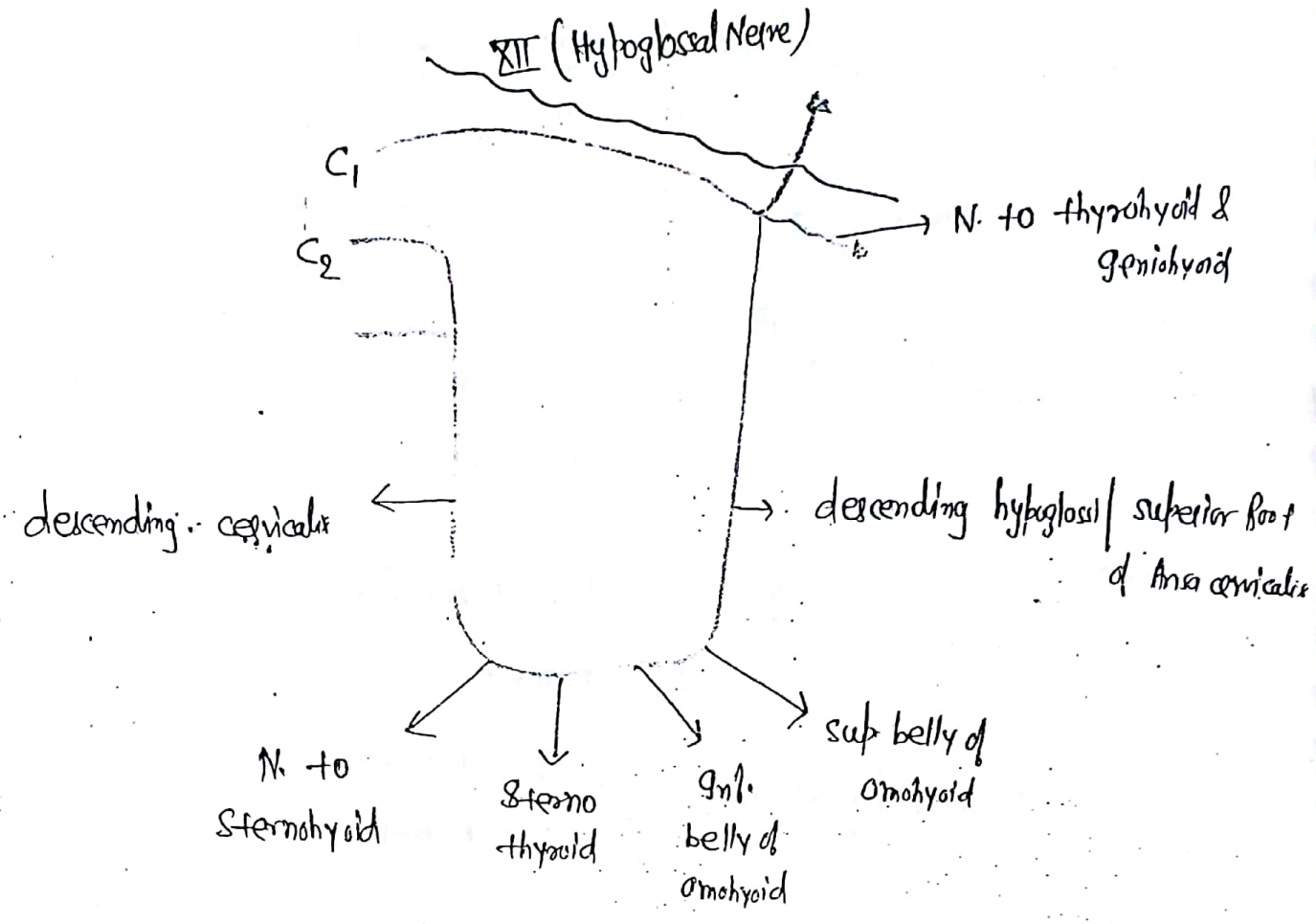
* **Muscular Δ** :⇒

a) Sternohyoid muscle
b) sterno-thyroid muscle
c) Thyrohyoid muscle
d) omohyoid muscle

→ Infrahyoid Ribbon Muscle

ANSA CERVICALIS

* It lies on Anterior wall of carotid sheath.



* "Thyrohyoid & Geniohyoid" are supplied by separate branch of C_1 Nerve through hypoglossal Nerve.

THE COMMON CAROTID ARTERY

- divides at the superior border of lamina of the thyroid cartilage.

- Muscle b/w the 2 carotids ⇒ Styloglossus & stylopharyngeus

- Branches of External carotid Artery :⇒

(A) Anterior Branches ⇒ Superior thyroid
Lingual
Facial

(B) Posterior Branch ⇒ Post. Auricular
Occipital

(C) Medial Branch ⇒ Ascending Pharyngeal

(D) Terminal Branch ⇒ Superficial temporal
Maxillary

* Carotid Pulse ⇒ Can be felt along the SCM muscle @ the Level of Laryngeal prominence QQ

MUSCLE OF MASTICATION

Masseter
Medial Pterygoid
(elevation of Mandible)

Temporalis
- Vertical fibres ⇒ elevation
- Posterior fibres ⇒ Retraction

Lateral Pterygoid
- Upper head ⇒ Depression
- Lower head ⇒ Protrusion

— N. Supply of all Muscles ⇒ Mandibular Nerve

* BOUNDARIES OF POSTERIOR TRIANGLE

Anteriorly → Posterior border of SCM Muscle.
Posteriorly → Anterior Margin of Trapezius;
Base → Superior Surface of Middle third of clavicle

* BOUNDARIES OF DIAGASTRIC TRIANGLE

Anteriorly → Base of Mandible & A line extending its Angle to Mastoid.
Below & in front → By Anterior Belly of diagastric
Below & behind → Post. Belly of diagastric

INTERIOR OF SKULL

① Foramen Rotundum ⇒ Maxillary Nerve;

② Foramen ovale ⇒ M → Mandibular Nerve;
A → Accessory Meningeal A.
L → Lesser Petrosal Nerve
E → Emissary vein

③ Foramen Spinosum ⇒ Nervus Spinosus / Meningeal branch / Recurrent branch of Mandibular Nerve;
Middle meningeal vessels;

④ Foramen Lacerum ⇒ Internal Carotid A

⑤ Internal Acoustic Meatus ⇒ 7th; 8th & Labyrinthine vessels

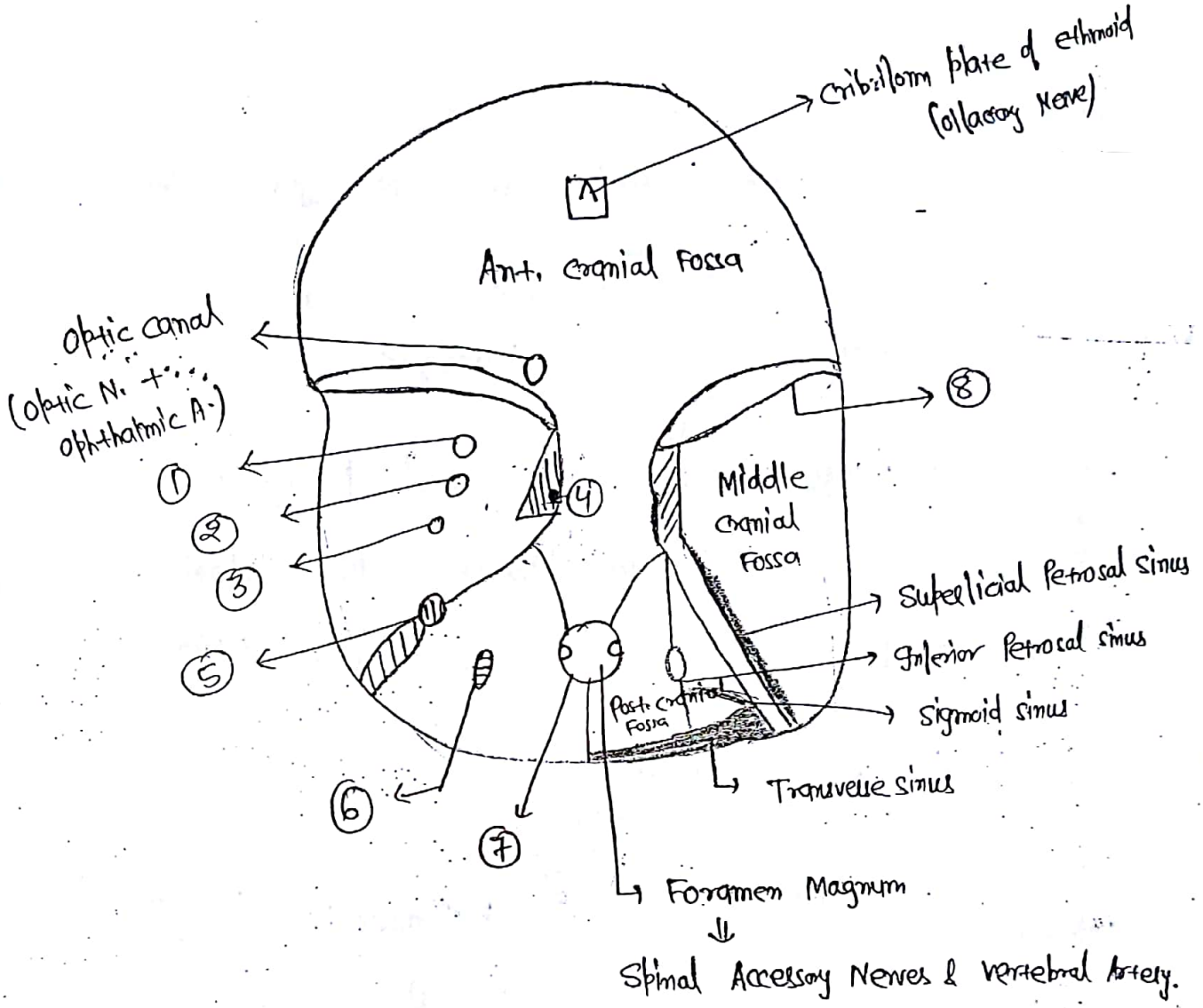
⑥ Jugular foramen :→

- Anterior compartment
  - Inferior Petrosal Sinus
- Middle compartment
  - 9th, 10th, 11th Cranial Nerve
- Posterior compartment
  - Sigmoid Sinus

⑦ Hypoglossal canal / Anterior condylar canal ⇒ Hypoglossal N.

