

SINUS

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Assignment => Anatomy

Submitted To :

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Radiology

4th

Semester

(1)

Q NO:1

Ans:

⇒ Structure of  
Human Ear :-

The structure of  
human ear is that

Human ear consist  
of three main  
parts:

Human Ear.

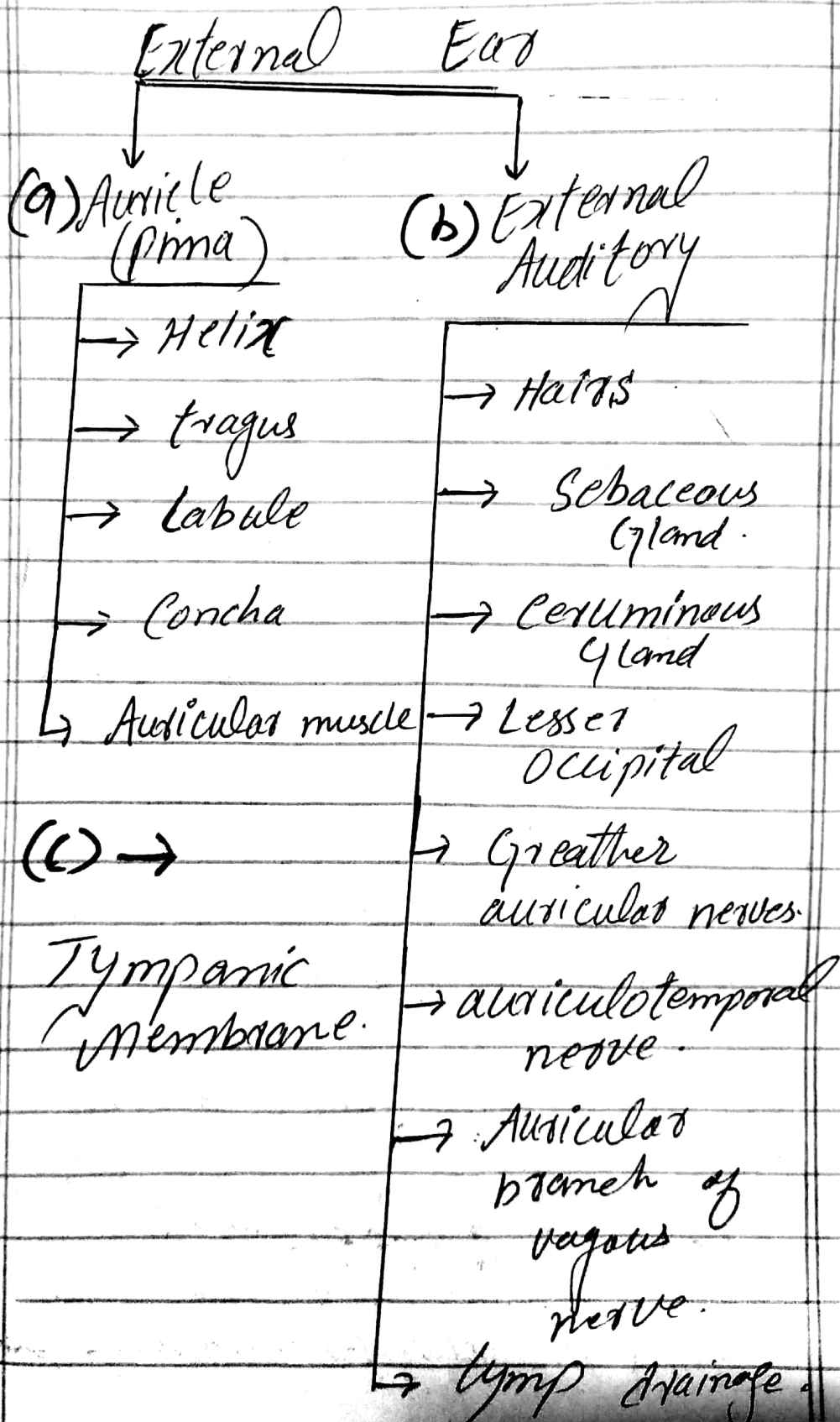
① → External Ear.

② → Middle Ear.

③ → Internal Ear.

(2)

# (1) External Ear



(3)

## ① Auricle (Pinna) :-

→ It has characteristic shape.

→ collect air vibration.

→ It consist of thin plate elastic cartilage.

covered by skin.

→ Main Components

### (i) Helix:-

→ The main component of ear.

→ Elevated margin of auricle...

(4):

(ii) Tragus:

→ A projection from anterior margin of auricle

→ Extend over opening of external acoustic meatus.

(iii) Lobule: (Earlobe)

→ Does not contain cartilage.

(iv) Concha:

→ Deepest depression within auricle.

→ Leads into External meatus.

## (v) Auricular Muscle

→ They are essentially vestigial in human

→ But are variably entertaining to those able to wiggle their ears.

## (b) ⇒ External Auditory meatus ::

→ Slender curved tube.

that leads from the concha of auricle to tympanic membrane.

→ It conduct sound waves from auricle to tympanic membrane.

→ outer third of meatus.  
↳ Elastic cartilage.

→ Inner two third of meatus:

↳ is bony

↳ formed by the

tympanic plate of temporal bone.

(i) Hair:

→ Located at outer third meatus.

→ prevent foreign bodies

(7)

(ii) Subaceous and  
Ceruminous Glands

- They are modified sweat gland.
- secrete a yellowish brown wax.
- provide sticky barrier.
- prevent the entrance of foreign bodies.

(iii) Lesser occipital and  
greater auricle  
nerves

(iv) Auriculotemporal  
nerve and  
auricular branches  
of vagus nerve.



(8)

(c) → Tympanic Membrane

→ It is a thin, fibrous structure.

→ It forms the interface b/w the External Ear and middle Ear.

→ The membrane is

(\*) obliquely oriented.

