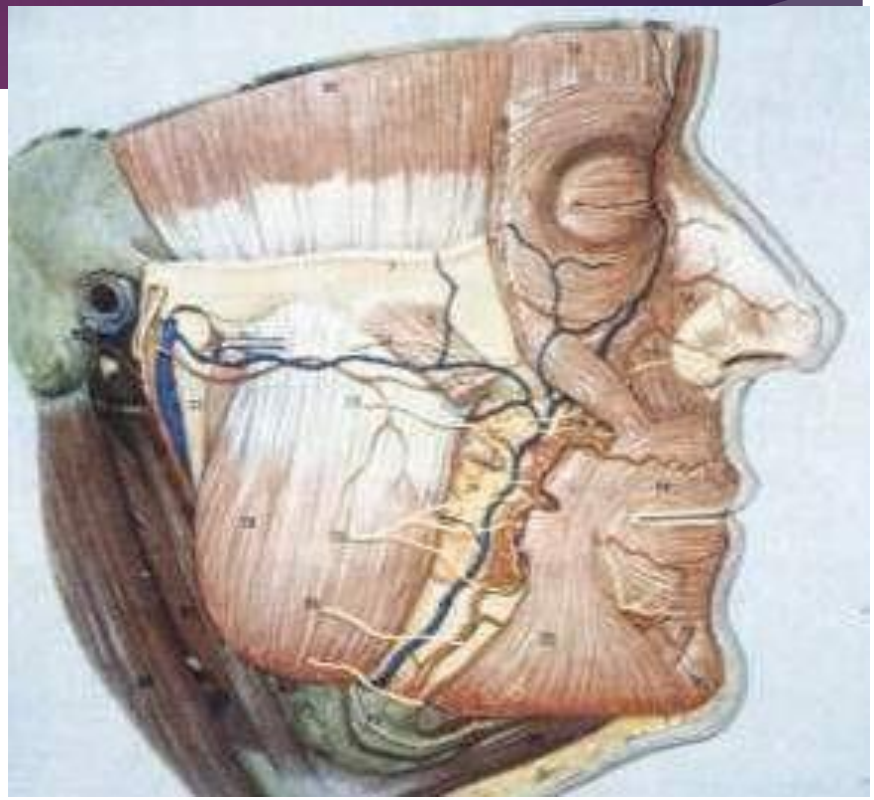
Anatomical Landmarks

Dept. of Prosthodontic Dental Sciences
College of Dentistry

Learning outcomes

- To know the definitions and terminology
- To understand the types of anatomical landmarks
- To understand the importance of each landmarks in prosthodontics
- To recognize the link between landmarks

- A knowledge of the oral anatomy and physiology will give the operator a positive guidelines during denture construction



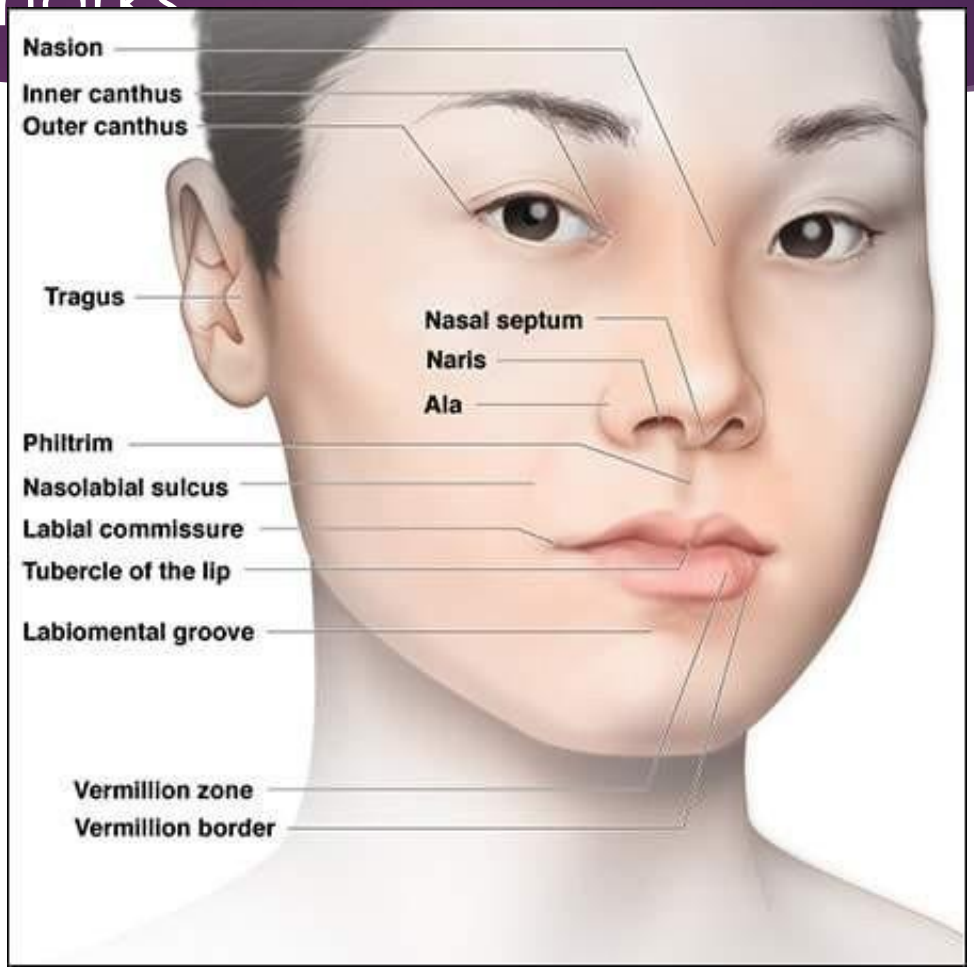
This subject will be discussed under

I. **Extra-oral landmarks of prosthetic importance**

II. **Intra-oral landmarks of prosthetic importance**

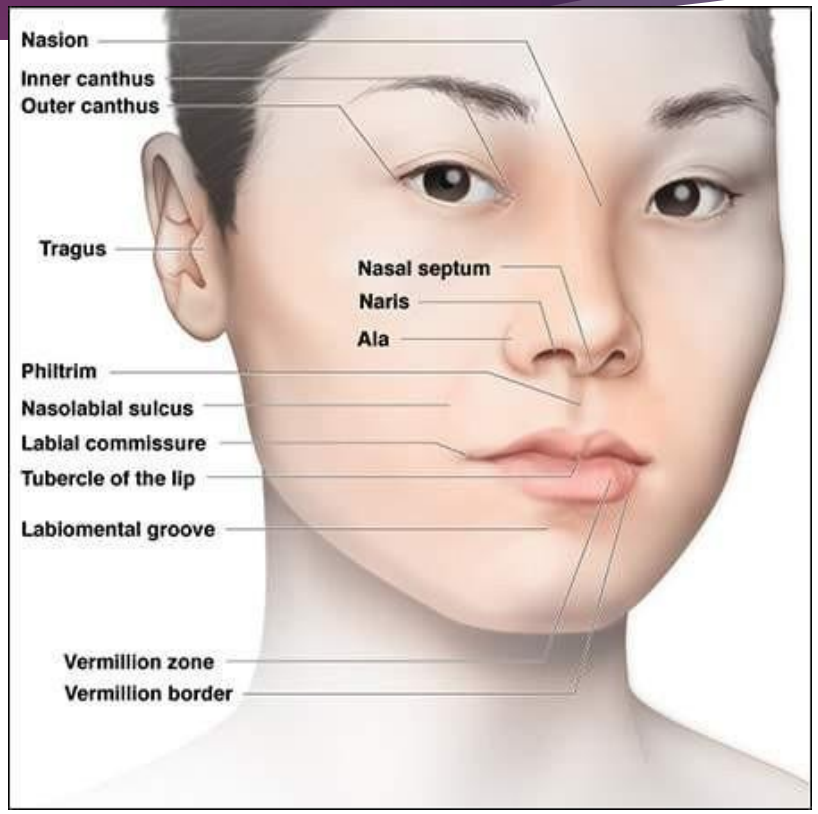
1. **Supporting structures**
   a. In maxilla
   b. In mandible
2. **Limiting structures**
   a. In maxilla
   b. In mandible

