MUSCLES OF MASTICATION

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CONTENTS

INTRODUCTION

- Main purpose of mastication is to reduce the size of food particle to a size that is convenient for swallowing (bolus formation) with the help of saliva.
- Muscles of mastication are the group of muscles that help in movement of mandible as during chewing and speech.
- Four pairs of the muscle in the mandible make chewing movement possible.
- These muscles along with accessory muscles together are termed as muscles of mastication.

DEFINITIONS

- **MUSCLE**:-An organ that by contraction produce movements of an organ or part of the body.
- **MASTICATION**:-Is defined as the process of chewing food in preparation for swallowing and digestion.
- CLASSIFICATION OF MUSCLES

Depending upon striations:-striated muscles

non-striated muscles

depending upon control:-voluntary muscles

involuntary muscles

depending upon function:-skeletal muscles

cardiac muscle

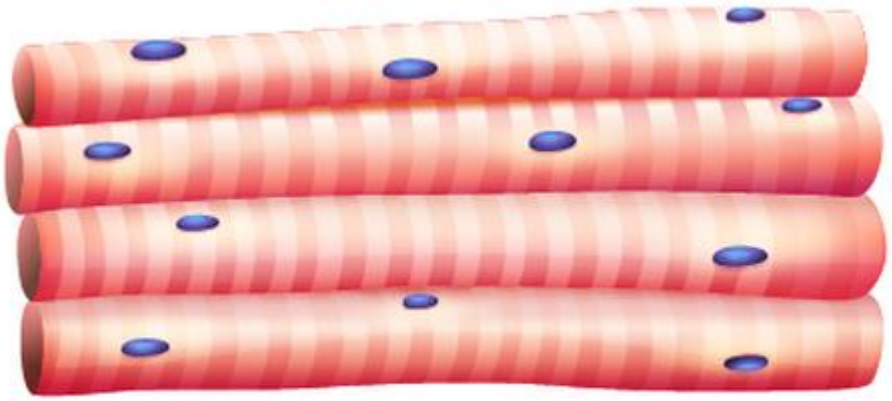
smooth muscles

- SKELETAL MUSCLES:-most are attached to the skeleton and form somatic musculature.

  -shows well developed cross striations thus called striated muscles.

  -generally under voluntary control.

  -help to maintain body posture and position.



Skeletal muscle

CARDIAC MUSCLES:-Present in heart

-well developed cross striations.

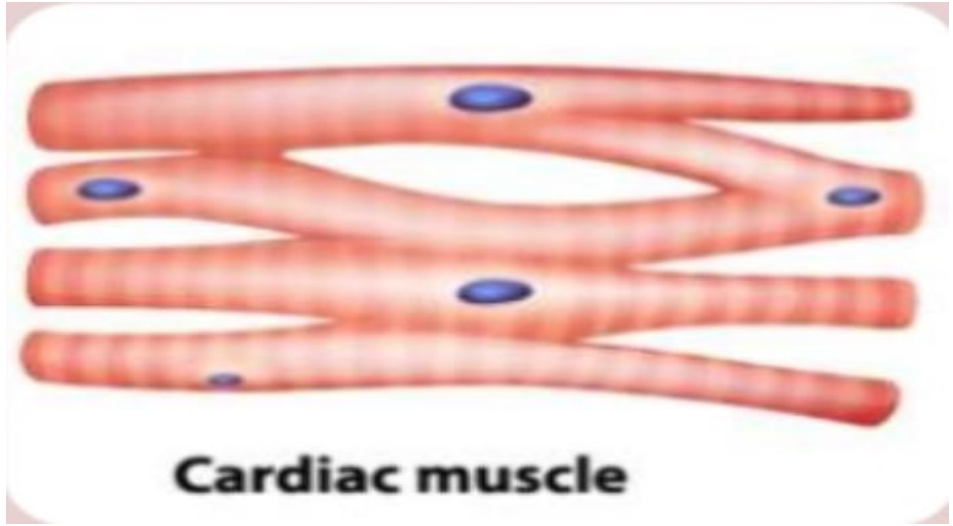
-involuntary in control

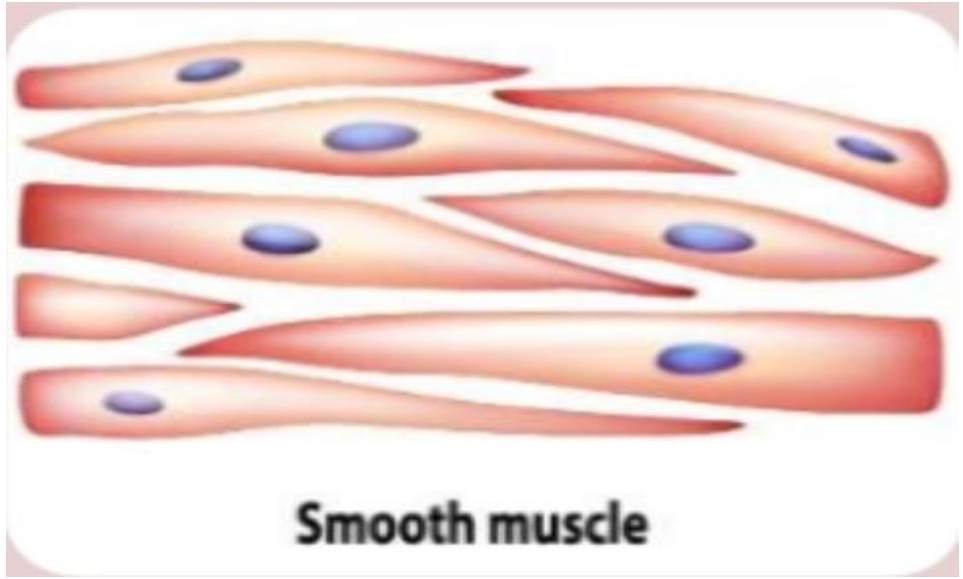
-maintain arterial B.P

SMOOTH MUSCLES:-mostly in hollow viscera

-lack cross striations

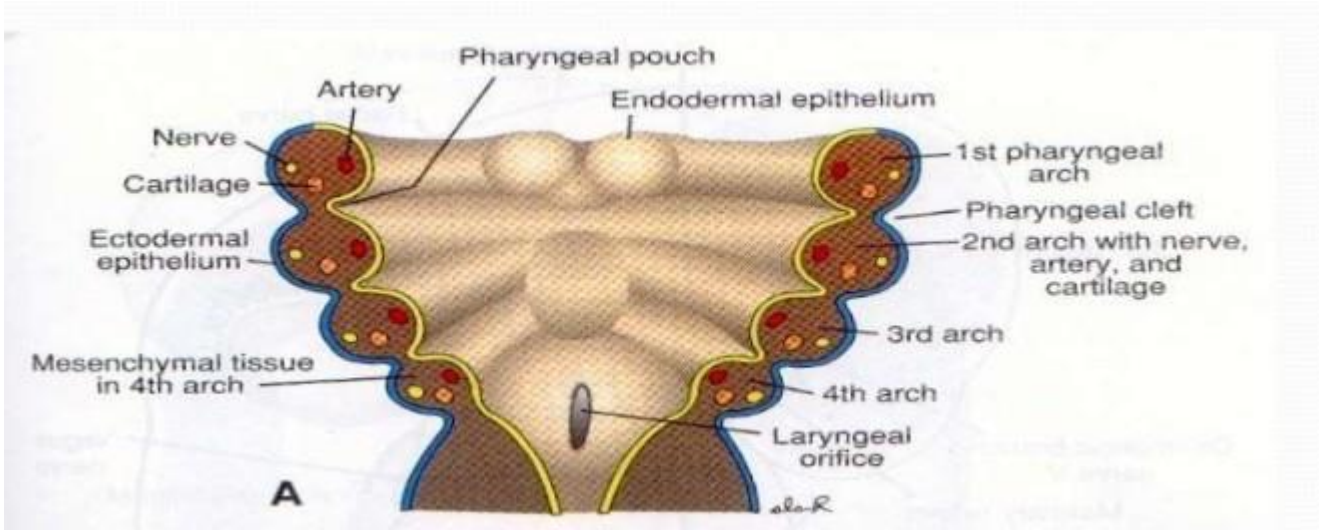
- involuntary in control





DEVELOPMENT

- The muscular system develops from intra-embryonic mesoderm from embryonic cells called myoblast.
- Muscle of mastication are derived from 1st brachial arch that is mandibular arch.



5th -6th WEEK

-Primitive cells forms and differentiate.

-Get oriented to site of origin and insertion.

7th – WEEK

-Mandibular muscle mass enlarges.

-Cells migrates to area of formation of four major muscle of mastication.

10th WEEK

-Muscle mass well organized

Masticatory force

- Muscles of mastication apply forces to dentition and which is vary from tooth to tooth.
- Average force applied by the tooth increases from anterior to posterior teeth.

incisors -155N

cuspid -208N

bicuspids-288N

first molar-390N

second molar-800N

CLASSIFICATION

PRIMARY MUSCLE OF MASTICATION

- MASSETER
- TEMPORALIS
- LATERAL PTERYGOID
- MEDIAL PTERYGOID

ACCESSORY MUSCLES

- DIGASTRIC
- MYLOHYOID
- GENIOHYOID

MASSETER MUSCLE

- It is one of the most powerful ,quadrilateral muscle.
- It covers the lateral part of ramus of mandible.
- It consists of 3 layers
    - (1)superficial
    - (2)middle
    - (3)deep

ORIGIN

SUPERFICIAL LAYER:-Largest

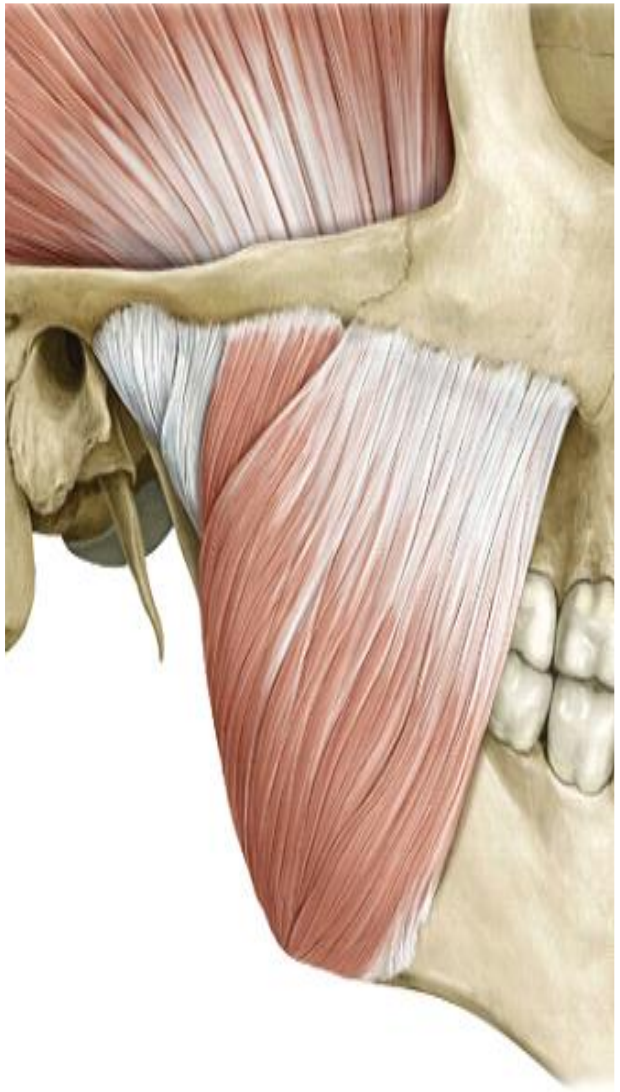
-Zygomatic process of maxilla and anterior 2/3rd of inferior border of zygomatic arch.

