Nomenclature and Anatomy of the Teeth, Orofacial Anatomy

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Man has two sets of teeth, which appear during different periods of life.

- those of the first set appear in childhood, and are called the deciduous teeth.

- those of the second set, which appear during childhood and stay until old age, and are named permanent.

DECIDUOUS TEETH

- The **deciduous dentition** (temporary) has **20** teeth
- In deciduous dentition *each quadrant* has 5 teeth called:

  a central incisor I

  a lateral incisor II

  a cuspid or canine III

  a first and second molar IV, V

- In each quadrant there are only 2 deciduous molars and no premolars

PERMANENT TEETH

- The complete **permanent dentition** consists of 32 teeth, which are symetrically divided into the lower and upper dental arches.
- In permanant dentition *each quadrant* has 8 teeth called:

  a central incisor, I1 -1

  a lateral incisor, I2 – 2

  a cuspid or canine, C – 3

  a first and second premolar, P1,P2 – 4,5

  a first, second and third molar, M1,M2,M3 – 6,7,8

  (third molars are sometimes called the wisdom teeth)

NOMENCLATURE OF THE TEETH

1. dental cross method

2. „ plus & minus“ method

3. two-digit system

Dental cross method

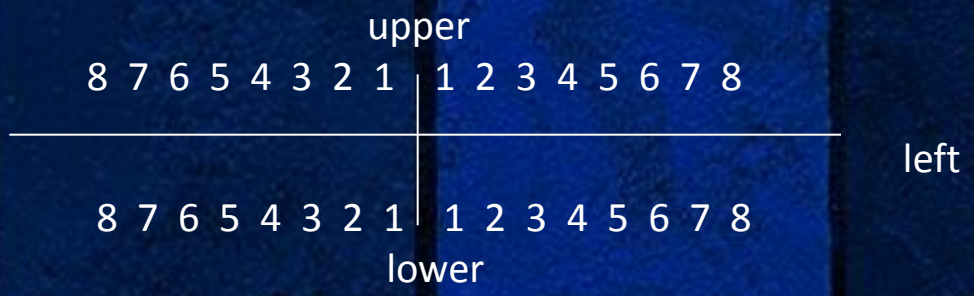
- In the clasification of the dentition the permanent teeth were normaly indicated by Arabic numbers and the deciduous dentition by Roman letters

- Vertical midleline of face divides dental arches into right and left halves (quadrant).

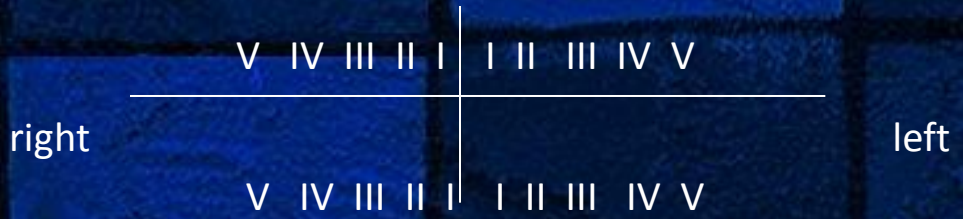
By lines of a cross the teeth are divident into four quadrants. We recognise upper right, upper left, lower left and lower right quadrants.

These places correspond with the position of the teeth as they are seen when looking into a patient´s mouth.

Permanent teeth:



Deciduous teeth:



One single tooth my also be indicated by means of a numeral in combination with part of this dental cross, e.g.

$\lfloor 6 \rfloor$ – right upper first permanent molar

$\lfloor \text{III} \rfloor$ – left lower deciduous canine

„ plus & minus“ method

2. The place of tooth in the classification of the dentition may also be indicated :

   + (upper jaw)

   - (lower jaw)

   When this sign is written on the right of numeral a tooth in the right half of the jaw is meant. When the sign is written on the left the tooth is located in the left half of the jaw.