I. Extra-oral landmarks



I. Extra-oral landmarks

1. Inter-pupillary line
2. Ala- Tragus line
3. Canthus Tragus line
4. Naso-labial sulcus
5. Vermillion border
6. Mento-labial sulcus
7. Philtrum
8. Modiolus

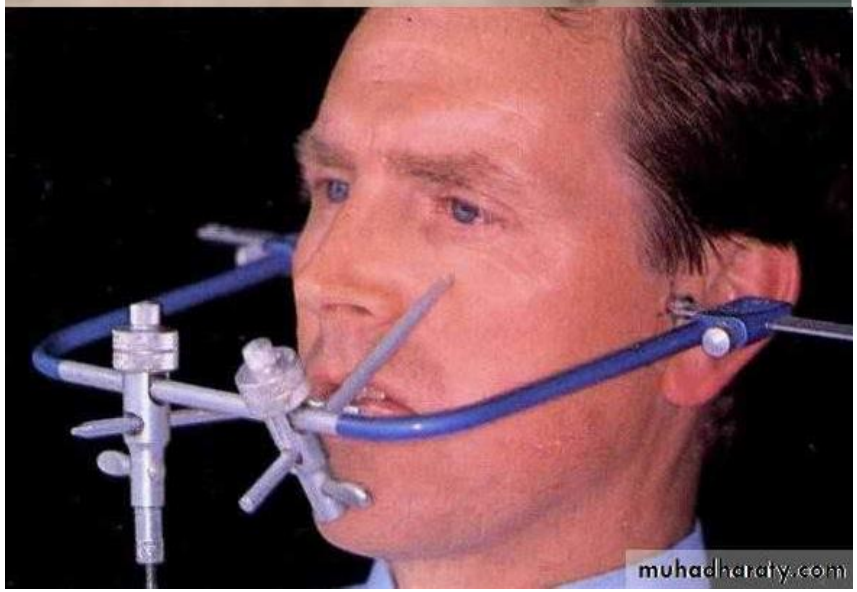


1. Inter-pupillary line

- This is imaginary line running between the two pupils of eye when patient is looking straight forward.
- This line is used for proper orientation of the maxillary anterior occlusal plane for establishing anterior occlusal plane for artificial anterior teeth

2. Canthus-tragus line

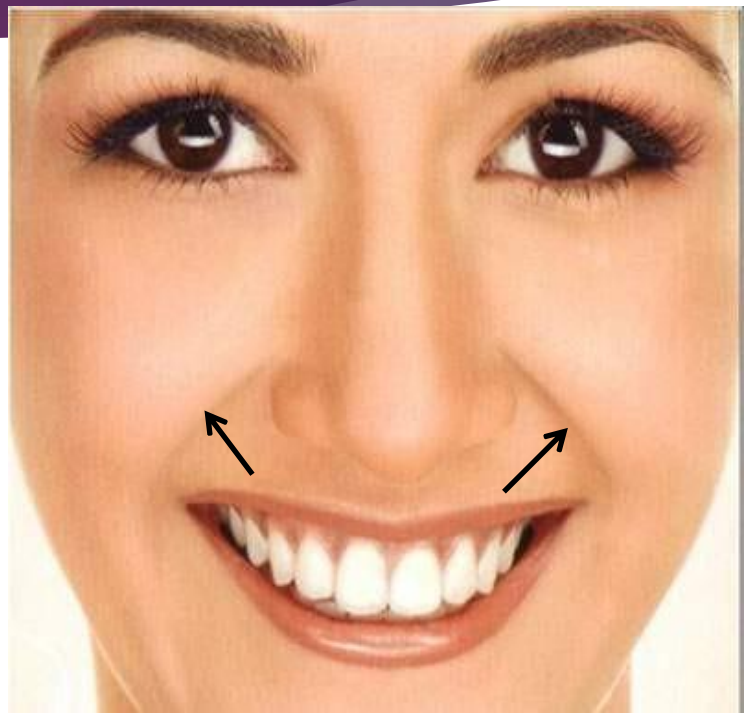
- This is an imaginary line running from the outer canthus of the eye to superior border of the tragus of the ear.
- This line is used in locating the position of the condyle



3. Ala-Tragus line

- This is imaginary line running from the inferior border of the ala of the nose to the superior border of tragus of ear (Camper's line).
- This line is used in establishing the posterior plane of the artificial teeth of the denture

4. Naso-labial sulcus



- This is a depression that extends from the **Ala** of the nose in a downward and lateral direction to the meeting point of the upper and lower lips (**Corner of the mouth).**
- It become deeper and more prominent with aging and also due to loss of teeth
- It can be restored to normal contour by proper positioning of anterior teeth of the denture, proper establishment of the occlusal vertical dimension and upper labial flange

5. Naso-labial angle

- It is the angle between Columella of nose and Philtrum of lip
- Normally it is 90^0 when viewed laterally
- Following loss of teeth and loss of support it becomes obtuse

6. Philtrum

- This is a diamond shape area between the center of the upper lip and the base of nose
- It becomes distorted with the loss of teeth and alveolar bone of labial arch
- Improper teeth alignment may also obliterate the philtrum

7. Vermillion border

- This is the transitional epithelium between the mucous membrane of the lip and the skin.
- The amount of vermillion border showing on the lips depend on
  - Bulk of orbicularis oris muscle.
  - The amount of the labial alveolar bone
  - The alignment of anterior teeth

  It improved by proper modification of denture flanges and the position of the anterior teeth.