MIDDLE LAYER

-Medial aspect of anterior 2/3rd of zygomatic arch and lower border of posterior third of zygomatic arch.

DEEP LAYER

-Deep surface of zygomatic arch.



INSERTION

SUPERFICIAL LAYER

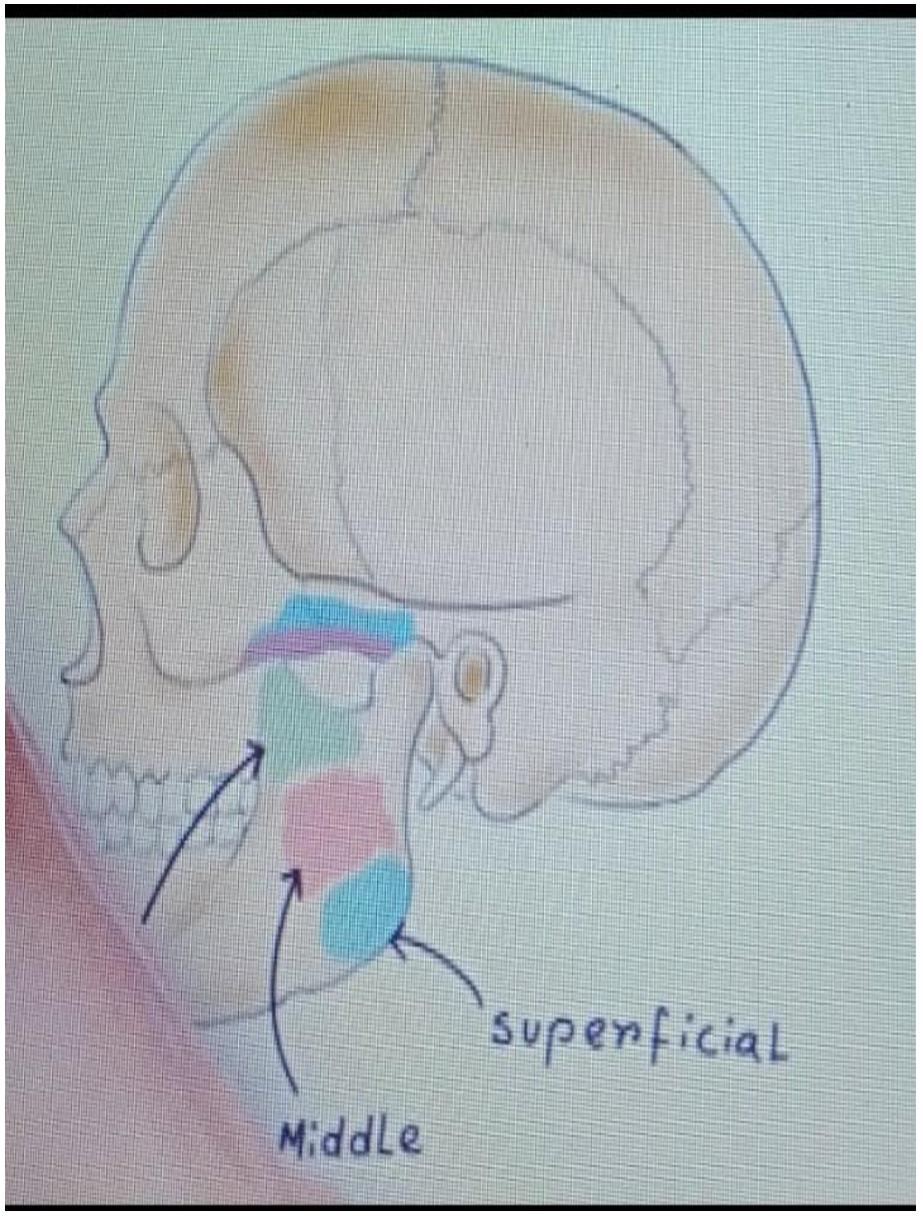
-Angle of mandible and lower posterior half of lateral surface of ramus of mandible.

MIDDLE LAYER

-Middle part of ramus of mandible

DEEP LAYER

-Upper part of ramus of mandible an coronoid process



NERVE SUPPLY:-

Supplied by masseteric nerve a branch of anterior division of mandibular nerve.

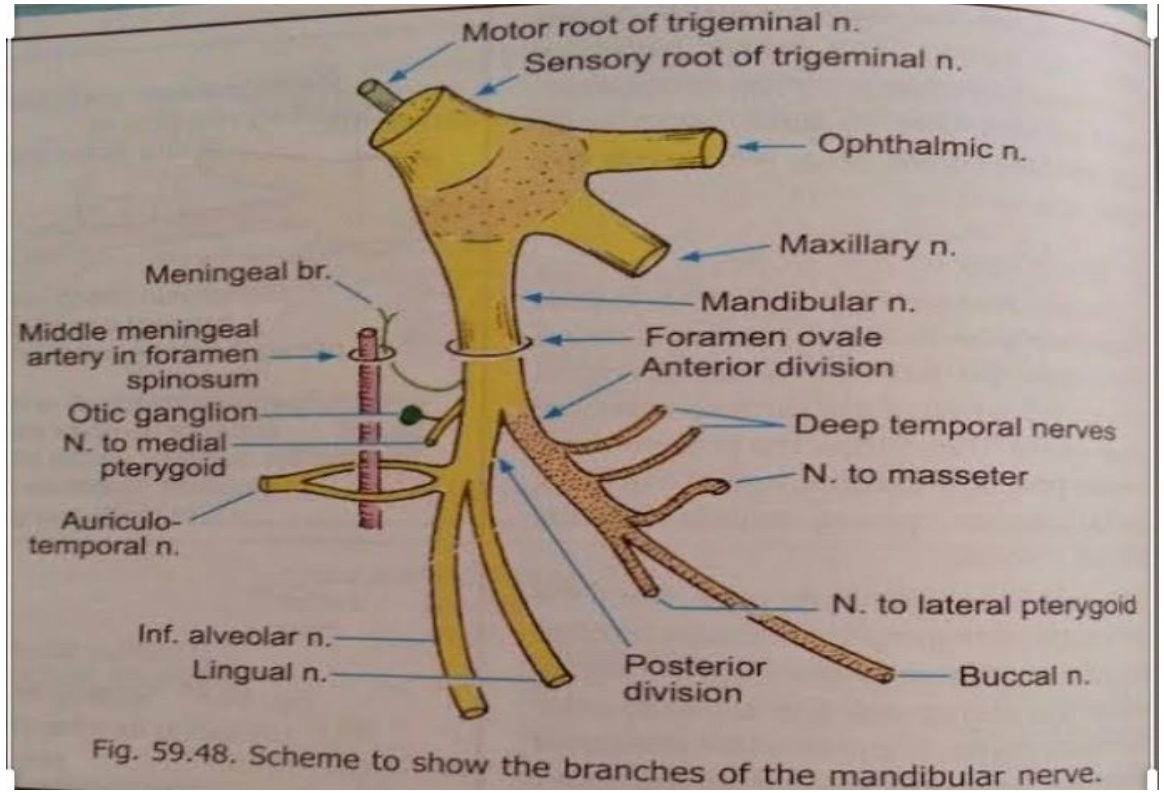
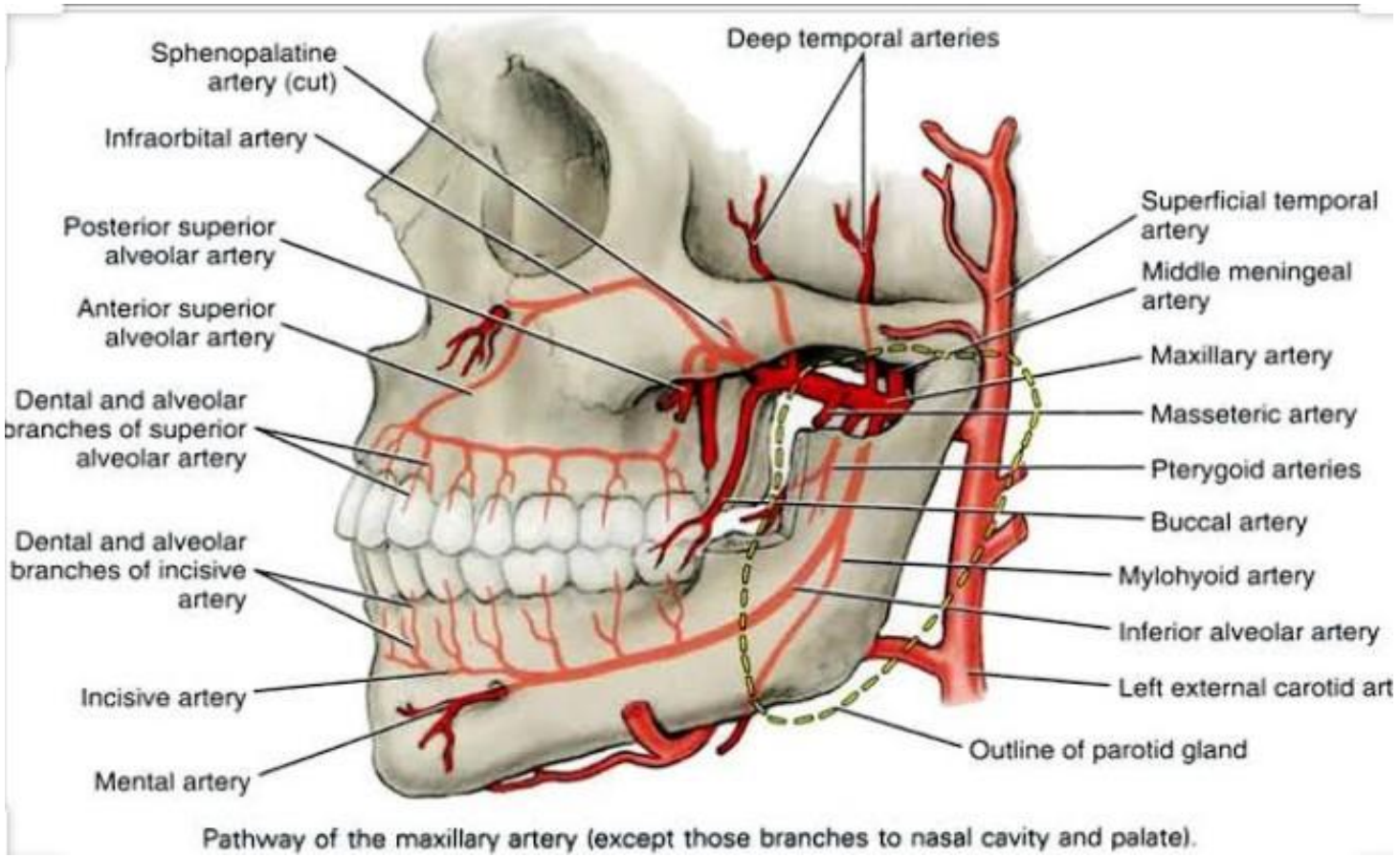


