Clinical anatomy of the head, neck and nerve pathways

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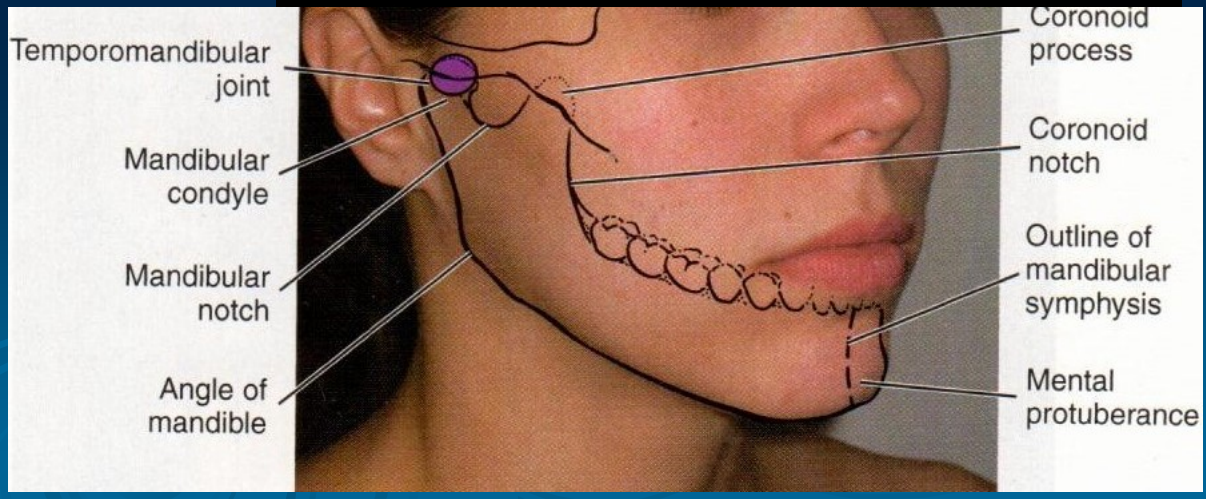
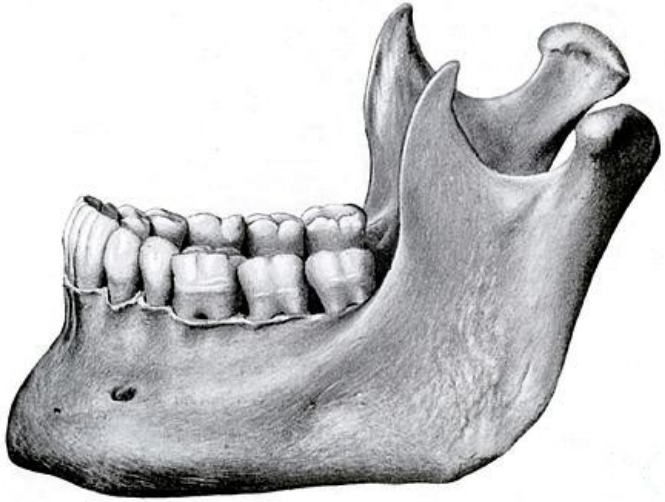
MANDIBULA

Lower jaw

- **Anatomy** (repetition), widespread description
- **Clinical notes**
- **Dentoalveolar topography**
- **Nerve and blood supply** (repetition)

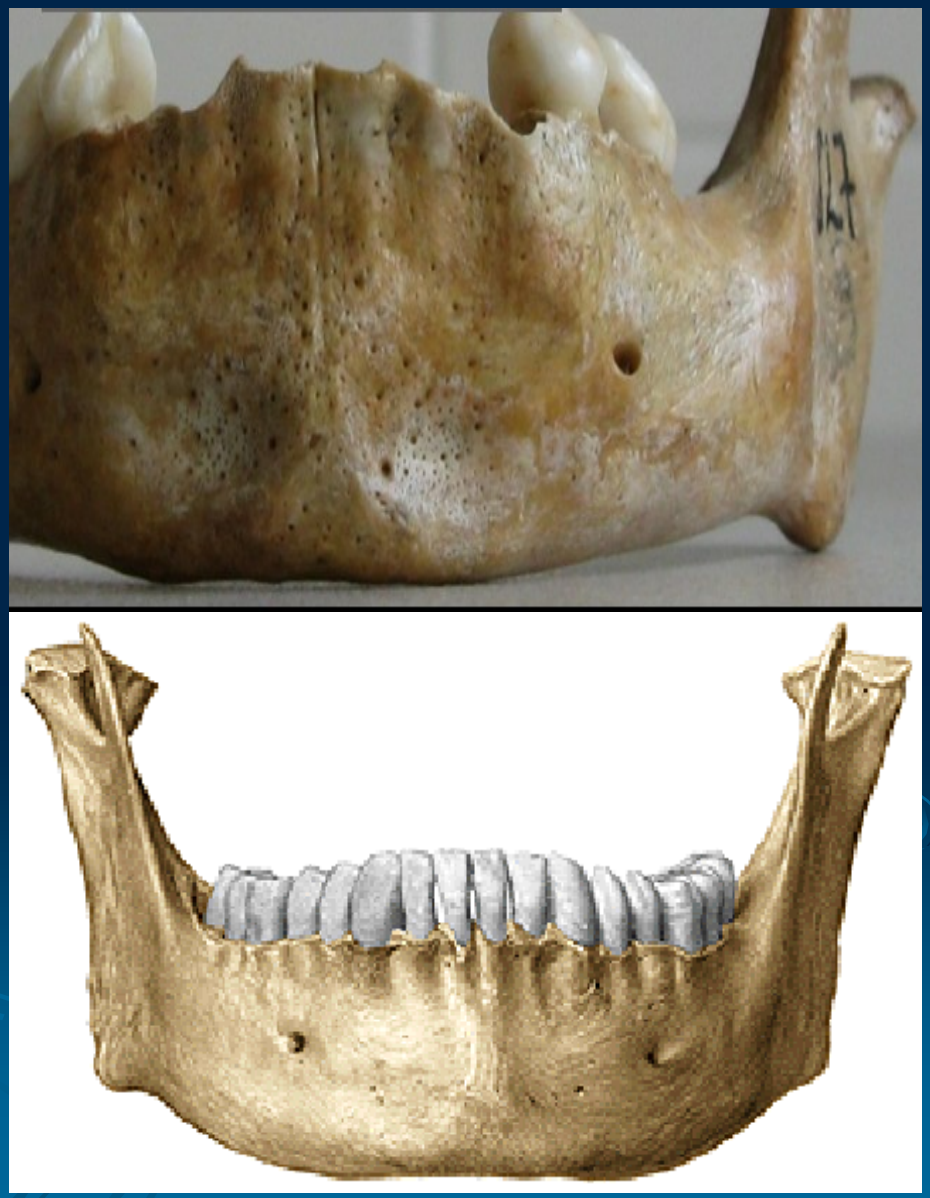
- An unpaired (single) facial bone
- Forms the osseous basis of the lower part of face
- The only skull bone connected with the remaining skull skeleton using articultion (ATM)
- The only **freely movable** bone of the skull
- The largest and strongest bone of the skull
- It also articulates with each of the maxillae by the way of lower and upper dentition





Corpus mandibulae

- Thickened along its whole lower margin – basis mandibulae and in the chin area – where it forms **trigonum mandibulae (protuberantia mentalis + tubercula mentalia) –** bony prominence of the chin
- Along cranial edge of mandibular body – **proc. alveolaris** with alveoli dentales with septa and juga alveolaria anteriorly
- **Mental foramen**



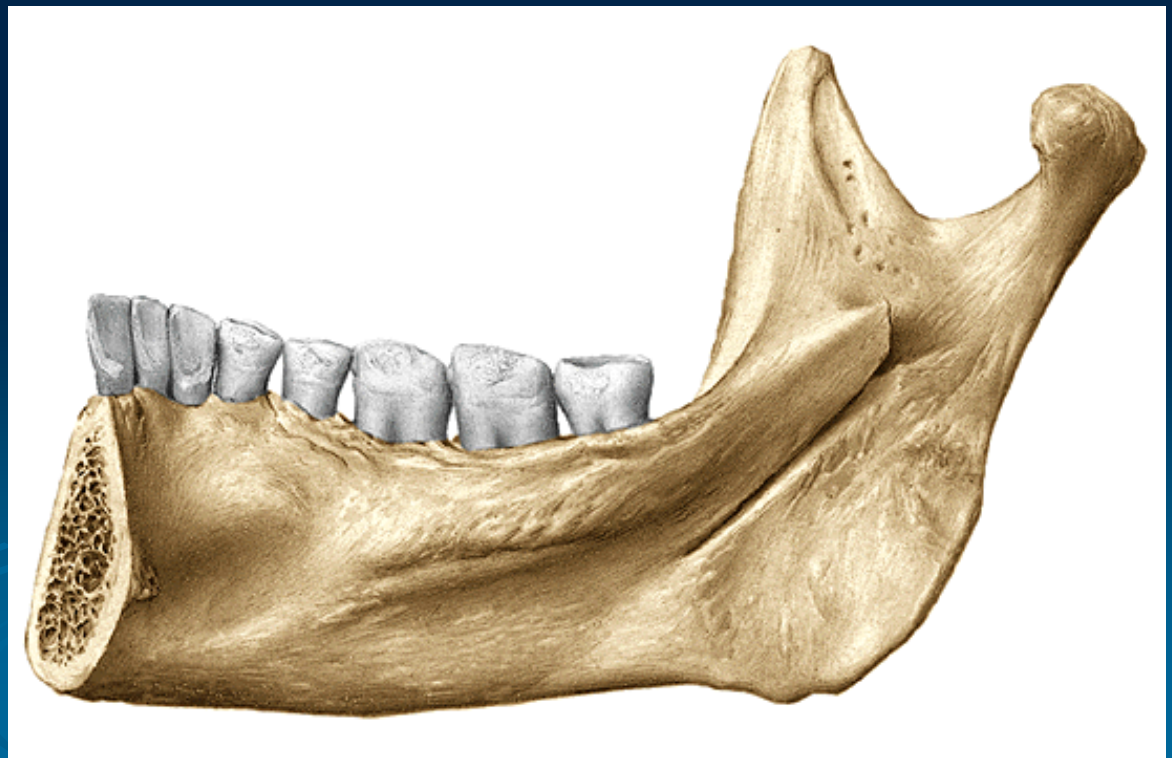

Septa interalveolaria
Septa intraalveolaria
šíře 0,7-14 mm

- On the inner plane of the chin part – **spina mentalis sup. et inf.**– origin of m. genioglossus and m. geniohyoideus
- Laterocaudally on each side – shallow pit **fossa digastrica**, to which venter ant. m. digastr. is attached
- An oblique margin **Linea mylohyoidea** passes – for attachement of m. myloh.;
- above it a shalow pit **fovea sublingualis,** below it **fovea submandibul.** – both cavities have equally named salivary glands

