

## Objectives Section A-1

### *Bones of the Skull*

Upon successful completion of this section the student will:

- a) List major bones of the skull
- b) Identify the location of major bones on a skull
- c) Describe landmarks of the maxillae
- d) Describe landmarks of the mandible
- e) Name different types of joints of the skull – movable, immovable
- f) Identify the major foramina and openings and the relevant structures that pass through them

## Objectives for Section A-2

### *Innervation of the Mouth & Dentition*

Upon successful completion of this section the student will:

- a) Describe what a nerve is and its components
- b) Describe the process of an impulse
- c) Define and contrast the function of an artery and a vein
- d) Name the basic components of the nervous system and its divisions
- e) Name the 12 pairs of cranial nerves and their function
- f) Name the branches of the trigeminal nerve and which area each branch supplies
- g) Describe where the facial nerve is located and its function
- h) Discuss the effects of damage to the nerves
- i) Discuss common conditions associated with nerve damage- Bells palsy, trigeminal neuralgia

## Objectives for Section A-3

### *Muscles of the Head & Neck*

Upon successful completion of this section the student will:

- a) Describe the action of a muscle
- b) List the muscles of mastication
- c) Describe the function and location of the muscles of mastication
- d) List and identify the different movements of the jaw and muscle involved
- e) Discuss the TMJ
- f) Explain the effects of parafunctional habits on TMJ
- g) Explain various causes and management of TMJ pain- NG, exercise, relieving a lockjaw

## Objectives for Section A-4

### *Salivary Glands*

Upon successful completion of this section the student will:

- a) List the names and locations of the 3 major salivary glands
- b) Discuss the importance of saliva
- c) Identify symptoms of blocked salivary flow
- d) Discuss problems related with reduced/lack of salivary flow
- e) Explain management of reduced salivary flow

**Manual Section A-1***Bones of the Skull*

Ref: Bones of the Skull Brand and Isselhard Ch.26

**Terms:**

**Medial** – toward the midline of the body

**Lateral** – away from the midline of the body

**Anterior** – toward the front of the body

**Posterior** – toward the back of the body

**Superior** – above

**Inferior** – below

**Proximal** – closer to the center of the body

**Distal** – further away from the center of the body

**a) *List major bones of the skull***

(Ref: Brand and Isselhard p.318)

The skull has 22 bones not including 3 bones of the ear. They comprise of paired and unpaired bones and are classified into two categories: bone that surrounds the brain called the neurocranium and bone that surrounds the face called the viscerocranium.

8 bones comprise the neurocranium including;

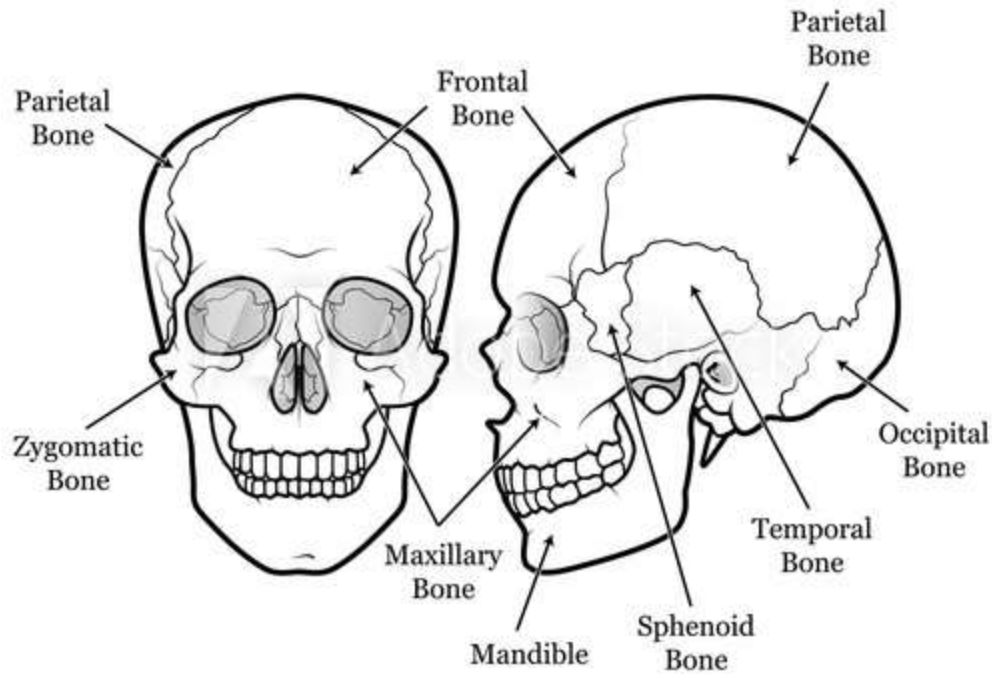
- Frontal bone (single)
- Sphenoid bone (single)
- Ethmoid bone (single)
- Occipital bone (single)
- Temporal bones (paired)
- Parietal bones (paired)

