Trigeminal Nerve Anatomy

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CRANIAL NERVES

I Olfactory
II Optic
III Oculomotor
IV Trochlear
V Trigeminal
VI Abducens
VII Facial
VIII Vestibulocochlear
IX Glossopharyngeal
X Vagus
XI Accessory
XII Hypoglossal

CEREBRAL HEMISPHERE
MIDBRAIN
PONS
MEDULLA
Trigeminal nerve

- Largest cranial nerve
- Mixed nerve
- Small motor root and large sensory root
Motor root

- Nucleus of motor root present in the pons and medulla oblongata.
- Motor fiber run with sensory fibers but its completely separated from it.

- Motor fiber run under the gasserian ganglion and leave the middle cranial fossa through foramen ovale in association with the third division of the sensory root.

- Just after formen ovale it unit with the sensory root to form single nerve trunk which is mandibular branch of trigeminal nerve.
Motor fibers supply:

1. **Masticatory muscles**
   - **Masseter**
   - **Temporalsis**
Motor fibers supply:

1. Masticatory muscles
   • Masseter
   • Temporalis
   • Medial and lateral pterygoid
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2. Mylohyoid
Motor fibers supply:

1. Masticatory muscles
   - Masseter
   - Temporalis
   - medial and lateral pterygoid

2. Mylohyoid
3. Anterior belly of diagastric
4. Tensor tympani
5. Tensor palatini
Motor fibers supply:

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   - Masseter
   - Temporalis
   - Medial and lateral pterygoid

2. Mylohyoid

3. Anterior belly of diagastric

4. Tensor tympani
Sensory root

- Sensory fibers meet in the trigeminal ganglia (gasserian ganglia)
- There are two ganglia (one in each side of cranial fossa)
- These ganglia located in the meckels cavity in the petrous part of temporal bone
- Sensory nerve divided into three branches: Ophthalmic, maxillary, mandibular
Ophthalmic branch

- Travel through lateral wall of cavernous sinus
Ophthalmic branch

- Travel through lateral wall of cavernous sinus
- Leave the cranial cavity through superior orbital fissure into the orbit
Ophthalmic branch

- Supplies: eye ball, conjunctiva, lacrimal gland, part of mucous membrane of nose and paranasal sinuses, skin of the forehead, eyelids, nose
Ophthalmic branch

Branches:

1. Nasociliary nerve
2. Frontal nerve
3. Lacrimal nerve
Maxillary division

• Leave the cranial cavity through foramen rotundum
Maxillary division

Branches:

1. Branch within the cranium

middle meningeal nerve .... Give sensory innervation to the dura mater
Maxillary division

II. Branches in the pterygopalatine fossa

A. Zygomatic nerve: divided into
   a. zygomaticofacial which innervate the skin over the prominence of the cheek
   b. Zygomaticotemporal: which innervate the skin in the lateral side of face
Maxillary division

II. Branches in the pterygopalatine fossa

B. Posterior superior alveolar nerve

Two divisions, one outside bone innervate buccal mucosa in the maxillary molar region.

And second division enter the maxilla and give innervation to the maxillary sinus, and upper first, second, third molars except the mesiobuccal root of the first molar.
MAXILLARY DIVISION OF TRIGEMINAL NERVE (CN V2)

- Trigeminal (semilunar) ganglion
- Trigeminal nerve (V)
- Zygomatic nerve
- Pterygopalatine ganglion

GANGLIONIC BRANCHES TO PTERYGOPALATINE GANGLION
Maxillary division

II. Branches in the pterygopatine fossa

C. Pterygopatine ganglionic branches:

Two short trunks communicate between the pterygopatine ganglia and the maxillary nerve.
Maxillary division

III. branches from ganglia:

a. Orbital nerve: innervate periostium of the orbit

b. Posterior superior nasal nerves: innervate mucous membrane of lateral wall of nasal cavity and part of nasal septum

c. Nasopalatine nerve: reach nasal cavity through the sphenopalatine foramen and oral cavity through incisive formamen, give innervation to part of nasal cavity mucosa and palatal mucosa in the premaxilla region.

d. Greater palatine nerve: reach oral cavity through greater palatine foramen in the posterior part of palate. Innervate the palatal mucosa over hard palate and small porion of soft palate

e. Lesser palatine nerve... give innervation to the soft palate

f. Pharyngeal branch: supply the mucosa of the nasopharynx
Nasal Septum

- Olfactory bulb
- Cribiform plate of ethmoid bone
- Olfactory tract
- Medial internal nasal branch of anterior ethmoidal nerve
- Olfactory nerves
- Incisive foramen
- Nasopalatine nerve
nasopalatine nerve

greater palatine nerve
Maxillary division

IV. Branches in the infraorbital canals:

a. Middle superior alveolar nerve: innervate premolars and mesiobuccal root of first molar as well as periodontium bone and buccal mucosa in premolar region.

  Sometimes MSA missing

B. Anterior superior alveolar nerve: innervate incisors, canine and its associated bone, labial gingiva and periodontium.
Maxillary division

V. Branches in the face (infra-orbital nerve)

a. Palpebral branch: supply skin of lower eyelid
b. Nasal branch: supply skin of lateral side of the nose
c. Labial branch: supply skin and mucosa of upper lip
Mandibular division of trigeminal nerve

Largest branch of the trigeminal nerve

Mixd nerve
Branches of mandibular nerve
Mandibular division

I. Branches from the main nerve trunk

a. nervous spinosus .... This nerve re-enter the cranium through the foramen spinosum to supply the dura mater

b. medial pterygoid nerve: innervate medial pterygoid muscle, tensor palatini and tensor tympani
II. Branches from anterior division:

- Mainly motor which innervate temporalis, masseter and lateral pterygoid muscles.

- Small sensory (long buccal nerve): Innervate skin of the cheek and buccal mucosa and gingiva in mandibular molars region.
Note:

long buccal nerve differ from buccal nerve

The first sensory from mandibular branch of trigeminal nerve, While the second motor from the facial nerve
Buccal branch of trigeminal nerve
Buccal branch of facial nerve

- Temporal branches
- Zygomatic branches
- Buccal branches
- Mandibular branch
- Submandibular gland
- Parotid plexus
- Parotid gland
- Cervical branch
- Posterior auricular branch
- Facial nerve

Branchial motor
**Mandibular division**

**III . Branches from posterior division :**

- Mainly sensory with small motor component

**Branches :**

1. **auriculotemporal nerve** : give sensory innervation to the auriculotemporal area

2. **lingual nerve** : give sensory innervation to the anterior two thirds of the tongue and mucous membranes of the floor of the mouth and gingiva on the lingual side of the mandible
Note: taste sensation of the anterior two third of the tongue take innervation from the facial nerve through its chorda tympani branch
Mandibular division

III. Branches from posterior division:

3. inferior alveolar nerve: largest branch, enter mandible through mandibular canal in association with inferior alveolar vein and artery
   • This nerve anteriorly through the mandibular canal until mental foramen and then divided into two branches: mental and incisive

4. Mylohyoid nerve: branch from inferior alveolar nerve just before its entry into the canal, give motor innervation to the mylohyoid and anterior belly of digastric
Notes:

- *Dental plexus* represent the terminal branches of main fibers that innervate the roots, bone, and periodontium.
Notes:

- Bone in the maxilla quite porous and cancellous leading to greater incidence of adequate anesthesia than mandible.

- The labial cortical bone of anterior mandible usually less dense than that of posterior region so regional mental block or even infiltration sufficient to anesthetize the anterior teeth.
Inferior Alveolar Nerve Block
Thank you for listening