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(1)

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Assignment = Anatomy

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Q No. 1

Ans  $\Rightarrow$  Structure of

Human Ear

The human ear are

structurally divided into

three main parts

1) External Ear

2) Middle Ear

3) Internal Ear

1) External Ear :-

has ~~four~~ (3) main parts

a) Auricle (Pinna)

b) External Auditory

c) Tympanic membrane



a) Auricle :- The

auricle is composed

of

→ Helix

→ Tragus

→ Lobule

→ Concha

→ Auricular muscle

The auricle has

characteristic shape

→ Its function is to

collect air vibration

→ The auricle is

composed of thin

elastic cartilage

Covered by skin

~~It~~ Main components

of auricle are:-

i) Helix :- The main component of Ear

→ It is the elevated margin of ~~the~~ auricle

ii) Tragus :-

→ A projection from the 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 to external meatus

v) Auricular muscle :-

→ They are essentially vestigial

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

(b)  $\Rightarrow$  External Auditory

meatus :-

$\rightarrow$  Slender curved tube

that leads from the

concha of auricle to

tympanic membrane.

$\rightarrow$  It transfer sound

waves from auricle

to tympanic membrane

$\rightarrow$  Outer Uid of meatus :-

is composed of elastic

cartilage

$\rightarrow$  Inner two Uid of

meatus :-



→ is bony in nature

→ Formed by the

lympenic plate of

tempered bone

### Main Parts External

Auditory meatus :-

i) Hair :- located at  
outer third meatus

→ prevent foreign bodies

ii) Subaceous anal

ceruminous glands

→ They are modified

sweat gland

→ Secrete a yellowish brown wax

→ Provide sticky barrier

→ block the entrance

i) Foreign bodies -

iii) Lesser Occipital &

Greater auricle nerves

iv) Auriculo temporal nerve

and auricular branches

v) Vagus nerve

v) Lymph drainage.



⇒ c) Tympanic membrane :-

→ It is thin, fibrous

structure -

→ It form the interface

b/w the external ear

and middle ear

The membrane is

→ obliquely oriented

→ facing inferiorly,

anteriorly and laterally

# External Ear Sketch

## External Ear

a) auricle

- Helix
- Tragus
- Lobule
- Concha

→ auricular muscle

b) External auditory

- Hairs
- Sebaceous gland
- Ceruminous gland
- Lesser occipital
- Greater auricular nerves
- auricular temporal nerves
- Auricular branch of vagus nerve
- Lymph nodes

c) Tympanic membrane



## 2) Middle Ear :-

→ It is air containing

cavity within petrous part of temporal bone

→ Covered with mucous membrane

→ It communicate with nasopharynx anteriorly and with mastoid antrum posteriorly

### Main Components

#### Middle Ear

(1) Tympanic cavity	(2) Auditory ossicles Eo their muscles	(3) Auditory tube	(4) mastoid area
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1) Tympanic cavity :-

It is composed of two parts

→ a) Tympanic cavity proper

— b) Epitympanic recess

a) ⇒ Tympanic cavity proper :-

→ This area directly medial to tympanic membrane.

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

Roof :- Thin plate of bone

⇒ Tegmen tympani :-



→ Part of petrous temporal bone

→ Separate epitympanic recess of tympanic cavity from dura mater

⇒ b) Epitympanic recess

→ It is the upper portion of chamber

→ Located superiorly to tympanic membrane

Tympanic Cavity :-

→ floor

→ lateral wall

→ Roof

→ posterior wall

→ medial wall

2) Auditory ossicles and

Associated Muscles :-

There are three auditory ossicles

i) → Malleus

ii) → Incus

iii) → Stapes

i) Malleus :- largest ossicle

It contain the following

parts

Malleus :-

a) → Head

b) → Neck

c) → long process

d) → Anterior process

e) → Lateral process



### 3) Auditory tube :-

It connect anterior

Wall of Tympanic cavity

to nasopharynx

→ Balance air pressure

on both side of Tympanic

membrane

→ Allow air drum - to

move easily

→ Lateral third - is bony

→ medial two-third is

cartilage

→ Mucous membrane lined

the middle ear

#### (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 :-

Honey comb like network of hollow space within in



the mastoid process

### 3) Internal Ear :-

It is located in petrous part of temporal bone

→ medial to middle ear.