⑧ Sup. orbital fissure ⇒ 3rd; 4th; 6th C.N. & Ophthalmic Ne

⑨ Optic canal ⇒ Optic Nerve & Ophthalmic Artery.



* Meckel's Cave → Trigeminal ganglion lies in it. (Gasserian ganglion)
→ Cave like formation of duramater

* Contents of Parotid gland (superficial to deep) :→ 1. Facial Nerve
2. Retromandibular vein;
3. External Carotid Artery.

* Pterygoid canal → Vidian Nerve (N. of Pterygoid canal);
Vidian Artery (Artery of Pterygoid canal);

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* N. of Pterygoid canal is formed by the junction of the greter petrosal N.

MANDIBULAR NERVE

- i) Branches from the trunk;

↳ ① N. Spinosus

⇊

Enters the skull through foramen spinosum & supplies the Meninges of Middle cranial fossa.

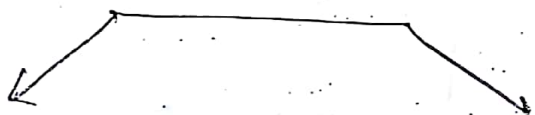
② N. to Medial Pterygoid

⇊

Supplies the Medial Pterygoid

↳ also supplies Tensor Palati; Tensor tympani

- ii) Anterior division



3 Muscular

- Massetric Nerve
- Deep temporal Nerve
- N. to Lateral Pterygoid

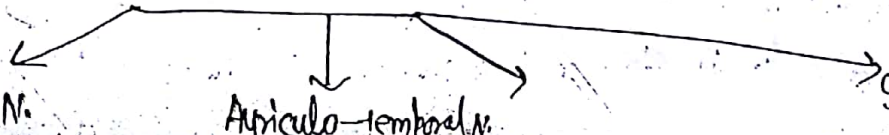
1 Sensory | cutaneous

- Buccal Nerve

⇊

Supplies the skin & Mucous Membrane over the buccinator

- iii) Posterior division



Lingual N.

Auriculo-temporal N.

Inferior alveolar N.

Lingual Nerve ⇒ Supplies General Sensation to Ant. 2/3rd of tongue
- It is joined by chorda tympani; which supplies Special sensation to Anterior 2/3rd of tongue.

Auriculo-temporal Nerve ⇒ Supplies the skin over the Auricle & temporal Region
↳ It also carries the post-ganglionic parasympathetic fibres from otic ganglia to parotid gland.

Inferior-Alveolar Nerve ⇒ Dentist Nerve
- enters the Mandibular Foramen; supplies the Lower jaw & teeth & emi out as Mental Nerve.
- Before entering the Mandibular foramen; it gives a branch – N. to Mylohyoic ⇓ which supplies Mylohyoid & An belly of digastric Muscle

MAXILLARY ARTERY

- Branch of external carotid; given in Parotid gland
- divided into 3 parts by lateral Pterygoid Muscle

(I) 1st part ⇒ (↳ extends upto lower border of Lateral Pterygoid Muscles.)
⇓
(Mandibular part)
- Deep Auricular A.
- Anterior tympanic A.
- Middle Meningeal A.
- Accessory Meningeal A.
- Inferior alveolar A.

(II) 2nd part ⇒ (↳ Lies in Infra-temporal fossa)
⇓
(Pterygoid part)
- Masseteric A.
- Deep temporal A.
- Artery to the Pterygoid
- Buccal Artery

(III) 3rd Part ⇒

⇓

(Pterygopalatine part)

⇓

Lies In Pterygo-palatine fossa.

Post. superior alveolar A.

Infra-orbital A.

Greater palatine A.

Pharyngeal A.

Artery of Pterygoid canal A.

Sphenopalatine A. (Artery of epistaxis)

AUTONOMIC NERVOUS SYSTEM

Symphathetic Nervous system ⇒

The preganglionic fibres arises from Lateral horn cells of T_1 to L_2 segments of the spinal cord,

- They Pass through ventral root; spinal Nerve & enters the Symp. ganglion through white Ramus communicans
- Thus white Ramus communicans are prt. in T_1-L_2 spinal Nerves
- The fibres goes to higher & lower ganglion.
- The Post-ganglionic fibres enters the spinal Nerve through Grey Rami communicans.
- Thus Grey Rami communicans is given to all the spinal Nerve

Parasympathetic Nervous system ⇒

AIIMS Nov'16

Cranial outflow

- Arises in the brain stem
- Carried by 3rd, 7th, 9th & 10th C.N
- They supplies the glands

Sacral outflow

$S_{2,3,4}$ | Nervi eregentie | Pelvic Splanchnic.

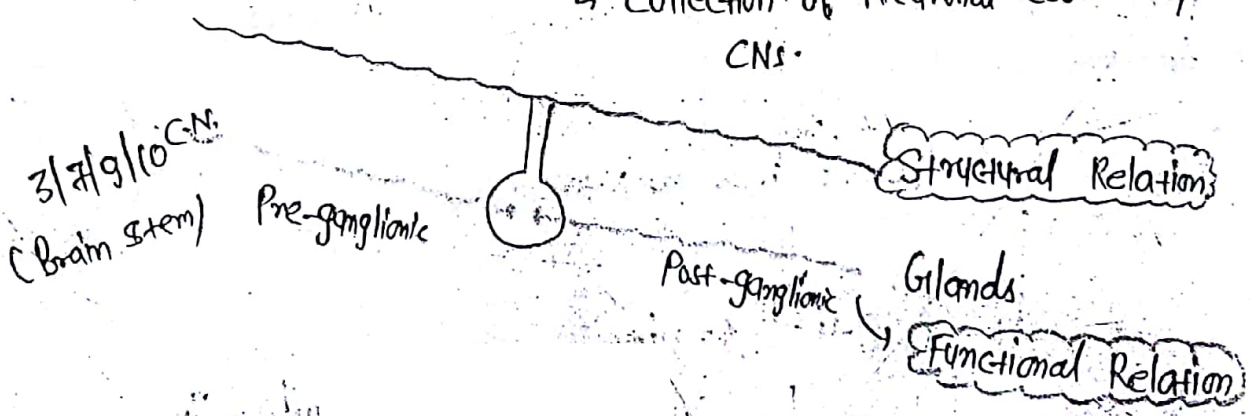
- Arises in the Lateral horn cells of $S_{2,3,4}$ segments of the spinal cord (Pre-ganglionic fibres)

* All the glands in the head & Neck are supplied by Facial Nerve except → Parotid gland
  ‖
  Supplied by glossopharyngeal Nerve

* Vagus supplies the gland of GIT

* 3rd C.N. Supplies ⇒ Sphincter pupillae & ciliaris Muscle.
  ↳ No gland supply.

GANGLION
↳ Collection of Neuronal cells body outside the CNS.



	Pterygopalatine Ganglion [Sphenopalatine ganglion (Largest P.S. Ganglion)]	Ciliary ganglion	Otic ganglion	Submandibular ganglion
Structural	Maxillary N.	Nasociliary N.	Mandibular N.	Lingual N.
Functional	VII	III	IX	VII

OTIC GANGLION :⇒ Relation ⇒ Superiorly : Foramen Ovale;

Laterally : Mandibular Nerve
Medially : Tensor vali Palatini
Posteriorly : Middle Meningeal A.

* Otic ganglion usually surrounds the origin of the N. to Medial Pterygoid

NERVE SUPPLY OF PAROTID GLAND :⇒

→ Inferior Salivatory Nucleus (Nucleus of Glossopharyngeal N. which supplies Parotid gland)

↓

Preganglionic

Tympanic br. of 9th C.N. (Jacobson's Nerve)

↓ + Symphathetic plexus

Supplies the Middle ear cavity; Eustachian tube; Mastoid Antrum

Tympanic plexus (Lies on the promontory of Middle ear)

↓

Lesser Petrosal Nerve

↓

Otic ganglion

↓ ← via — Auriculotemporal N. (it carries the post. ganglionic fibres from otic ganglion to Parotid)

Post-ganglionic

Parotid gland

FACIAL NERVE

Superior Salivatory Nucleus (Nucleus of Facial N.)

↓

Sensory br. of Facial Nerve
(Nervus Intermedius / N. of Wrisberg)

← Joins ⊂ Motor branch

↓

Trunk of Facial N. (in the Internal ear)

↓

Geniculate ganglion (Bend / Genu of Facial Nerve)

- → Greater Petrosal N.
- → N. to Stapedius
- → Stylomastoid ⊥ Parotid Gives N. to Chorda tympani

* Chorda tympani emerges out through Petro-tympanic fissure

Joins ⊂ Lingual → Sub Mandibular ganglion

↓ & supplies

- Sub Mandibular gland
- Lingual gland
- taste fibres from ant. 2/3rd of tongue (except Circumvallate papillae)

* Greater Petrosal Nerve joins ε deep petrosal N.

↓ Forms

Vidian Nerve | N. to Pterygoid canal NEET'16

↓

Pterygopalatine ganglion

↓ supplies

∴ ... Lacrimal; Nasal; Palatine & pharyngeal gland.

* Crocodile tears involves submandibular & Lacrimal gland.

* Vidians Nerve irritation ⇒ Symptom of Allergic Rhinitis occur.

FUNCTIONAL COMPONENT OF NUCLEUS

(1) SPECIAL VISCERAL EFFERENT / BRANCHIO-MOTOR COMPONENT :-

- Supplies the Muscle derived from the Pharyngeal arches.
- Ⓐ in 5, 7, 9, 10th C.N.
- Common Nucleus for 9th ; 10th & cranial accessory (11th C.N.) is Nucleus Ambiguous

(2) General visceral efferent / secreto-Motor COMPONENT :-

- Supplies the gland
- It represents the cranial outflow of the parasympathetic Nervous system
- Ⓐnf in 3, 7, 9, 10th CNs

③ General Somatic element ⇒

- Supplies the Muscle derived from occipital somites | Myotome (extra-ocular & tongue Muscle)
- ⊕nt in 3rd; 4th; 6th; 12th C.N.

* Blood Supply OF Facial Nerve

① In Facial canal → ⓐ Superficial Petrosal branch of Middle Meningeal Artery;

ⓑ Stylomastoid branch of Posterior Auricular or occipital Arteries;

② Extracranially → ⓐ Stylomastoid branch of Posterior Auricular or occipital arteries

ⓑ Tympanic branch of Ascending pharyngeal Artery.