14 bones comprise the viscerocranium including;

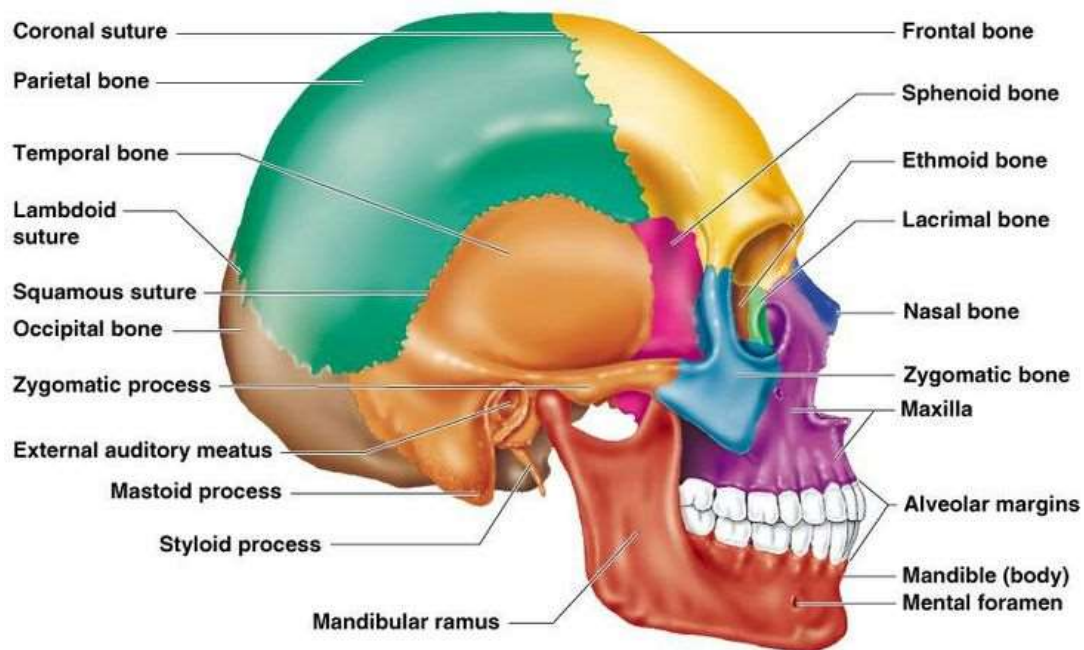
- Mandible (single)
- Vomer (single)
- Nasal bones (paired)
- Lacrimal bones (paired)
- Zygomatic bones (paired)
- Inferior nasal conchae (paired)
- Palatine bones (paired)
- Maxillae (paired)