Angulus mandibulae:

On external and internal side of m. angle – **tuberositas for attachement of masticatory muscles**

- tuberositas masseterica
- tuberositas pterygoidea

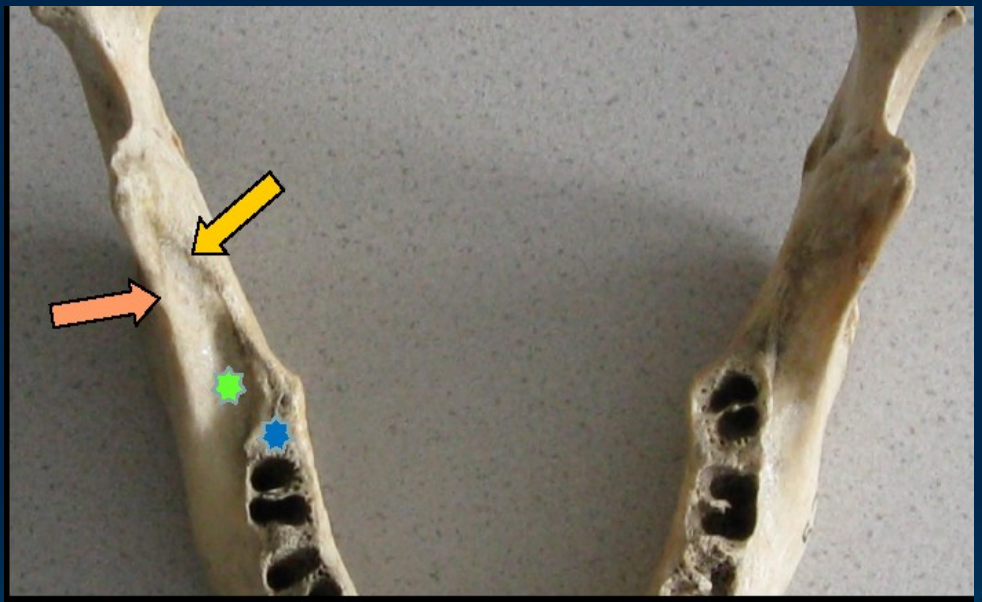


Ramus mandibulae

- Is attached to corpus in mandibular left and right **angle**
- Protrudes ventrally into **processus coronoideus** (insertion of m. temporalis) and dorsally into **proc. condylaris** with cranial enlargement caput m., below it a narow neck – collum m. with central depression – **fovea pteryg**. (for attachement of mastic. muscle m. pteryg. later.)
- **Incisura m.**
- On external surface **linea obliqua** protrudes caudally

- Trigonum retromolare

- there is very porous bone – CAVE during extraction of the last molar



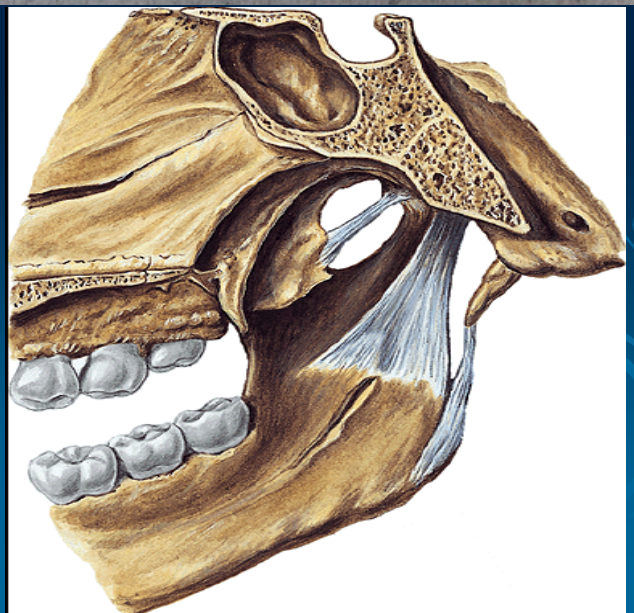
Inner surface of ramus mandibulae

- **Mandibular foramen**
- the beginning of canalis mandibulae
- middleline between anterior and posterior edge of ramus
- 1 cm above M3
- 2 cm behind M3

CAVE! Local anesthesy

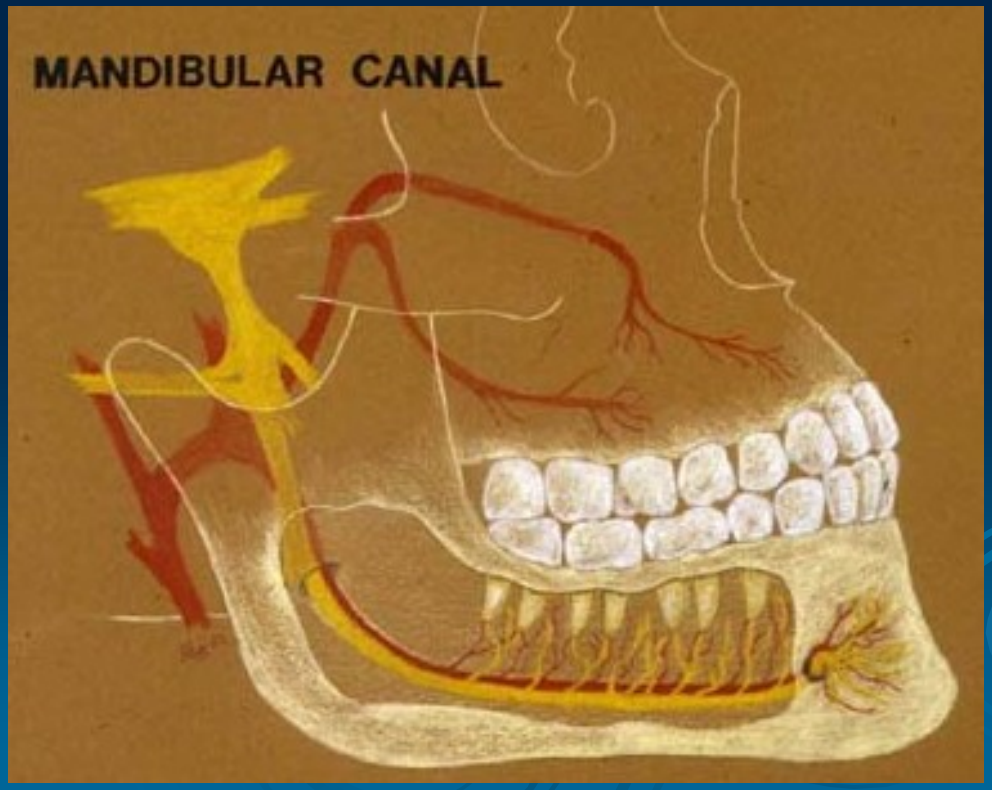
- foramen m. - through which the neuro-vascular bundle passes into canalis m.; it is demarcated by thin osseous plate – **lingula m.** (attachement of lig. Sphenomandibul.)

- **Sulcus mylohyoideus**



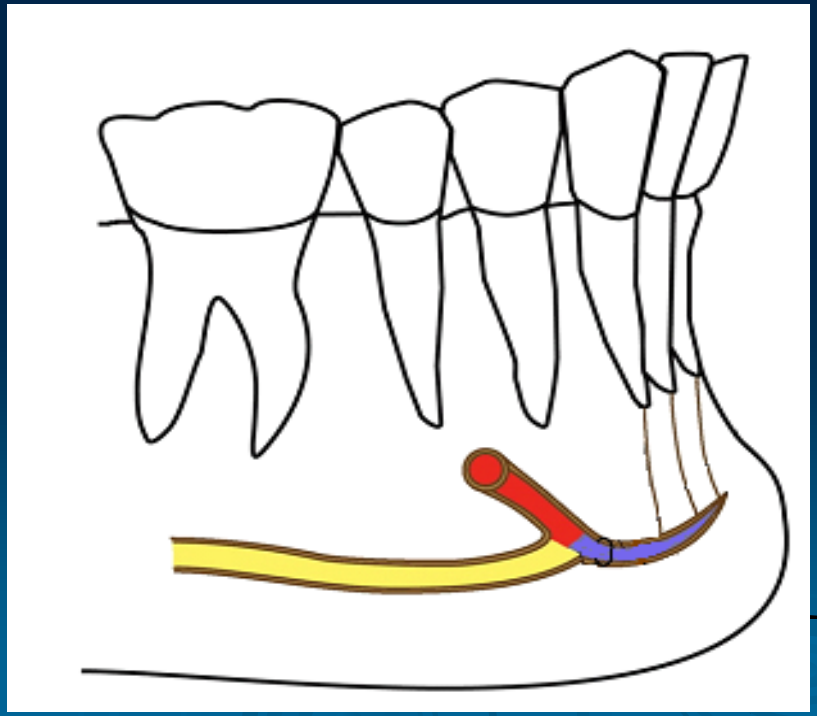
Mandibular canal

- Is placed under the alveoli and communicates with them by small openings
- Contains the inferior alveolar nerve, artery, vein