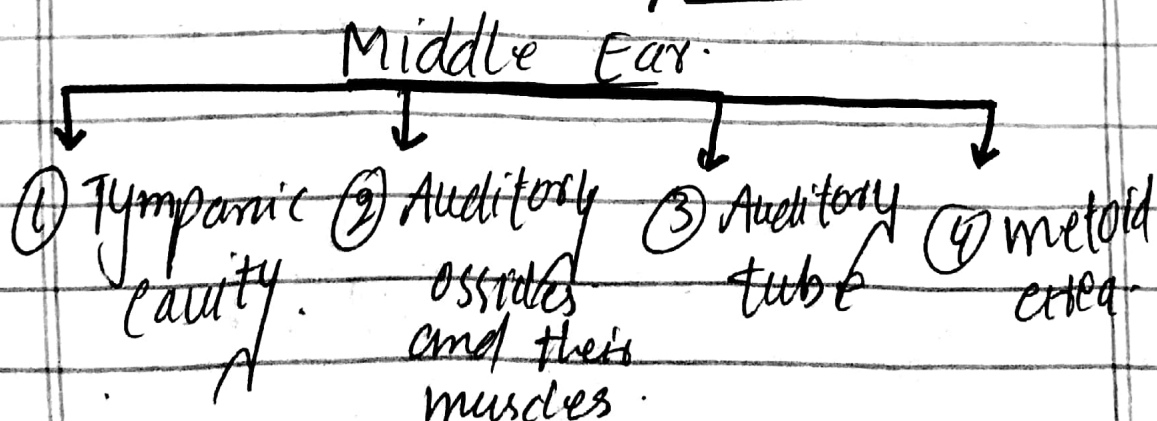
(\*) facing inferiorly, anteriorly and laterally.

(4)

## (2) Middle Ear

- Air containing cavity, within the petrous part of temporal bone.
- Lined with mucous membrane.
- It communicates with nasopharynx anteriorly and with mastoid antrum posteriorly.

### Main Components



## (1) Tympanic cavity

It consist of two parts.

(a) Tympanic cavity proper

(b) Epitympanic recess.

(a) Tympanic cavity proper

→ It is the area directly medial to tympanic membrane.

→ It is six sided box with a roof, floor, anterior wall, medial wall and lateral wall.

→ Roof:- This plate of

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→ tegmen tympani :-

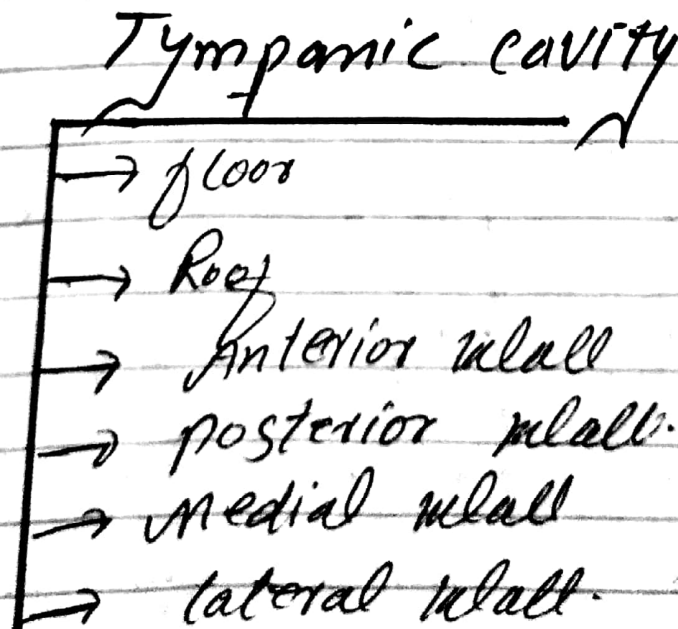
→ part of petrous temporal bone.

→ separate epitympanic recess of tympanic cavity from dura matter.

(b) Epitympanic recess

→ It is the upper portion of chamber

→ located superiorly to tympanic membrane.



(12)

## (2) Auditory ossicles and Associate Muscle

Three auditory ossicles.

- (i) → Malleus
- (ii) → Incus.
- (iii) → Stapes.

(i) Malleus : → largest ossicle

→ It contains the following parts.

- Malleus (a)
- (a) → Head.
  - (b) → Neck
  - (c) → Long process
  - (d) → Anterior process.
  - (e) → lateral process.

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### (3) Auditory tube

→ It connects anterior wall of tympanic cavity to nasopharynx.

→ Balancing air pressure on both sides of tympanic membrane.

→ Allow eardrum to move easily.

→ Lateral two third is bony part.

→ medial two third is cartilage.

→ Mucous membrane lined the middle ear.

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## (4) Mastoid Area

It consist of two parts.

### (i) Mastoid antrum:-

→ It main cavity within the mastoid process.

⇒ Mastoid antrum:

→ Anterior wall.

→ posterior wall

→ lateral wall

→ medial wall.

→ Superior wall.

→ inferior wall.

### (ii) Mastoid Air cells.

→ Honeycomb like network of hollow space within the mastoid process.

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### (3) Internal Ear

→ It is located in petrous part of temporal bone.

medial to middle ear.

→ It consist of:

(i) Bony labyrinth.

(ii) Membranous labyrinth.

(i) Bony labyrinth

→ vestibula.

→ Semi-circular canal.

→ Cochlea

(ii) Membranous labyrinth

→ It is lodged within bony labyrinth.



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## Membranous Labyrinth

- utricle.
- saccule.
- Three semicircular ducts.
- Ducts of cochlea.