**b) *Identify the location of major bones on a skull***

See Brand and Isselhard p319 figure 26-1



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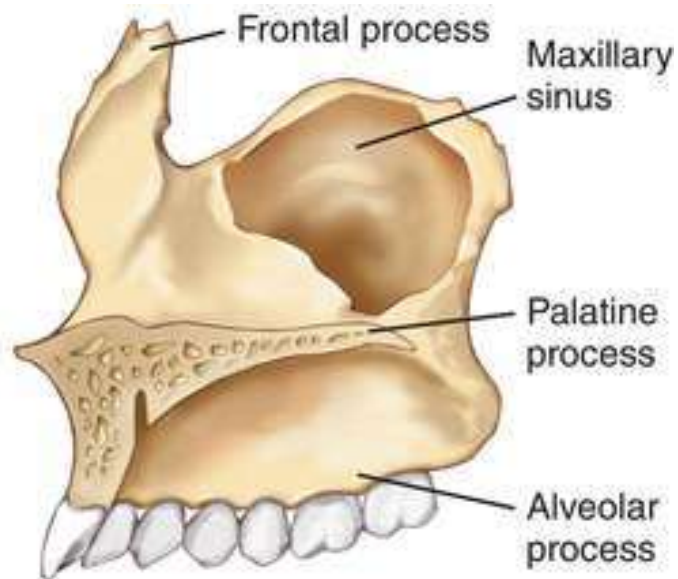


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## c) Describe landmarks of the maxillae

Comprised of 4 processes and body in each bone

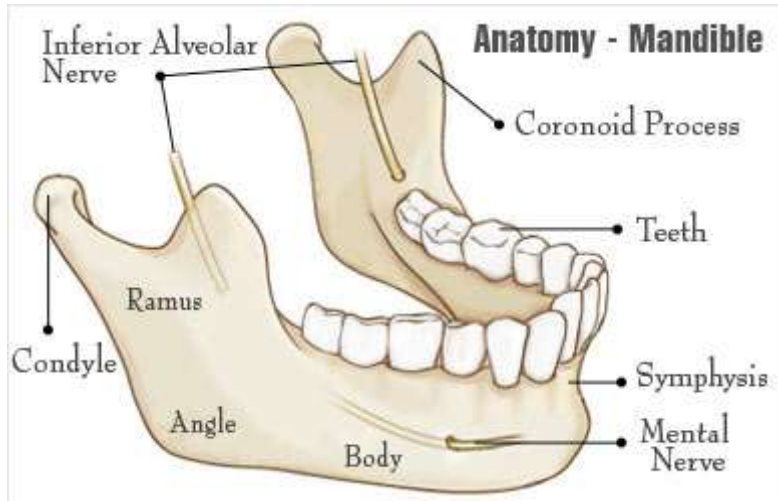
- The body consists of
  - the maxillary sinuses
- The four processes are
  - Frontal process
  - Zygomatic process
  - Alveolar process
  - Horizontal palatine process



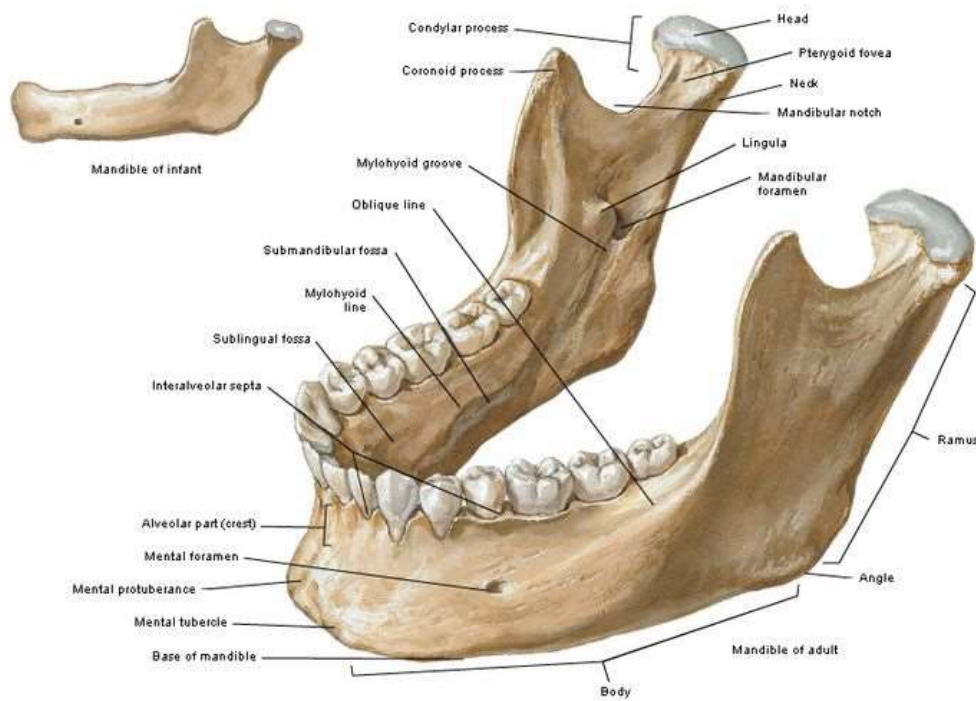
*Medical Dictionary-the Free Dictionary*