Fig. 59.48. Scheme to show the branches of the mandibular nerve.

BLOOD SUPPLY:-

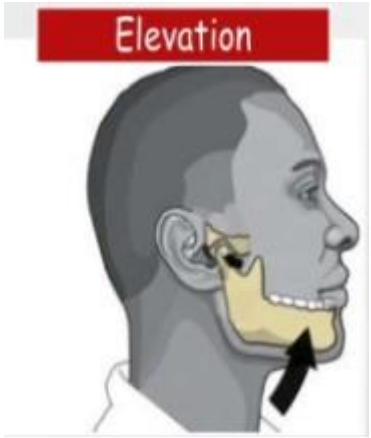
Supplied by masseteric artery a branch of maxillary artery.



Pathway of the maxillary artery (except those branches to nasal cavity and palate).

FUNCTION:-

- Elevates the mandible to close the mouth
- Clenches the teeth



PALPATION

- The patient is asked to clench their teeth and using both hands palpate the masseter muscle on both sides extra-orally.
- Palpate the origin of masseter bilaterally along the zygomatic arch and continue to palpate down the body of mandible where masseter is attached.

TEMPORALIS MUSCLE

- Extensive fan shaped muscle that covers the temporal region .

- It is powerful muscle that can be easily seen and felt during closure of mandible.

ORIGIN

Origin is from inferior temporal line ,floor of temporal fossa and from the overlying temporal fascia.

Divided into three areas

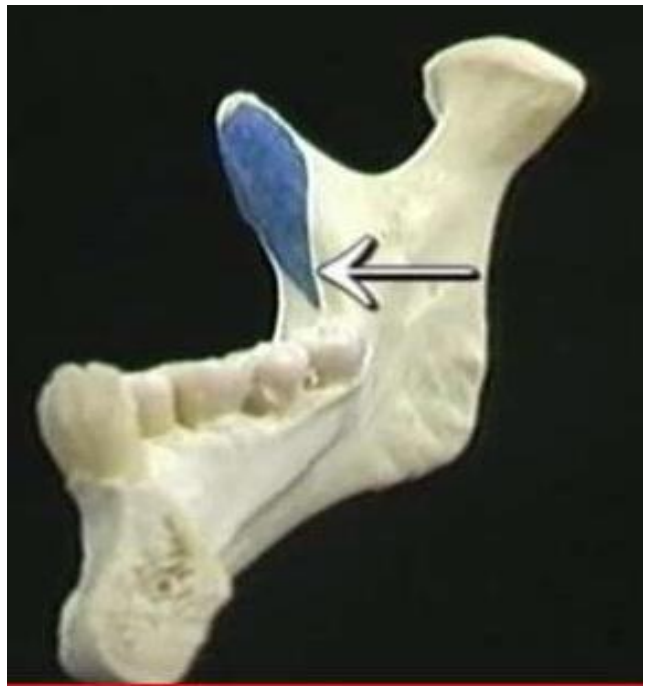
-anterior temporal

-middle temporal

-posterior temporal

INSERTION

-Margins and deep surface of the coronoid process and anterior border of ramus of mandible.



NERVE SUPPLY

-Deep temporal branches from anterior division of mandibular nerve.

BLOOD SUPPLY

-Superficial temporal artery branch of maxillary artery.

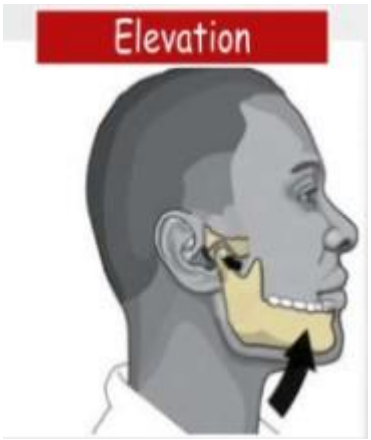
-Superficial temporal vein and middle temporal vein.

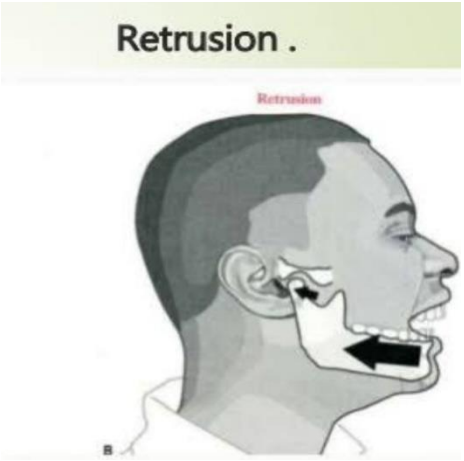
FUNCTION:-

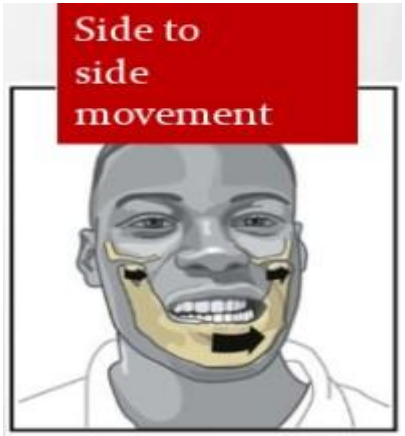
-Anterior fibres elevates the mandible.

-posterior fibres retract the protruded mandible.

-it also contribute in side to side movement.







PALPATION

-To locate the muscle have the patient clench.

-the anterior region is palpated above the zygomatic arch and anterior to TMJ.

-The middle region is palpated directely above the tmj and superior to the zygomatic arch..

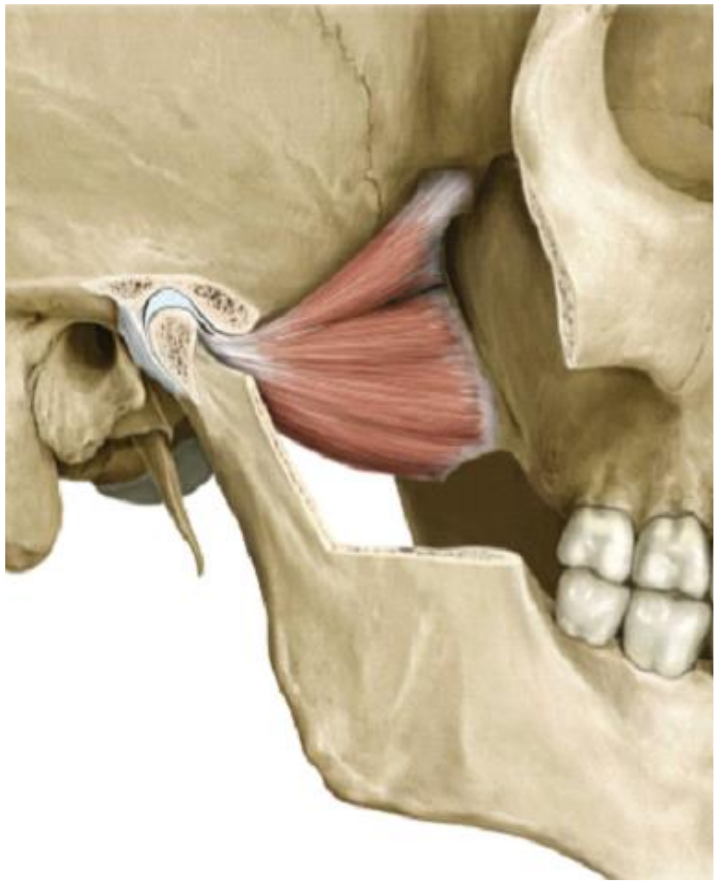
-The posterior region is palpated above and behind the ear.

CLINICAL IMPORTANCE OF TEMPORAL MUSCLE

Sudden contraction of temporalis muscle result in coronoid fracture,which is rare.