8. Angle of the mouth

- Angle of the mouth (commissure).
- Denture should support mouth angle through proper vertical dimension
- Failure to get support may lead to fungal infection and development of *angular chielitis*

9. Mento-labial sulcus

- This line run from side to side horizontally between the lower lip and chin
- It might indicate the character of the *maxillo-mandibular* relationship
  - It is obtuse in Angle's class I
  - It is acute in Angle's class II
  - It is nearly 180 with Angle's class III

10. Modiolus

- This is located at the confluence of the buccinator and other facial muscles near to angle of the mouth
- With the loss of teeth , the *modiolus* droops and is frequently displaced.
- Proper arrangement of upper teeth (premolars) return it to normal shape

ANATOMICAL LANDMARKS IN THE MAXILLA

The anatomical landmarks in the maxilla are:

Limiting Structures

- Labial frenum
- Labial vestibule
- Buccal frenum
- Buccal vestibule
- Hamular notch
- Posterior palatal seal area (vibrating line).
- fovea palatina.

- **Supporting Structures**
- *Primary stress-bearing areas:*
- Hard palate.
- The postero-lateral slopes of the residual alveolar ridge

Secondary stress-bearing areas:

- Rugae
- Maxillary tuberosity.

lief Areas

- Incisive papilla
- Cuspid eminence
- Mid-palatine raphe

II. Intra-oral landmarks

It is quite essential to have knowledge of the tissues that support the dentures. These tissues also help the dentures in obtaining their retention and stability.

- There are certain tissue areas or regions in the edentulous foundations, which are better suited to bear the stresses due to mastication, and are called as ***stress bearing areas.***

- While there are other tissue areas which are not quite suited to take up these stresses, either due to their anatomy or due to the structures that lie beneath them and are called ***stress relief areas****.*

- The structures which limit the extension of the maxillary and mandibular complete dentures are called ***border-limiting areas.***

1. Stress bearing structures

- The surfaces of oral structures that resist forces, strains, or pressures brought on them during function

- The portion of the mouth capable of providing support
- for a denture also known as DENTURE FOUNDATION/ DENTURE BASE AREA

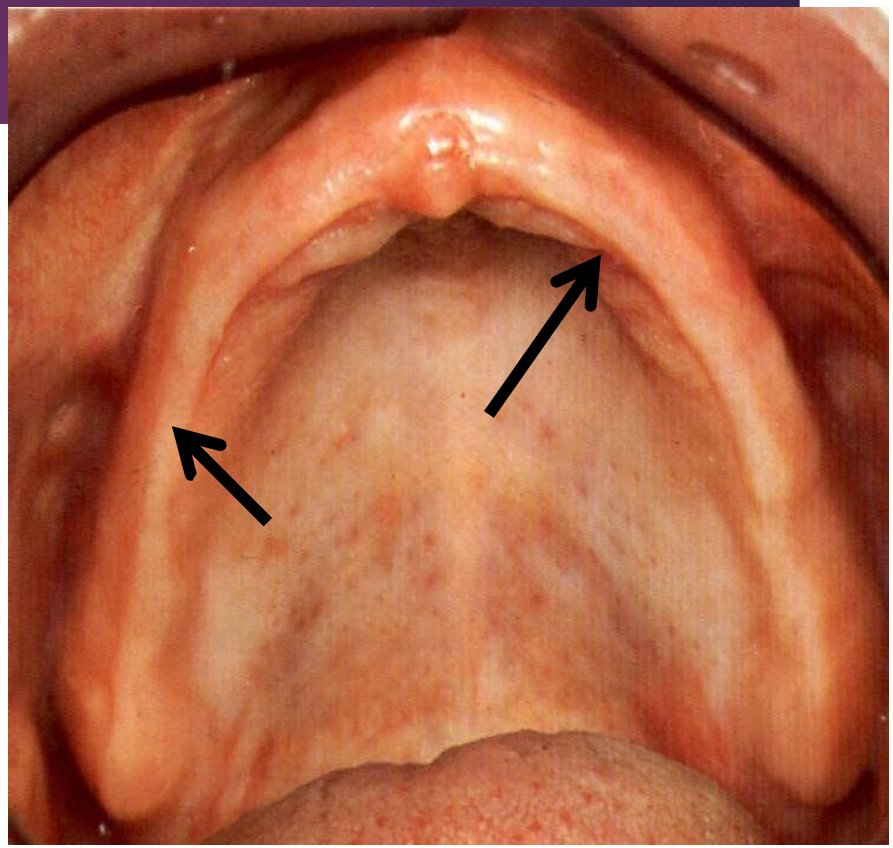
2. Limiting structures

Border / limiting structures: These are the structures that limit /define the zone upto where the denture borders can be extended.

II. Intra-oral landmarks

1. **Bearing structure of Maxilla**

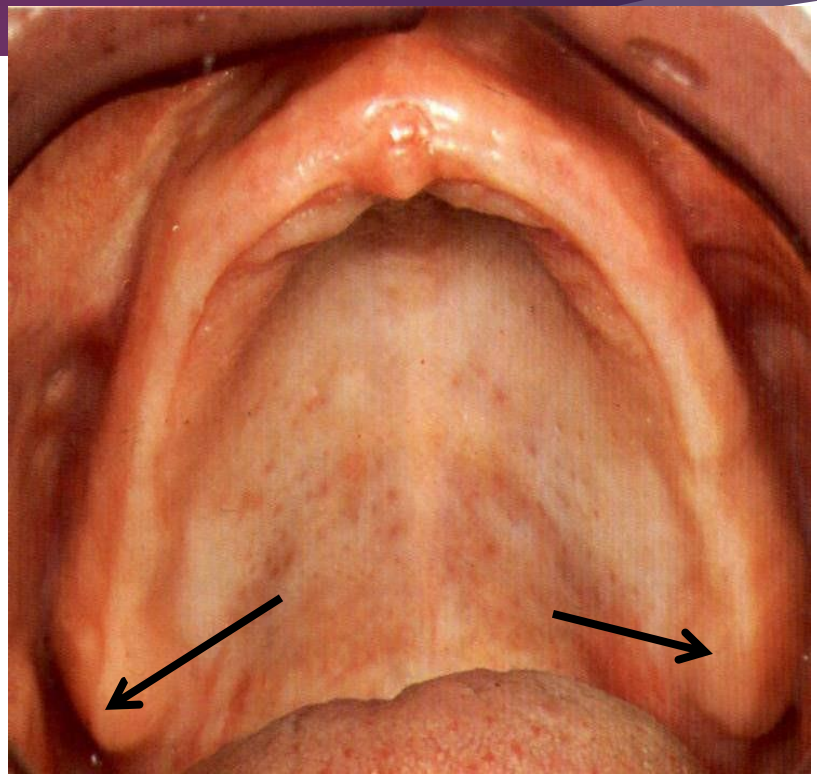
1. Residual ridge



- It is the portion of the alveolar process and its soft tissue covering that remains after removal of teeth
- It is considered 2ry stress bearing in the upper jaw because the crest of the ridge is covered with layer of dense fibrous connective tissue which is the most favorable for supporting denture