## d) Describe landmarks of the mandible

Comprised of 3 parts: horizontal body, alveolar processes and the ramus



Medindia



*F. Netter M.D.*  
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**e) Name different types of joints of the skull – movable, immovable**

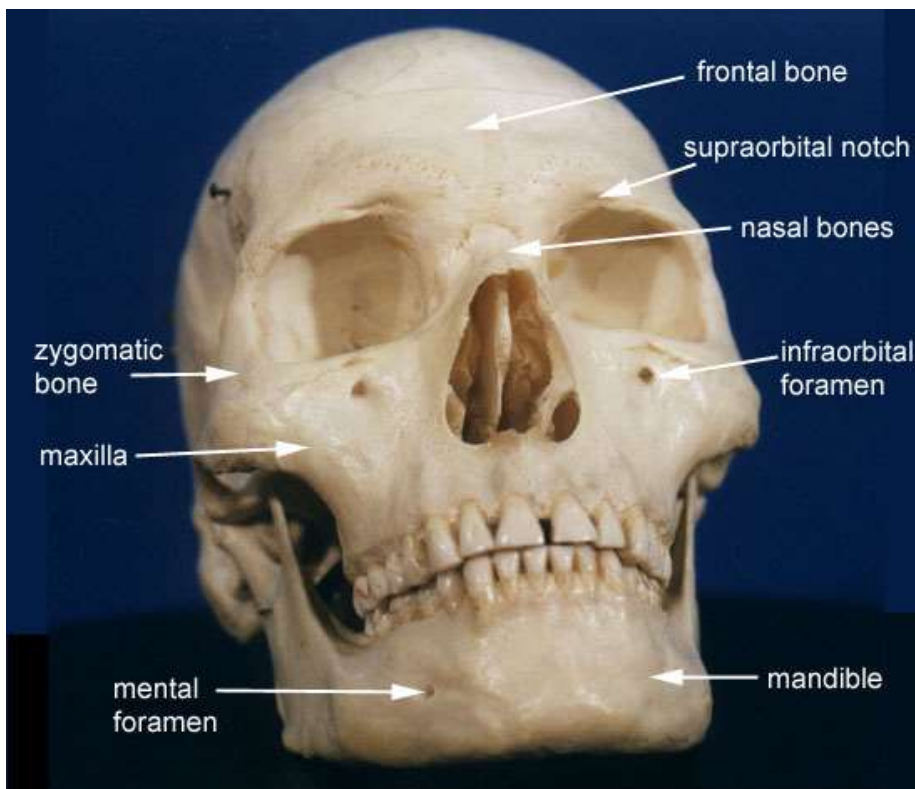
- Immovable joints of the skull are sutures that join two bones together.
- Movable joint of the skull is the temporomandibular joint. It is the articulation between the temporal bone and mandible. It is two joints that move and function as one. It is a bilateral (two sided) joint that is fused at the midline giving left and right movement. It is also called a hinge and sliding joint or gliding joint.