SINUSES

* DURAL VENOUS SINUS ⇒ It is outer to Meningeal Layer inner to endosteal Layer.

– The duramater divides into an endosteal and Meninges layers to encloses the dural venous sinus.

*

Superior Sagital Sinus

↓

Rt. transverse

↓

Rt. Sigmoid

↓

Rt. internal jugular vein.

* Inferior Sagittal Sinus

↓

Straight Sinus

↓

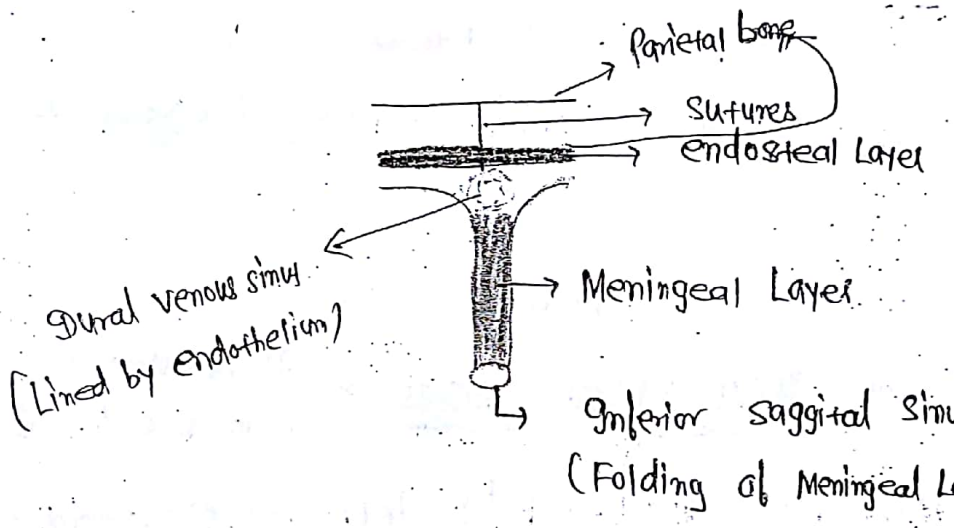
Lt. transverse

↓

Lt. Sigmoid

↓

Lt. Internal jugular vein

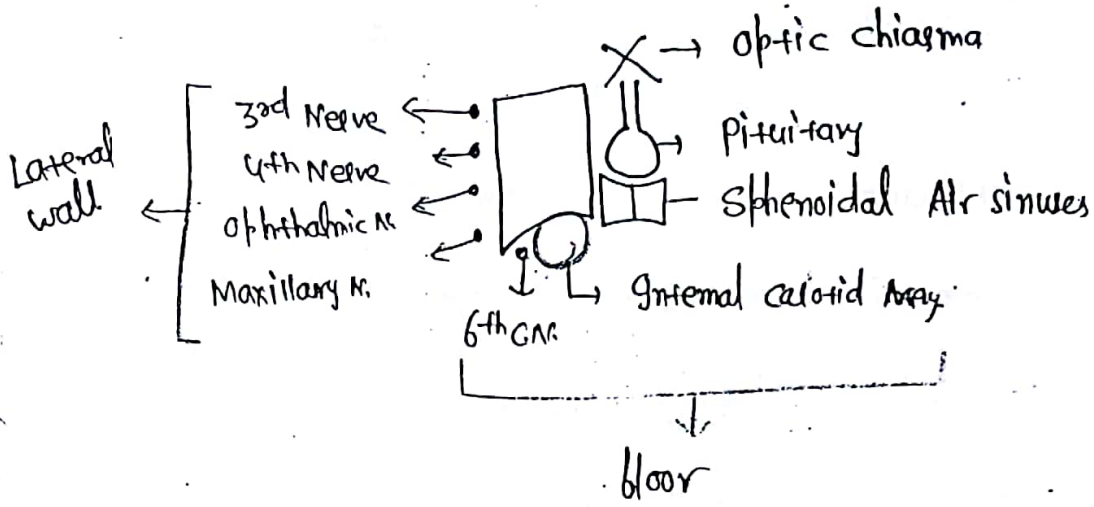


* Falx cerebri :⇒ It contains Superior saggital sinus & straight sinus.

* Falx cerebelli :⇒ Encloses occipital Sinus.

* Great cerebral vein of Galen ⇒ It is formed by the Union of two Internal cerebral veins ; is 2 cm long & it drains into the straight Sinus.

CAVERNOUS SINUS



* Tributeries of cavernous sinus (coming towards C.S.)

From the orbit
- Sup. ophthalmic vein
- Inf. Ophthalmic vein
- Central vein of Retina

From the Meninges
- Spheno-parietal sinus

From the Brain
- Superficial Middle cerebral vein
- Inferior cerebral ve

* Draining channels (Away from cavernous sinus)

1. Superior petrosal sinus ⇒ drains cavernous sinus to transverse sinu
2. Inferior petrosal sinus ⇒ drain cavernous sinus to internal jugul vein / sigmoid sinus
3. The two cavernous sinuses all connected by An Anterior & Posterior Inter-cavernous sinuses
4. The cavernous sinus drains into pterygoid venus plexus through Emissary veins

THE PHARYNX ⇒ extends from base of skull to the level of 6th cervical vertebrae.

i) Structure passing b/w the Superior constrictor & Base of skull | Sinus of Morgagni ⇒

a) Eustachian tube. Mnemonic ⇒ PALE

b) Levator palati Muscle

NEET 16 c) Ascending Palatine A.

d) Palatine branches of ascending pharyngeal A.

ii) Structure passing b/w superior & Middle constrictor ⇒

a) Stylopharyngeus Muscle;

b) Glossopharyngeal Nerve;

iii) b/w the Middle & inferior constrictor ⇒

a) Internal Laryngeal Nerve

b) Superior Laryngeal vessels

iv) Below the inferior constrictor ⇒

a) Recurrent Laryngeal N.

b) Inferior Laryngeal vessels

* Tensors of Vocal cords ⇒ crico-thyroid
  = supplied by external Laryngeal Nerve
  Paralysis Results in "Loss of Timber of the voice"

* Abductor of vocal cord ⇒ Post. crico-arytenoid

* Safety Muscle of tongue ⇒ Genioglossus
  = it protrudes the tongue

* In lesions of hypoglossal N. the tongue is ~~pushed~~ deviated to same side of Lesion.

* Intrinsic Muscle of Pharynx ⇒ Stylopharyngeus; Salpingopharyngeus; Palato-pharyngeus.

* Extrinsic Muscle of Pharynx ⇒ Superior constrictor; Middle constrictor; Inferior constrictor.

* Foramen of Morgagni ⇒ Located in Thoracic Diaphragm; from which Superior epigastric A. & vein & Lymphatics passes.
- It is also Klas "Sternocostal Hiatus or Larrey's Δ"

* Retropharyngeal space ⇒ Potential space of the head & Neck; bound by the buccopharyngeal fascia Anteriorly & the Alar fascia Posteriorly.

* Pharynx is Subdivided Into → Nasopharynx → Lined by ciliated columnar epithelium & Lies above the soft palate
→ oropharynx
→ Hypopharynx

* Pharyngeal opening of Eustachian tube is situated 1.25 cm behind the posterior end of Inferior turbinate

* Key Muscle of the oral Region ⇒ Hyoglossus

* Structure Superficial to Hyoglossus Nerve ⇒
- Lingual Nerve
- Submandibular ganglion
- deep part of Submandibular gland
- Submandibular duct
- Hypoglossal Nerve

* Structure deep to Hyoglossus Muscle ⇒ Glossopharyngeal Nerve
Lingual Artery.

* Structure lie around Sub Mandibular duct ⇒

PHARYNGEAL ARCHES

ECTODERMAL CLEFTS ⇒

1st E.C. ⇒ Forms the external Acoustic Meatus & Pinna

2nd E.C ⇒ grows down & fuses c the last

⇓

The Neck thus become smooth;

if it doesn't fuse → Branchial Sinus / Fistula

ENDODERMAL POUCHES ⇒

First Endodermal Pouch

Dorsal

- Forms the tubo-tympanic Recess; which forms Middle ear cavity & eustachian tube.

Ventral

- Joins c the 2nd & forms the palatine tonsil.

Second Endodermal Pouch

- Joins c ventral part of 1st E.P. & forms the palatine tonsil.

Third Endodermal Pouch

Dorsal

⇓

Inferior Parathyroid

Ventral

⇓

Forms the thymus

Fourth Endodermal Pouch

Dorsal

Superior Parathyroid

Ventral

Ultimo-branchial bodies; which forms Para-follicular "c" cells of thyroid.

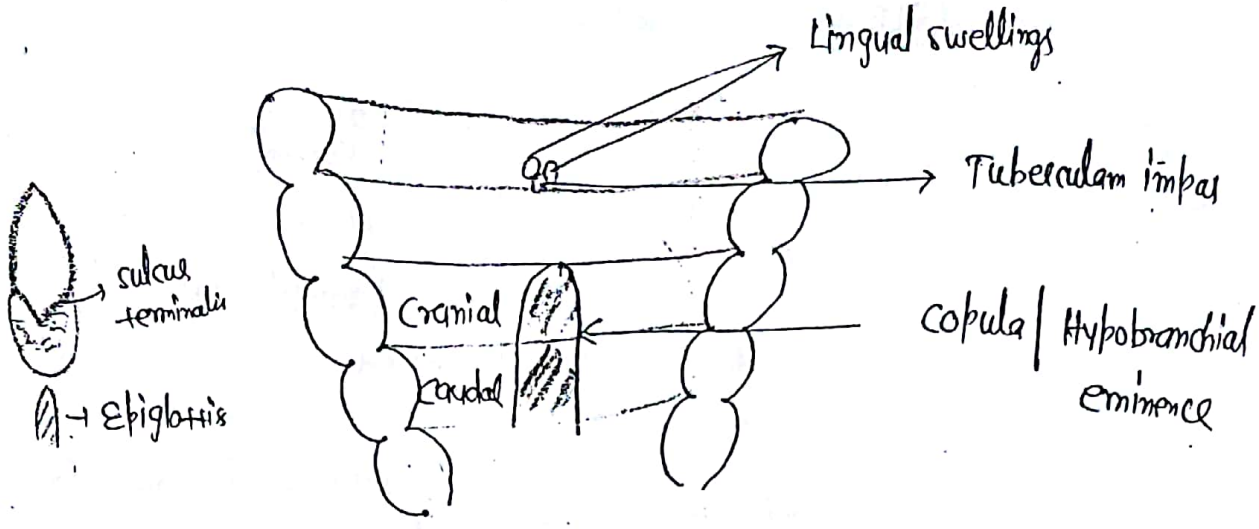
⇓

Recently discovered from "Neural crest cells" (≡)

Ultimo-branchial bodies ⇒ 4th Endodermal Pouch.