== xx == xt ==

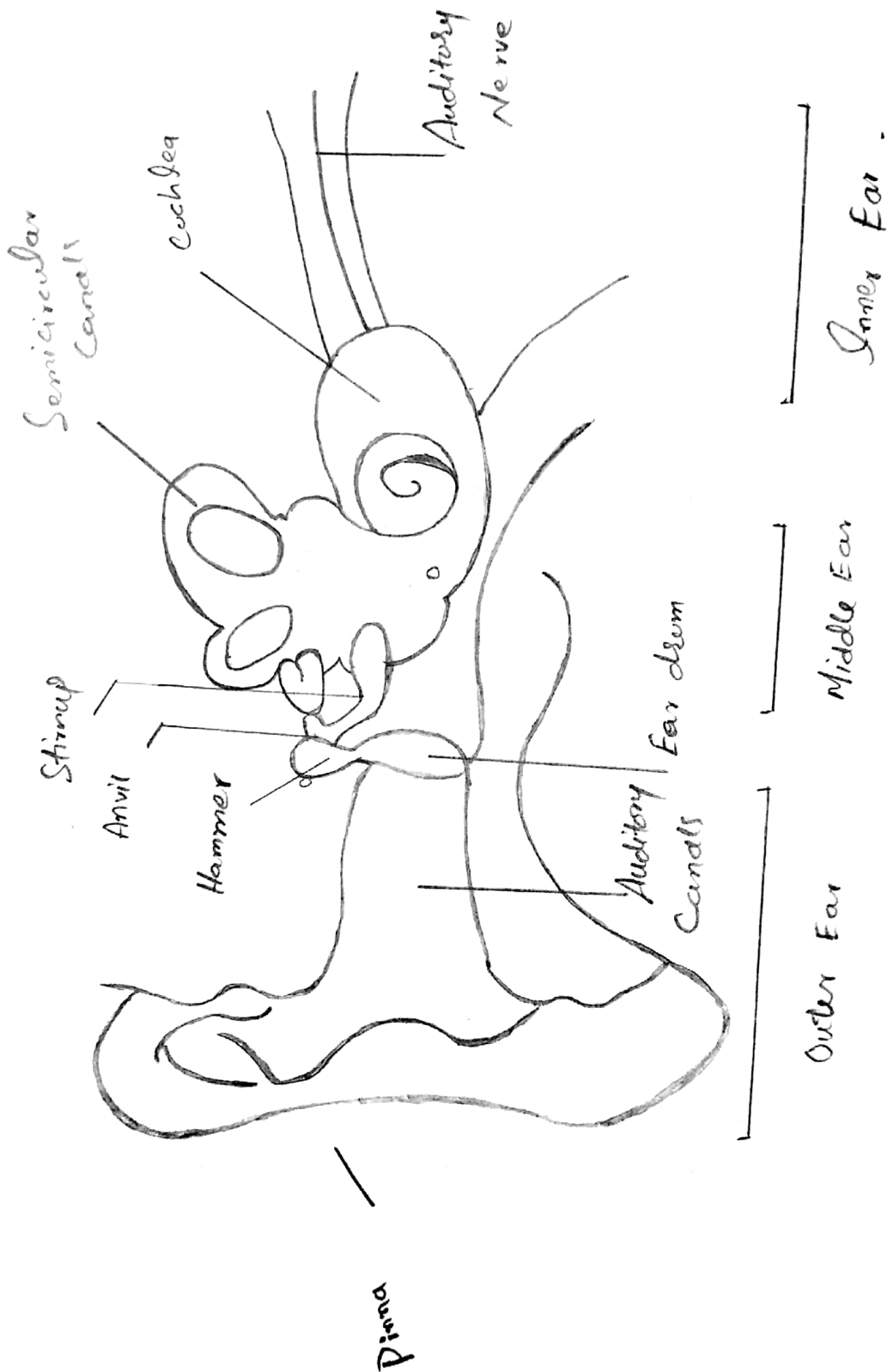
Diagram

of Ear.

are below

# Ear Diagram

## Anatomy of Ear



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Q No: 2

Ans:

→ Sub Mandibular:

This gland located in the face.

→ The submandibular gland are bilateral salivary gland.

→ This salivary gland secrete mixed serous and mucus secretion are important for

(18)

lubrication of food  
during mastication  
to enable effective  
swallowing and aid  
digestion.

Histology :- This glandular  
mass is

responsible for the  
production of 70% of  
the overall salivary  
output.

It secretes both serous  
and mucinous saliva.

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→ Anatomical position:-

→ The submandibular gland is the second of three major head salivary gland.

→ After the parotid and before the sublingual gland.

→ It is located both superiorly and inferiorly to posterior of mandible

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in the submandibular  
triangle of neck and  
makes up part of  
floor of oral cavity.

⇒ Boundaries of submandibular  
triangle:

→ Superiorly: inferior  
body of the  
mandible

→ Anteriorly: anterior  
belly of digastric  
muscle.

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→ Posteriorly :-

belly of the posterior  
diaphragm  
muscle.

## Anatomical Structure

Structurally, the  
submandibular gland  
are a pair of  
elongate flattened hooks  
which have two  
set of arms: Superficial  
and deep.

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The positioning of these arms is relation to Mylohyoid muscle which gland hooks around.

Superficial arms:-

Comprises the greater portion of the gland and lies partially inferior to the posterior half of mandible within



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an impression on its  
medial aspect:

→ It is situated outside  
the boundaries of oral  
cavity.

Deep arm:-

→ Hook around posterior  
margin of mylohyoid  
through a triangular  
aperture to enter oral  
cavity proper.

→ It lie on lateral surface  
of tongue,

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lateral to the root of  
the tongue.

Wharton's Duct

→ also known as

Submandibular duct.

arises from this  
deep part of

the gland and runs

forward, beneath the

mucosa of mouth along

the side of tongue

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→ To open medially at side of the frenulum Linguae.

→ The duct ascend on its course to open

as 1-3 orifices on

Small sublingual papilla.

→ The duct is about 5cm in length.

→ The submandibular secrete Saliva through this duct.

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## ⇒ Relationship with Nerves:-

The Submandibular gland and duct both share close anatomical relationship with three main nerves.

→ The lingual nerve.

→ The hypoglossal nerve.

→ Facial nerve.

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⇒ Lingual Nerve

→ Being lateral end  
looping anteromedially  
of submandibular duct

→ It innervate 2-3rd  
of tongue mucous  
membrane.

⇒ Hypoglossal Nerve:-

It situated deep to  
the submandibular gland  
and runs superficially  
to hyoglossus and

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deep to digastric  
muscle.