→ It consists of

i) Bony labyrinth

ii) Membranous labyrinth.

#### i) Bony Labyrinth :-

Composed of

→ Vestibule

→ Semicircular canals

→ Cochlea

ii) Membranous Labyrinth:-

→ It is lodged within bony labyrinth

Membranous Labyrinth =

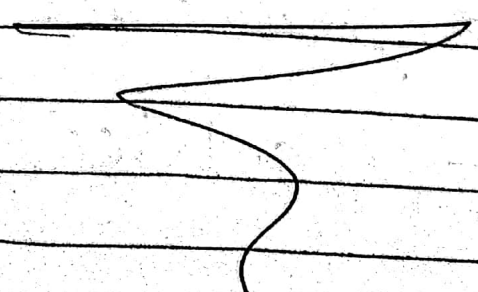
→ utricle

→ saccule

→ Three semicircular ducts

→ Ducts of cochlea.

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Q No: 2 :-

Ans :- Sub Mandibular :-

→ This gland located in the face

→ The submandibular glands are bilateral salivary gland

→ This salivary gland secrete mixed serous & mucous secretions are.

important for the 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

Anatomical Position :-

The submandibular gland is the second of the three major head salivary glands, after the parotid and before the sublingual gland.



→ It is situated both superiorly and inferiorly to the posterior aspect of the mandible in the submandibular triangle of the neck and makes up part of the ~~base~~ floor of the oral cavity.

Boundaries of submandibular

triangle :-

→ Superiorly :- Inferior body of the mandible

→ Anteriorly :- Anterior belly of the digastric

Muscle

→ Posteriorly :- posterior belly of the digastric muscle.

→ Anatomical Structure :-

Structurally, the submandibular glands are a pair of elongate flattened nodules which have two sets of arms; superficial & deep. The positioning of these arms is in relation to the Mylohyoid muscle



Which the gland hooks  
around.

→ Superficial arm : — comprises  
the greater portion of  
the gland and lies  
partially inferior to the  
posterior half of the  
mandible, with in an  
impression on its  
medial aspect. It is  
situated outside the  
boundaries of the oral  
cavity.

→ Deep Arm : — Hooks  
around the posterior

The posterior margin of mylohyoid through a triangular aperture to enter the oral cavity proper. It lies on the lateral surface of the hyoglossus, lateral to the root of the tongue.

Wharton's duct :-

also called submandibular duct, arises from this deep part of the gland and runs



Forwards

beneath the mucosa of  
the mouth along the  
side of the tongue,  
→ to open immediately  
at the side of the  
frenu-lingual linguae.

The duct ascends on  
its course to open  
as 1-3 orifices  
on small sublingual

Bipilla

→ The duct is  
about 5 cm in length

→ The submandibular secretes saliva through this ducts.

### 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



Lingual Nerve :-

→ Begning lateral and

looping antero medially

of submandibular duct

→ It innervate 2-3rd of

tongue mucous membrane.

Hypoglossal Nerve :-

It situated deep to the

submandibular gland &

runs superficial to

hyoglossus and deep

to digastric muscle

Facial Nerve :-

Passed from parotid

gland at anteroinferior  
portion at the angle  
of jaw & curving  
down inferior to the  
submandibular gland.