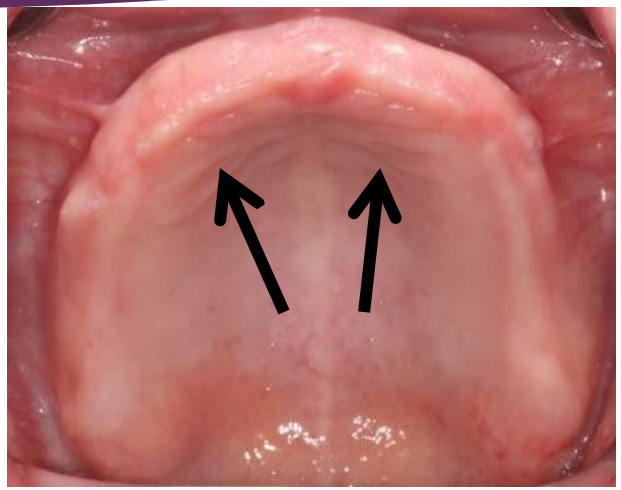
2. Maxillary tuberosity

- It is round prominent bulge located just behind and above the distal end of maxillary ridge
- It is important for retention and support of the maxillary denture and hence should be covered with denture 1ry stress bearing area.
- Extremely large tuberosities may need surgical correction before denture fabrication



3-The palatine rugae

- This are irregularly shaped ridges of dense connective tissues radiating from the median suture in the anterior one third of the hard palate
- It play role in speech specially letter S
- It should not disturbed by impression in order to insure maximum comfort
- It consider secondary stress bearing area as it resist the forward movement of the denture



Relief Areas

These areas resorb under constant load or contain fragile structures within. The denture should be designed such that the masticatory load is not concentrated over these areas.

Relief Areas

- Incisive papilla
- Cuspid eminence
- Mid-palatine raphe

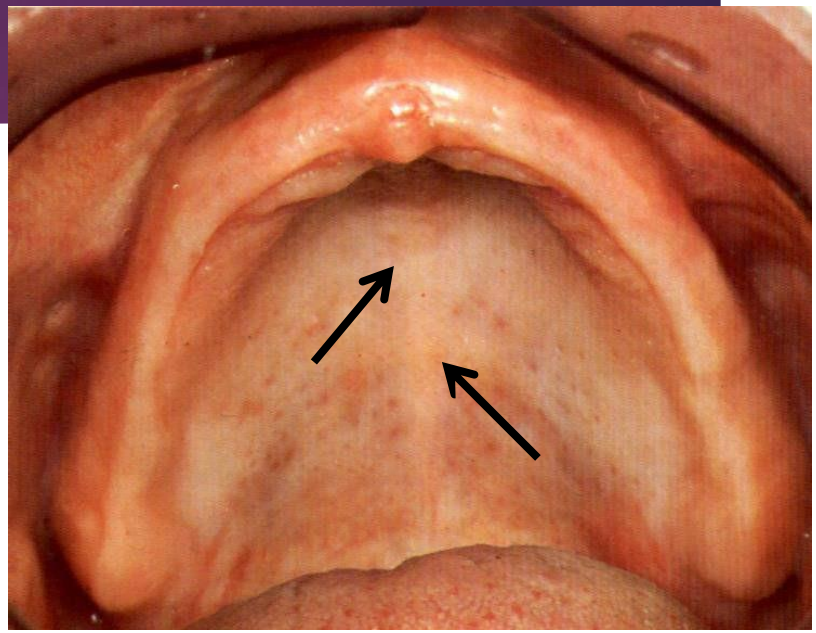
1. Incisive papilla

- It is pear shape elevation of soft tissue situated at the midline just posterior to the crest of the edentulous ridge just behind central incisor
- It cover the opening of incisive foramen through which nasopalatine nerve and vessels pass
- It consider midline landmark set 8-10mm from the incisal edge of central incisor
- It should be relieved in denture to avoid any possible interference with nerve and blood supply

2.Canine eminence

- It is a round elevation in the corner of the mouth, it represent the location of the root of the canine which is helpful to be use as a guide for the arrangement of maxillary anterior teeth.

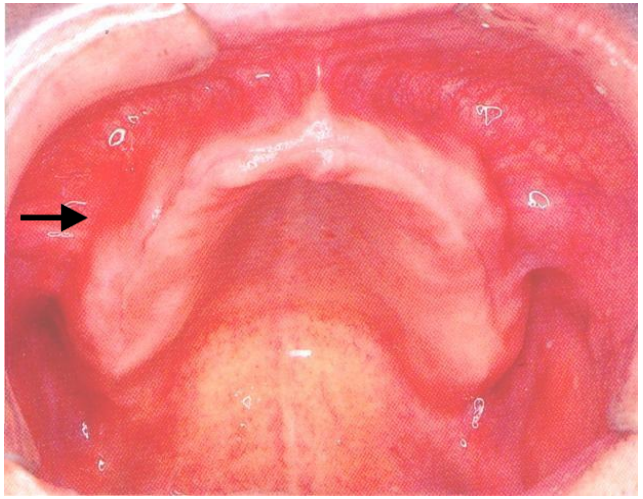
3. Median palatine raphe



- The hard palate is formed by premaxilla and two palatine processes of maxillary bone
- The suture that join the two palatine process at the midline is called mid-palatal suture. It is covered with thin layer with muco-periostium with little or no submucosa. Its position in mouth called ***median palatine raphe***
- It is hard and sensitive need relief in denture to prevent rocking or fracture of denture

Zygomatic process

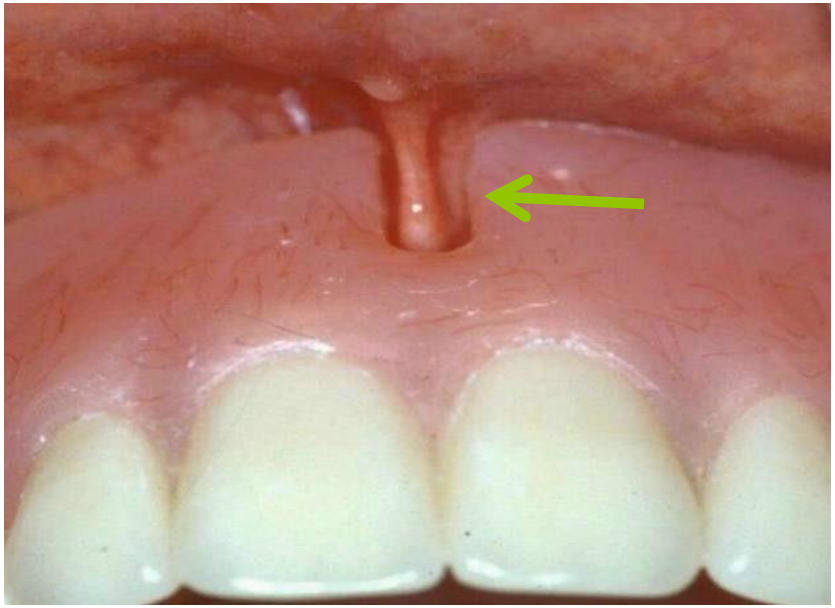
- It is located opposite to the 1st molar region, hard area found in the mouth that has been edentulous for long time. Relief over this area may be required to prevent soreness of the underlying
- tissues.



2. Limiting structures of maxilla

1. Labial frenum

- It is a fold of mucous membrane that contain no muscle fibers, extending from the mucous membrane of lip toward the residual ridge on the labial surface.
- It may be single or multiple, narrow or wide
- Labial notch must be done in denture border to provide complete freedom of motion of the frnum.