⇒ Fascial Nerve :-

passed from parotid  
gland at anterior inferior  
portion at angle of  
Jaw and curving  
down inferior to  
Submandibular gland

⇒ Blood Supply :-

The fascial and lingual  
arteries contribute to  
the blood supply of

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The submandibular gland and tons their venous drainage is provided by corresponding vein.

⇒ Innervation:-

The secretory mechanism of the submandibular gland is regulated directly by parasympathetic nervous system and indirectly sympathetic nervous system.

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## Parasympathetic

→ Control by (A) facial  
nerve.

(A) → mandibular nerve

## Sympathetic:-

→ Regulated by

(A) → Superior cervical  
ganglion.

(A) → vasoconstrictor fibers  
plexes.



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## ⇒ Sublingual Gland

→ The sublingual glands are smallest of the three major pairs of head salivary glands.

→ It is situated very deep.

→ These pairs only produce

3-5% of salivary

volume.

→ Lubricate mouth and food for easy mastication and swallowing.

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⇒ Anatomical position

The sublingual gland  
lie beneath the mucous  
membrane of floor of  
the mouth close to  
the frenulum of  
the tongue.

→ It has both serous  
and mucous acini

with lateral predomi-  
-ning.

→ The sublingual ductus  
(8 to 20 in number)  
open into mouth on  
the summit of the  
sublingual fold.

⇒ Structure :-

It is diamond  
in shape and situated  
under the tongue.

Borders :-

The sublingual gland  
bordered by the mandible

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and the genioglossus

muscle posteroinferiorly.

→ It is covered superiorly  
by the tongue.

→ Numerous ducts can  
be seen secreting

saliva along the margin

of the sublingual fold.

Histology :- In opposition  
to the parotid  
gland.

→ It secretes entirely

mucinous saliva about  
3-4% of all saliva.

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## Nerve Supply :-

→ Parasympathetic secretomotor supply is from the facial nerve via chorda tympani and submandibular ganglion.

→ Postganglionic fibers passed directly to the gland.

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## Blood supply

→ Arterial supply is from

(\*) → Sublingual artery

(\*) → Submental artery

→ Venous supply.

(\*) → Sublingual vein.

→ Submental vein.

Lymphatic:- for lymphatic

drainage submandibular lymph nodes are responsible for draining sublingual gland.

== xx == xx == xx ==

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Q Nos 3:-

Ans:-

⇒ Stone formation

Submandibular gland:-

It is also known as  
Sialolithiasis.

It means Salivary  
Calculi or Salivary Stone

It is the condition in

which calcified mass  
or sialolith form in  
a salivary gland.

It occur in the duct  
of the Submandibular

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gland termed as Wharton's duct.

Rarely occur in sublingual gland.

It may also develop

because of presence of

existing chronic infection

of gland, dehydration.

But many instance

the cause is idiopathic

If a calculus form in

duct that drain the saliva from the salivary gland into mouth.



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Then saliva which  
trapped in gland.

→ It may cause painful  
swelling and inflammation  
of gland.

→ Inflammation associated  
with blockage of duct  
is also termed as

Sialadenitis which cause  
Salivary calculi

## Division:-

The Salivary Stone  
may be divided  
according to which  
Gland they form in.

5-10% occur in  
parotid gland.

0-5% occur in the  
Sublingual Gland.

About 85% of stone

occur in the submandibular  
Gland.

## Reason:-

Several reason  
of formation of stone  
in submandibular gland.

⇒ The concentration of  
calcium in saliva  
produced by the sub-  
mandibular gland is  
twice that of the  
saliva produced by  
parotid gland.

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⇒ The submandibular gland saliva is alkaline and mucous.

⇒ The submandibular duct is long it means that saliva secretion must travel further before being discharged into mouth.

⇒ The duct possess two bends,

The first at posterior border of the

(43)

"mylohyoid muscle" and  
second near to duct  
orifice.

→ place of saliva is  
against gravity due  
to variation in location  
of duct orifice.

The orifice itself is  
smaller than that  
of the parotid.

⇒ So from the above  
reason in which  
stone more likely

(uu)

in Submandibular Gland.

⇒ Symptoms

→ Swelling

→ Difficulty in  
opening the mouth.

→ Dry mouth.

Pain.

→ Strang  
Saliva.

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⇒ 1 Diagnosis

→ MRI

→ CT

→ Sialograph.

⇒ Treatment :-

Surgery :- is required  
for large  
stone.

→ Drinking plenty of  
water to facilitate  
small stone.

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Q No: 4:-

Ans:.

⇒ Vertebrae's of Human skeleton:

→ The vertebra within region possess distinctive & distinguishing features.