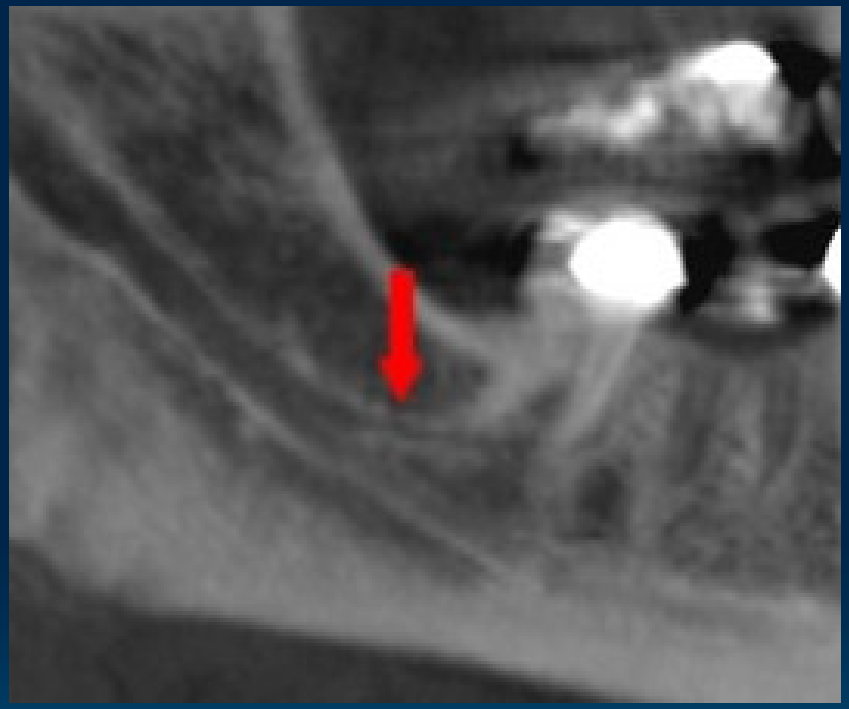


- Demarcated by the compact bone (noticeable to x-ray)

- On arriving at the incisor teeth, it turns back to communicate with the mental foramen, giving off a small canal known as the mandibular incisive canal



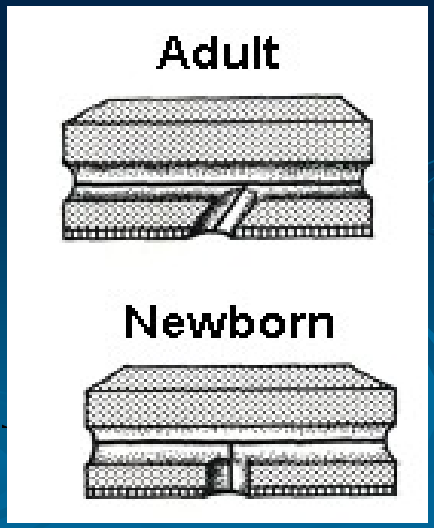
Canalis mandib. bifidus

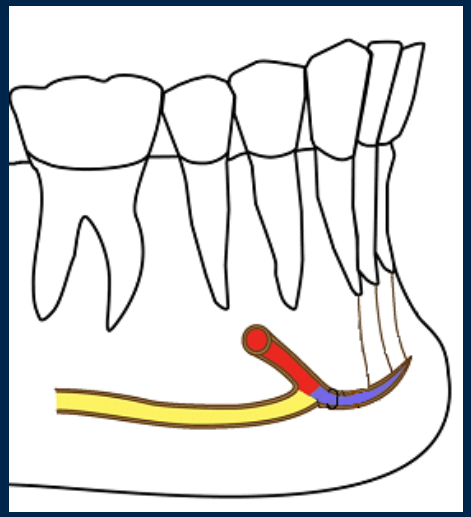


Over 99% simple

Mental foramen

- The opening of mandibular canal
- on external side
- The position of this foramen is most frequently near the apex of the mandibular second premolar and rested between the premolars
- The foramen open upward and slightly posteriorly in adults
- The foramen open straight upward in newborns





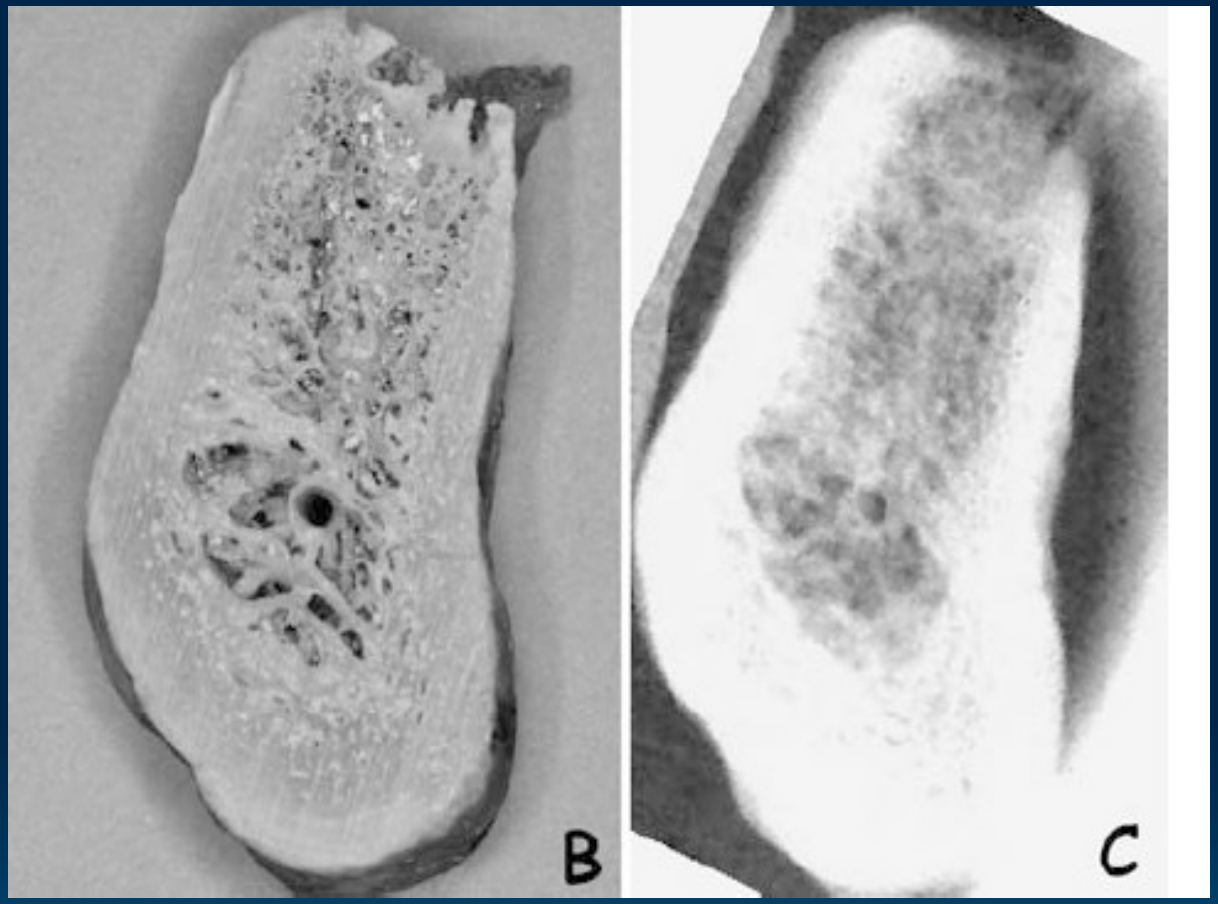
CAVE ! Local anesthesy

Lateral (accessory orifices)

- Inner area of mentum sup. and inf. retromental for.
- Unilateral, bilateral or mutliple
- In neighbourhood of mylohyoid line

CAVE! Bleeding (implant placement)