DEVELOPMENT OF TONGUE

- Ant. 2/3rd of the tongue is derived from → 2 Lingual Swellings & Tuberculum Impar.
- Post. 1/3rd of the tongue is derived from ⇒ Cranial part of hypo-branchial eminence / copula
- Post. Most. part of the tongue & epiglottis is derived from caudal part of hypo-branchial eminence.
- Muscles of the tongue are derived from ⇒ Occipital Myotomes.



* NERVE SUPPLY OF TONGUE :⇒

PART	TASTE	GENERAL (TOUCH & TEMP.)
Anterior 2/3rd (oral part) except → circumvallate papillae)	Chorda tympani (Facial Nerve)	Lingual branch of Mandibular division of Trigeminal Nerve
Posterior 1/3rd Including circumvallate papillae	Glossopharyngeal	Glossopharyngeal
Posterior Most part	Internal Laryngeal branch of vagus	Internal Laryngeal branch of vagus

* Delphian Nodes ⇒ Also "Pre-Laryngeal Nodes".

DEVELOPMENT OF FACE

→ 5 Processes ; which takes part in formation of Face :-

- 1 Frontonasal process
- 2 Maxillary process
- 2 Mandibular process

* Midline upper lip cleft ⇒ d/t Non-fusion of 2 Medial Nasal process

* Hare lip | cleft lip ⇒ d/t Non-fusion of Maxillary process & Medial Nasal process

* oblique facial cleft ⇒ Non fusion of Maxillary process & Lateral Nasal process

* Midline lower lip cleft ⇒ Non-fusion of 2 Mandibular process

DEVELOPMENT OF HARD PALATE

Primary | primitive palate | pre-Maxilla

⇓

Fusion of two Medial Nasal process

Secondary

⇓

Fusion of two palatine process of Maxilla

* The Incisive foramen differentiates b/w Primary & secondary palate

PHARYNGEAL PLEXUSES

- Formed by → a) pharyngeal branch of glossopharyngeal Nerve,
- b) Pharyngeal branch of vagus & cranial accessory
- c) A branch from superior cervical ganglion

→ The Pharyngeal plexuses lies on Middle constrictor Muscle of the pharynx.

- It supplies → ① All the Muscles of Soft palate except → tensor palati.

⇓

Supplied by Mandibular N. through the Nerve to Medial Pterygoid

② All Longitudinal Muscle of pharynx.

Stylopharyngeus | Salpingopharyngeus | Palatopharyngeus

Supplied by glossopharyngeal Nerve

③ All the circular Muscle of Pharynx except cricopharyngeus part of Inf. constrictor

⇓

External / Recurrent Laryngeal N.

VAGUS NERVE

Superior Laryngeal (4th Pharyngeal Arch)

Internal Laryngeal

- pierces the thyrohyoid Membrane; passes blw Middle & Inferior constrictor; to supply the Mucous membrane of the Larynx above vocal folds.
- also supplies Posterior Most part of Tongue & Epiglottis

External Laryngeal

- Supplies the Crico-thyroid.

Recurrent Laryngeal (6th pharyngeal Arch)

- Lies in the tracheo-esophageal groove
- passes below Inferior constrictor to supply all Muscle of Larynx except Crico-thyroid
- Sensory supply below the vocal Folds.

BRAIN

Central sulcus is kias ⇒ Sulcus of Rolando.

Lateral sulcus is kias ⇒ Sylvian fissure.

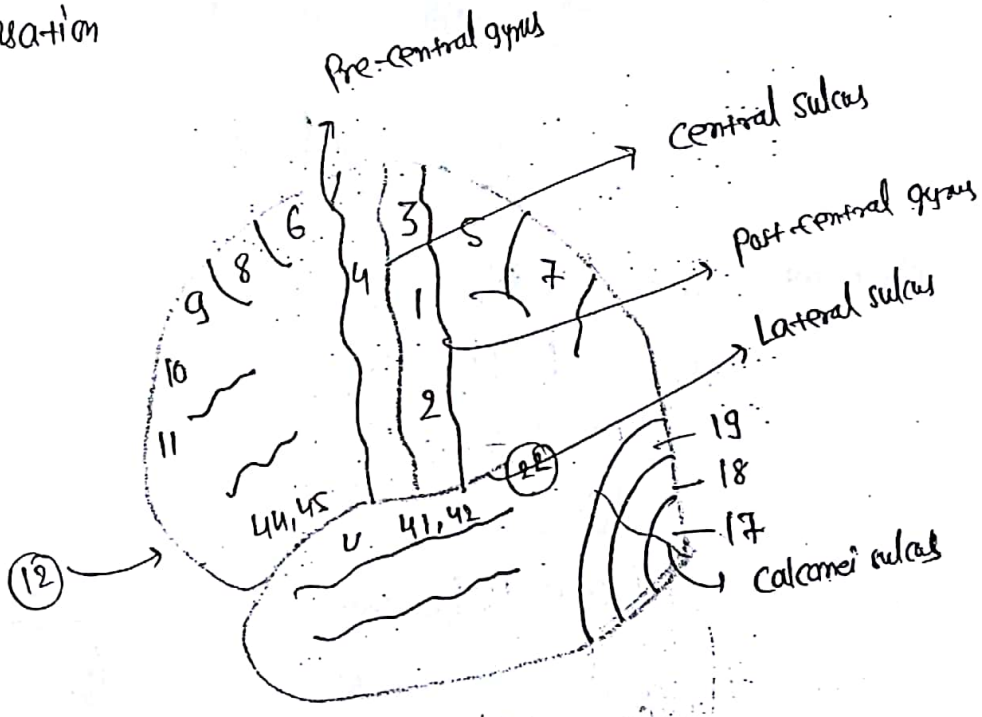
* Functional Areas :⇒

Primary Area

- Perception of sensation

Association Area

- Interpretation of sensation



Area 3,1,2 ⇒ 1° Sensory Area

Crude sensation ⇒ Touch; Pain; temperature

Fine sensation ⇒ Tactile localization;
Tactile discrimination;
Stereognosis;
Vibration;
Bognosthesia

	1st ORDER NEURON	2nd order Neuron	3rd order Neuron
Crude sensation	Dorsal Root Ganglion	• Dorsal horn cells of spinal cord (Substantia gelatinosa)	Thalamus (Ventro-posterio-Lateral Nucleus)
Fine sensation	Dorsal Root Ganglion	• Nucleus gracilis & Nucleus cuneatus	• Thalamus - (Ventro-posterio-Lateral Nucleus)

∴ ∴

Area 5, 7 ⇒ Sensory Association Area

Area 17 ⇒ Primary visual Area

Visual Pathway ⇒ Retina

↓

Optic Nerve

↓

Optic chiasma

↓

Optic tract

↓

Lateral geniculate body

↓

Optic Radiate (Retrolentiform part of Internal capsule)

↓

Area 17

Area 18, 19 ⇒ Visual Association Areas

* Damage to Area 18, 19 leads to ⇒ Visual Agnosia / word blindn

Area 41, 42 ⇒ Primary Auditory Area

Auditory pathway ⇒ Organ of Corti

↓

Dorsal & ventral cochlear Nucleus (⊕ in Medulla oblo

↓

Superior olivary Nucleus

↓

Trapezoid body

↓

Lateral Leminiscus

↓

Inferior colliculus

↓

Medial geniculate body

↓

Auditory Radiation (Sublenticular part of Internal capsule)

↓

Area No. 41, 42 (Cortex)

Area No: 22 ⇒ Sensory speech Area / Wernicke's Area

* Damage to 22 leads to ⇒ Auditory agnosia / word deafness
* Area 41, 42 damage ⇒ Deaf.

Area No. 44, 45 ⇒ Broca's Area / Motor speech Area

* Arcuate fasciculous / Uncinate fasciculous ⇒ Connects the Wernickes & broca's Area. (connect Frontal to temporal Lobe)

Area No. 4 ⇒ 1° Motor Area

Func^{n} ⇒ Initiation of Movements

* Large Pyramidal cells is k/a ⇒ "Betz cells"

Descending fibres

Cortico spinal

↓

Area No. 4

↓

- Internal capsule (Posterior limb)

↓

Mid brain (Crus cerebri)

↓

Pons (Basilar part)

↓

Medulla (Pyramids)

↓

Spinal Cord / Anterior horn cells

Cortico-Nuclear

↓

Area No. 4

↓

Internal capsule (Genu)

↓

Brain Stem / Nuclei of the cranial Nerves

Area No. 6,8 → Pre-Motor Area

↳ execution of Movements

Area No. 9,10,11,12 → Pre-frontal Area

↳ function ⇒ Intelligence; Memory; ego & self-Respect (Personality | social behaviour).

* Pterion ⇒ It is the Region; where the Frontal; Parietal temporal & Sphenoid joined together.
  - Klas the "weakest part of the skull".
  - The Anterior division of Middle Meningeal Artery Runs underneath the pterion.

* FRONTAL LOBE ⇒ It has following functional Areas ⇒

i) 1° Motor Cortex ⇒ Broadmann's Area 4;

ii) Premotor Cortex ⇒ Areas 6, 8;

iii) Supplementary Motor Area ⇒ Area No. (6), (8)

iv) Frontal eye field ⇒ Area No. (6), (8), (9)
↳ Located in Posterior part of Middle fr gyrus.

v) Broca's Motor Speech Area ⇒ Area No. (44), (45)
↳ Located in Posterior part of Inferior frontal gyrus.

vi) Prefrontal Area ⇒ Area No. (9), (10), (11), (12)

* PARIETAL LOBE ⇒ i) Primary Somatosensory cortex

⇓

Area No. (3), (1), (2)

ii) Somatosensory: Association Areas :→

a) Superior parietal Lobule → Area No. (5), (7)

b) Supra Marginal gyrus → Area No. (40)

c) Angular gyrus → Area No. (39)

* TEMPORAL LOBE ⇒ i) Primary Auditory Area

⇓

Area No. (41), (42)

ii) Auditory association cortex (Secondry Auditory Area)

⇓

Area No. (22)

- It includes Wernick's speech Area & is located in Posterior part of Superior temporal gyrus.