LATERAL PTERYGOID MUSCLE

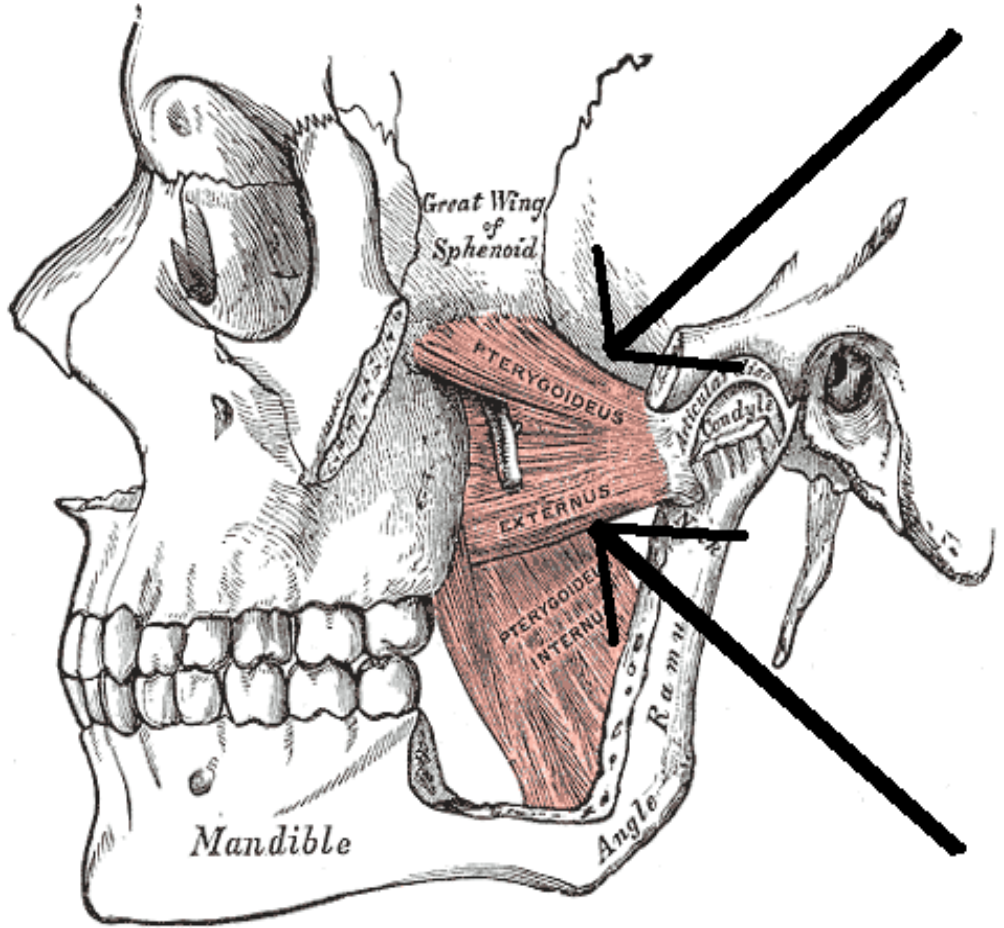
- Also called as external pterygoid muscle.
- It occupy in horizontal position.
- It is thick ,short ,conical and triangular muscle with two heads:-
  - -Superior head(small)
  - -Inferior head(large)



ORIGIN

SUPERIOR HEAD:-from infratemporal surface and crest of the greater wing of sphenoid bone.

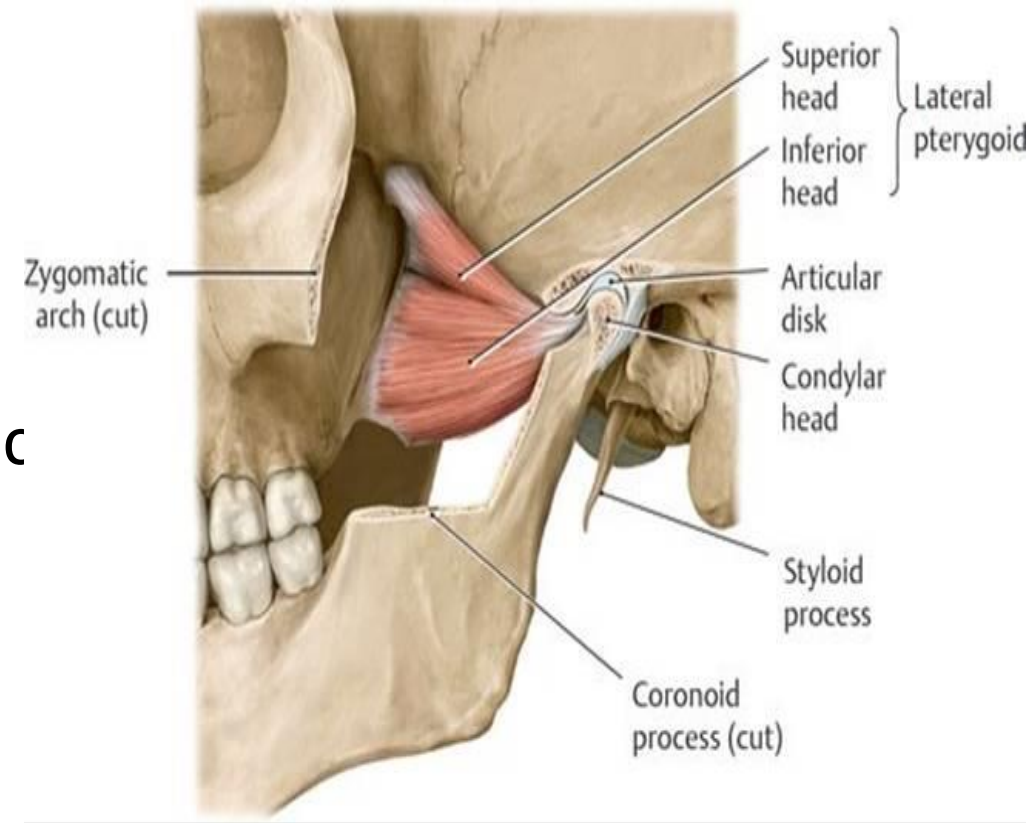
INFERIOR HEAD:-from lateral surface of lateral pterygoid plate.



INSERTION

-Fibers runs backward and laterally and converge into the pterygoid fovea on anterior surface of neck of condyle.

-Into anterior margin of articular disc and capsule of tmj.



NERVE SUPPLY

-Branch from anterior division of mandibular nerve.

BLOOD SUPPLY

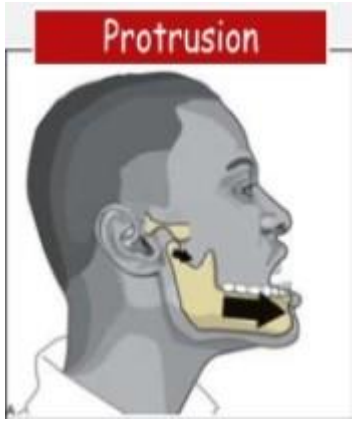
-Maxillary artery and ascending palatine artery

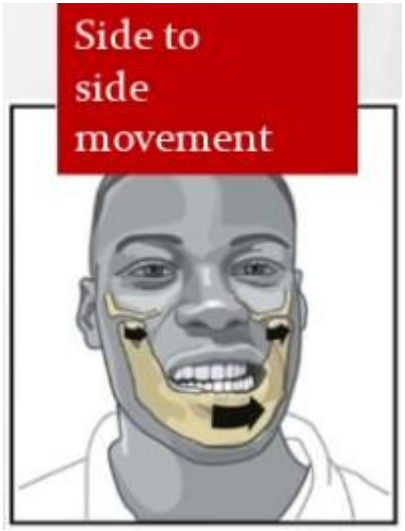
FUNCTION

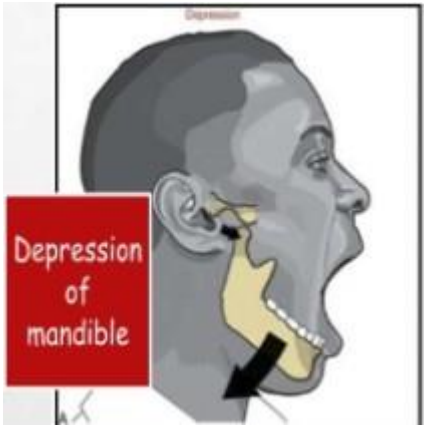
-Acting together ,these muscle protrude the mandible

-acting alone and alternately ,side to side movement of mandible occurs

-depression of mandible







Palpation

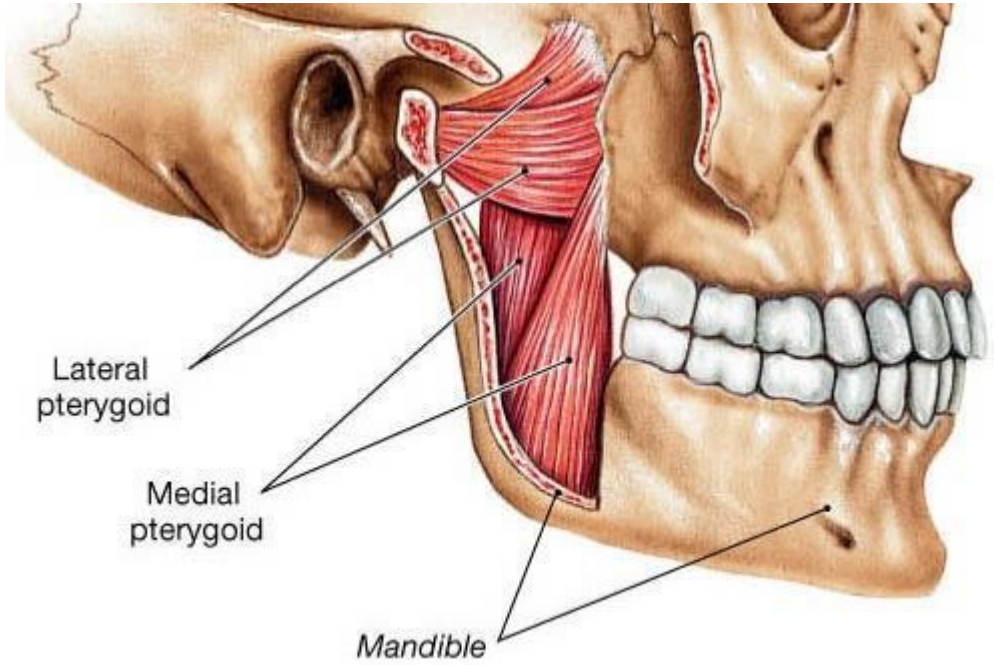
- Placing the forefinger , or the little finger ,over the buccal area of the maxillary third molar region and exerting pressure in a posterior ,superior and medial direction behind the maxillary tuberosity.