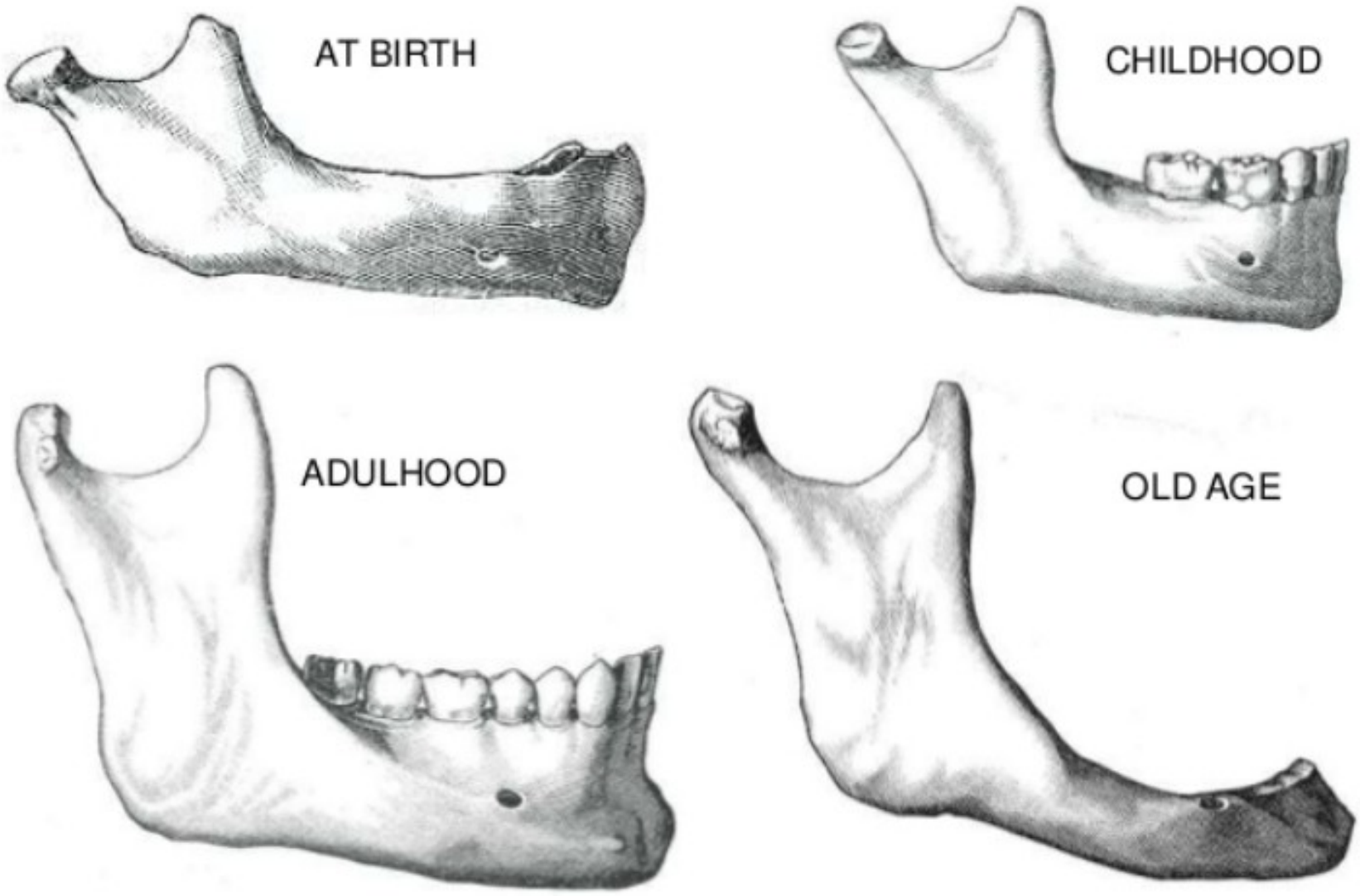
Incisive canal



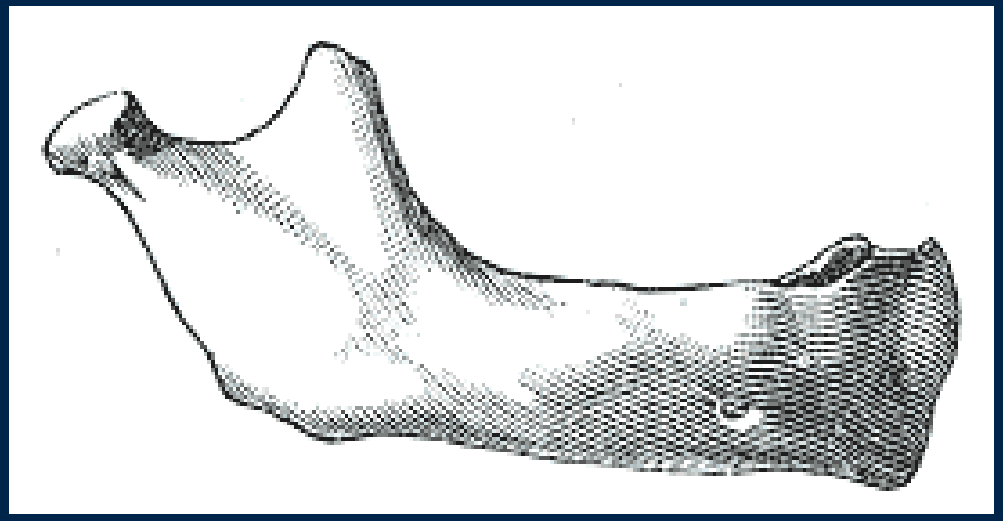
Summary 96%

Demarcate of the compact bone (noticeable to x-ray)

AGE CHANGES

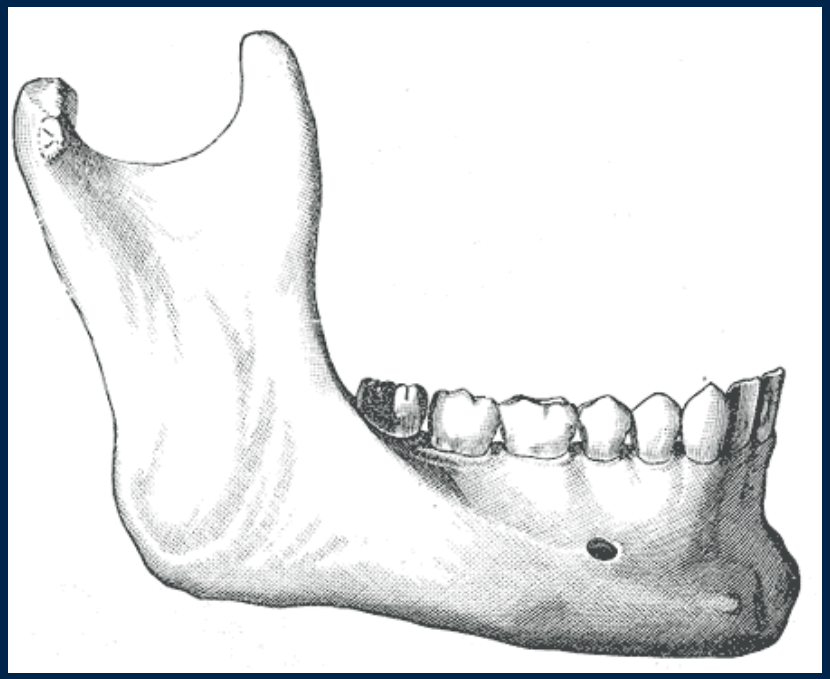


Newborn



- mandibular corpus is low
- the body contains the sockets of deciduous teeth (only with development and eruption of teeth proc. alveol. appears)
- the angle between corpus and ramus is over 150 (widely open)
- mental foramen lies on the lower edge of corpus
- Mandibular body is still paired - it meets in so-called symphisis menti – it ossifies in first year of life

Adulthood



- the angle is much sharper – about 120°
- condylar process is higher than the coronoid process and the sigmoid notch becomes deeper
- Alveolar processus developed
- Mental foramen lies in the middle of the corpus

Old age

- after the loss of teeth, the body is reduced + due to atrophy of the alveolar process → mandibular foramen is closer to the alveolar border
- enlargement of the angle to 140°
- deepen pterygoid fovea → neck is tapered
- sharp mylohyoid linea, highlighted mental spinae

- sharp mylohyoid linea

- enlarged mental spinae

Resorption of alveolar bone

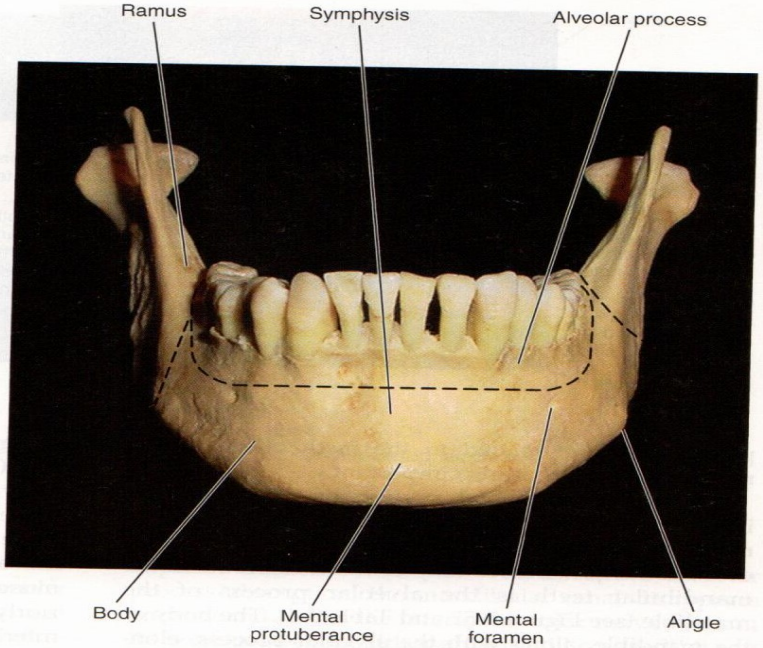
Decreased bone of alveolar process is noted when there is inactivity of tooth

Alveolar process

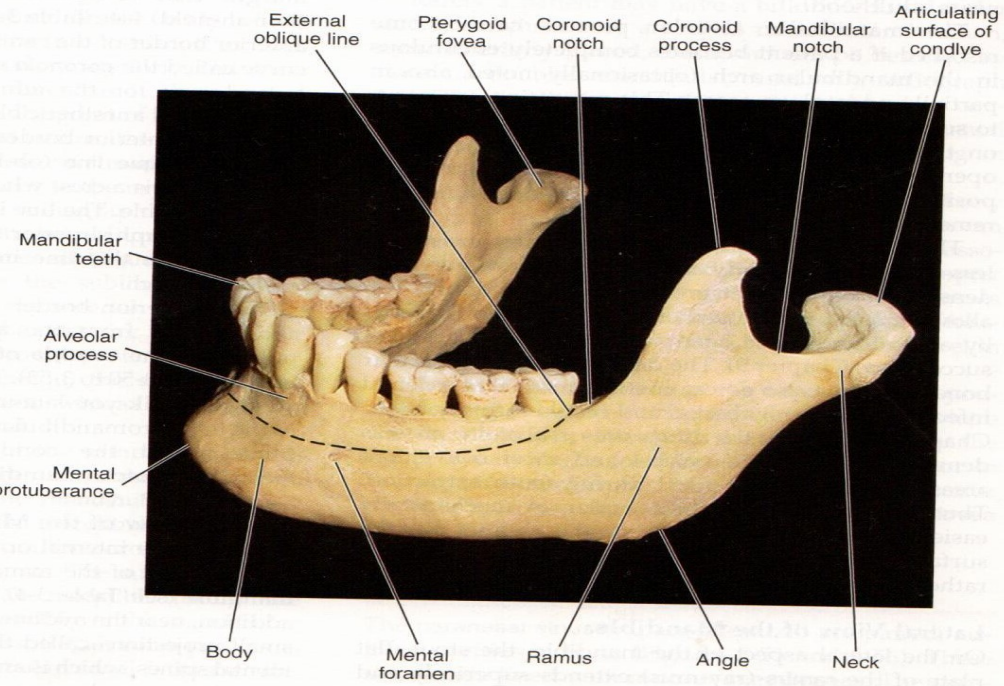
- The portion of the jaw bone that contains the roots of the mandibular teeth and the alveoli in which they are suspended