* OCCIPITAL LOBE ⇒ i) Primary visual cortex

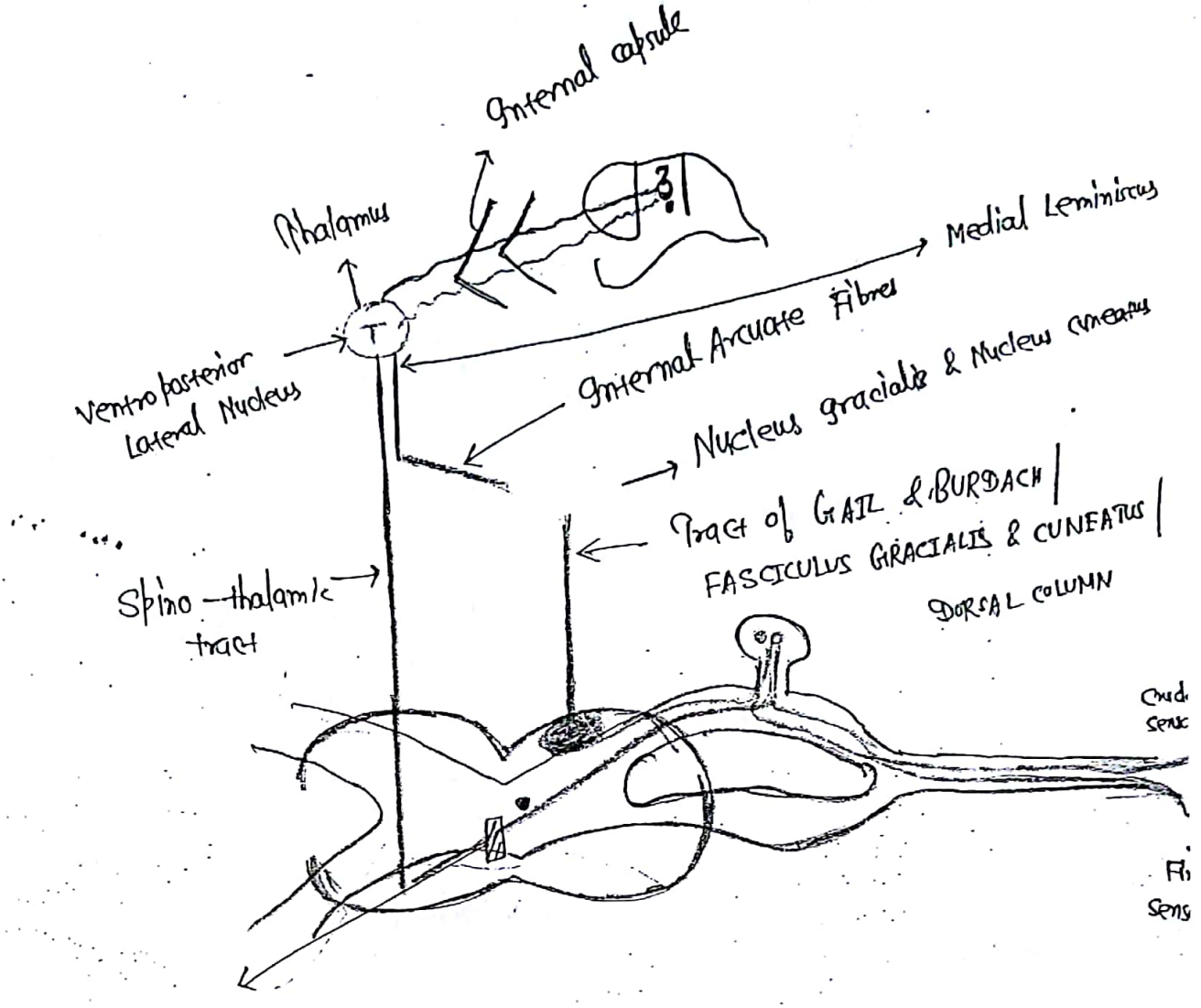
⇓

Strike Area; Area No (17)

ii) visual Association Areas

⇓

Secondary visual Area; Area No. (18), (19)



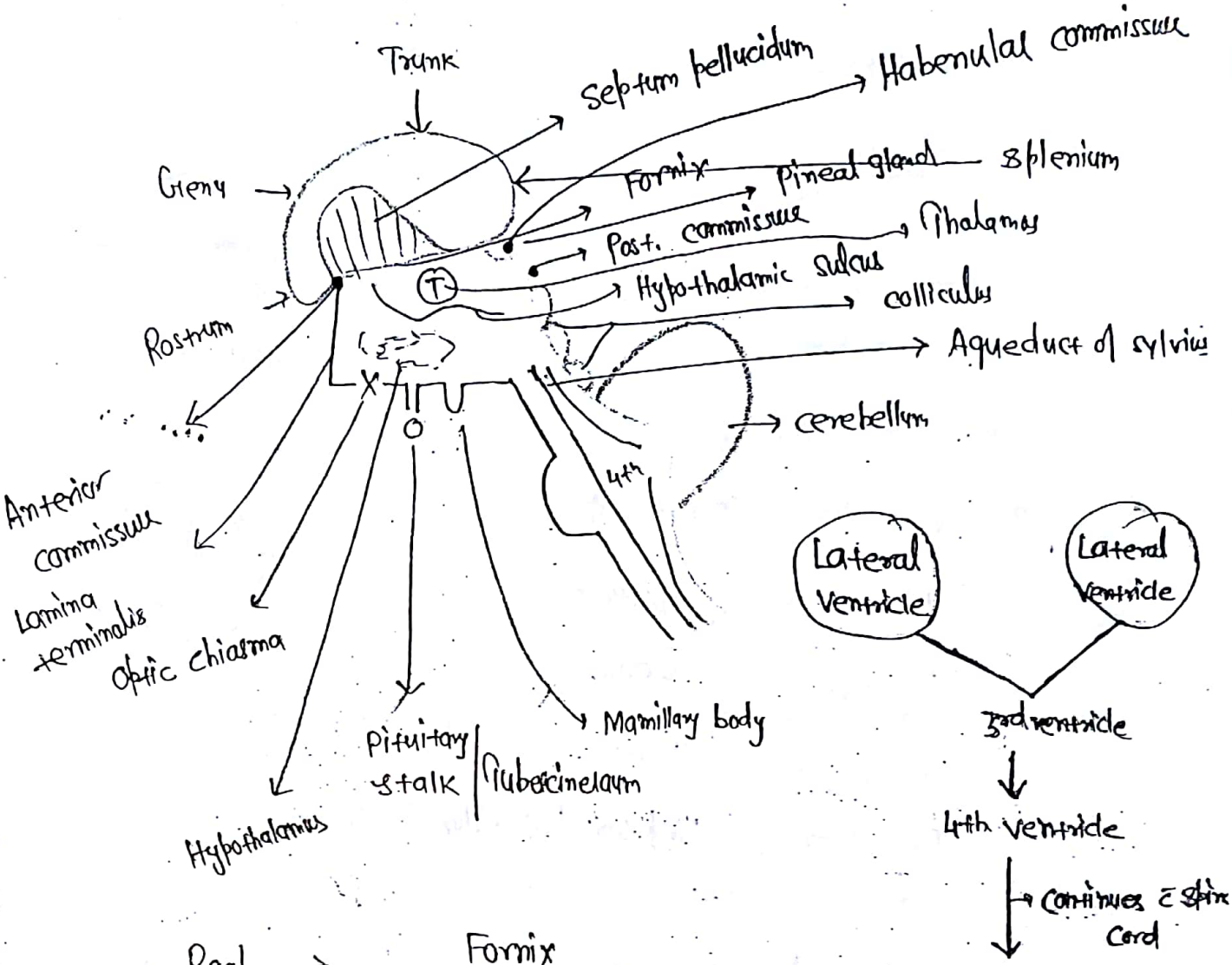
Syringomyelia

↳ Fine sensations all intact.

- All crude sensation all lost.

IIIrd ventricle

Epithalamus ⇒ Habenular commissure + Pineal gland + Post. commissure



Roof ⇒ Fornix

Floor ⇒ Optic chiasma ; Pituitary stalk ; Mamillary body

Ant. wall ⇒ Ant. Commissure & Lamina terminalis

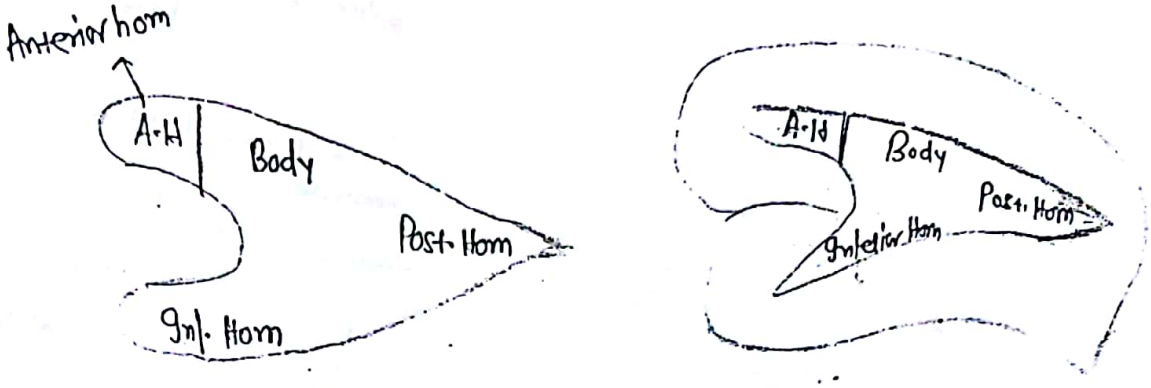
Post. wall ⇒ Pineal gland ; post. commissure & habenular commissure

Lateral wall ⇒ Thalamus & hypothalamus

* Ventricles ⇒ These are the cavities in the brain lined by "Ependyma & fi
c CSF".