MEDIAL PTERYGOID MUSCLE

- It is also called as the internal pterygoid muscle.
- It is almost a mirror like image of the masseter muscle.
- It is rhomboidal and runs practically in the same direction on the inner surface of mandible.
- It consists of two heads which differ in origin:

  -superficial head

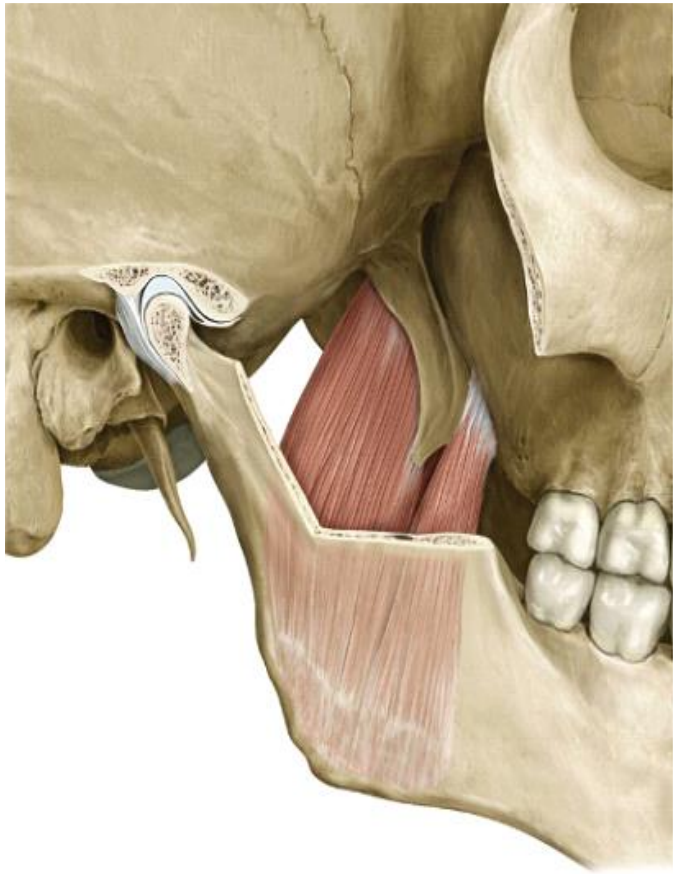
  -deep head(large)



ORIGIN

SUPERFICIAL HEAD:-from maxillary tuberosity

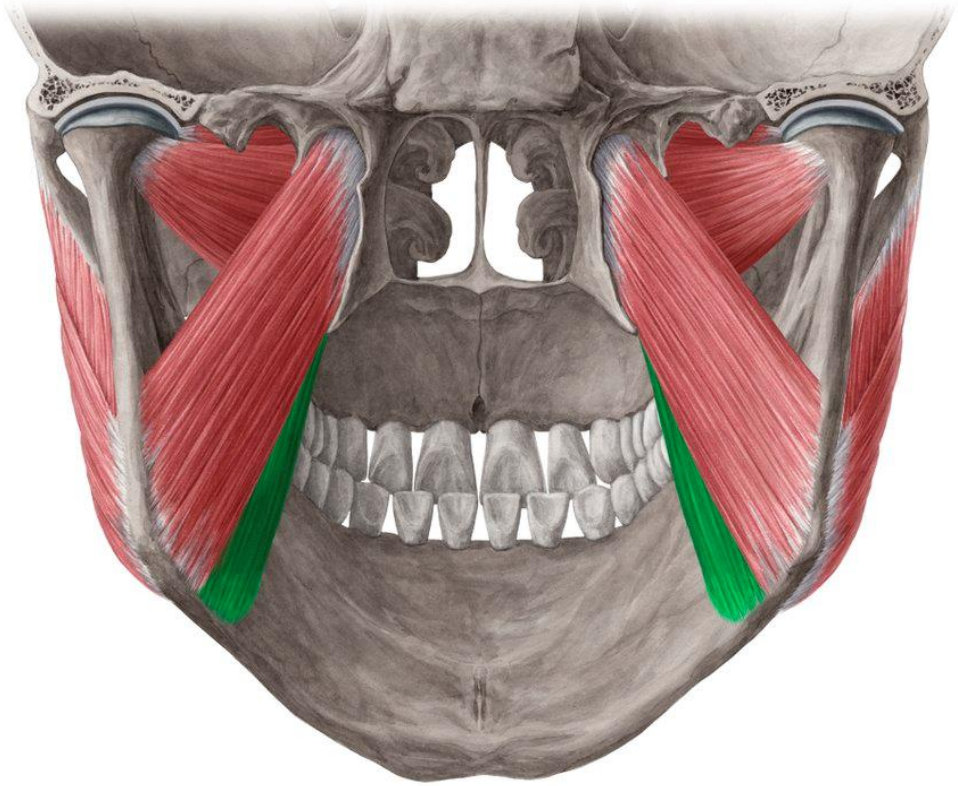
DEEP HEAD:-from medial surface of lateral pterygoid plate and part of palatine bone.

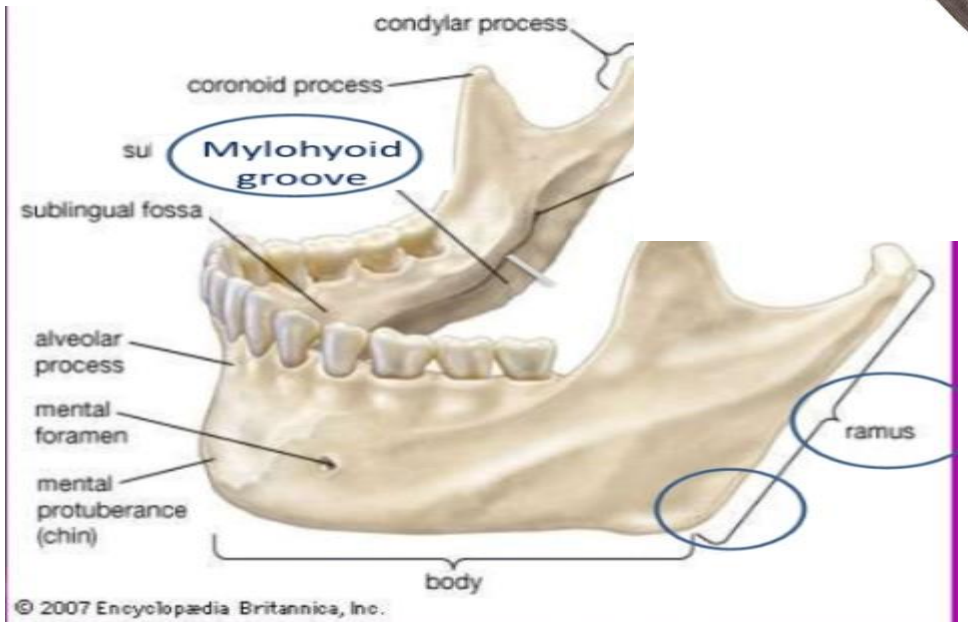


INSERTION

-Fibers run downwards , backwards and laterally and inserted into the roughened area on the medial surface of angle.

-Below and behind the mandibular foramen and mylohyoid groove





BLOOD SUPPLY

Pterygoid branch of 2nd part of maxillary artery.

NERVE SUPPLY

Nerve to medial pterygoid ,branch of main trunk of mandibular nerve.

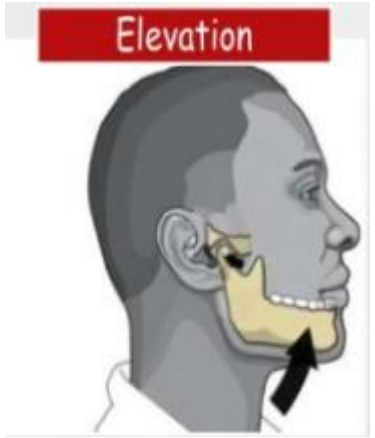
FUNCTIONS

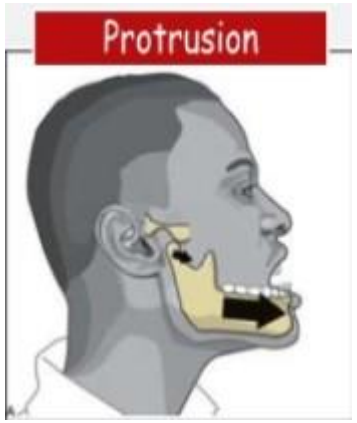
-Elevates the mandible

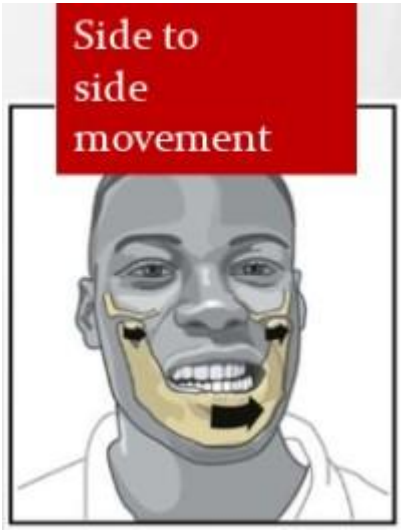
-Acting together ,they help to protrude the mandible.

-acting alone , it protrude the side of jaw.

-acting alternately, they produce grinding motion.







PALPATION

It can be palpated by placing the finger on the lateral aspect of the pharyngeal wall of the throat ,this palpation is difficult and sometimes uncomfortable to the patient.

CLINICAL IMPORTANCE

Trismus following inferior alveolar nerve block is mostly due to involvement of medial pterygoid muscle.