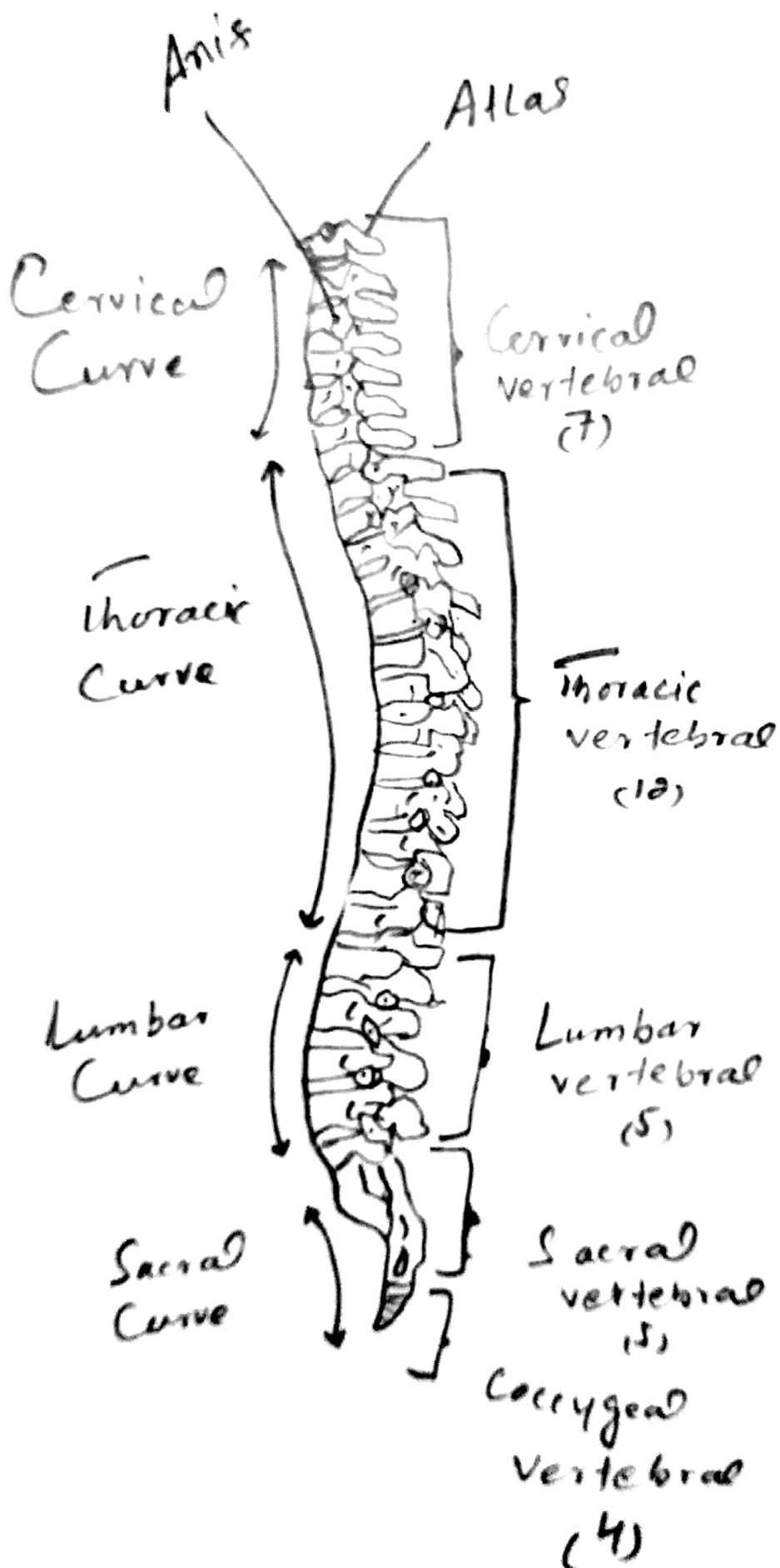
→ vertebrae are 33 individual bones that are interlock with each other to form the spinal column.

→ only 24 bones are movable.

Sacrum and coccyx are fused.



# VERTEBRAL COLUMN



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The vertebrae are numbered and divided into regions:

- ① → Cervical vertebrae.
- ② → Thoracic vertebrae.
- ③ → Lumbar vertebrae.
- ④ → Sacrum vertebrae.
- ⑤ → coccyx vertebrae.

### ① Cervical vertebrae

→ The body cervical vertebra is small and transversely broad.

→ No costal facet.

→ Support weight of head.

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There are Seven Cervical vertebrae (C<sub>1</sub> - C<sub>7</sub>).

→ first vertebra C<sub>1</sub>

is ring shaped atlas

that connect directly to skull.

→ The second vertebra (C<sub>2</sub>) is peg-shaped

axis, which has

projection called odontoid.

⇒ Spinous process ::

→ short, bifid and inclined inferiorly

⇒ Transverse process

posses a foramen transversarium for passage

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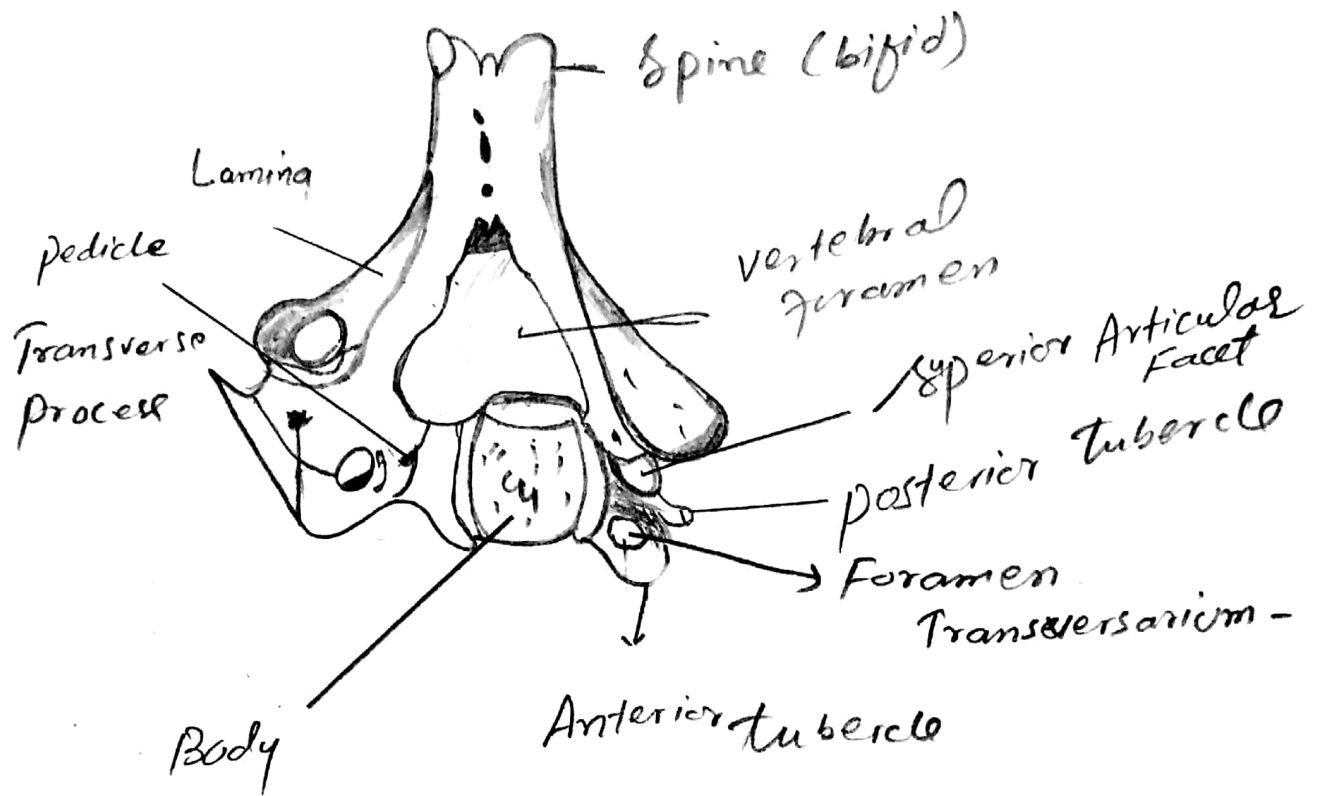
of vertebral artery and veins.