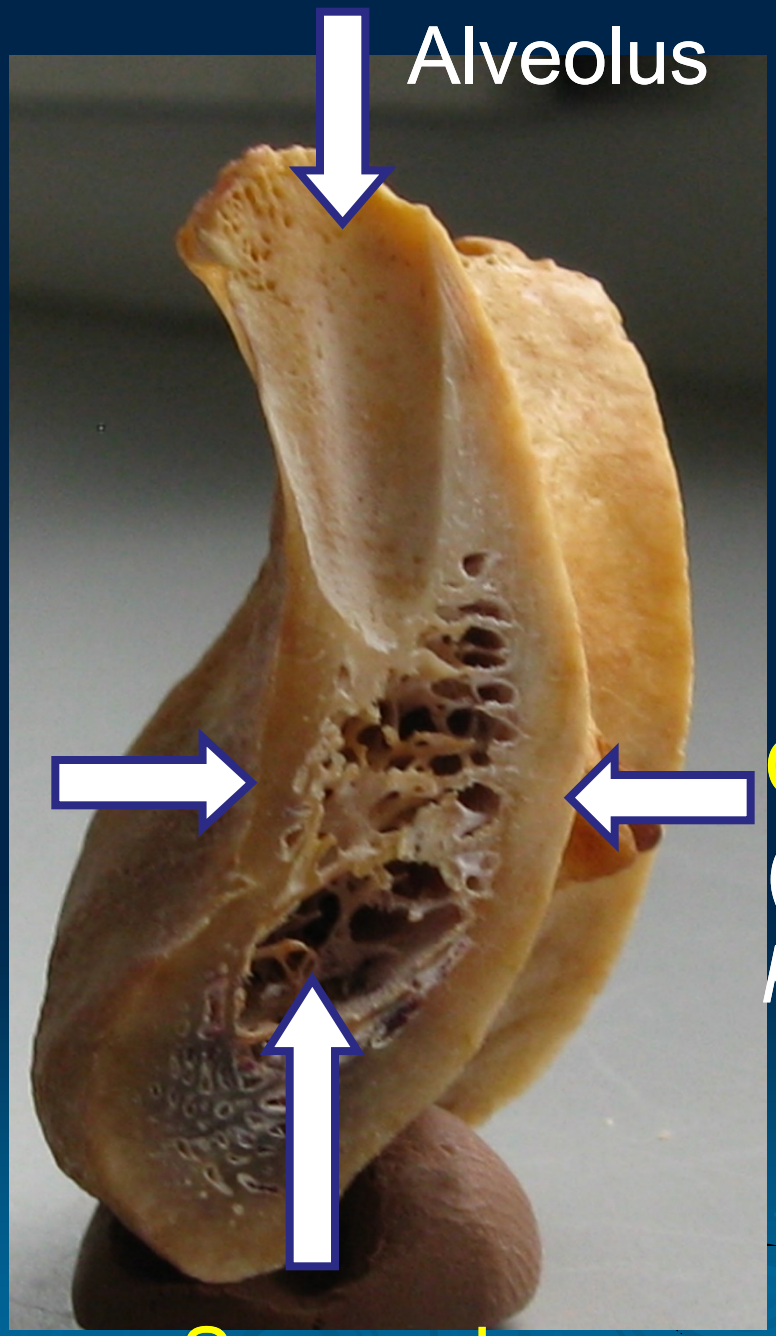
- The development is dependent on tooth eruption and its maintenance on tooth retention

- Is composed of compact bone (0.1-0.8 mm) that encloses the spongiosa



ew of the mandible and




Alveolus
Compact bone (labial cortical plate)
Compact bone (lingual cortical plate)
Spongy bone

Alveolus

- Is composed of a thin plate of **cortical bone** with numerous perforations (or cribriform plate) that allow the passage of blood vessels between the bone marrow spaces and the periodontal ligament

- The coronal rim of the alveolar bone forms the alveolar crest, which generally parallels the cemento-enamel junction at a distance of 1-2 mm apical to it

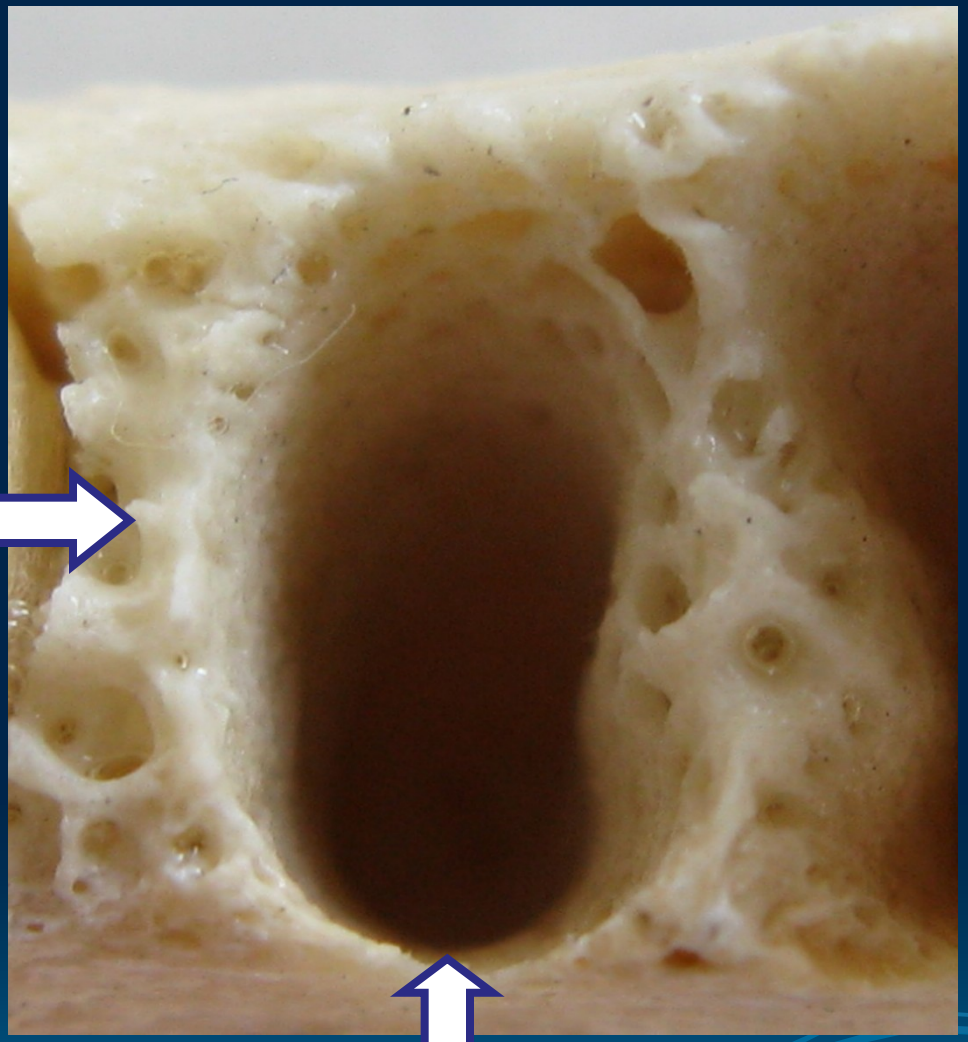
Bundle bone

= the inner portion of the bone of the alveolus that surrounds teeth and into which the collagen fibers of the periodontal ligament are embedded

- Radiographically, the bundle bone is the **lamina dura**

Septum interalveolare *(spongy bone)*

0.7-14 mm



Alveolus *(compact bone)*

Reconstruction of alveolar bone

- The whole life the bone keeps the potential to reconstruction

- Bone is resorbed on the side of pressure and opposed on the site of tension - regenerated

- Movement of a tooth by extrusion involves applying traction forces in all regions of the periodontal ligament to stimulate marginal apposition of crestal bone

Dentoalveolar topography

Important for anesthesia, extraction, injury, implantology, endodontic treatment ...

1. The transverse asymmetry of alveolus
2. The rate of the spongy and the compact bone
3. The relationship the roots the lower jaw to neighbouring structures

1. The transverse asymmetry of alveolus

- The dental and skeletal arch are asymmetric !

- Roots of the teeth:
  - 1-5 eccentric in the vestibular direction
  - 6 in alveolar process axis
  - 7-8 eccentric into oral direction

2. The rate of the spongy and the compact bone

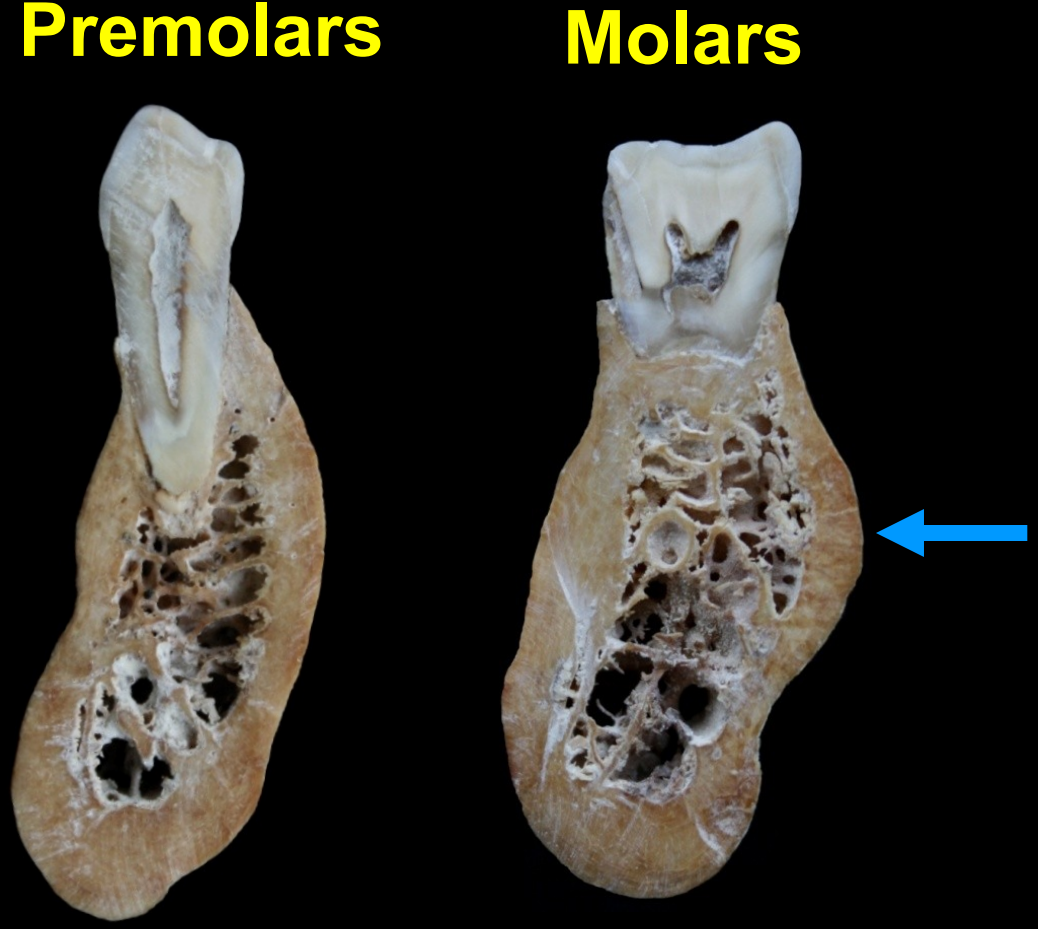
- The layer of compact bone is thicker than in the upper jaw
- Roots of the incisivi and canini teeth are surrounded by the compact bone
- Roots of the premolars and molars are surrounded by the pre- and retroalveolar spongy bone that is thin, fragible

Incisivi, Canini

Compact bone only

CAVE!