**f) Identify the major foramina and openings and the relevant structures that pass through them**

(Ref: Brand and Isselhard)

**Term:** Foramina/Foramen: circular openings through bone supplying nerves and blood vessels to the body

- Supraorbital foramen: supraorbital nerves and vessels that innervate the forehead
- Mental foramen: mental nerves and vessels to the chin, lower lip and facial anterior gingiva
- Infraorbital foramen: infraorbital vessels and nerves to upper lip, lower eyelid and side of nose
- Foramen spinosum: middle meningeal artery to supply to coverings of the brain
- Foramen ovale and foramen rotundum: nerves to lower and upper teeth
- Stylomastoid foramen: facial nerve exits
- Foramen magnum: spinal cord passage
- Mandibular foramen: nerves and blood vessels to mandibular teeth



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## Manual for Section A-2

### *Innervation of the Mouth & Dentition*

Ref: Innervation Brand and Isselhard Ch.32

#### **a) Describe what a nerve is and its components**

- A cell of the nervous system is called a neuron. It consists of three parts - cell body, the axon and the dendrite. Many neurons consist of myelin sheaths which is a protective covering that helps to insulate and protect nerve fibers.
- A nerve is a bundle of neurons that carry messages to (afferent) and from (efferent) the brain and usually cause an action to take place.
- There are different types of nerves, including sensory nerves which cause someone to feel or perceive and motor nerves that cause indirect or direct movement

#### **b) Describe the process of an impulse**

(Ref: Brand and Isselhard)

- An impulse works by a wave of electricity passing through the dendrites to the cell body down to the axon and passes the message or impulse to the next neuron. These messages or impulses work mainly in one direction carrying the message to or from the brain.

#### **c) Define and contrast the function of an artery and a vein**

(Ref: Marieb, Hoehn. Human Anatomy and Physiology 7<sup>th</sup> ed. 2007, Pearson)

- An artery is an oxygenated vessel that carries blood away from the heart to the rest of the body.
- A vein is a deoxygenated blood vessel that carries blood from the body back to the heart.

#### **d) Name the basic components of the nervous system and its divisions**

The basic divisions of the nervous system are

- Central nervous system
  - Consisting of the brain and spinal cord
- Peripheral nervous system
  - All nerves that extend from the brain and spinal cord
    - Spinal nerves
    - Cranial nerves
    - Autonomic nervous system

#### **e) Name the 12 pairs of cranial nerves and their function**

I – olfactory (sensory): for smell

II – optic (sensory): for sight from the eye to the brain



III – oculomotor (motor): to move most muscles in the eye; parasympathetic causes pupil to contract and lens to change shape

IV – trochlear nerve (motor): move the eye downwards and laterally

V – trigeminal nerve (motor and sensory): innervation from the teeth, oral cavity, and anterior 2/3 of tongue, max sinus, nasal cavity, skin of most the front of the head and face. Motor innervations to muscles of mastication, soft palate and tensor tympani muscle

VI – abducens (motor): moves eye laterally

VII – facial nerve (motor and sensory): motor innervation for facial expression, salivary and lacrimal glands, sensory ear and taste

VIII – statoacoustic nerve (sensory): hearing and balance

IX – glossopharyngeal – (motor and sensory): motor innervation to muscles of the pharynx, stylopharyngeus; parasympathetic to parotid and salivary glands, sensory for posterior 1/2 of tongue for taste and sensations for pain, pressure, heat and cold

X – Vagus nerve (motor and sensory): motor for muscles of the pharynx, larynx and most of soft palate, parasympathetic for smooth muscles including cardiac and many glands; sensory for skin of ear, taste and sensation of root of tongue and epiglottis

XI – accessory (motor): trapezius and sternocleidomastoid muscle. It also runs with the vagus muscle and helps supply the soft palate, larynx and pharynx

XII – hypoglossal (motor): muscles of the tongue

## f) *Name the branches of the trigeminal nerve and which area each branch supplies*

There are three main branches of the trigeminal nerve the ophthalmic, maxillary and mandibular.