## Articular process

- Relatively flat facet
- Facet on superior
- articular processes face superiorly and posteriorly
- Body:
  - Small and transversely broad.
  - No costal facets.

## Interlaminar Space

The interlaminar space of lumbar (L3-6) vertebrae is small.



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## (2) Thoracic vertebrae

→ Twelve Thoracic vertebrae are numbered T<sub>1</sub> - T<sub>12</sub>.

→ It hold rib cage and protect the heart and lungs.

→ Range of motion is limited.

→ Body: → medium size.  
⇒ → valentine heart shape.

→ Posterior inferior corner for articulation with the head of ribs.

⇒ vertebral foramen:

→ Small and circular.

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## Spinous process :-

→ Long and inclined inferiorly

→ Thoracic spine overlap a shingle like pattern.

→ Transverse process

→ No foramen transversarium

→ possess a costal facet for articulation with tubercle of rib.

Note ::

T<sub>11</sub> and T<sub>12</sub> do not have costal facet.

## Articular process

→ Relatively flat facets

→ Facet on Superior

(57)

articular process face  
anterolordy and medially.

Note: facet on inferior

Process of T12 face  
laterally in typical  
lumbar fashion.

### (3) LUMBER vertebrae:-

→ five vertebrae are  
numbered L<sub>1</sub> - L<sub>5</sub>.

→ Much larger in  
size

→ Lifting and carrying  
heavy objects.

→ Body → large and  
kidney shape.



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⇒ Spinous process :-

→ Short, flat, quadrangular and projecting posteriorly

⇒ Transverse process :-

→ No foramen transversarium.

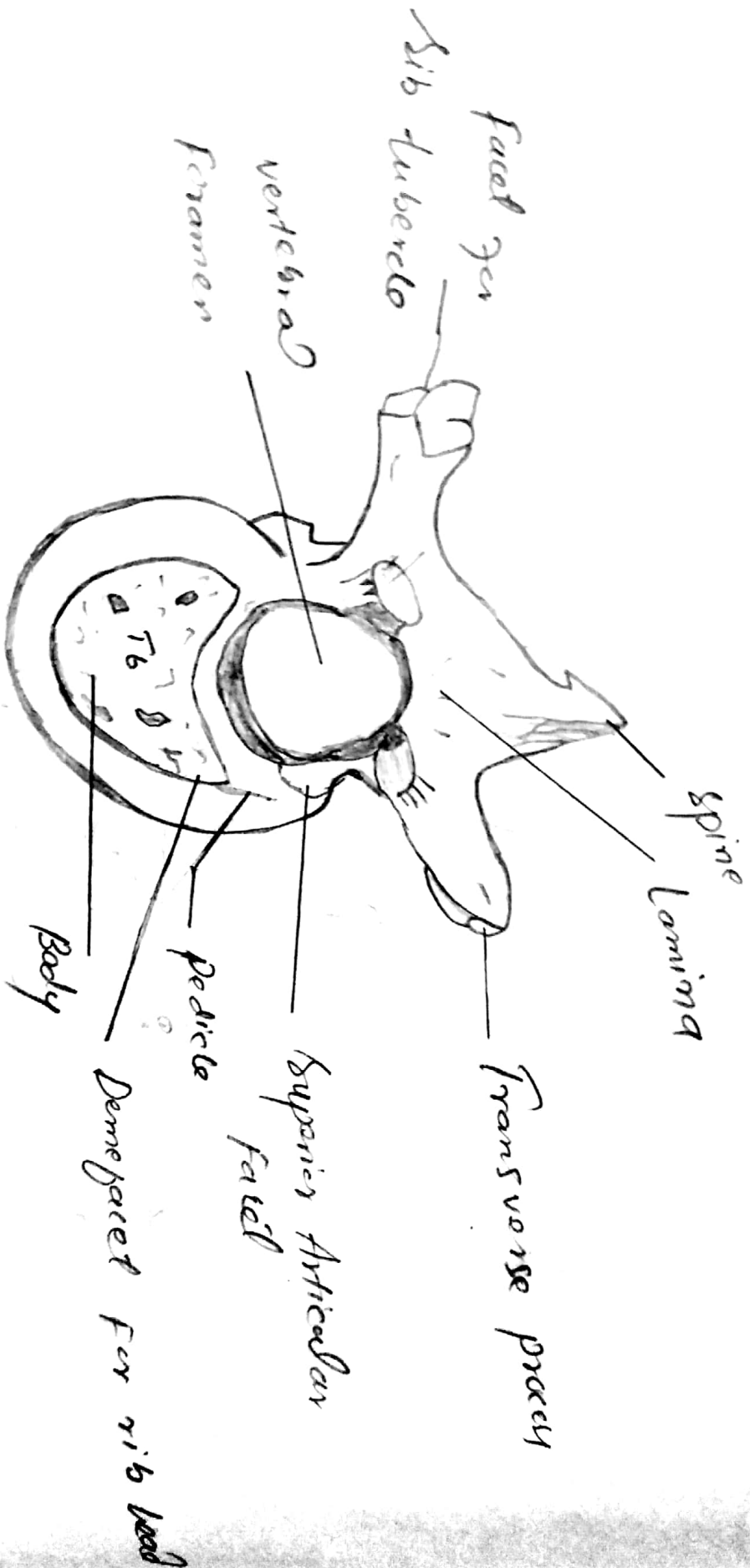
→ No costal facet.