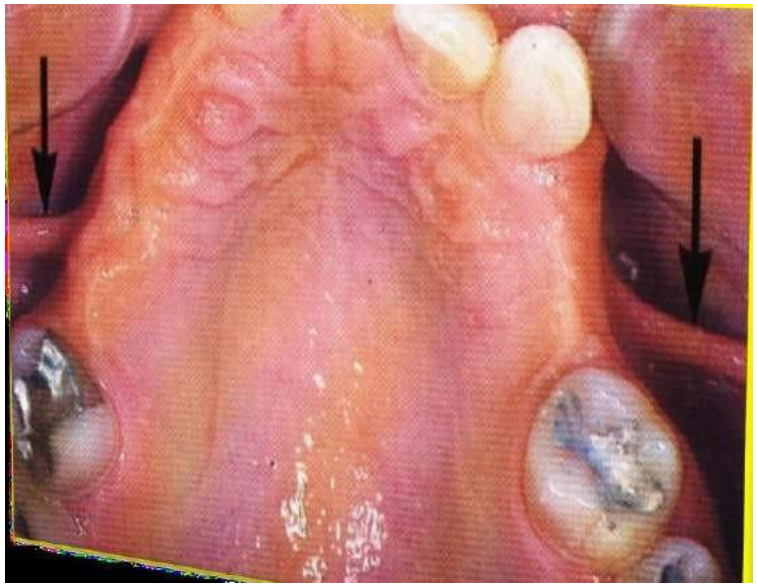


2. Labial vestibule

- It is the reflection of the mucosa between the lip & labial alveolar bone
- It extend from labial frenum to buccal frenum
- It determine the height of vestibule
- It limit the thickness and length of the labial flange of the denture in the anterior area

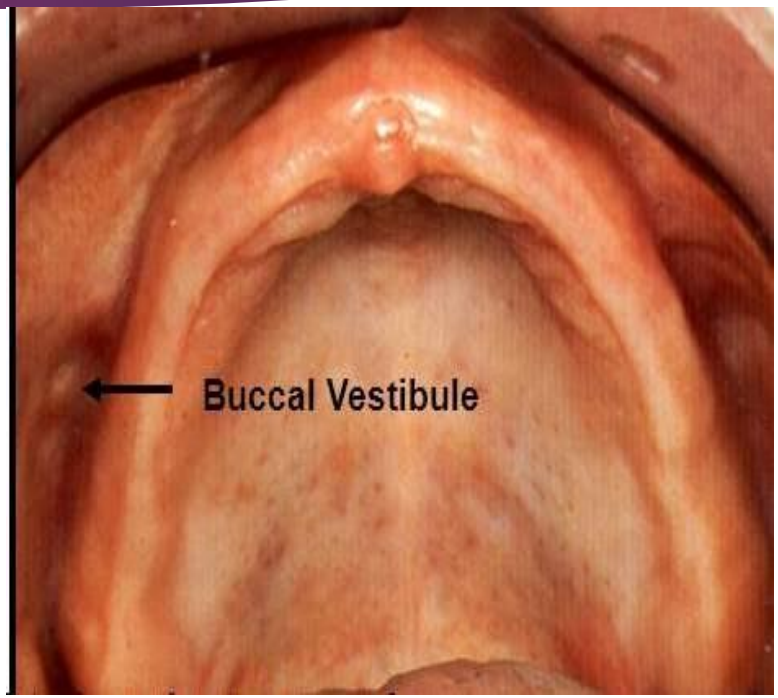
3. Buccal frenum

- It is fold of mucous membrane that varies in size number and position.
- It extend from the buccal mucous membrane reflection toward the crest of the ridge
- Inadequate clearance of buccal frenum can cause dislodgement of denture during function



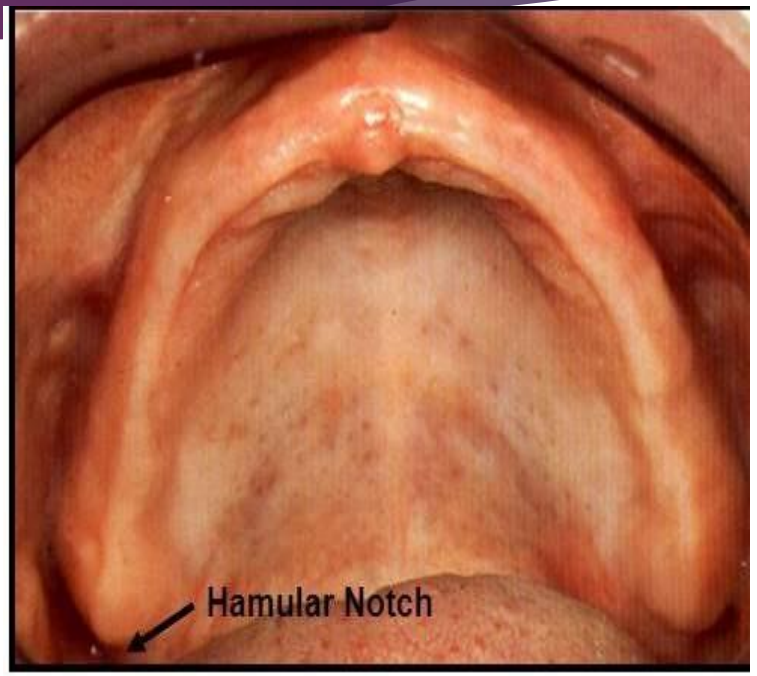
4. Buccal vestibule

- It is the reflection of mucous membrane from the check to the alveolar ridge distal to the buccal frenum
- The thickness of the distal end of the buccal flange in this area must be adjusted to accommodate the coronoid process of the mandible and attached temporal muscle fiber during function. Otherwise the coronoid process will push the denture out of the place



5. Hamular notch

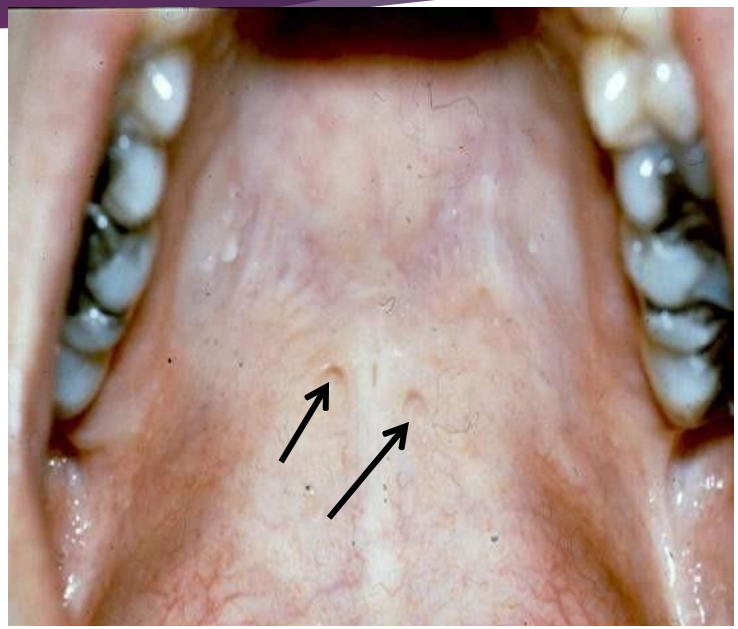
- Hamular notch (pterygomaxillary notch) is a band of loose connective tissue laying between pterygoid hamulus of sphenoidal bone and distal portion of maxillary tuberosity
- The distal palatal termination should extend from hamular notch to the hamular notch of the other side