- Fractures by extraction !
- Root of the 3nd tooth – fracture of mandible !

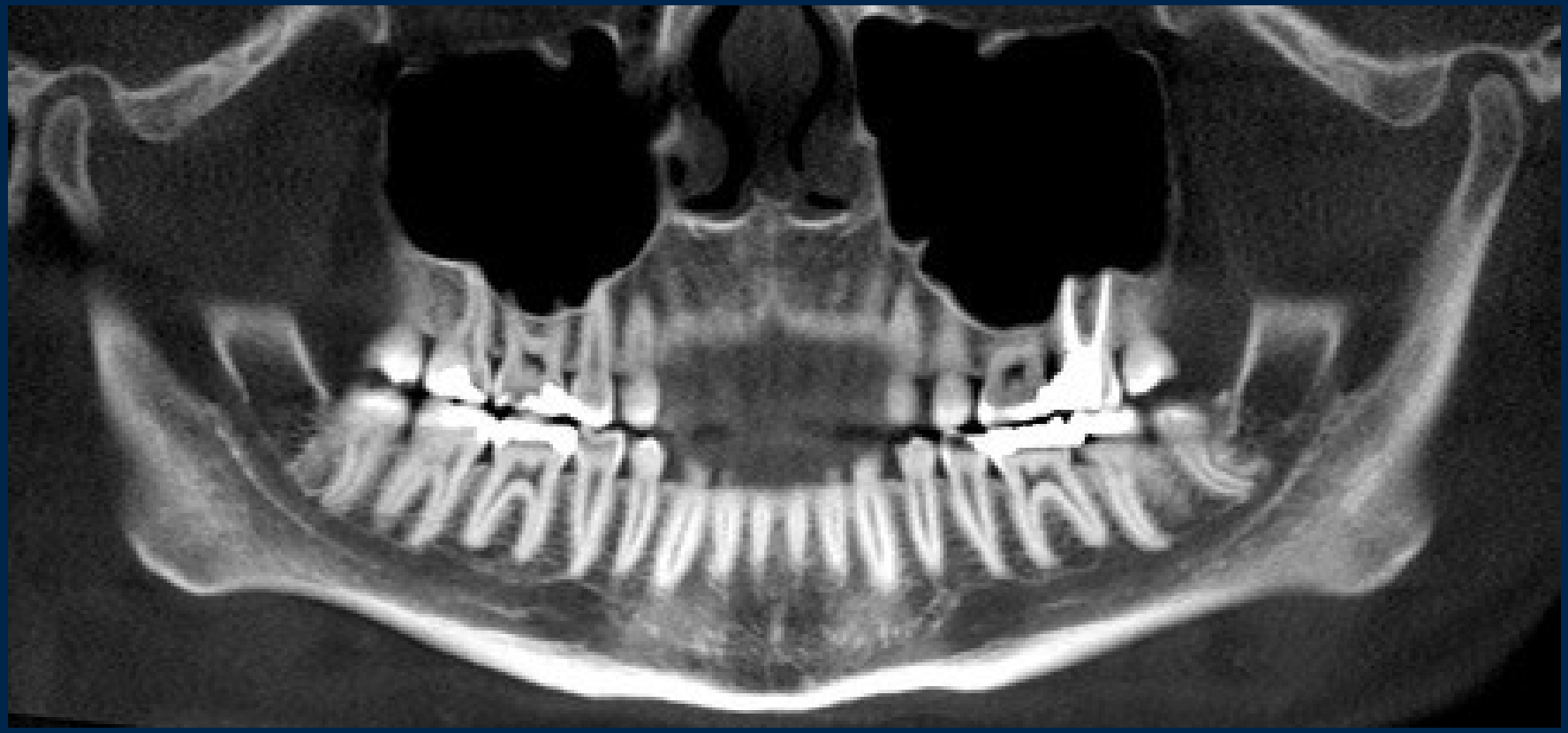


Compact bone and variable thickness of spongy bone bucally and lingually (linea mylohyoidea)

Spongy bone is distally to 8

3. The relationship the roots the lower jaw to neighbouring structures

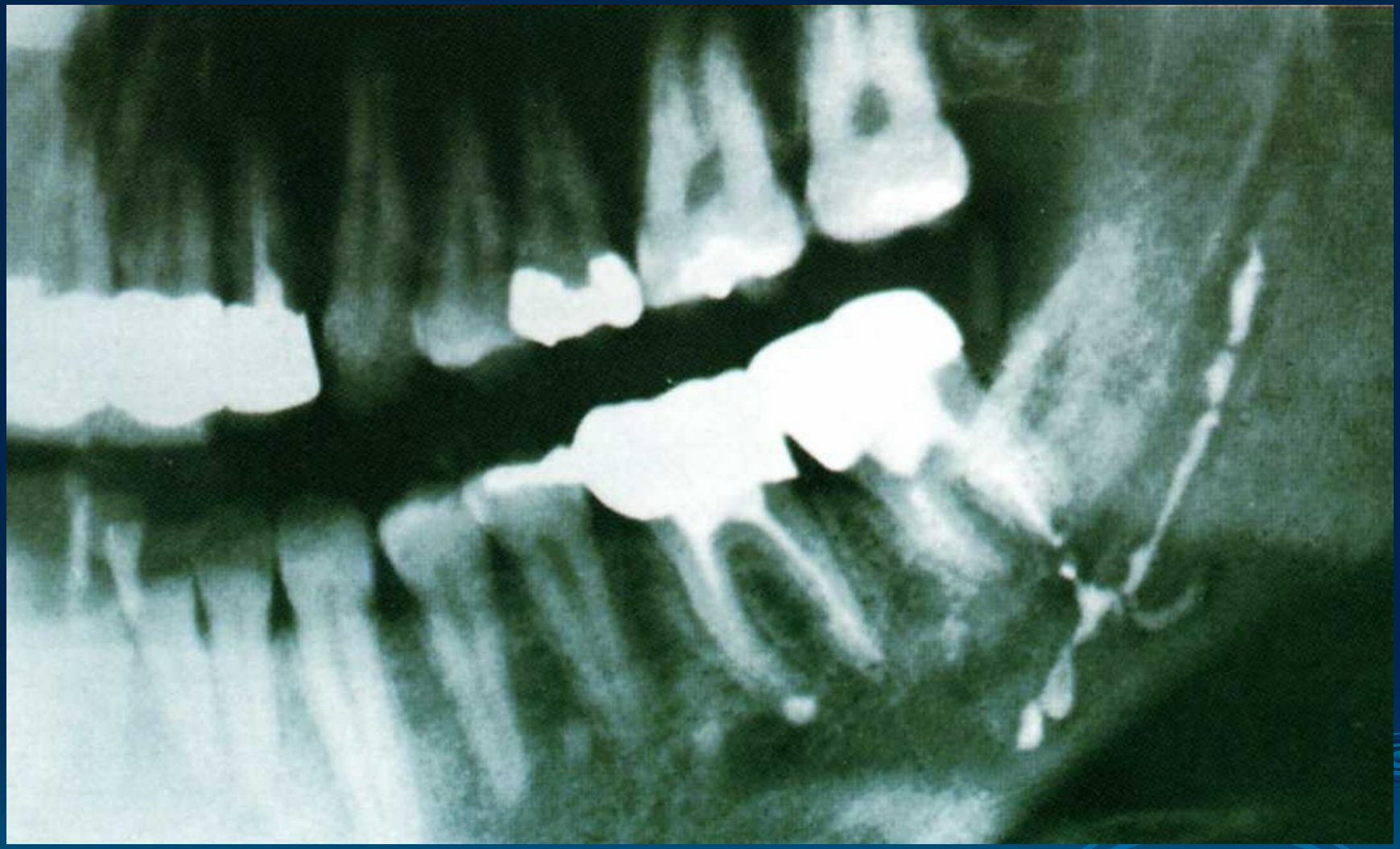
Canalis mandibulae
(incisivus, mentalis)



Variable layer of spongy bone between canals and teeth´s roots

CAVE!