- 1) Ophthalmic (V1) – sensory : innervates the forehead and skin above the eye, upper part of forehead, upper medial corner of eye, carries sensory responses from the skin above the lateral eye area and lacrimal area, and inferior medial corner of the eye
- 2) Maxillary (V2) – sensory: upper teeth, oral cavity, nasal cavity, skin of the cheek, midface and temporal region.
- 3) Mandibular (V3) – sensory :helps supply mucosa of cheek, lower teeth, lower lip and skin of chin, anterior 2/3 of tongue, skin anterior and superior to the ear.

Motor – keeps the eardrum taut, tenses the soft palate, temporalis muscle, masseter muscle, medial and lateral pterygoid muscles, mylohyoid and anterior digastric muscle.

**g) Describe where the facial nerve is located and its function**

The facial nerve exits the brain through the stylomastoid foramen behind the ear. It comes forward into the parotid gland and separates into branches for motor innervation of facial expression.

**h) Discuss the effects of damage to the nerves**

Damage to the nerves can occur to different areas when there is injury or damage to neurons, then function is lost or compromised.

**i) Discuss common conditions associated with nerve damage- Bells palsy, trigeminal neuralgia**

- Bell's palsy: it is a type of temporary facial paralysis caused by damage/trauma to facial nerve. It usually only occurs on one side and causes the face on that side to droop. Saliva and tears are also affected. Usually it is a sudden onset and can go away in a few weeks by itself. It is not the result of a stroke.
- Trigeminal neuralgia: It is a chronic pain condition that affects the trigeminal nerve, one of the most widely distributed nerves in the head. TN is a form of neuropathic pain (pain associated with nerve injury or nerve lesion.) It typically causes extreme, sporadic, sudden burning or shock-like facial pain that lasts anywhere from a few seconds to as long as two minutes per episode. These attacks can occur in quickly, one after the other, even lasting as long as two hours. sometimes it can also be characterized by constant aching, burning, stabbing pain of somewhat lower intensity. The intensity of pain can be physically and mentally incapacitating.

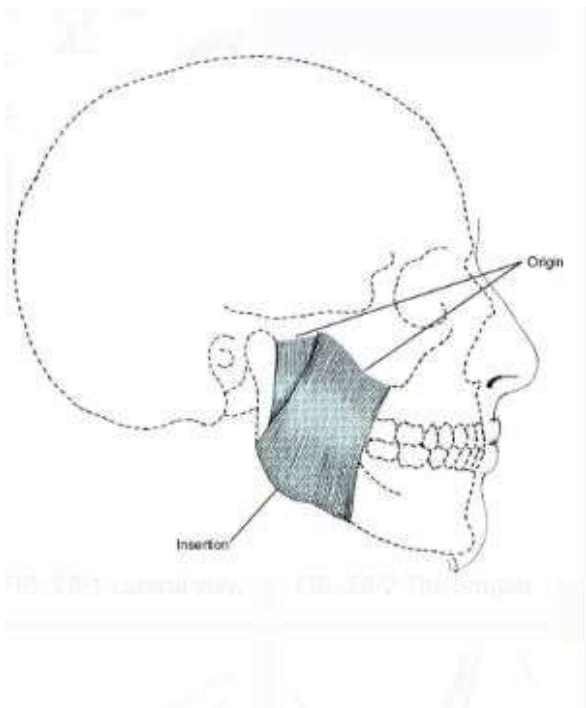
## Manual for Section A-3

### *Muscles of the Head & Neck*

**a) Describe the action of a muscle**

- Origin is the end of the muscle that is attached to the least movable bone or structure
- Insertion is the end of the muscle that is attached to the most movable bone or structure
- Action is the work accomplished when the muscle fibers contract