6. Vibrating line (Ah line)

- It is imaginary line (area) drawn across the palate between immovable and movable part of soft palate
- It extend from one hamular notch to another when patient start to say "ah"
- It determine the posterior extension of maxillary denture
- It permit compression of tissue to provide efficient seal to the denture to provide more and efficient retention

7. Fovea palatinae



- These are small pits or indentation usually two in number. Which found on each side of the midline just posterior to junction of hard and soft palate
- They are opening ducts of minor salivary glands
- *The posterior border of maxillary denture should extend 2mm behind it*

- Thank you

II. Intra-oral anatomical landmarks

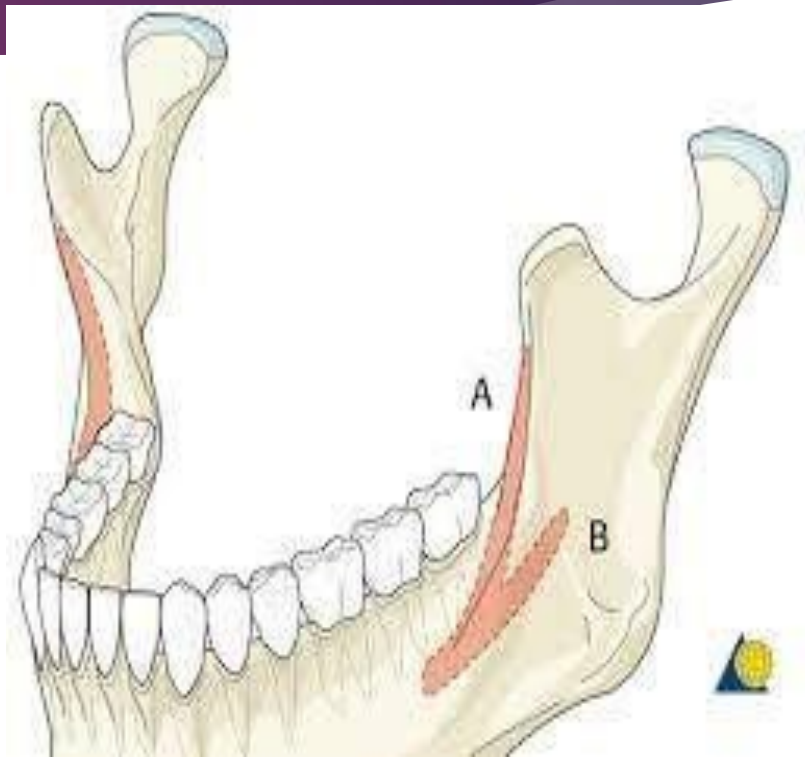
Supporting structure of the mandible

1. Residual ridge

- It is the remaining portion of alveolar process and soft tissue covering after teeth extraction.
- The highest portion of ridge is called ***crest of the ridge***
- The crest of lower residual ridge is formed of cancellous bone.
- The porous nature and roughness of this bone make it unsuitable for primary stress bearing area for mandibular denture.

2. External oblique ridge

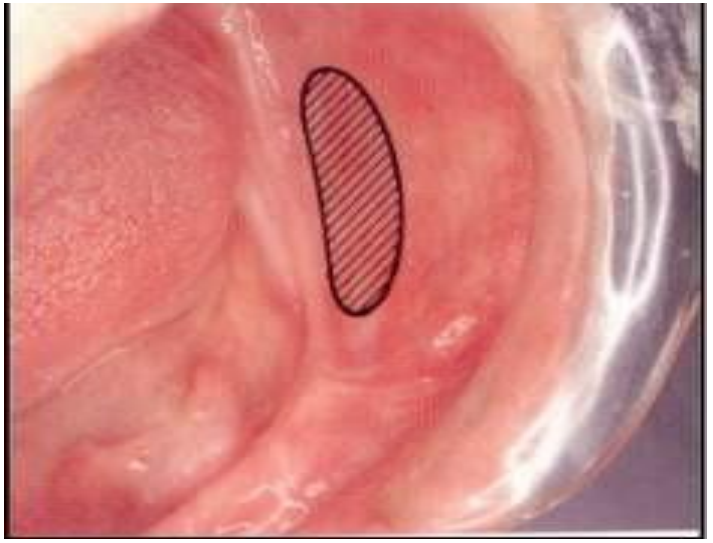
- It is dense bony ridge descend obliquely downward and forward from the ramus of the mandible until it fade near to the mental foramen
- The lower denture should cover but not extend beyond it
- In the development of the disto-buccal border of mandibular denture care should be taken to avoid displacement of the anterior fiber of masseter muscle as they reflected through the buccinator muscle



3. Buccal shelf area

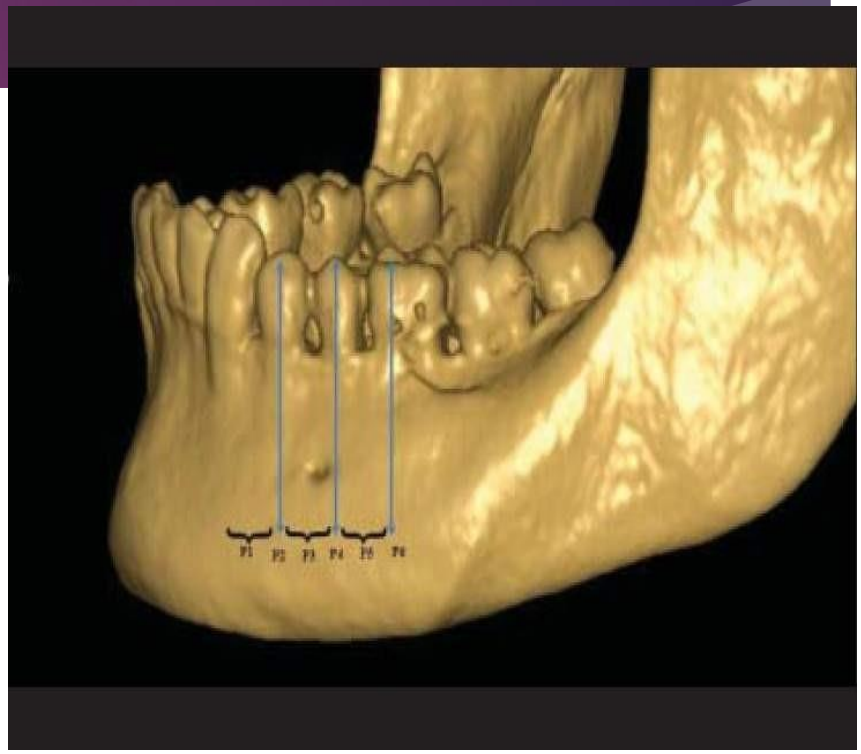
- This area lies between the crest of residual ridge and the external oblique ridge.