Blood supply :-

The facial and  
lingual arteries contribute  
to the blood supply  
of the submandibular  
gland and 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

Parasympathetic :- control

by

→ Facial Nerve

→ mandibular Nerve

Sympathetic :- regulated

by

→ Superior cervical ganglion

→ vasoconstrictor fiber plexus

## Sublingual gland :-

The sublingual glands are the smallest of the three major pairs of head salivary glands & are situated very deep

→ These pair only

produce 3-5% of

all salivary volume

→ Lubricate mouth &

food for easy mastication

& swallowing



## Anatomical Position :-

The sublingual gland

lies beneath the mucous

membrane (sublingual fold)

of the floor of the

mouth close to the

frenulum of the

tongue

→ It has both

serous and mucous

acini. with later

predominating.

→ The sublingual ducts

(8 to 20 in number)

Open into the  
mouth on the summit  
of the sublingual  
fold.

Structure :-

It is almond shaped  
(ovoid) situated under the  
tongue

Borders :-

The sublingual gland  
bordered by the the  
mandible anteriorly  
& the genioglossus  
muscle posteriorly



→ 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 secret entirely  
mucinous saliva about  
3-4% of all saliva.

Nerve Supply :-

Parasympathetic secretomotor

supply is from the

facial nerve via the

chorda tympani &

submandibular ganglion

→ Postganglionic fibers

passed directly to

the gland.

Blood Supply :-

Arterial supply is from

→ sublingual artery

→ submental artery

Venous supply is from

→ sublingual vein



$\xi$   
 → Submental vein

~~Sub~~

Lymphatic :-

For lymphatic drainage

Submandibular lymph

nodes are responsible

for draining sublingual

glands.



Q No 3 :-

STONE formation in

submandibular gland :-

Ans :- It is also called

sialolithiasis, which means

salivary calculi or

salivary stone.



It is a condition

where a calcified mass

or sialolith forms with

in a salivary gland

→ It is usually occur

in the duct of the

submandibular gland



also termed as

« Wharton's duct »

→ less commonly occur

in the Parotid Gland

→ Rarely occur in

the Sublingual Gland

→ Sialolithiasis may

also occur because of

the presence of existing

chronic infection of the

gland, dehydration

→ e.g. Case of Pheno-

-thiazine Stogren's syndrome

and increase blood

level of calcium

→ But in many instances the cause is idiopathic (unknown)

→ It is a calculus form in the ducts that chokes the saliva from a salivary gland into the mouth, then saliva will be blocked in

the mouth

→ This may cause painful swelling and inflammation of the gland.



→ Inflammation associated with blockage of the duct is also termed as 'Sialadenitis' which cause Salivary calculi

### Division

Salivary stones may be divided according to which gland they form in

→ About 85% of the stone occur in the submandibular gland

→ 10-15% occur in parotid gland.

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→ 0-5% occur in

Sublingual gland

→ Minor gland is very

rarely affected.

⇒ Why Stone Formation

is more common in

the sub mandibular

Gland :-

⇒ Reason :- There

are many reason

of stone formation

commonly occur in

sub-mandibular gland



→ The concentration of calcium in saliva produced by the submandibular gland is twice that of the saliva produced by the parotid gland

→ Submandibular saliva is also relatively alkaline and mucous

→ The duct of submandibular is long in length, meaning that saliva

Secretions must travel further before being discharged into the mouth.

→ The duct possesses the two bends, the 1st at the posterior border of the mylohyoid muscle and the second near the duct orifice.

→ The flow of saliva from submandibular gland is often against gravity due to variation in



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The location of duct  
orifice

→ The orifice is itself  
is smaller than that of  
the parotid gland orifice

→ This all factor promote  
stowing and stasis of  
saliva in the submandibular  
duct

→ which lead to an  
obstruction with more  
directly calcification.

→ which result into  
stone formation.

So, these are the reasons  
of stone development more  
commonly in submandibular  
glands than parotid glands.

### Symptoms :-

- Swelling
- Difficulty in opening  
the mouth
- Dry mouth
- Pain
- Strange tasting of  
saliva.