   +I (left upper deciduous central incissor)

   8 – (right lower permanent third molar)

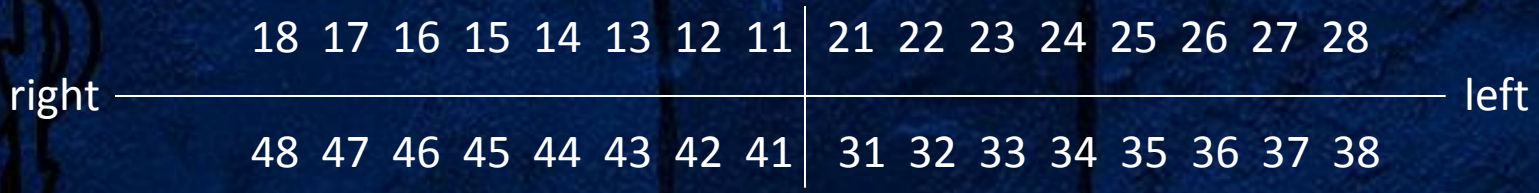
two-digit system

3. two-digit system (Féderation Dentaire International)

- In the two-digit system the first digit indicates the quadrant and the second digit the tooth within the quadrant.
- Quadrants are alloted the digits 1 -4 for the permanent teeth,and 5 -8 for the deciduous teeth in a clockwise sequence, starting at the upper right side.
- Teeth within the same quadrant are alloted the digits 1 – 8 (deciduous teeth 1 – 5) from the midline backwards. The digit should be pronounced separately.

- deciduous teeth:

- permanent teeth:



ORIENTATION ON THE TOOTH SURFACES

Each tooth has :

- an incisal edge or occlusal surface
- a vestibular surface
  (labial or buccal)
- an oral surface
- (palatal or lingual)
- a mesial surface
- a distal surface

- Incisal edge is edge for biting on incissors and canines
- Occlusal surfaces are masticatory surfaces on premolars and molars.
- Vestibular surface of each tooth is directed toward the vestibule:

  -toward the lips – labial (incissors, canines)

  -toward the cheek – buccal (premolars, molars)
- Oral surface is directed toward the oral cavity :

  -toward the palatum – palatal

  -toward the tongue – lingual
- Mesial surface facing the median line following the curve of the dental arc.
- Distal surface facing away from the median line following the curve of the dental arc.

ANATOMY OF THE TEETH AND SUPPORTING TISSUES

Each tooth consists of three parts:

1. the crown, projecting above the gum
2. the root (roots), imbedded in the alveolus
3. the neck, the constricted portion between the crown and root

Structure of the teeth:

On making a vertical section of a tooth, a cavity will be found in the interior of the crown and the center of each root. This is called the pulp cavity, and contains the dental pulp, a loose connective tissue richly supplied with vessels and nerves, which enter the cavity through the small aperture at the point of each root.

The solid portion of the tooth consists of:

- the dentin, which forms the bulk of the tooth. It forms the principal mass of a tooth. On microscopic examination it is seen to consists of a number of minute wavy and branching tubes, *the dental canaliculi*, imbedded in a dense homogeneous substance, *the matrix*.
- the enamel which covers the exposed part of the crown. It is the hardest and most compact part of the tooth.
- the cement which is disposed on the surface of the root.

The supporting structures of the teeth consist of :

- the attachment apparatus
  - the cementum of the root
  - the periodontal ligament
  - the alveolar process

- the mucous membrane covering (gingiva).

These tissues are called the periodontium.

- GINGIVA (GUM) – is that mucous membrane extending from the cervical portion of the tooth to the zone of the alveolar mucosa. It is divided into the *marginal, papillary* and *attached* gingiva. The attached gingiva and alveolar mucosa are separated by the mucogingival junction.

- CEMENTUM – is a calcified hard tissue, it is arranged in layers around the tooth root

- ALVEOLUS – the teeth are fixed in the alveoli of the alveolar process.

- PERIODONTAL LIGAMENT – the main portion of the periodontal ligament is composed of bundles of white collagenous connective tissue fibres that extend from the cementum to the alveolar bone.

OROFACIAL ANATOMY

- the facial bones
- temporomandibular joint
- the muscles of mastication
- the mimic muscles
- the blood vessels
- the lymphatic system
- the nerves
- the salivary glands

THE FACIAL BONES

- the nasal bones
- the maxillae – upper jaw

  - the body: pyramidal in shape, contains a large cavity –*the maxillary sinus.* It has 4 surfaces: anterior, posterior (infratemporal), superior (orbital), medial (nasal).