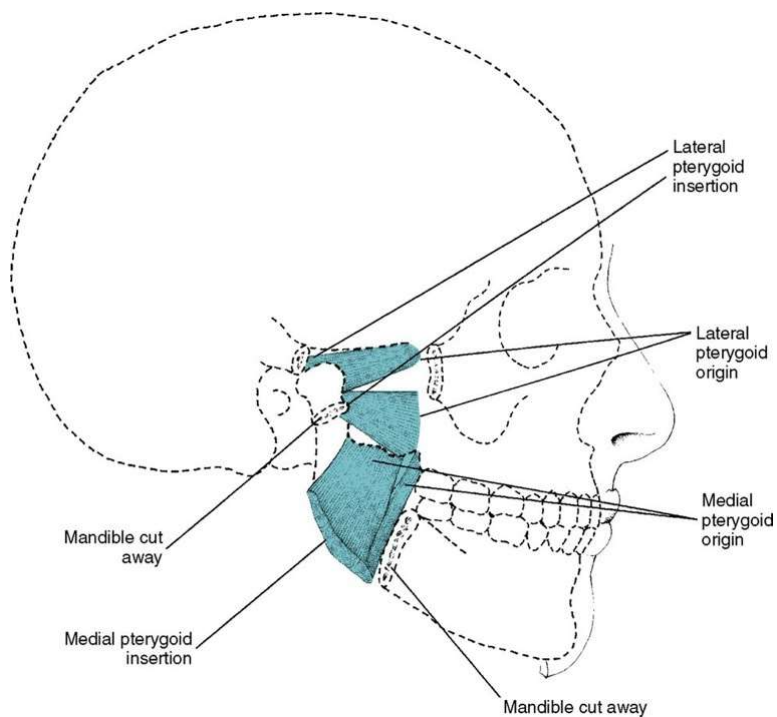
See Brand and Isselhard p.341 Figure 28-1