LATERAL VENTRICLE

Parts :-



Relations of Anterior Horn :⇒

Floor ⇒ Rostrum

Anterior ⇒ Genu

Roof ⇒ Trunk

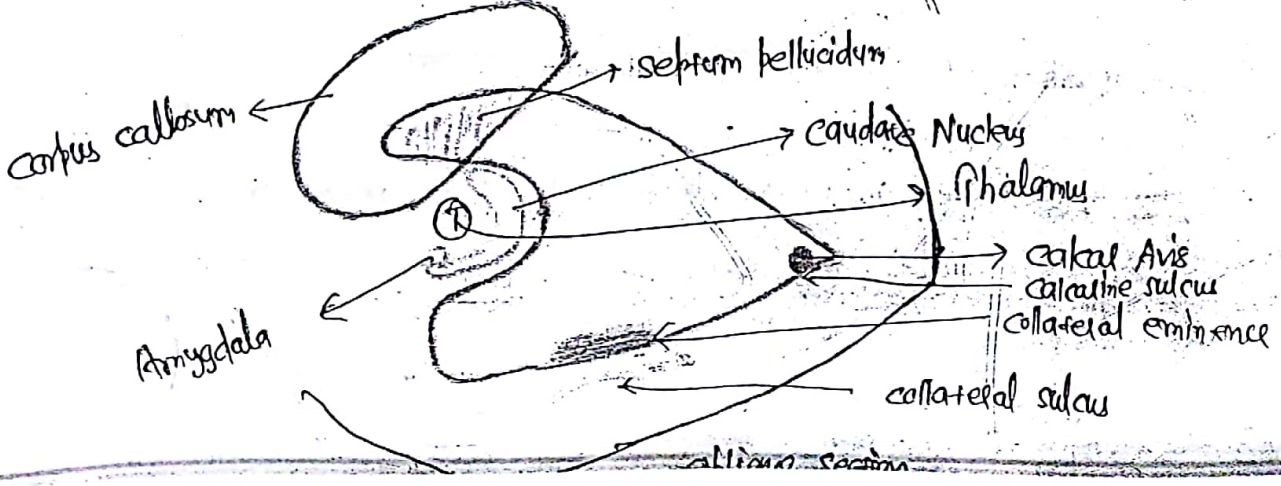
Medial ⇒ Septum pellucidum & Fornix

Body of Lateral ventricle :⇒

Roof ⇒ Trunk

Medial ⇒ Septum pellucidum & the fornix

Floor ⇒ Medially thalamus & laterally caudate Nucleus



* Posterior Horn & Ant Horn ⇒ Both has No choriodal plexus
* Body & Inf. horn ⇒ have choroidal plexus.
* Interventricular Foramina or Foramina of Monro ⇒ Connects 3rd ventricle to Lateral ventricle

COMPLETE SULCUS

- is the one which forms an elevation in the floor of the lateral ventricle

eg ⇒ Calcarine Sulcus ⇒ Forms an elevation in the floor of Posterior Horn
↓
Calcal Avis

Collateral Sulcus ⇒ Forms an elevation in the floor of Inferior horn
↓
Collateral eminence.

* if both all in option ⇒ collateral > calcaline

* BLOOD SUPPLY OF BRAIN

(A) Vertebral Artery ⇒ Enters into the foramen transversarium of C6 vertebral
- crosses the Arch of Atlas & enters the skull through foramen Magnum
- Two vertebral joins to form Basilar Artery

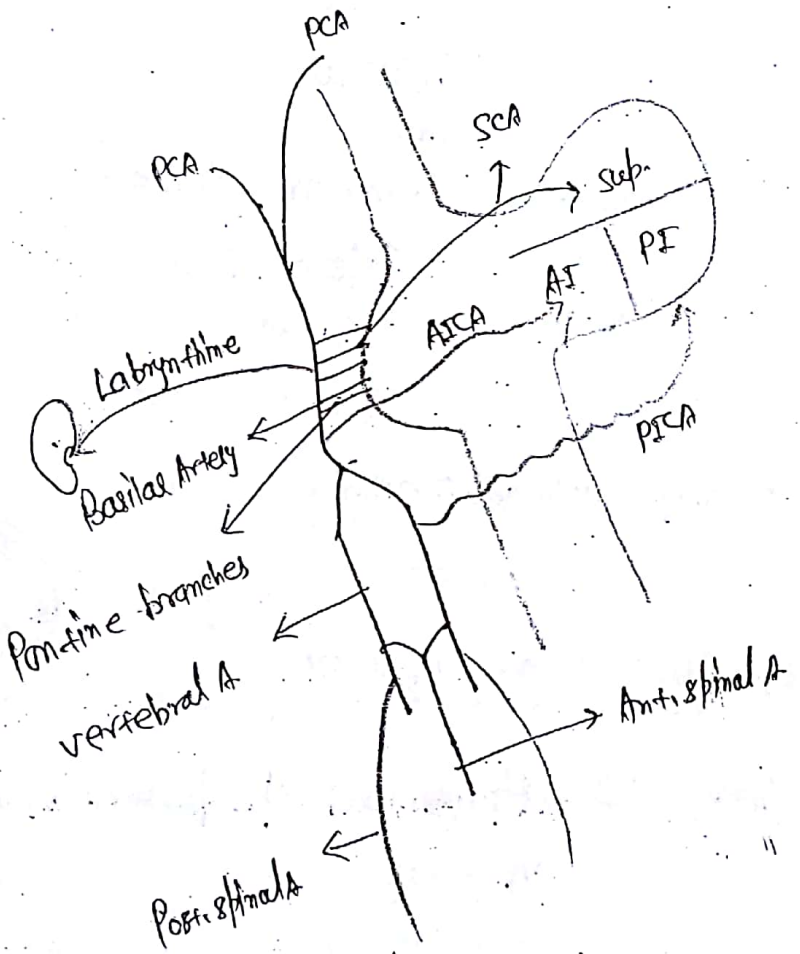
Branches ⇒ Anterior Spinal Artery
Posterior Spinal Artery

(B) Basilar Artery ⇒ Lies In Pons

Branches ⇒ Pontine branches | Paramedian branches

supplies base of Pons ⇒ damage cause of Hemiplegia

- Labrynthine artery
- Ant. Inferior cerebellar artery
- Superior cerebellar artery
- Post. cerebral artery



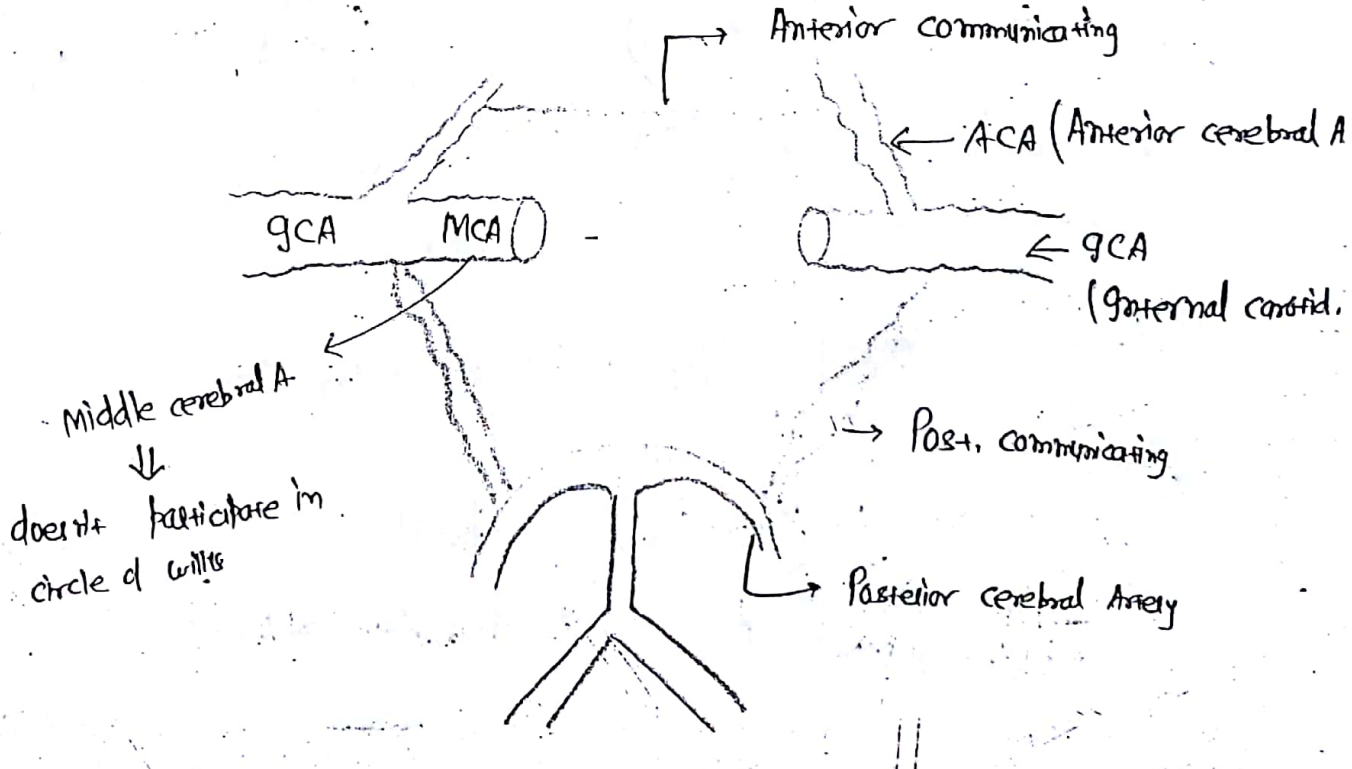
Internal carotid Artery

- enters the skull through Foramen Lacerum

Branches ⇒

1. cavernous branches
2. Hypophyseal branches (to pituitary gland)
3. opthalmic Artery (pass through optic canal ≅ optic Nerve)
4. Ant. Choroidal Artery
5. Post. communicating Artery
6. 2 terminal branches → Ant. cerebral A.
   → Middle cerebral A.
   ↳ continuation of Internal carotid

Circle of willis



Circle of willis

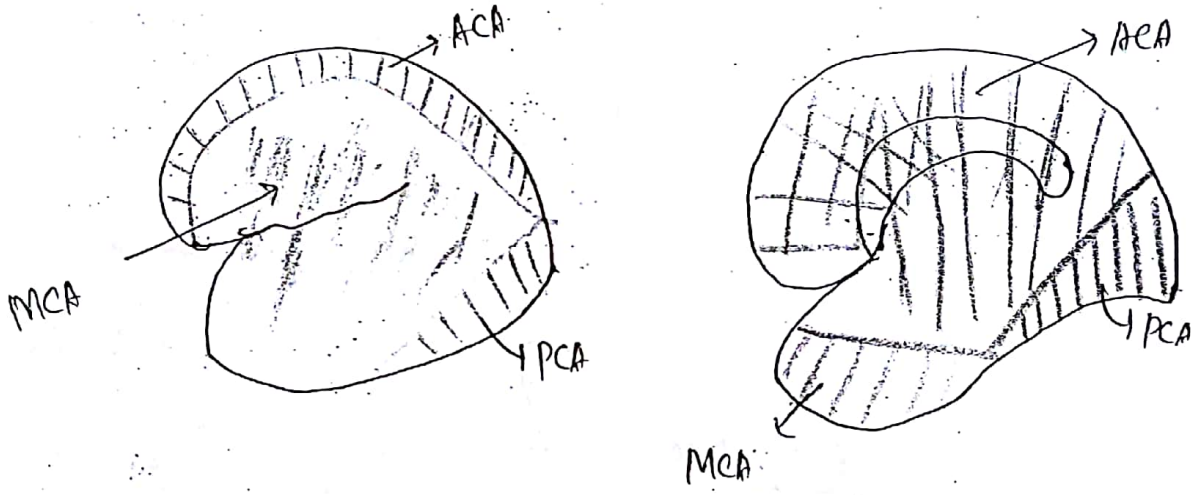
Cortical branches

- enters the sulci to supply Sulaces of the brain

Central branches

- enters the Substance of the brain to supply to deep Nuclei.