  - 4 processes: zygomatic, frontal, alveolar, palatine
- the lacrimal bone , the smallest and most fragile bone of the face
- the zygomatic bone

Is quadrangular, situated at the upper and lateral part of the face, it forms the prominence of the cheek.

- the body
- 4 process: frontosphenoidal, orbital, maxillary, temporal

- the palatine bone, resembles the letter L, consists of a horizontal and a vertical part and 3 outstanding processes – pyramidal, orbital, sphenoidal

- the inferior nasal concha

the vomer, forms the hinder and lower part of the nasal septum

- the mandible – lower jaw

  Is the largest and strongest bone of the face. It consists of a curved, horizontal portion –*the body*, and two perpendicular portions- *the rami*, which unite with the ends of the body at *angles.*

  The upper border of the ramus is surmounted by two precesses:

  -*the coronoid process*- gives attachment to the temporalis muscle

  -*the condyloid process* - the condyle: presents an articular surface for articulation with the articular disk of the TMJ

  - the neck: attachment of the pterygoideus externus muscle

TEMPOROMANDIBULAR JOINT

Is a complex hinge and glide articulation with an *articular disc* interposed between the *condyle of the mandible* and *the glenoid fossa of the temporal bone* consists of a posterior concave part and an anterior convex part. The concave portion of the temporal bone is the mandibular fossa (glenoid fossa) and the convex part is the articular eminence.

The fibrous synovial capsule of the joint is attached to the temporal bone along the edge of the articular tissues of the eminence and mandibular fossa, to the neck of the mandible, and to the articular disc.

There are 2 spaces: upper- discotemporal, lower- discomandibular. A small amount of *synovial fluid* is normally present.

THE MUSCLES OF MASTICATION

- Temporal muscle
- Masseter muscle
- Medial (internal) pterygoid muscle
- Leteral (external) pterygoid muscle

- Temporal muscle – has a broad origin on the lateral surface of the skull and extends as far forward as the lateral border of the supraorbital ridge. The insertion is on the coronoid process and the anterior border of the ascending ramus of the mandible.

- Masseter muscle – is approximately rectangular and is made up of 2 main muscle bundles that extend from the zygomatic arch to the ramus and body of the mandible. The insertion on the mandible extends from the region of the second molar on the lateral surface of the mandible to the lower one-third of the posterior lateral surface of the ramus.

- Medial (internal) pterygoid muscle – is a rectangular muscle with its main origin in the pterygoid fossa and its insertion on the medial surface of the angle of the mandible.The muscle from its origin, runs downward, posteriorly and laterally to its insertion.

- Lateral (external) pterygoid muscle – this muscle has two origins: one head of the muscle originates on the outer surface of the lateral pterygoid plate, while a smaller and upper head originates from the greater sphenoid wing. Both divisions of the muscle join in front of the temporomandibular joint near the condyle of the mandible. The main insertion is to the anterior surface of the neck of the condyle. There also is an insertion of some muscle fibres to the capsule of the joint and to the anterior aspect of the articular disc.

- The mucsles of mastication are supplied by the mandibular nerve.
- Actions:

The Temporalis, Masseter and Pterygoideus internus raise the mandible against the maxillae with great force.

The Pterygoideus externus assists in opening the mouth, but its main action is to draw forward the condyle and articular disk so taht the mandible is protruded and the inferior incisors projected in front of the upper, in this action it is assisted by the Pterygoideus internus.

The mandible is retracted by the posterior fibres of the Temporalis.

If the Pterygoidei internus and externus of one side act, the corresponding side of the mandible is drawn forward while the opposite condyle remains comparatively fixed, and side-to-side movements.

THE MIMIC MUSCLES

- the muscles of the eyelids
- the muscles of the nose
- the muscles of the mouth

the muscles of the eyelids

- levator palpebrae superioris
- orbicularis oculi
- corrugator supercilii

the muscles of the nose

- procerus (pyramidalis nasi)
- nasalis (compressor naris)
- depressor septi (alae nasi)
- dilatator naris posterior
- dilatator naris anterior

the muscles of the mouth

- quadratus labii superioris
- depressor anguli oris
- levator anguli oris
- buccinator
- zygomaticus major
- orbicularis oris
- levator menti
- risorius
- depressor labii inferioris

THE BLOOD VESSELS (the arteries, the veins)

The principal *arteries* of supply to the head and neck are the two common carotids, they ascend in the neck and each divides into two branches:

1.the external carotid

2. the internal carotid

1.the external carotid supplying the exterior of the head, the face, and the greater part of the neck.