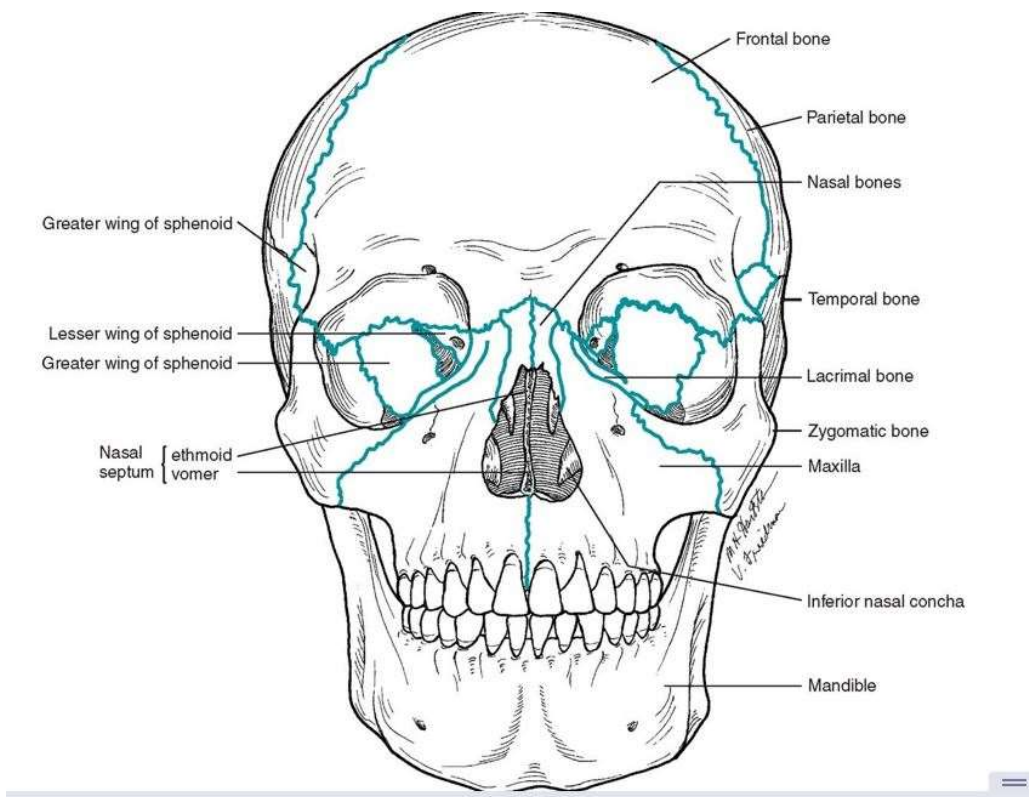


**b) List the muscles of mastication**

- Masseter, temporalis, medial pterygoid and lateral pterygoid

Brand and Isselhard p.341 Figure 28-3, 26-1





**c) Describe the function and location of the muscles of mastication**

- Masseter – closes the jaw and elevates the mandible
- Temporalis – elevates the mandible if entire muscle contracts retrudes the mandible
- Medial pterygoid – elevates the mandible
- Lateral pterygoid – protrudes, depresses and provides side to side lateral excursion, functions for biting and relaxes/controls the condyle

**d) List and identify the different movements of the jaw and muscle involved**

- Elevation – raising the mandible and closing the jaw – masseter, medial pterygoid muscle temporal
- Protrusion- moving the mandible forward – lateral pterygoid
- Retrusion- moving the mandible posteriorly – temporal muscle (posterior fibers), digastric when infrahyoid is relaxed
- Depression- lowering the mandible and opening the mouth – inferior head of lateral pterygoid, digastric, mylohyoid, geiohyoid, supra and infrahyoid when working together
- Lateral excursion- forward movement of one condyle and the mandible moves laterally – lateral pterygoid

## *e) Discuss the TMJ*

- The temporomandibular joint is the articulation between the temporal bone and mandible. It is two joints that move and function as one. It is a bilateral (two sided) joint that is fused at the midline giving left and right movement. It is also called a hinge and sliding joint or gliding joint.
- It consists of an articular disc, retrodiscal pad, synovial cavities, capsule, temporomandibular ligament, upper elastic lamina and lower collagenous lamina

## *f) Explain the effects of parafunctional habits on TMJ*

- Bruxism – incisal/ occlusal wear of the tooth surfaces
- Thumb or finger sucking – can cause extreme overjet of maxillary incisors, stretched lips and a deep palate

## *g) Explain various causes and management of TMJ pain- NG, exercise, relieving a lockjaw*

(Reference: Brand and Isselhard)

- Bruxism - Recommended treatments for bruxism (teeth grinding) include behavioural therapies and using mouth guards or mouth splints. Other treatments, such as muscle relaxation exercises and sleep hygiene measures, may also help you manage your symptoms. Nightguards even out the pressure across the jaw and create a physical barrier between the upper and lower teeth to protect them from further damage. They can also reduce any grinding noises one makes at night.
- Subluxation – consists of controlled movements to guide the jaw back into position
- Arthritis – anti-inflammatories

## **Manual for Section A-4**

### *Salivary Glands*

Ref: Brand and Isselhard Ch.33, Bath-Balogh and Fahrenbach Ch. 11, Darby and Walsh Ch. 48

## *a) List the names and locations of the 3 major salivary glands*

- Parotid – on the surface of the masseter muscle behind the ramus
- Submandibular- posterior part of the body of the mandible
- Sublingual – anterior floor of mouth next to canines

## *b) Discuss the importance of saliva*

- Helps break down food
- Helps to swallow
- Keeps oral cavity moist
- Aids in speech
- Protects body and teeth due to defense

**c) Identify symptoms of blocked salivary flow**

(Ref: Bath -Balogh)

- Xerostomia- dry mouth
- Enlargement and tenderness in glandular oral tissue

**d) Discuss problems related with reduced/lack of salivary flow**

(Ref: Bath -Balogh)

- Xerostomia/ dry mouth can cause caries, damage to non protected tissues, problems in speech and mastication

**e) Explain management of reduced salivary flow**

(Ref: Bath –Balogh, Chart in Darby p.885)

- For dry mouth sipping water, use of artificial saliva, fluoride rinses, avoid products that contain alcohol