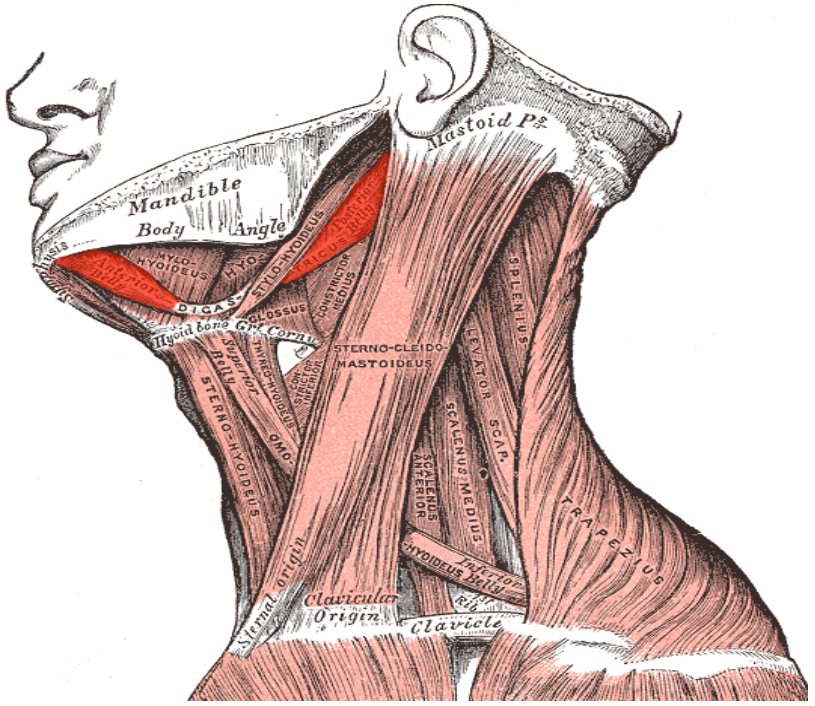
ACCESSORY MUSCLE OF MASTICATION

DIGASTRIC MUSCLE

Formed by two belly like masses of muscle tissue joined by intermediate tendon.

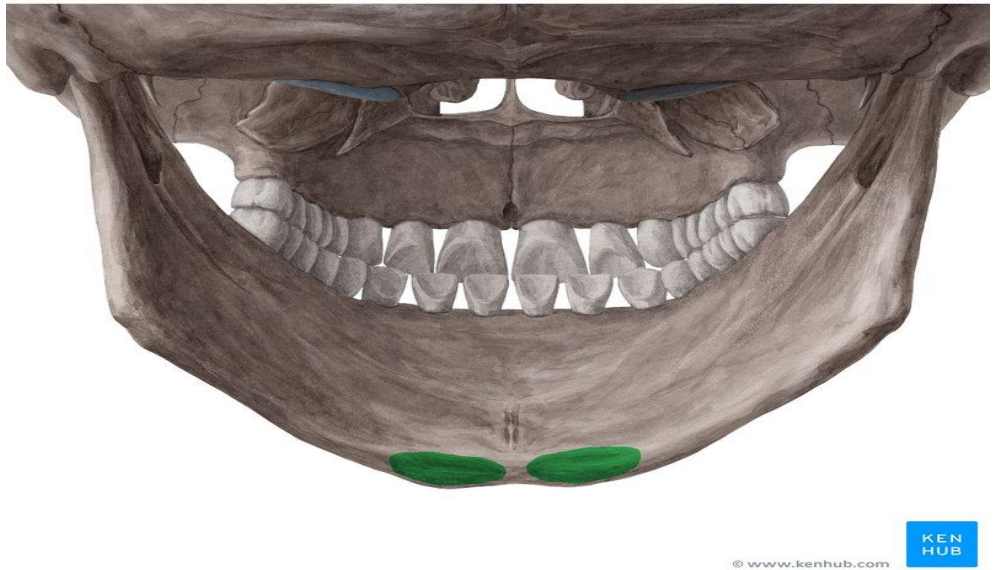
-Anterior belly

-Posterior belly

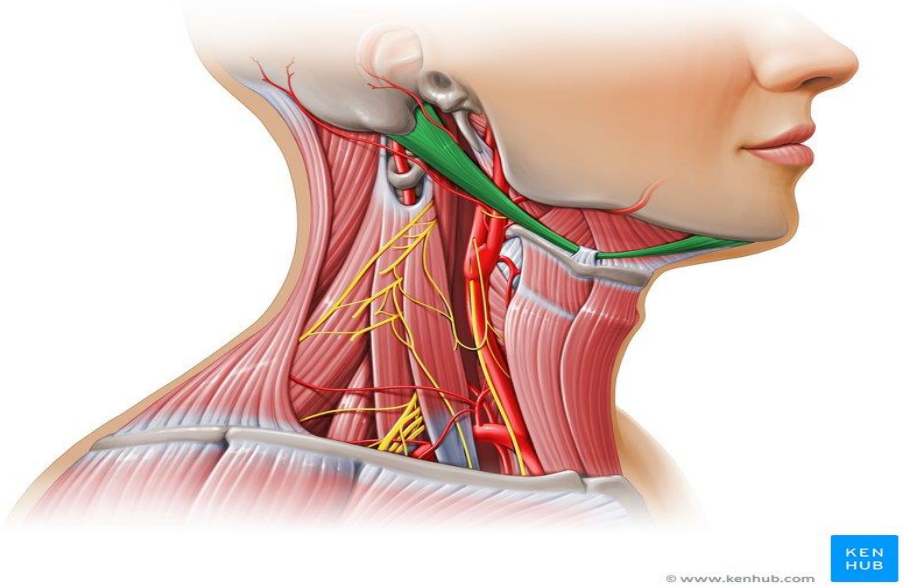


ORIGIN

ANTERIOR BELLY:-from digastric fossa of mandible, lateral to mental symphysis.



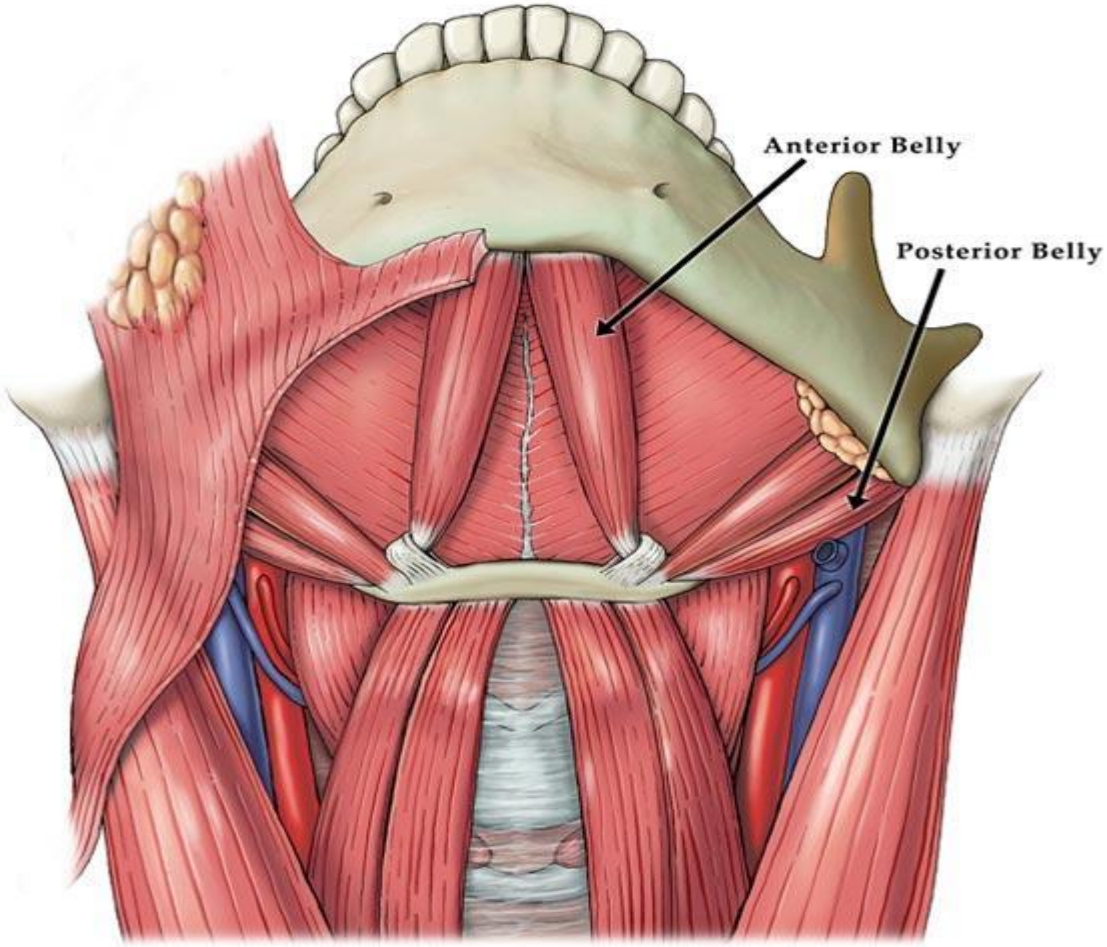
POSTERIOR BELLY:-From mastoid notch of temporal bone.



INSERTION

Anterior belly runs downwards and backwards and posterior belly runs downwards and forewards

both bellies unite to form a intermediate tendon that is attached to the hyoid bone .



NERVE SUPPLY

Anterior belly:-supplied by mylohyoid branch of the mandibular nerve

Posterior belly:-supplied by facial nerve since it is a second brachial arch muscle.

FUNCTION

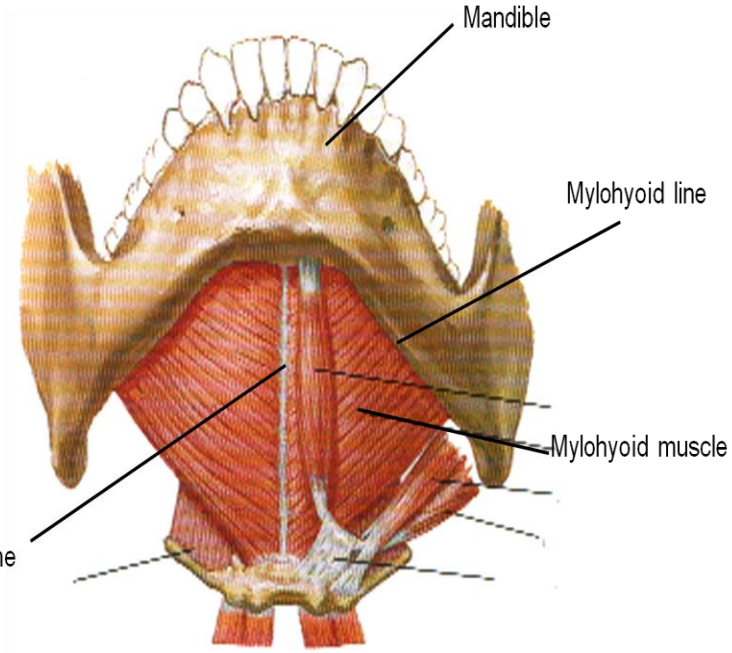
-Depression of jaw

-Elevation of hyoid during swallowing

MYLOHYOID MUSCLE

-This is a flat, triangular , muscle lying deep to the anterior belly o digastric.