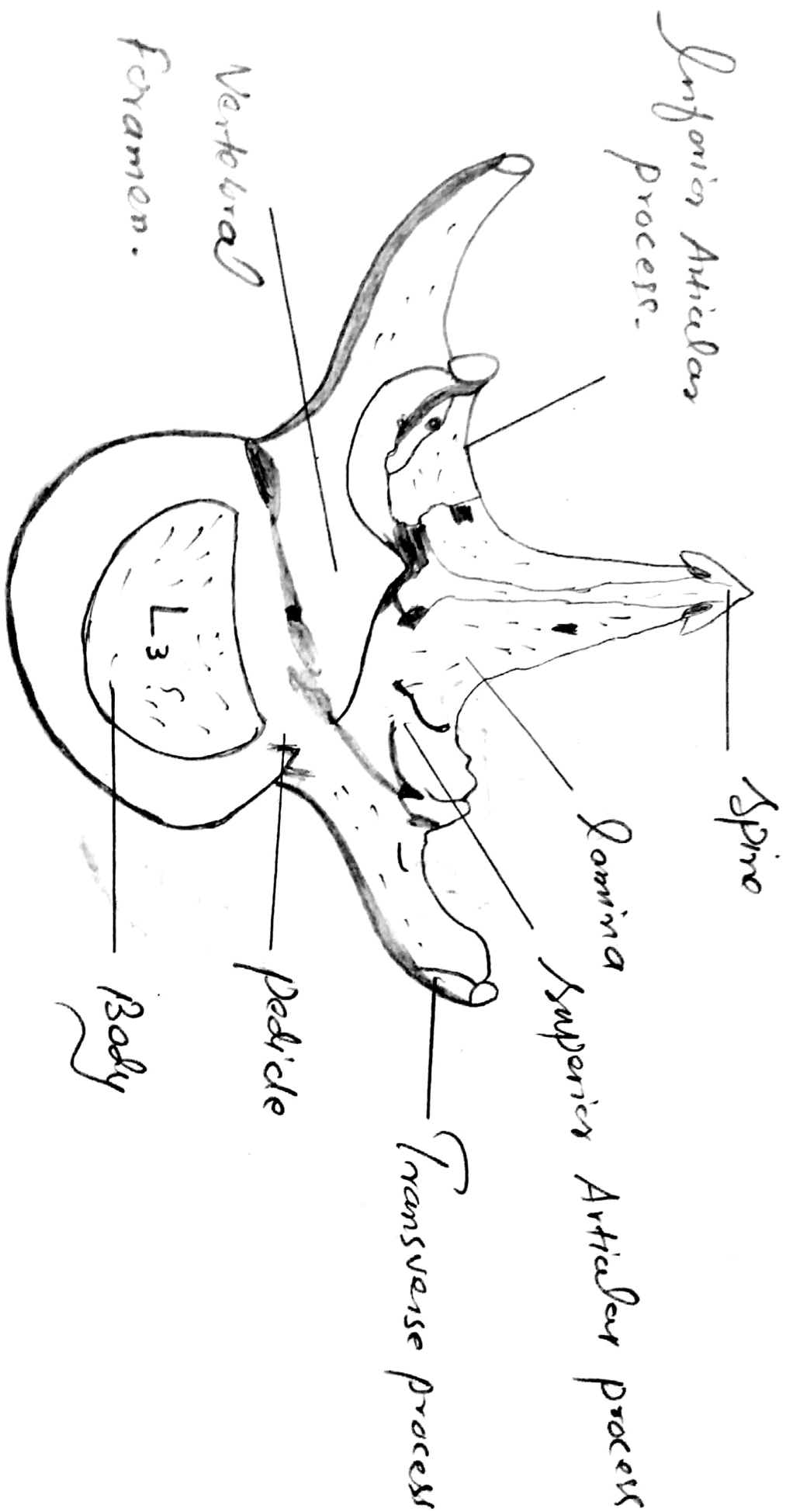
⇒ Articular process :-

→ Curved facet.

→ Facet on superior articular processes are concave and face medially.

→ Facet of inferior processes are convex and face laterally.





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## (4) Sacrum:

- There are five sacral vertebrae, which are fused together.
- It connects the spine with hip bone.
- Together with iliac bone form a ring called the pelvic girdle.

### ⇒ Base:

→ The upper border of base articulates with fifth lumbar vertebra.

⇒ Apex: → articulates with coccyx.

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⇒ Laterally:-

⇒ Laterally

Sacrum articulate with

two iliac bones to

form the sacroiliac  
Joint.

⇒ sacral promontory.

⇒ sacral canal

vertebral canal continues

into sacrum where

it form sacral canal.

⇒ It contains the

Cauda equina.

⇒ Sacral hiatus:-

The laminae of fifth

sacral vertebra and  
sometimes of fourth

fail to meet in the

(5b)