- It is formed of dense compact bone which nearly lies perpendicular to the vertical masticatory forces, so it consider primary stress bearing area. Therefor it should be covered by denture to provide support



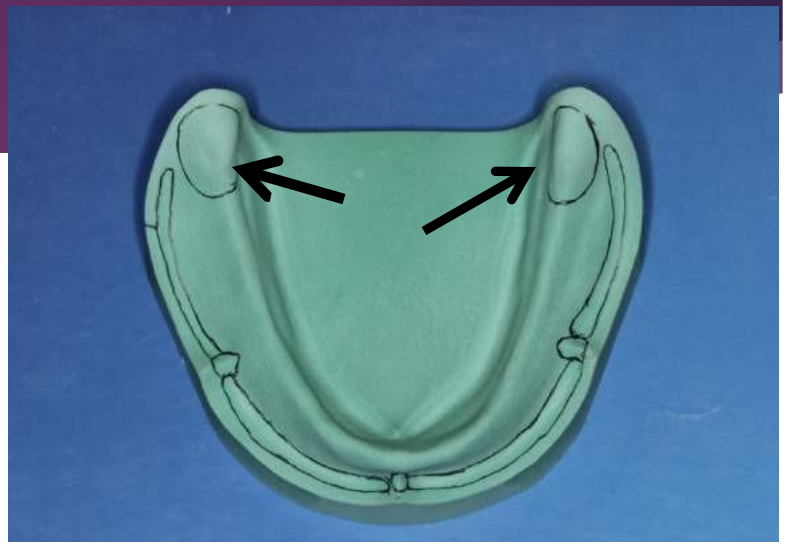
4. Mental foramen

- It is opening in the buccal surface of the mandible between the roots of 1st and 2nd premolars through which the mental nerve and vessels come out
- With severe ridge resorption the mental foramen usually located on the crest of the mandibular ridge. In these situation relieve in denture must be done to avoid pain and numbness



5. Retromolar pad

- It is small pear shape area found on each side of distal end of the residual mandibular ridge.
- It contains mucous glands, temporal tendon, fiber of buccinator and superior constrictor muscles
- Because of its spongy nature it act as a cushion or shock absorber. It provide posterior soft tissue seal for mandibular denture support and retention (1ry stress bearing area)

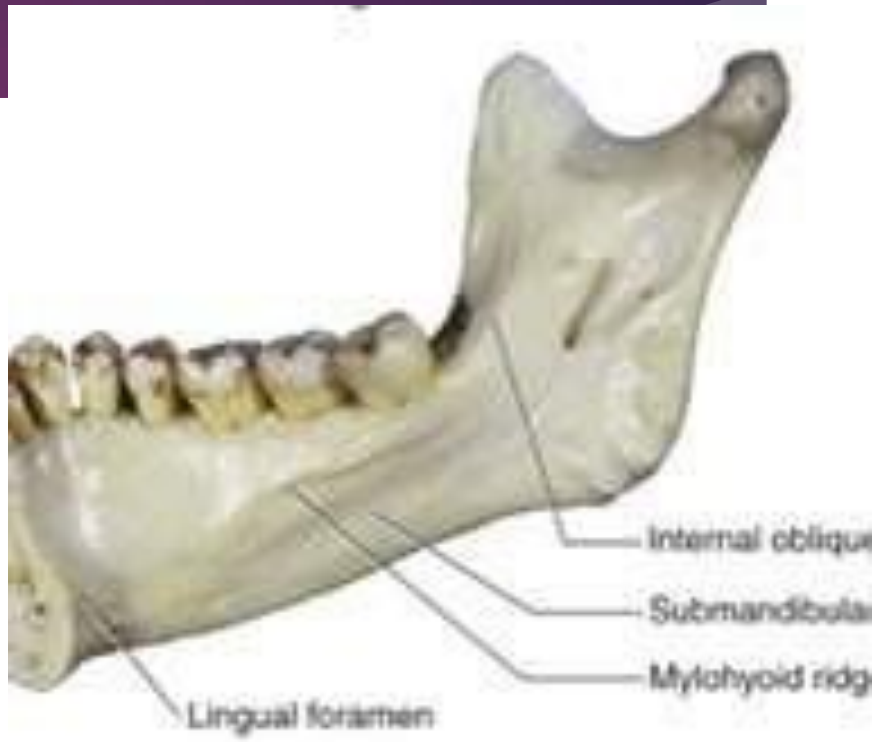


6. Torus mandibularis

- It is bony projection found on the inner surface of the mandible at the premolar region. It may be unilateral or bilateral
- It is cover by thin mucous membrane, so it need relieve in the denture
- Sometime it may be big enough to prevent seating of denture, so it must be removed surgically before denture fabrication

7. Internal oblique ridge (Mylohyoid ridge)

- It is irregular bony ridge in the inner surface of the mandible represent the attachment of the Mylohyoid muscle to the mandible
- It begin at the region of third molar and extend downward and forward of the lower border of the mandible near the midline
- Upon mandible resorption it become prominent and high
- It should be covered with the mandible but if it was extremely sharp it should be re-contoured surgically



8. Genial tubercles (mental spine)

- These are two bony projections that are located on the medial surface of the mandible one on each side of the symphisis.
- It represent the attachment of genioglossus and geniohyoid muscles
- Following resorption it become very close to the ridge so it need relieve to the denture

landmarks

II. Intra-oral anatomical

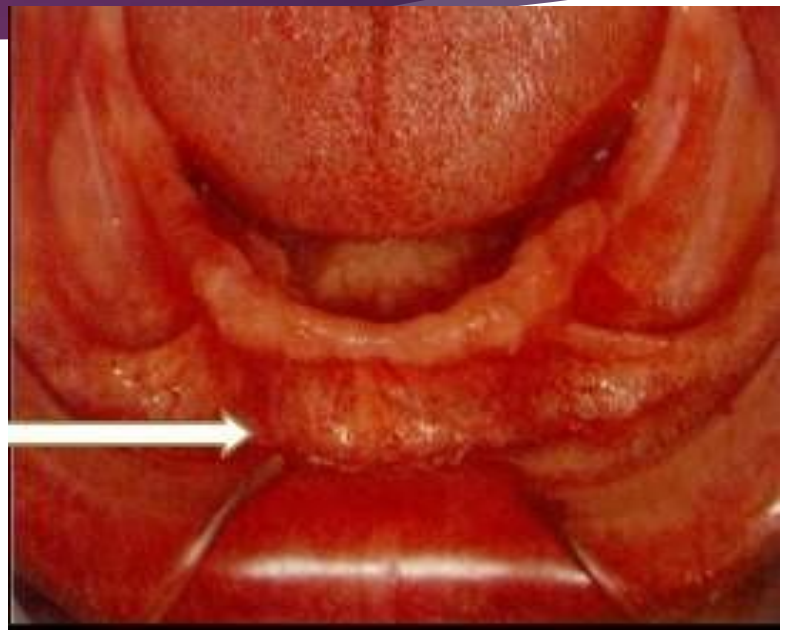
Limiting structures of the mandible

1. Labial frenum

- It is fold of mucous membrane that contains no muscles. It extend from mucous membrane of the lip toward residual ridge
- Labial notch must be done within lower denture to provide complete freedom of motion to the frenum