-Right and left mylohyoid muscles together form floor of the mouth.



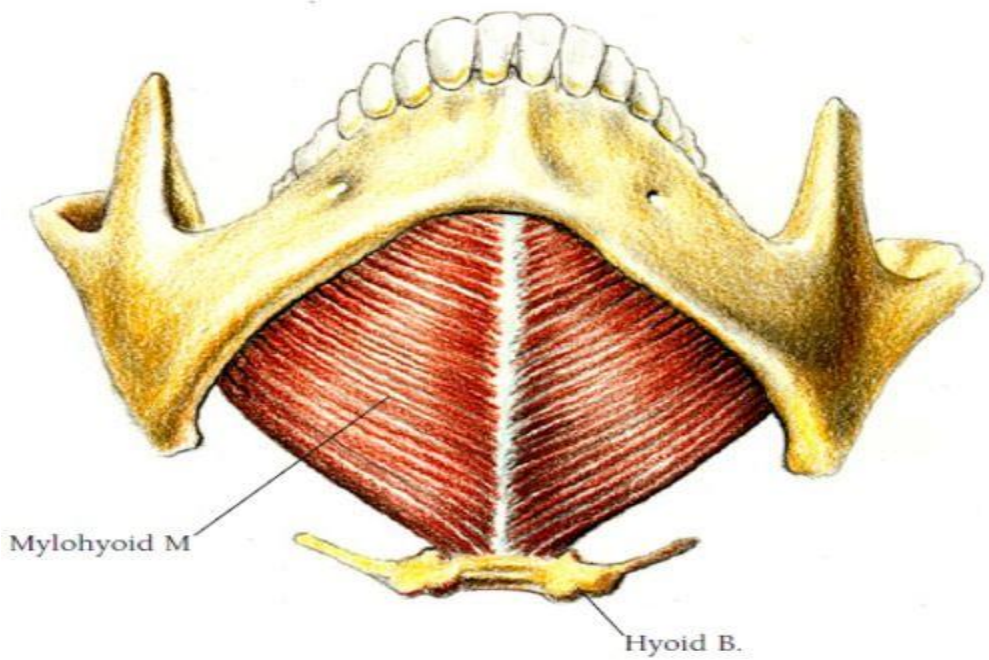
ORIGIN

Originates from mylohyoid line of mandible

INSERTION

-Middle and anterior fibers are inserted into median raphe between mandible and hyoid bone.

-Posterior fibers are inserted into body of hyoid bone .



NERVE SUPPLY

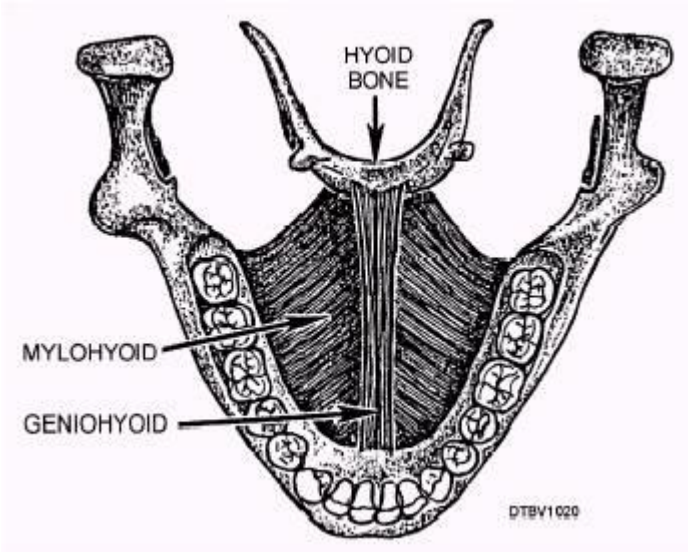
Nerve to mylohyoid (branch of mandibular nerve) since it develops from the first brachial arch.

FUNCTION

- Helps in depression of mandible
- Raises the floor of mouth and in doing so presses the tongue against the palate.
- Elevates the hyoid bone during swallowing.

GENIOHYOID MUSCLE

-Short and narrow muscle lies above mylohyoid .

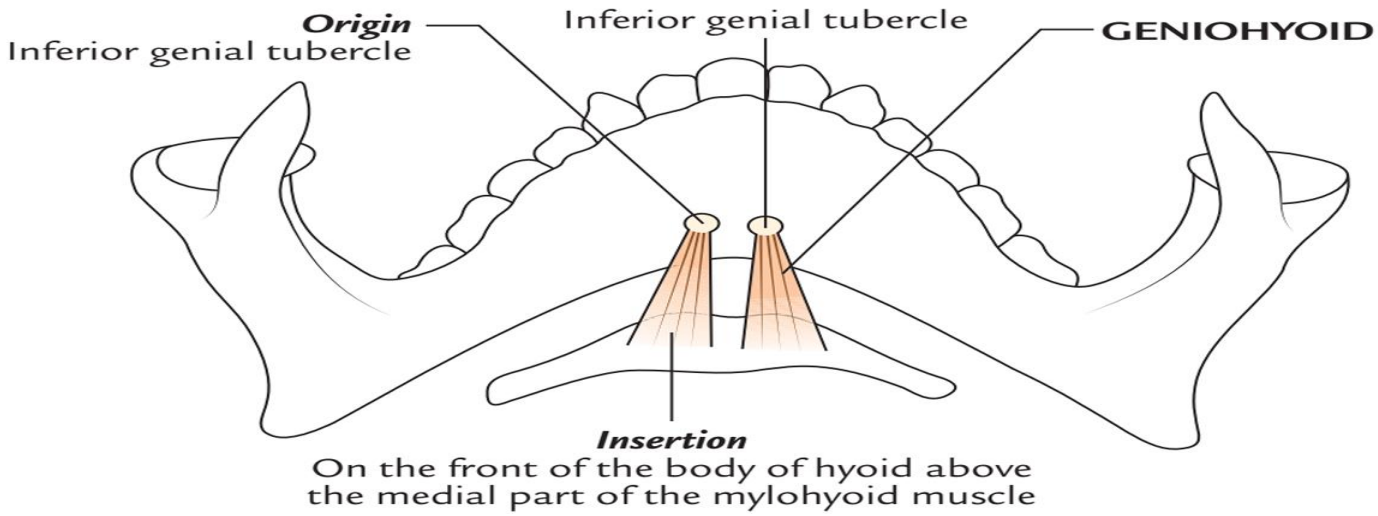


ORIGIN

-Inferior mental spine(genial tubercle)

INSERTION

-Fibers runs backward and downwards to be inserted into the anterior surface of body of the hyoid bone.



NERVE SUPPLY

- Through the hypoglossal nerve.

FUNCTION

-Elevates the hyoid bone

-depress the mandible

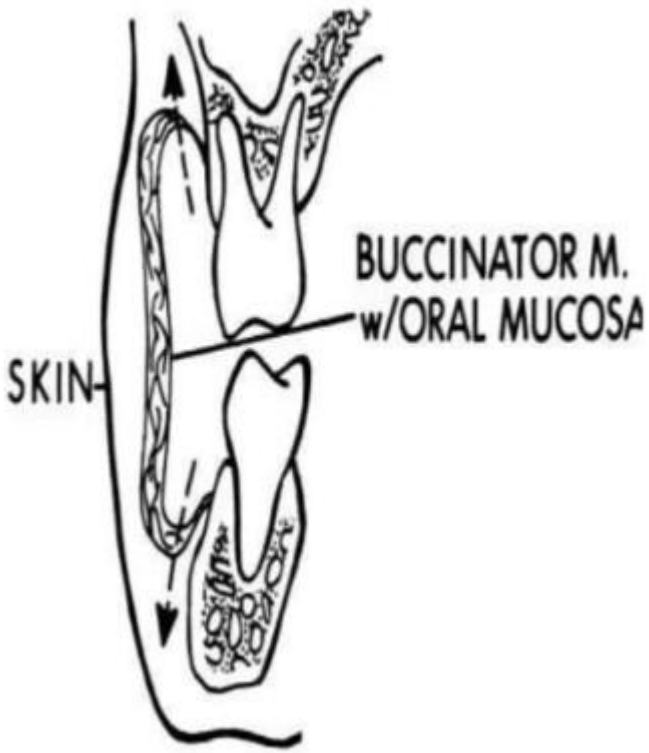
MASTICATORY SPACE INFECTIONS

- Fascial spaces or compartment are generally “potential spaces”that become opened or expanded by invading infection that intervenes between the structures.