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## Diagnosis :-

- CT
- MRI
- X-ray
- Sialography.

## Treatment :-

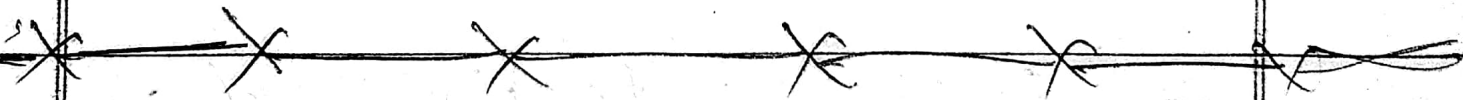
→ Drink of water

many glass every day

to remove small stone

→ For large stone

surgery is required.



Q NO: 4 :-

Ans: -

Vertebrae's

Human skeleton

→ The vertebra in a specific region possess distinctive distinguishing features

→ There are 33 individual bones that are combine & interlock with each other to form spinal column

→ out of which only 24 are movable



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While Sacrum & Coccyx  
are fused & immovable

The vertebrae are  
numbered and divided  
into regions

- 1) Cervical vertebrae
- 2) Thoracic vertebrae
- 3) Lumbar vertebrae
- 4) Sacrum vertebrae
- 5) Coccyx vertebrae.

D. Cervical vertebrae :-

→ The body cervical vertebrae is small and

transversely broad

→ No costal facet

→ support weight of head

→ Cervical vertebrae are

seven in number (C<sub>1</sub>-C<sub>7</sub>)

→ The 1st atlas (C<sub>1</sub>)

vertebrae is ring shaped

which is directly connected

(to skull)

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



axis, which has projection called adontoid

⇒ Spinous process

→ Short, bifid and inclined anteriorly

⇒ Transverse process

Posses a foramen

transversarium for passage

of vertebral artery

and vein.

⇒ Articular process

→ Relatively flat facet

→ Facet on superior

→ articular processes

face superiorly & posteriorly.

Body :-  
small & transversely  
broad

→ No costal facets

### Interlaminar Space

The interlaminar space

of cervical (C3-C6)

vertebrae is small

2)

### Thoracic Vertebrae :-

Thoracic vertebrae are

12 in number from

T1 - T12

→ It holds rib cage  
and protect the heart

& lung.



→ Range of motion is limited

Body :- → medium size

→ valentine heart shape

→ Posterior, inferior corners

for articulation with the head of ribs

Vertebral formation :-

small & circular

Spinous process :-

inclined inferiorly &

long.

→ Thoracic spine overlaps

a shingle like pattern

## Transverse Process

→ No Foramen transversarium

→ Possess a costal facet

for articulation with tubercle  
of rib

→ T<sub>11</sub> & T<sub>12</sub> do not  
have costal facet

## Articular process :-

→ Relatively flat facet

→ Facet on superior

articular process base

inferiorly and medially

Note :- Facet on

inferior process of T<sub>12</sub>

base laterally in typical lumbar fashion



3) Lumbar vertebrae :-

→ Five vertebrae are

numbered L1-L5

→ very large in size

→ helps in lifting and

carrying heavy objects

Body :- Large &

kidney shaped

⇒ Spinous Process

→ Short & flat

triangular and projecting

posteriorly

⇒ Transverse process :-

→ No Foramina transversarium

→ No costal facet

## Articular process :-

→ curved facet

→ facet on superior

articular process are

concave and face

medially

→ facet of inferior

process are convex

and face laterally

## (4) Sacrum :-

→ five in number

→ fused together

→ connect the spine

with hip bone



→ Together with iliac bone form a ring called the pelvic girdle

Base :- The upper border or base articulates with fifth lumbar vertebra

Apex :- Articulate with coccyx

Laterally :- Laterally sacrum articulates with two iliac bones to form the sacroiliac joint

⇒ Sacral promontory

⇒ Sacral canal

⇒ Sacral canal :-

Vertebral canal continues

into sacrum where it

form sacral canal

⇒ It contain the

cauda equina.