Branches may be divided into 4 sets:

- *anterior*: superior thyroid, lingual, external maxillary (facial artery)
- *posterior*: occipital, posterior auricular
- *ascending*: ascending pharyngeal
- *terminal*: superficial temporal, internal maxillary

2. the internal carotid supplying to a great extent the parts within the cranial and orbital cavities (supplies the anterior part of the brain, the eye and its appendages, and sends branches to the forhead ond nose.)

It may be divided into 4 portions: cervical, petrous, cavernous, cerebral

The veins of the head and neck may be subdivided into three groups

1. the veins of the exterior of the head and face:

frontal
supraorbital
angular
anterior facial
superficial temporal
internal maxillary
posterior facial
posterior auricular
occipital

2. the veins of the neck

external jugular
posterior external jugular
vertebral
anterior jugular
internal jugular

3. the diploic veins, the veins of the brain, and the venous sinuses of the dura mater

THE LYMPHATIC SYSTEM –lymphatic glands and lymphatic vessels

The lymph glands of the head are arranged in the following groups:

- occipital
- posterior auricular
- anterior auricular
- parotid
- facial
- deep facial
- lingual
- retropharyngeal

The lypmph glands of the neck:

- submandibular
- submental
- anterior cervical
- deep cervical
- superficial cervical

THE NERVES

There are 12 pairs of cranial nerves:

1st olfactory
2nd optic
3d oculomotor
4th trochlear
5th trigeminal
6th abducent
7th facial
8th acoustic
9th glossopharyngeal
10th vagus
11th accessory
12th hypoglossal

The trigeminal nerve

The trigeminal nerve- is the largest cranial nerve and is the great sensory nerve of the head and face, and the motor nerve of the muscles of mastication.

Three large branches:

ophtalmic, maxillary, mandibular

The ophtalmic and maxillary consist exclusively of sensory fibres, the mandibular is joined outside the cranium by the motor root.

The facial nerve

The facial nerve – consists of motor and a sensory part:

-*the motor part*: supplies somatic motor fibres to the muscles of the face, scalp, and auricule, the Buccinator and Platysma, the Stapedius, the Stylohyoideus, and posterior belly of the Digastricus.

-*sypmathetic motor fibres:* which constitute the vasodilator nerves of the submandibular and sublingual glands, and are conveyed through the chorda tympani nerve.

-*the sensory part* contains the fibres of taste for the anterior two-thirds of the tongue and a few somatic sensory fibres from the middle ear region. A few splanchnic sensory fibres are also present.

- The glossopharyngeal nerve – contains both motor and sensory fibres and is distributed to the tongue and pharynx. I tis the nerve of ordinary sensation to the mucous membrane of the pharynx, fauces, and palatine tonsil, and the nerve of taste to the posterior part of the tongue.

- The hypoglossal nerve – is the motor nerve of the tongue

THE SALIVARY GLANDS

- Three large pairs of salivary glands communicate with the mouth, and pour their secretion into its cavity, they are the:
  - parotid gland
  - submandibular gland
  - sublingual gland
- there are accessory glands besides the salivary glands proper, numerous other glands are found in the mouth

Parotid gland

- -parotid gland (only serous)– the largest, it lies upon the side of the face, immediately below and in front of the external ear.

- Parotid duct (Stensen´s) opens upon the oral surface of the cheek by a small orifice, opposite the second upper molar tooth.

- !! there is facial nerve within the gland

Submandibular gland

- **submandibular gland** (serous)– is situated in the submandibular triangle.

- Submandibular duct (Wharton´s duct) –opens by a narrow orifice on the summit of a small papilla,at the side of the frenulum linguae.

Sublingual gland

- **sublingual gland** (mucous) **–** the smallest, it is situated beneath the mucous membrane of the floor of the mouth, at the side of the frenulum linguae, in contact with the sublingual depression on the inner surface of the mandible.

- Sublingual ducts - smaller (Rivinus),some join the submandibular duct,others open separately into the mouth ,on plica sublingualis

  - larger (Bartholin),which opens into the submandibular duct

Thank you for your attention