Buccal space

Boundaries:

- Superiorly: - zygomatic arch
- Inferior:-inferior border of mandible
- Laterally:-skin and subcutaneous tissue
- Medially:-buccinators muscle
- Posteriorly:-anterior edge of masseter muscle



- Etiology:-infected mandibular and maxillary premolars and molars
- Clinical features:-obliteration of nasolabial fold

  -angle of mouth shifted to opposite side

  -swelling in cheek extending to corner of mouth

Submental space

Boundaries:-

- Roof: mylohyoid muscle
- Inferior:deep cervical fascia,
  Platysma,superficial fascia and skin
- Laterally:anterior belly of digastric
- posteriorly:submandibular space

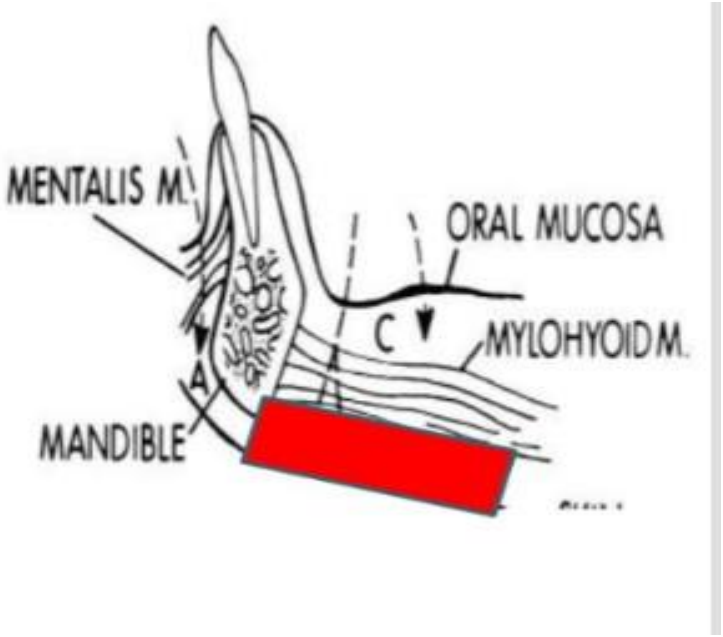
- Etiology:-infected mandibular incisors
- Clinical features:-chin appears glossy and swollen

  -Pain and discomfort on swallowing

Submandibular space

Boundaries:

- Superiorly:-mylohyoid muscle and
  Inferior border of mandible
- Inferior:-anterior and posterior belly
  Of digastric
- Laterally:-deep cervical fascia,platysma,
  Superficial fascia and skin
- Medially:-hyoglosssus,styloglossus,
  mylohyoid muscle
- Posteriorly:- hyoid bone
- Anteriorly:-submental space



Etiology:-

- Infected mandibular 2nd and 3rd
  Molars
- From submental,sublingual
  Spaces

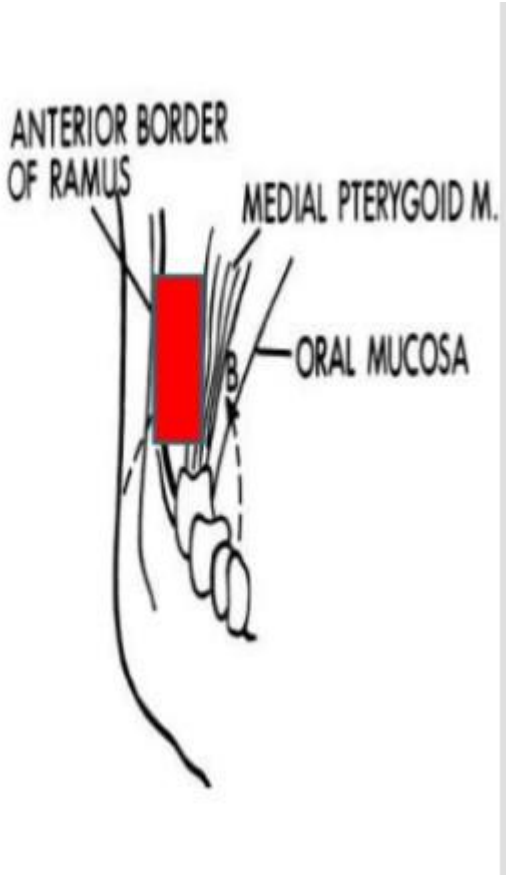
Clinical features:-

- Indurated swelling in
  Submandibular region
- Usually bulges over lower border
  Of mandible

Pterygomandibular space

Boundaries:

- Superiorly:-lower head of lateral Pterygoid muscle
- Laterally:-medial surface of ramus
- Medially:-medial pterygoid muscle
- Posteriorly:-deep part of parotid
- Anteriorly:-pterygomandibular raphe

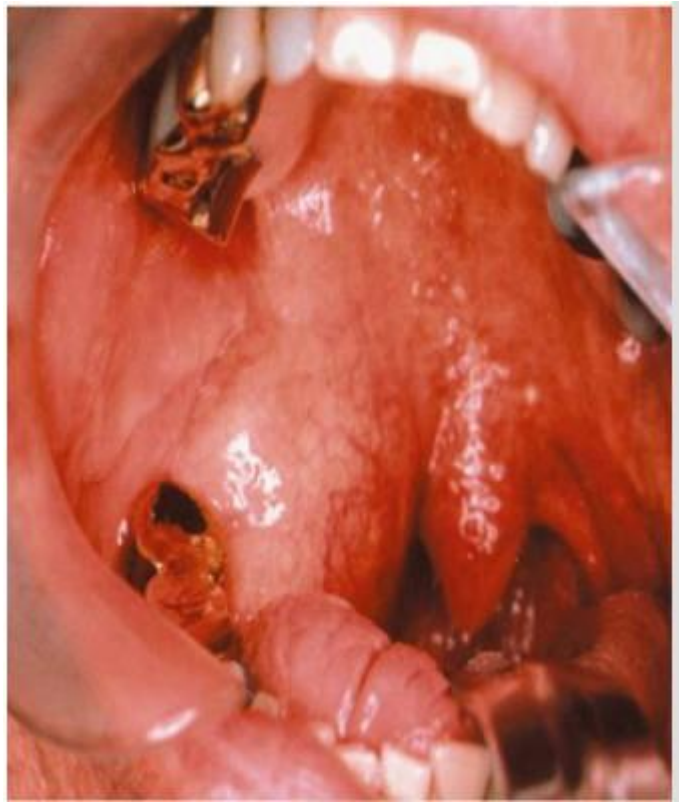


Etiology:-

- Infected mandibular third molar
- Pericoronitis
- Infected needles or contaminated
  LA solution

Clinical features:-

- Absence of extra- oral swelling
- Severe trismus
- Difficulty in swallowing
- Anterior bulging of half of soft palate and tonsillar pillars with deviation of Uvula to unaffected side



MASTICATORY MUSCLE DISORDERES

- TRISMUS
- BRUXISM
- TETANUS
- CONGENITAL HYPERPLASIA/HYPOPLASIA
- HYPERMOBILITY/HYPOMOBILITY OF THE MUSCLE
- MUSCLE PAINS
- MPDS
- MYOSITIS OSSIFICANS
- TEMPORAL TENDONITIS

TRISMUS

-Defined as a prolonged ,tetanic spasm of jaw muscles by which the normal opening of mouth is restricted.

-The normal range of mouth opening is 35 – 55mm which is equal to the width of three fingers.

CAUSES

-Pericoronitis

-Masticatory space infection

-inferior alveolar nerve block

-post surgical trismus

-trismus

PREVENTION

-Use a sharp sterile and disposable needle

-thorough knowledge of anatomy to avoid multiple injections and and insertions

-Use aseptic technique

MANAGEMENT

-Heat therapy –hot moist towel 20 minutes per hr. on affected area

-Warm saline rinses

-Analgesics

-Muscle relaxants-diazepam(0.2mg/kg)

-physiotherapy

TETANUS(LOCK JAW)

-Caused by exotoxins of gram positive bacillus clostridium tetani.

-Tetanus is a disease of nervous system characterized by intense activity of motor neuron and resulting in severe muscle muscle spasm.

CLINICAL FEATURES:-

pain and stiffness in the jaws and neck muscles ,with muscle rigidity producing trismus and dysphagia.

TREATMENT:-

-Antimicrobial drugs(penicillin,erythrmycin,metronidazole)

-Active and passive immunization

-Surgical wound care

-Muscle relaxants-diazepam

BRUXISM

- BRUXISM: Bruxism is the clenching or grinding of the teeth when the individual is not chewing or swallowing.
- It can occur as a brief rhythmic strong contraction of the jaw muscles.
- Bruxism may lead to:

Tooth wear

Fracture of teeth or restoration

Muscle hypertrophy

TREATMENT

-Coronoplasty

-Maxillary stabilization appliances

MYOSITIS

- This disorder is characterized by inflammation of the muscle due to

a spreading infection ,external muscle trauma or muscle strain.

CLINICAL FEATURES:-

Acute pain within the muscle ,which may additionally be swallon and red ,with an overlying increased temperature.

The muscle is tender to palpation and may cause a limited range of motion.

This can be treated by anti-inflammatory ,analgesic ,gentle range of

muscle exercise.

MYOFASCIAL PAIN DYSFUNCTION SYNDROME(MPDS)

- When muscle spasm develops ,dysfunction as well as pain occurs and the condition usually is designated as MPDS.
- It is initiated as spasm of one or more masticatory muscle.
- Most commonly involved muscle:lateral pterygoid and medial pterygoid muscle.
- Etiology:

  Abnormal occlusion

  Prosthetic problems

  Emotional problems

Laskin’s cardinal criteria of MPDS

Cardinal symptoms of MPDS

Pain or discomfort

Limited motion of the jaw

Tenderness to palpation of the muscles of mastication

Joint noises- Clicking, snapping

Treatment

- Eliminate oral habits eg , tooth clenching
- Heat and cold therapy ,TENS(Transcutaneous Electronic Nerve Stimulation)
- Intraoral appliance therapy-A bite appliance is also worn by the patient in the further stages to splint the muscle movements.

Congenital hypoplasia /hyperplasia

- It occurs very rarely ,and is more common in masseter and orbicularis oris.
- Enlargement(hyperplasia) or decreased size (hypoplasia) of the affected muscle,which may show an asymmetric facial pattern and stiffness in tmj.

Muscle hypermobility/ hypomobility

- This disorder involves extreme or diminished activity of the masticatory muscle.
- Etiology

  -decreased /increased threshold potential of neural activity.

  -parkinsonism

  -facial paralysis

  -nerve decompression

Muscles of mastication and endodontics

- The masticatory structure comprises masticatory muscles,TMJ and teeth
- Any functional disturbance that occur to the TMJ will have an effect on the muscles of mastication and vice versa;any disturbance that occur to the muscles of mastication will have an effect the TMJ.
- Prolonged root canal sessions(more than 2 hours)result in longer and wider opening of mouth for longer period of time,thus causing harm to tmj and associated masticatory structures and may give rise to sign and symptoms of tmj disorder.
- Dull aching pain in the jaw joint and surrounding structures,limited movement of jaw,pain in jaw muscles,,painful clicking and grating sound in the jaw joint.it may also associated with chronic headache,and ear pain.

Clinical significance:-it is prudent to break treatment sessions into shorter appointments and let patient relax during the treatment to prevent any extra stress on the TMJ and associated masticatory apparatus.

CONCLUSION

- The masticatory muscles include a vital part of the orofacial structure and are important both functionally and structurally.
- Precise movement of mandible by the musculature is required to move the teeth effectively across each other during function.

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THANK YOU