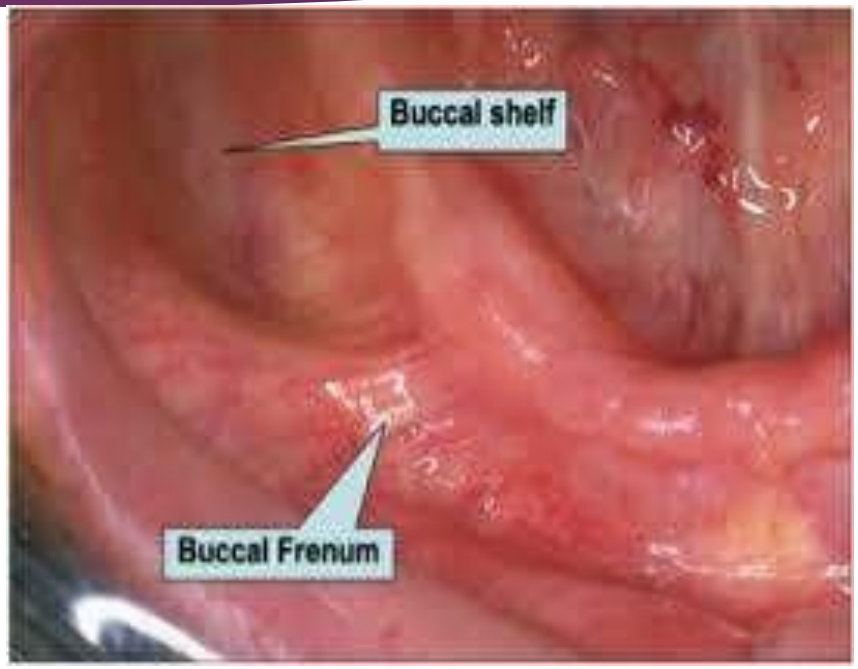
2. Labial vestibule

- It is the reflection of the mucous membrane from the lip to alveolar ridge
- It limit the thickness and length of the labial flange of denture in these area



3. Buccal frenum

- It is fold or folds of mucous membrane that varies in size number and position.
- Notch must be done in the lower denture to provide complete freedom of motion



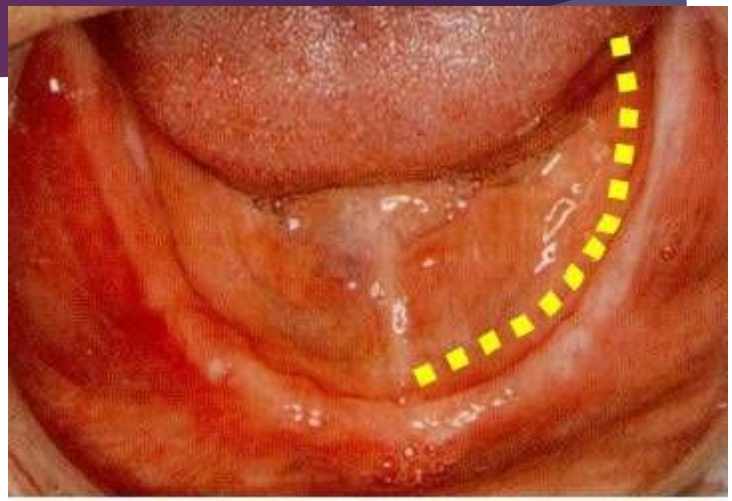
4. Buccal vestibule

- It is the reflection of the mucous membrane from cheek to the alveolar ridge distal to the buccal frenum
- It extend from buccal frenum anteriorly to outside border of the retromolar pad
- The buccinator muscle does not displace the lower denture because its attachment is at lower side in molar region, therefore the buccal flange of properly extended denture can be rest on these muscle

5. Lingual frenum

- It is fold of the mucous membrane that extend from the floor of the mouth along midline to the undersurface of the tongue.
- When tongue raised up it elevate the floor of mouth from frenum to 1st bicuspid on both side of midline
- Denture flange must be rounded at these frenum to avoid displacement of denture or trauma to the frenum

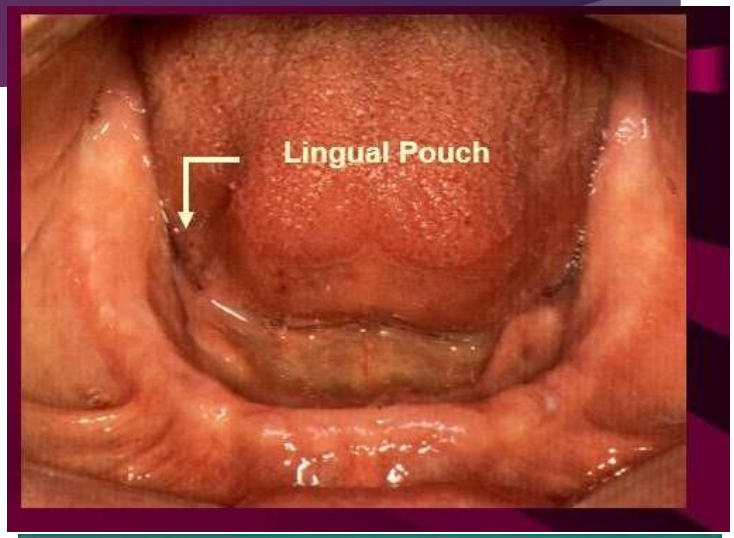
6. Alveololingual sulcus



- It is the space between residual ridge and tongue. This space extents posteriorly to retro-mylohyoid curtain. Part of this sulcus is available for the lingual flange of the denture. In this area the denture border will be in relation to mylohyoid ridge

7. Retro-mylohyoid space (fossa)

- It is lies at the distal end of the alveolar sulcus
- Its boundaries are the tongue medially, the medial surface of mandible laterally, the palatoglossus muscle posteriorly, mylohyoid muscle anteriorly,
- This lingual pouch aid in retention of lower denture
- Over-extension of disto-lingual flange will cause sore throat due to the pressure on the superior constrictor muscle



Maxillary and mandibular stress

- bearing area
- › Maxillary
- 1ry stress B.A
  a. firm tuberosities
  b. hard palate on side of median raphe
- 2ry stress B.A.
  a. Alveolar ridge
  b. Rugea
  c. Slope of palate

› **Mandibular**

1ry stress B.A.

a. buccal shelves

b. retromolar pads

2ry Stress B.A

a. alveolar ridge

References

1. G Zarb, et al. Prosthodontic treatment for edentulous patients.,2013 Mosby, Elsevier inc
2. V Rangarjan, TV Padmanabhan. Textbook of prosthodontics. 2013 Mosby, Elsevier