Anatomy of Mandibular and Maxillary Local Anesthesia

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Anatomy of Mandibular and Maxillary Local Anesthesia

I. Introduction
   A. The anatomical basis of local anesthesia
      1. Infiltration anesthesia
      2. Block or trunk anesthesia

II. Review of the Trigeminal Nerve (Cranial n. V) – the major sensory nerve of the head
   A. Ophthalmic Division
      1. Course
         a. Superior orbital fissure - root of orbit - supraorbital foramen
      2. Branches - sensory
   B. Maxillary Division
      1. Course
      2. Branches - sensory
         a. Zygomatic nerve
         b. Pterygopalatine nerves [nasal (nasopalatine), orbital, palatal (greater and lesser palatine), pharyngeal]
         c. Posterior superior alveolar nerves
         d. Infraorbital nerve (middle superior alveolar nerve, anterior superior nerve)
   C. Mandibular Division
      1. Course
         a. Foramen ovale – infratemporal fossa – mandibular foramen, Canal -> mental foramen
      2. Branches
         a. Sensory
            (1) Long buccal nerve
            (2) Lingual nerve
            (3) Inferior alveolar nerve -> mental nerve
            (4) Auriculotemporal nerve
         b. Motor
            (1) Pterygoid nerves
            (2) Temporal nerves
            (3) Masseteric nerves
            (4) Nerve to tensor tympani
(5) Nerve to tensor veli palatine
(6) Nerve to mylohyoid
(7) Nerve to anterior belly of digastric
c. Both motor and sensory
(1) Mylohyoid nerve

III. Usual Routes of innervation
A. Maxilla
1. Teeth
   a. Molars – Posterior superior alveolar nerve
   b. Premolars – Middle superior alveolar nerve
   c. Incisors and cuspids – Anterior superior alveolar nerve
2. Gingiva
   a. Facial/buccal – Superior alveolar nerves
   b. Palatal – Anterior – Nasopalatine nerve; Posterior – Greater palatine nerves

B. Mandible
1. Teeth
   a. Molars, premolars, cuspids and incisors – Inferior alveolar nerve
2. Gingiva
   a. Facial – Mental nerve
   b. Buccal – Long buccal nerve
   c. Lingual – Lingual nerve

IV. Aberrant and/or Supplemental Routes of Innervation
A. Maxilla
1. Posterior superior alveolar nerve; tuberosity
2. Cross-over innervation in molar area
3. Absence of middle superior alveolar nerve
4. Anterior superior nerve; infraorbital nerve
5. Nasopalatine nerve; greater palatine; cross-over innervation in incisor area

B. Mandible
1. Inferior alveolar nerve
   a. mylohyoid nerve
   b. supplemental innervation to 2nd and 3rd molars
   c. supplemental innervation to 1st and/or 3rd molars
   d. transverse cervical nerve: “cross-over” innervation
2. Lingual nerve
3. Long buccal nerve
4. Mental nerve
5. Mandibular (Third) Division: Gow-Gates; Akinosi

V. Technique tips based on anatomical features

A. Maxilla
   1. PSA nerve block (tuberosity nerve block)
   2. MSA nerve – zygomaticoalveolar crest
   3. ASA nerve
   4. Infraorbital nerve block
   5. Nasopalatine nerve block
   6. Greater palatine nerve block
   7. Second Division nerve block (Pterygopalatine fossa)

B. Mandible
   1. Inferior alveolar nerve block – Halstead approach
   2. Lingual nerve block
   3. Long buccal nerve block
   4. Gow-Gates (wide open mouth) approach
   5. Akinosi (closed mouth) approach
   6. Supplemental routes of mandibular innervation
      a. mylohyoid nerve
      b. branch of inferior alveolar nerve to 2nd and 3rd molars
      c. branch of inferior alveolar nerve to 1st and/or 3rd molars
   7. Mental (incisive) nerve block

VI. Complications of Local Anesthesia

A. Facial paralysis
   1. Parotid gland and facial nerve (Cranial n. VII)

B. Muscle trismus
   1. Medial pterygoid muscle and temporalis muscle

C. Lingual nerve trauma

D. Hemorrhage (venous versus arterial)
   1. Pterygoid plexus of veins
   2. Maxillary artery (proximal, distal)
   3. Inferior alveolar artery
   4. Internal carotid artery
REFERENCES