- Dehiscence of the canal and the alveolus
- Implants



CAVE! The endodontic treatment

Nerve and blood supply

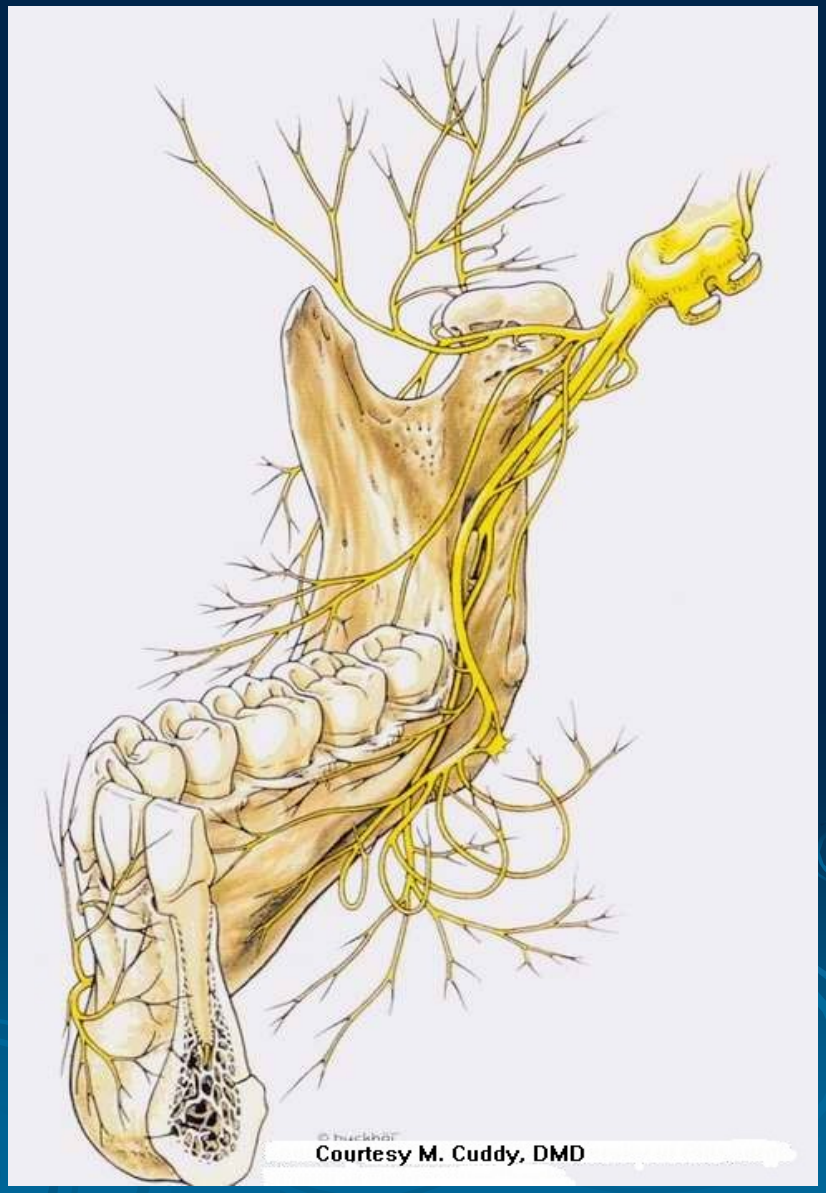
Trigeminal nerve

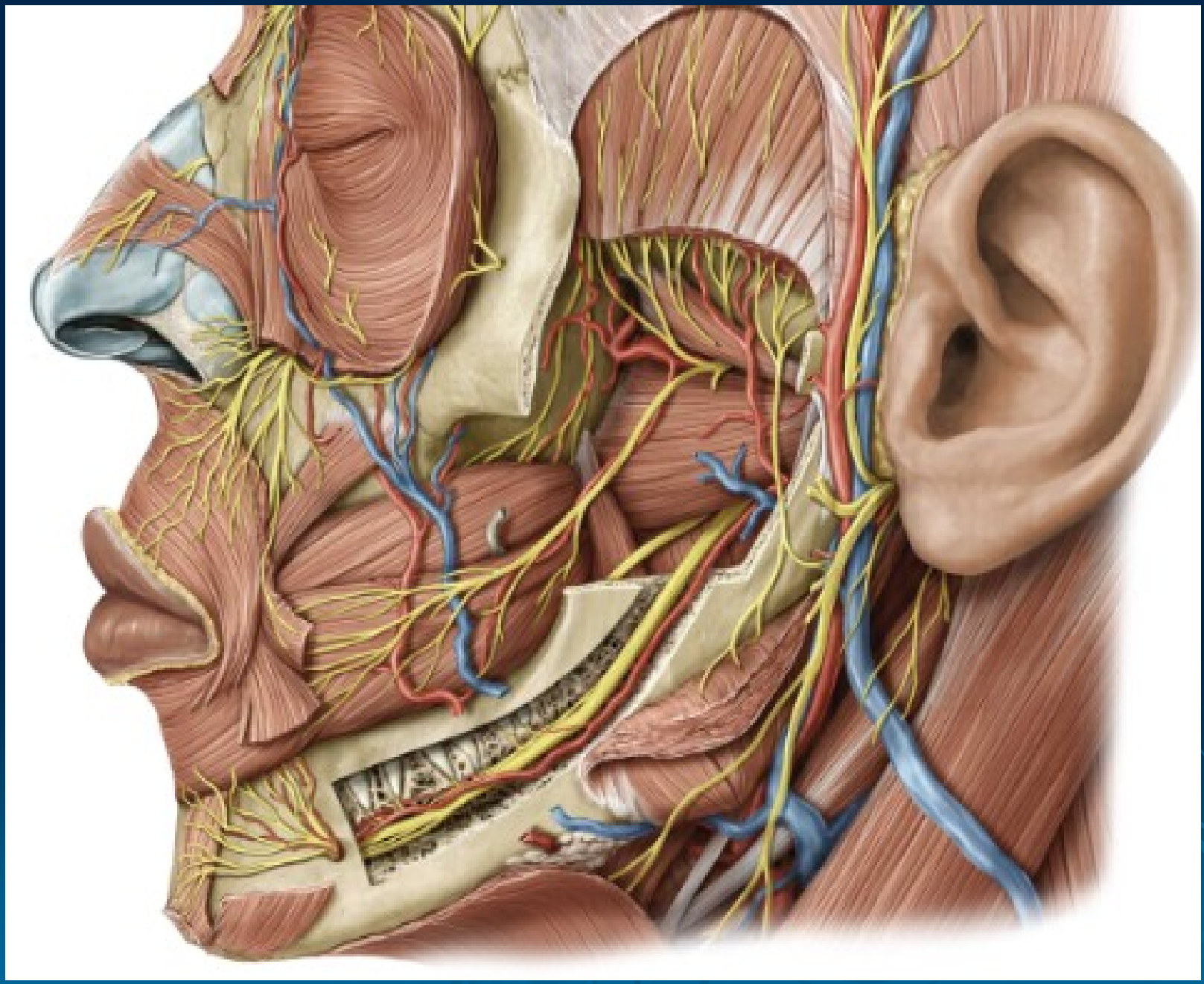
Alveolar inferior nerve
- mental nerve
- incisive nerves