- Artery ⊕nt in Lateral Sulcus ⇒ MCA (Middle cerebral A)
  Artery ⊕nt in callosal sulcus ⇒ ACA (Anterior cerebral A)



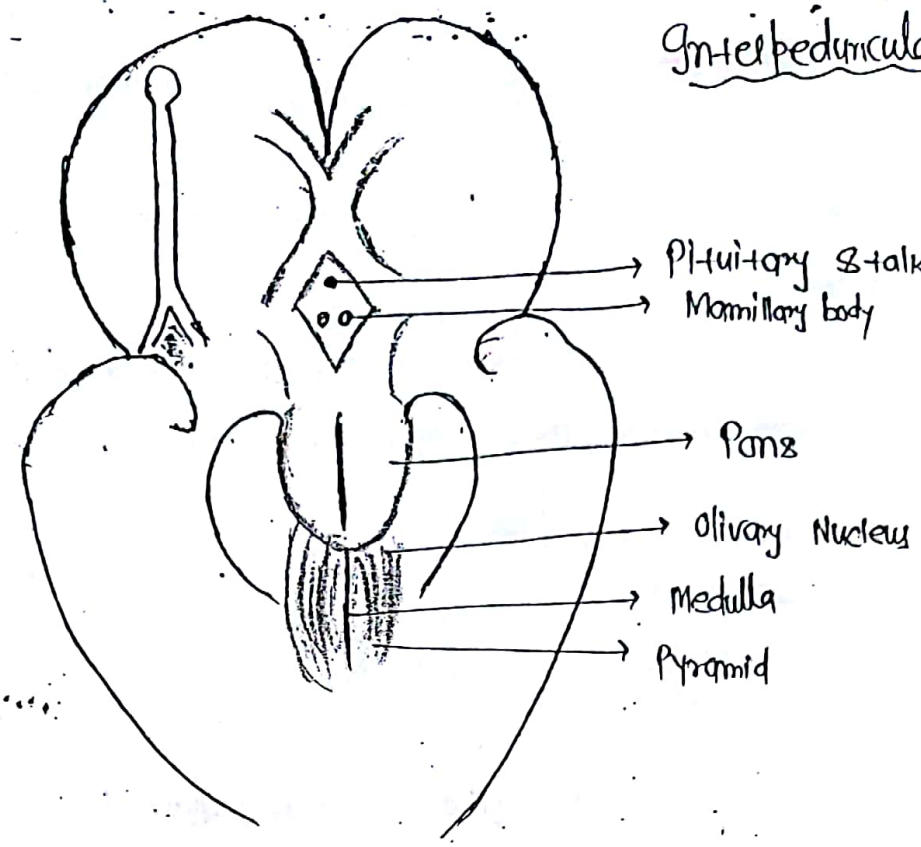
Blood supply of Motor/sensory Area

⇓

MCA + ACA both

Middle cerebral A — Anterior cerebral A

Interpeduncular Fossa



Boundaries ⇒ Anterolateral ⇒ Optic tract

Posterolateral ⇒ Crus cerebri

Floor ⇒ Pituitary stalk; Mamillary body & Posterior Perforated substance

Content ⇒ 3rd Nerve & circle of willis

VENOUS DRAINAGE OF BRAIN

1. Superficial vein ⇒ Superior cerebral vein

⇓

drains lateral surface of the brain & they opens into the superior saggital sinus.

Inferior cerebral vein

⇓

drains the inferior surface of the brain & they opens into the cavernous sinus & sigmoid sinus.

Anterior cerebral vein

⇓

Lies in the callosal sulcus along ⊂ Anterior cerebral Artery

Middle cerebral vein

⇓

Superficial Middle cerebral

⇓

communicates Medially ⊂ cavernous sinus & Laterally ⊂ Superior saggital & transverse sinus

Deep Middle cerebral

⇓

- Lies deep in the lateral sulcus along ⊂ MCA
- Anterior cerebral ; the deep Middle cerebral & striate veins joins to form Basal vein.

⇓

drains into Great cerebral vein of galen

2. Deep vein ⇒ Internal cerebral vein

⇊

- Formed @ Inter ventricular foramen by joining of T – Thalamostriatal vein
  C – Choroidal vein
  S – Septal vein

- The two Internal cerebral veins joints to form Great cerebral vein of Galen
  ↳ drains into Straight sinus

- The Basal vein drains into Great cerebral vein.

THE BRAIN

IV th ventricle

Roof ⇒ Formed by cerebellum

Floor ⇒ Lower half of the pons & upper half of the Medulla

Facial colliculus ⇒ Formed by fibres of Facial Nerve as they wind around the Abducent Nerve Nucleus

Hypoglossal Δ ⇒ Formed by hypoglossal Nerve Nucleus

Vagal Δ ⇒ Formed by dorsal Nucleus of vagus

BRAIN STEM

- Only cranial Nerve ; which emerges from dorsal aspect of brain stem
  ⇓
  Trochlear (Thinnest cranial Nerve)

- The Nerve which undergo complete decussation before emerging
  ⇓
  Trochlear Nerve

- Pregnant Nerve ⇒ Nerve having artery within it.
  ↳ eg ⇒ Optic Nerve ⇒ contains central A. of Retina
  Sciatic Nerve ⇒ branch of inferior gluteal

* Medial Most N. attached to Ponto-Medullary junction ⇒
* Lateral Most

Nerve attach @ the Junction of Pons & Middle cerebral Peduncle

⇓

Trigeminal Nerve.

FUNCTIONAL COMPONENTS OF NUCLEUS

① Special visceral efferent :-

Nerves		Nucleus
5	→	Motor Nucleus of Trigeminal Nerve
7	→	Motor Nucleus of Facial Nerve
9, 10, 11	→	Nucleus Ambigous

② General visceral efferent :-

Nerves		Nucleus
3	→	Edinger-Westphal Nucleus
7	→	Sup. salivatory & Lacrimatory
9	→	Inf. salivatory
10	→	Dorsal Nucleus of vagus

③ General Somatic efferent :⇒

Nerve		Nucleus
3	⟶	Occulomotor N. Nucleus
4	⟶	Trochlear N. Nucleus
6	⟶	Abducent N. Nucleus
12	⟶	Hypoglossal N. Nucleus

④ Special visceral Afferent :⇒

⊕ In 7, 9 & 10th Cranial Nerve

⇓

Nucleus of tractus solitarius

⑤ General visceral Afferent :⇒

10th Nerve (vagus);

⑥ Special Somatic Afferent :⇒ present in

1st C.N.

2nd C.N.

8th C.N.

⑦ General somatic afferent :⇒ carried by trigeminal Nerve, its three Nuclei → ① Mesencephalic Nucleus

↳ prts in Mid brain

b) Chief Sensory Nucleus → prt. In Pons

c) Spinal Nucleus → prt. in Medulla.

No. of Nucleus of Trigeminal Nerve ⇒ (4)

(3) Sensory

(1) Motor.

WHITE MATTER OF THE BRAIN

Commisural fibres
- Connects similar areas in the opposite hemisphere

eg ⇒ Corpus callosum
Ant. commissure
Post. commisure
Hebenular commisure

Projection fibres
- they projects outside the brain

eg ⇒ Internal capsule

Association fibres
- Connects different area in same hemisphere

eg ⇒ Uncinate fasciculus

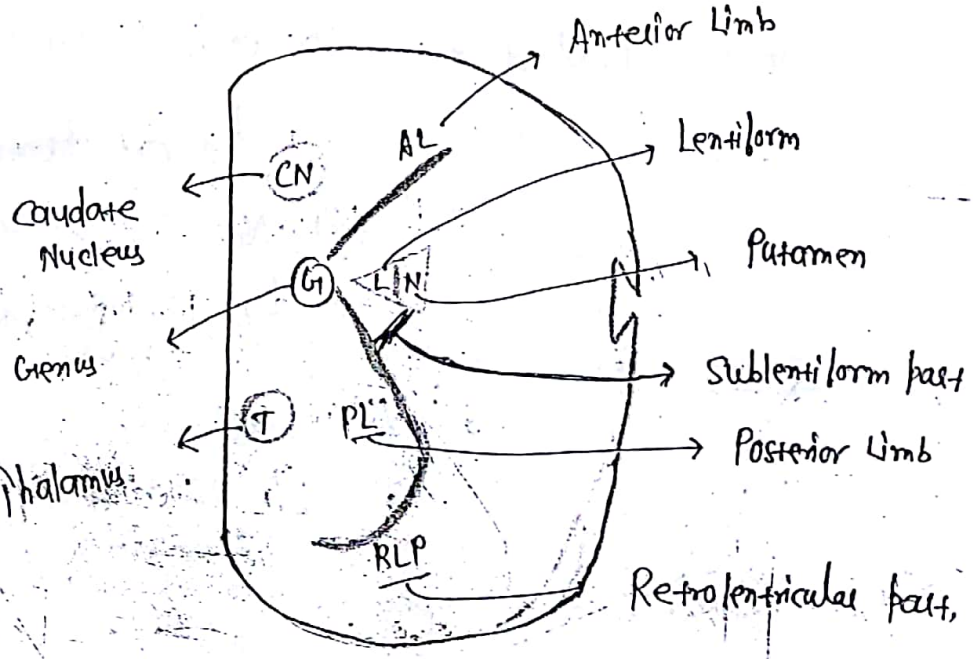
INTERNAL CAPSULE

Parts :-

- Anterior Limb (Lies b/w caudate Nucleus & Lentiform Nucleus)
- Genu
- Posterior Limb (Lies b/w the thalamus & Lentiform Nucleus).
- Retrolentiform part ; lies behind Lentiform Nucleus
- Sublentiform part ; lies below Lentiform Nucleus

	AL	G	PL	RLP	SLP
Ascending fibres ⇒	Thalamo-frontal		Thalamo-Parietal	Thalamo-occipital (Optic Radiation)	Thalamo-temporal (Auditory Radi.
Descending fibres ⇒	Fronto-pontine	Cortico-Nucleus	Cortico-spinal	Occipito-pontine	Temporo Pontine

* Main A. Supplying the Internal capsule ⇒ Middle cerebral



* Medial Medullary Syndrome | Alternating Hypoglossal hemiplegia

- Thrombosis of Vertebral Artery;
- Structures Involved → Hypoglossal Nucleus
  ↳ I/L Paralysis of Tongue
  Corticospinal tract
  ↳ C/L hemiplegia
  Medial Leminiscus
  ↳ C/L Loss of Fine sensation.