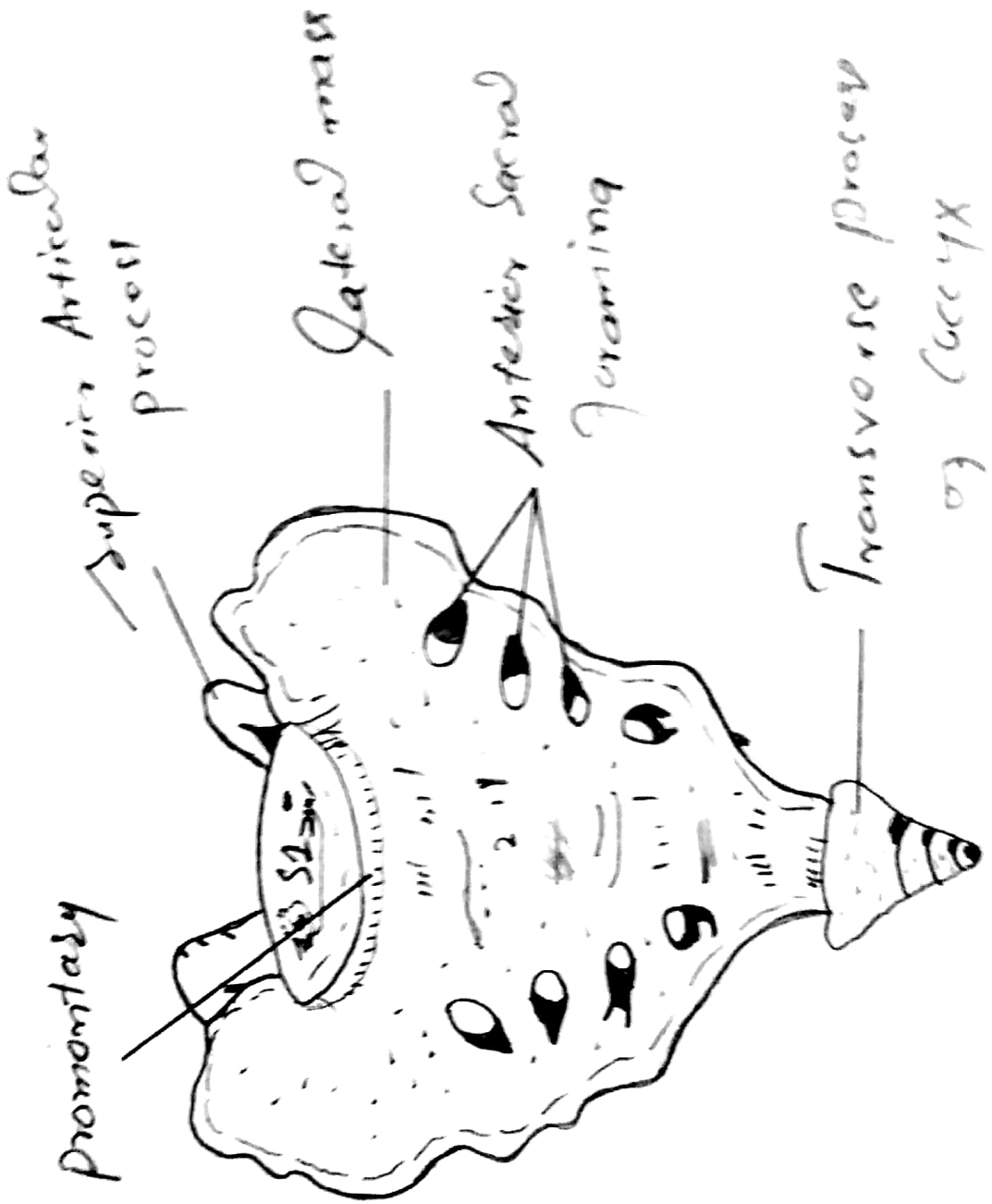
midline forming the  
sacral hiatus.

(5) Coccyx :-

usually consist of  
four vertebrae fused  
together to form a  
single small triangular  
bone that articulate  
as its base with lower  
end of Sacrum.

→ It may have only  
three vertebrae or  
five vertebrae.

→ first coccygeal vertebra  
is not fused or is  
incompletely fused with  
second vertebra.



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⇒ Q NO: 5

ANS:.

⇒ Importance of  
Radiology in  
Medical field.

→ Radiology play a vital  
importance in medical  
field.

→ Radiology is all about  
imaging for medical  
purpose.



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It includes

(\*) → Radiologist

(\*) → Radiographers

(\*) → Sonographers

(\*) → Biomedical Engineers

etc.

⇒ These are some importance of Radiology in medical field.

→ Radiology is diagnostic tool for many disease and has important

role in monitoring treatment and predicting outcome.

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⇒ X-Rays

→ Radiology is always  
starting with the  
x-rays

→ which changed the field  
medicine forever.

→ Diagnose the

broken bones.

→ Diagnose the disease.

→ So radiology is much  
more necessary  
for medical field.

(60)

→ So x-rays use radiation and with the help of these radiation technologists look at the body.

→ This allows physicians to better diagnose anything

working with bone structure or disease which leads to proper cause of treatment.

→ Along with x-rays

radiology has grown to

include other imaging technology such as:

(\*) → CT scan

(\*) → MRI

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(\*) → Fluoroscopy

(\*) → Angiography

→ These different technologies

allow for real time

Imaging of digestive

System, looking at

blood vessels providing

2D and 3D maps

of tissue within the  
body.

→ providing cross section

view of body.

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→ Without these technology  
the physicians do not  
diagnose the common  
disease

→ Central to disease  
Management?

→ With so many horrific  
disease.

It is important to  
have a good disease  
management plan.

→ Radiology play important  
role in disease management  
by giving physician more  
option, tools and technique  
for treatment.

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⇒ Doctors rely on  
Radiograph

→ In medical field

Doctors rely heavily  
on radiographers. b/c

They need accurate test  
to be able to diagnose

the issue and provide

proper treatment.

(6u)

## ⇒ Diagnostic Image:-

→ Allows for detailed information about structure or disease related changes.

→ It has ability to diagnose during early stage patient.

→ Diagnostic image will not be possible without radiology.

→ It has one of the powerful diagnostic tools therefore it give to

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• detail information to doctors.

→ It allow better treatment and better looks at what's really going on within the body.

⇒ Value of Radiology in Health Care :-

→ Radiology has a crucial role in health care.

B/c it diagnose the disorders and gives us a detail information.



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## → Treatment and Therapy

→ Radiology play important role in the treatment of cancer, stone and many other disease.

→ Guiding treatment of common condition such as injury, cardiac disease and stroke.

→ It reduce the need for exploratory surgeries.

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## Nuclear Medicines

It scan are used  
in diagnosis and to

See how internal organs  
are functioning.

### Conclusion:-

Radiology is play vital  
role in medical field.  
because it diagnose the  
disease and give the  
information about the  
pathology. and with  
help these the doctors  
treat the disease.

Without radiology

it is ~~very~~ difficult  
for doctors to know  
about the disease.

With help of radiology  
can be easily diagnose  
the disorders.

== XX == XX ==

The End

⇒ Thank You