Sacral hiatus :-

The laminae of 7th

sacral vertebrae and

some of 4th pair

to meet in the

midline forming the

sacral hiatus



5) Coccyx :-

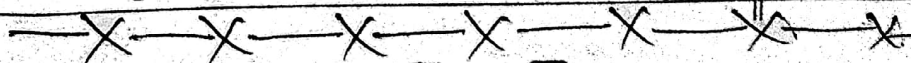
usually consist of four vertebrae closely fused together to form

a single small triangular bone that articulate at its base with lower end of sacrum

→ It may have only three vertebrae or five vertebrae

→ 1st coccygeal vertebrae is not fused or is incompletely (partially)

fused with second vertebrae



Q No 5 :-

Importance of Radiology  
in medical field :-

Ans :-

Radiology is all about imaging for medical (sciences) purposes.

→ It usually includes radiologists, radiographers, Sonographers, Biomedical engineers, Nurses, medical Physicists, technologists and other cooperative staff



→ Radiology has numerous importance in medical field some which are following.

→ Radiology is the key diagnostic tools for many disease and has important role in monitoring treatment and predicting out comes.

→ It has number of imaging modalities which play a crucial role in medical care.

## X-Ray :- Radiology

Started with the discovery  
X-ray which changed  
the medical field forever

→ The ability to use  
imaging to see inside  
the body

→ Diagnosis a broken  
bone, diagnose other

Pathology of different  
diseases and so much  
more has made

Radiology necessary

for medical field



→ X-rays use radiation to look through the body and see foreign objects and bones.

→ This allows physicians to better diagnose anything wrong with the bone structure or other disease which leads to the proper course of treatment.

### Other Imaging:

Along with X-ray radiology has grown to include other

Imaging system such  
as CT, MRI, Fluoroscopy  
& Angiography

→ These different technologies  
allow for real time  
imaging of the digestive  
system, looking at the  
blood vessels providing  
2D & 3D images of  
tissue within the  
body and providing  
cross-section views of  
the body



→ without these technologies it would be very difficult for physicians to diagnose many of the common diseases.

### Need of Radiographers

Now a days medical field, doctors rely heavily on radiographers. They need accurate tests to be able to diagnose the issue and provide the proper treatment.

Importance in disease

management :-

With so many

fatal, infections, &

horrific diseases it

is important to

have good disease

management

→ Radiology plays

huge role in disease

management by

offering a doctor

a wide range options,

tools & techniques

for detection & treatment.



## Diagnostic Images -

→ Diagnostic image allows for detailed information about structure or disease-related changes

→ It has the ability to diagnose during early staging, patients may be saved.

→ Without radiology, this may not be possible

→ When all comes down to it

→ Radiology saves

lives

→ Its vital in

medical field because

it is one of the

most powerful diagnostic

& treatment tool in

hospital

→ And it will be

much harder to

even fix something

as simple as a

broken bone

→ Diagnostic imaging



allows better treatment

& prevention, it

also allow better look

at what's going on

with in body.

The value of Radiology

in health caring :-

→ It play key role

in health care.

Prevention & Screening :-

The value of screening

leads to early detection,

staging & treatment

## Treatment and therapy :-

→ Treatment monitoring

with imaging and

diagnosis methods

→ Now a days

Radiology also play

a very important role

in the treatment of

Cancer, Stone and

many other diseases

→ It reduces the

need for exploratory

surgeries

→ Guiding treatment



of common condition  
such as injury >  
cardiac disease &c  
Stroke etc

### Interventional Radiology :-

Provide treatment &  
diagnosis

→ It is not-risky  
as surgery with  
early recovery

### Nuclear medicine :-

Its scans are used in  
diagnosis and to see  
how internal organs  
are functioning

—X—X—X—X—X—X—