* Milard-Gubler syndrome

- Thrombosis of Paramedian branches of basilar arteries;
- Structures Involved → Corticospinal tract
  ↳ C/L hemiplegia
  7th Nerve
  ↳ I/L Paralysis of Face
  6th Nerve
  ↳ I/L Medial squint.

WEBER'S SYNDROME

- Thrombosis of Post. cerebral Artery.

Structures Involved ⇒ ① cortico-spinal tract

↳ C/L Hemiplegia

② 3rd Nerve

↳ I/L Lateral squint & Diplopia;

Ptosis;

Pupils are dilated & fixed.

CEREBELLUM

* Fibres coming to the cerebellum

Climbing fibres

⇓

arises from the Inferior olivary Nucleus

- Stimulates Purkinje cells

Mossy's fibre

⇓

arises from spinal cord; vestibular Apparatus & Cort

- Stimulates granule cells

⇓

Stimulates Purkinje cells

↓

↓ inhibits the deep cerebellar Nucleus & Lateral vestibul Nucleus

INFERIOR CEREBELLAR PEDUNCLE

Afferent fibres → Posterior spino cerebellar ;

Olivo – cerebellar ;

Vestibulo - cerebellar ;

Reticulo - cerebellar ;

Cuneo - cerebellar (carries Unconscious proprioception from upper limb)

Efferent fibres → Cerebello – Vestibular

Cerebello - Reticular

Cerebello – Olivary

MIDDLE CEREBELLAR PEDUNCLE

Afferent fibres → Ponto - Cerebellar

SUPERIOR CEREBELLAR PEDUNCLE

Afferent fibres → Ant. spino - cerebellar

tecto – cerebellar

Hypo thalamo - cerebellar

Efferent fibres → Cerebello – Rubral

Dentato - Rubral & Dentato – thalamic

THALAMUS

Ventral group of Nucleus

Ventro – Anterior

⇓

Receives input from Basal ganglia

⇓

Projects to Area No. 6 & 8

Ventro – Lateral

⇓

Receives Input from Cerebellum

⇓

Project to Area No. (4)

Ventro – Posterior

Ventroposterolateral

- Receives Medial Leminiscus & Spinal Leminiscus

↓

Projects to Area No. (3), (1), (2)

Ventroposteromedial

- Receives Trigeminal Leminiscus & Solitaro – thalamic tract (Nucleus of Tractus solitari

↓

Projects Into (3), (1), (2) Area

* SPINAL CORD

DORSAL HORN :

Substantia Gelatinosa : 2nd order Neuron for crude Sensation :

Nucleus Proprius : Receives conscious Proprioception :

Nucleus dorsalis | clarke's columna : Receives Unconscious proprioception from trunk & Lower limbs;

Visceral Afferents : Receives sensation from visceral organs.

VENTRAL HORN :

Medial group : innervates the Muscle of the Neck & the trunk

Lateral group : present in the cervical & Lumbosacral enlargement of the spinal cord

central group : a) Phrenic Nerve Nucleus = $C_3 - C_5$

b) Spinal Nucleus of Accessory Nerve = $C_1 - C_5$

c) Lumbosacral Nucleus

LATERAL HORN :

- Intermedio Medial Nucleus (S_2, S_3, S_4)
  - ↓
  - Gives origin to pre-ganglionic fibers of Parasympathetic N. system
- Intermedio Lateral Nucleus
  - ↓
  - Gives origin to preganglionic fibers of Sympathetic N. system T_1 to

REXED LAMINA

- System of ten layers of grey Matter.

1 → Posteromarginal Nucleus
2 → Substantia Gelatinosa
3 & 4 → Nucleus Proprius
5 & 6 → Base of dorsal column
7 → Nucleus dorsalis; Nucleus of Lateral horn
8 & 9 → Nuclei of Anterior grey column
10 → Surrounds the central canal.

* HEUBNER's Artery ⇒ Recurrent branch of Anterior cerebral;
* CHARCOT's Artery ⇒ Striate branch of Middle cerebral

NEET'16
* The cerebral cortex contains 5 types of Neurons ⇒

i) Purkinje cells
ii) Granule cells;
iii) Basket cells;
iv) Stellate cells;
v) Golgi cells.

* DEVELOPMENT OF BRAIN

Structures formed from Neural tube are ⇒

(A) From cranial part of Neural tube ⇒ Give Rise to "Brain":

- Prosencephalon
- Mesencephalon
- Rhombencephalon

i) Prosencephalon

Telencephalon
- Cerebral Hemisphere
- Cavity → (Lateral ventricle)

Diencephalon
- Thalamus
- Hypothalamus
- epithalamus
- Metathalamus (Medial geniculate body, Lateral geniculate body)
- Subthalamus
- Cavity ⇒ 3rd ventricle

ii) Mesencephalon

Mid brain — Cavity ⇒ Aqueduct of sylvius.

iii) Rhombencephalon

Metencephalon → Pons & cerebellum

Myelencephalon → Medulla oblongata

Cavity ⇒ 4th ventricle

NEET'13

From caudal part of Neural tube → Gives Rise to "Spinal cord".

* Cell Nest is chaaractized of ⇒ Hyaline cartilage
* Largest size of chondrocytes are seen in ⇒ Elastic cartilage
* Smallest size of chondrocytes are seen in ⇒ White fibro cartilage
  eg ⇒ Intervertebral disc
  Articular disc
  Menisci

* Apocrine gland ⇒ eg ⇒ Sweat gland → Simple coiled tubular type of gland; which Unbranched duct.
  Holocrine gland ⇒ eg ⇒ Sebaceous gland
  Merocrine | eccrine gland ⇒ eg ⇒ Mammary gland

* eg of Serous Salivary gland ⇒ eg ⇒ Parotid gland
  Mucous Salivary gland ⇒ eg ⇒ Sublingual gland
  Mixed salivary gland ⇒ eg ⇒ Sub Mandibular gland

MUCOUS ACINUS

SEROUS ACINUS

MIXED ACINUS (Demilune)

* Lymphoid follicles are abt. in ⇒ Thymus
⇓
Hassell's corpuscles are characteristics of it.

* Spleen contain Red & white Pulp ē eccentric Arteriole.
* Tonsil contains crypts & epithelium is "Stratified Squamous V Non-Keratinized epithelium"
* Lymph Node ⇒ Subscapular sinus
* Gall bladder ⇒ Simple columnar ē brush border.
* PCT ⇒ Lined by simple cuboidal ē brush border
Ansa Nephron (Loop of Henle) ⇒ Lined by simple squamous epithelium
* Goblet cells are abt. in ⇒ esophagus
⇓ ⇓
plenty in colon SubMucosal glands ⊕ ⇒ Lubricates the esophagus

* Toughest Layer of esophagus ⇒ SubMucosa
* Lining epithelium of secreting thyroid follicle ⇒ Simple cuboidal
* Germinal epithelium ⇒ simple cuboidal
* Respiratory epithelium ⇒ Pseudo stratified ciliated columnal ē goblet cells
* External elastic Laming ⇒ Characteristics of Muscular Artery.

TYPE OF EPIPHYSIS

↳ Part of bone which develop from 2° ossification center.

1. Pressure epiphysis ⇒ Seen @ - the ends of long bone subjected to pressure
   ↳ eg ⇒ Head of Humerus; QQ
   Head of Femur; QQ
   condyles of tibia, QQ

2. Traction epiphysis ⇒ Form d/t pull of the Muscle
   ↳ eg ⇒ Tubercle; Q
   Trochanter; Q
   Mastoid process; Q
   Tibial tuberosity.

3. Atavastic epiphysis ⇒ Functional in Lower Animals & degenerate in humans
   ↳ eg ⇒ Coracoid process of Scapula Q
   Os trigonum of Talus

4. Aberrant epiphysis ⇒ It is an extra epiphysis
   ↳ eg ⇒ Proximal end of 1st Metacarpal bone QQ

JOINTS

Fibrous

- Sutures ⇓ eg ⇒ Skull
- Syndesmosis ⇓ eg ⇒ Interosseous Membrane b/w Radius & Ulna; Tibia & Fibula
- Gomphosis ⇓ Teeth fitting in socket

Cartilagenous

- 1° cartilagenous / synchondrosis ⇓ eg ⇒ joint b/w epiphysis & diaphysis; Xiphisternal joint; 1st chondrosternal junction; Symphysis Menti
- 2° cartilagenous / symphysis ⇓ eg ⇒ Pubic symphysis; Manubriosternal; Intervertebral joints

Synovial

Synovial joint

Saddle Joint ⇒ Sterno clavicular joint; 1st carpo metacarpal joint;

Condylar Joint ⇒ TM Joint; Atlanto-occipital Joint; Metacarpophangeal Joint

ellipsoidal Joint ⇒ Wrist

Pivot Joint ⇒ Superior & Inferior Radio-ulnar Joint; Atlanto-axial Joint

Plane Joint ⇒ Intercarpel ; Intertarsal; Acromio-clavicular ;

Hinge ⇒ Elbow; Ankle