Mylohyoid nerve

Buccal nerve

Lingual nerve





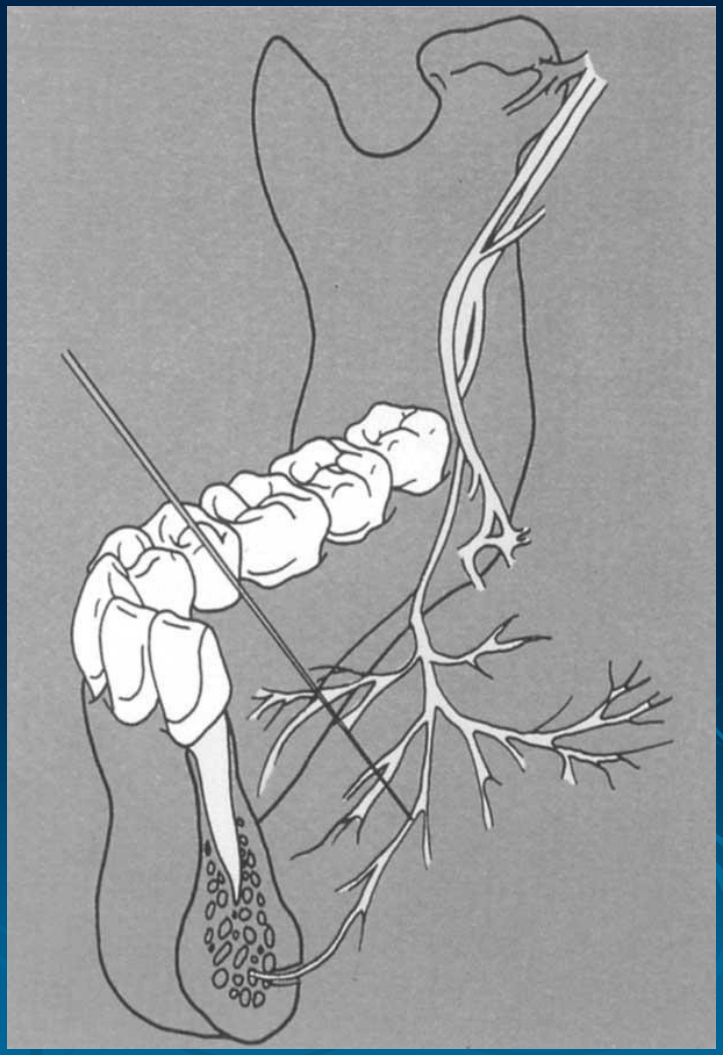
Variation

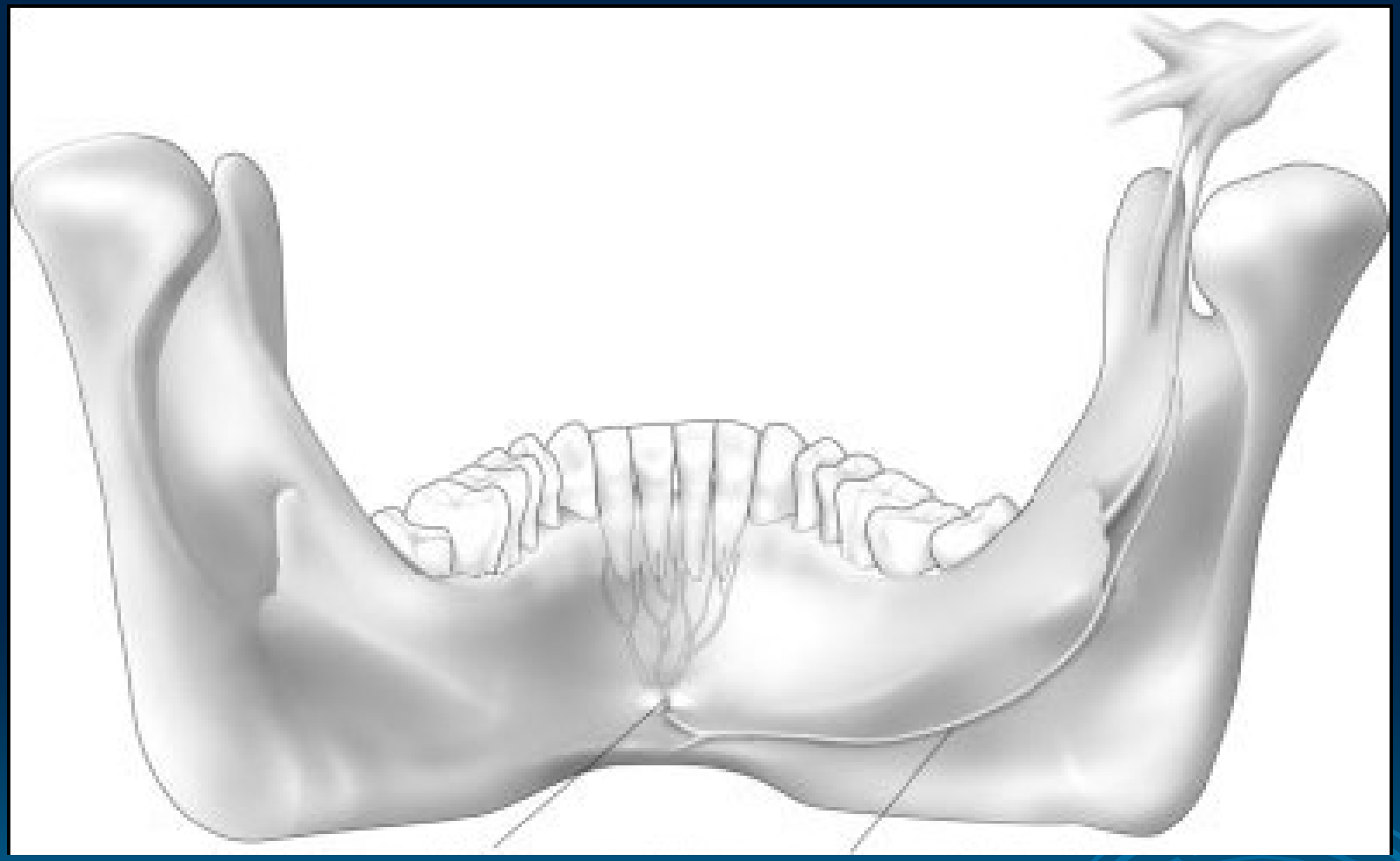
Important for anesthesy !

1.

Mylohyoid nerve

has traditionally been considered a **motor** nerve, but it can convey impulses from the incisive and canine teeth and gingiva !

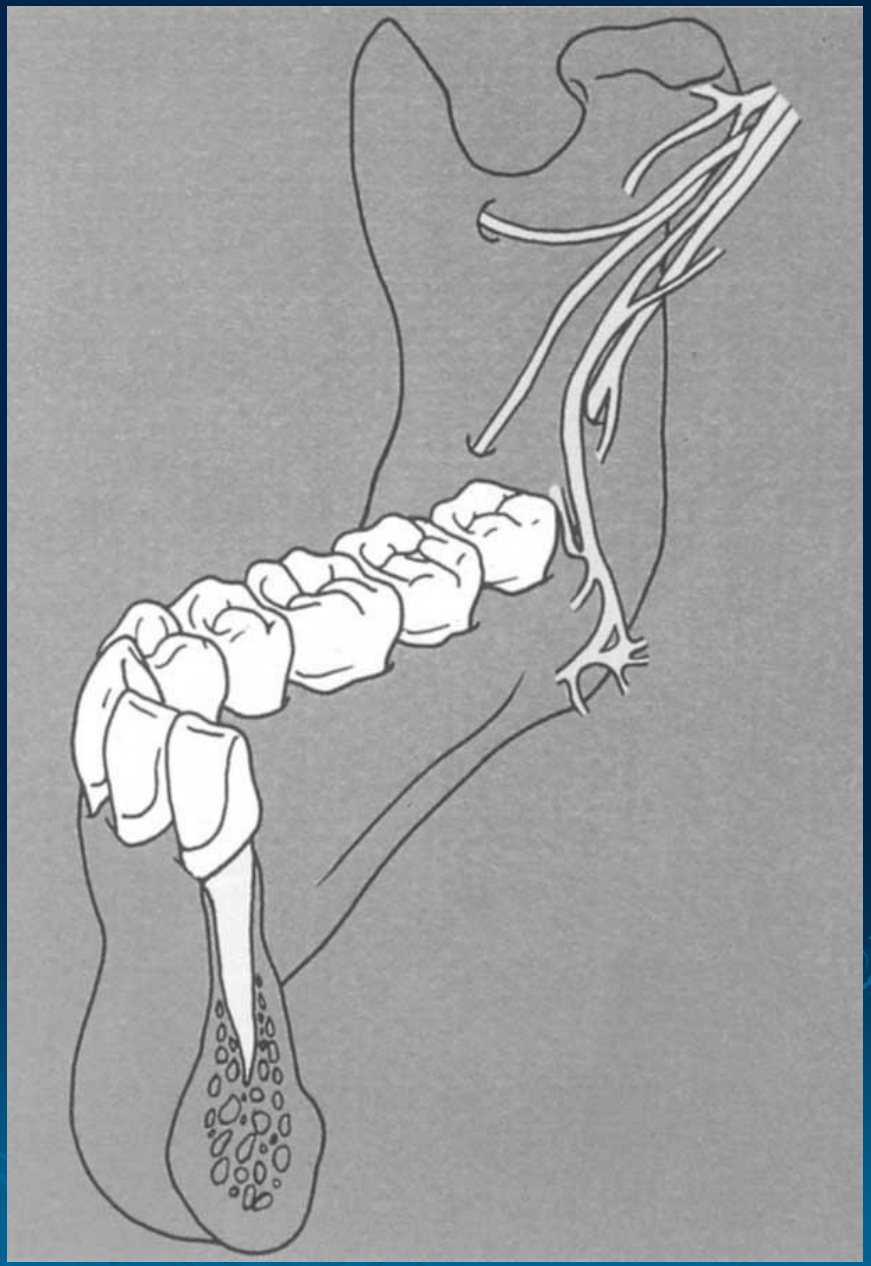




2.

Sometimes the branches entering separated bony channels laterocranial of mandible foramen and M3, M2

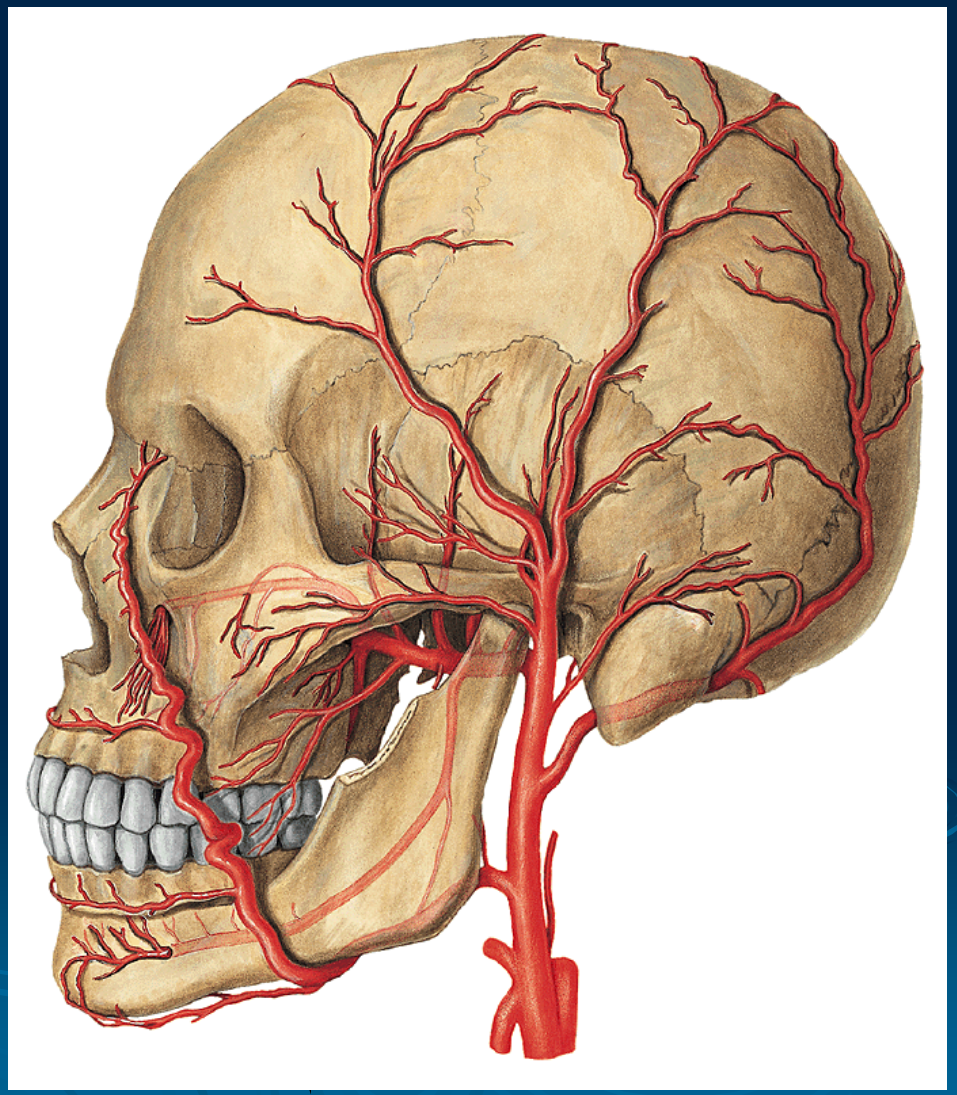
The nerves entering the mandible at the retromolar fossa



Inferior alveolar artery
(maxillary artery)
mylohyoid a.
dent. et interalveolar a.
mental a.
incisive a.

Facial artery
submental a.

Lingual artery
sublingual a.



The pictures used in this lecture were taken from following sources:

- Čihák: Anatomie I, II, III.
- Atlas der Anatomie des Menschen/Sobotta. Putz,R., und Pabst,R. 20. Auflage. München:Urban & Schwarzenberg, 1993
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