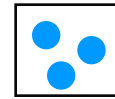


# DENTAL ANESTHESIA



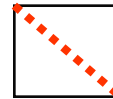
# MAXILLA



Rr. labiales sup.



N. buccalis



Rr. alveolares sup. ant.  
et medii



Rr. alveolares sup. post.

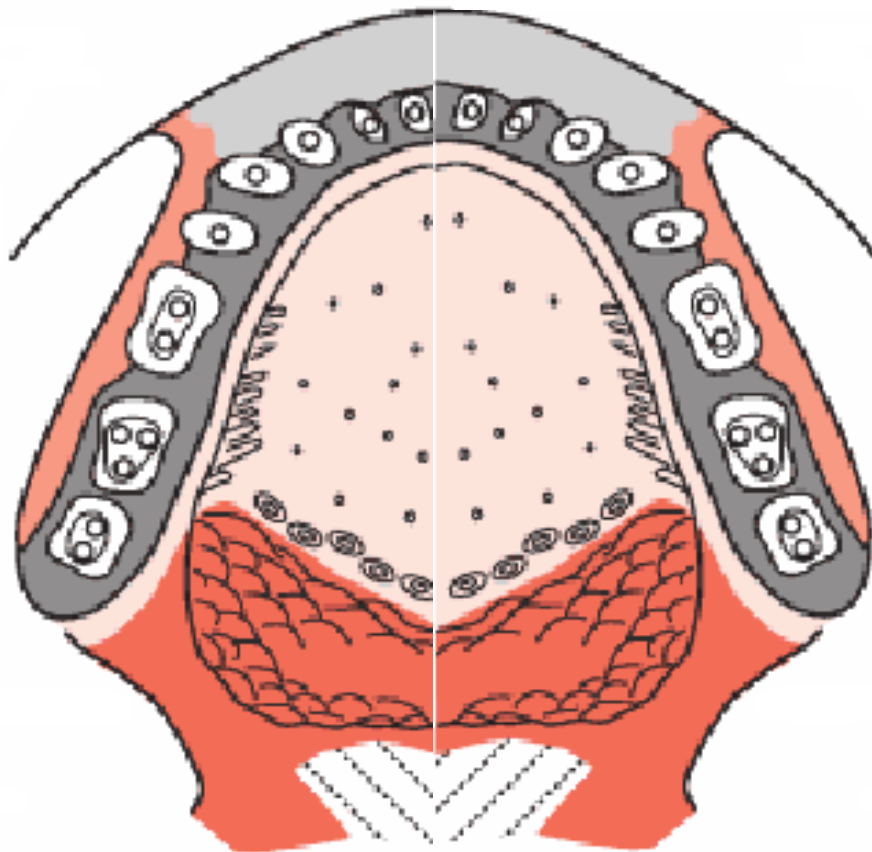


N. nasopalatinus



Nn. palatini

# MANDIBLE



N. mentalis



N. buccalis



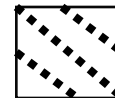
N. alveolaris inf.



N. lingualis



N. glossopharyngeus



N. vagus


- **Operative procedures** require cutting through sensitive structures, producing extreme discomfort and **pain**
- Pain is a result of stimulation of nociceptors that are receptors preferentially sensitive to a noxious stimulus (**A $\delta$ , C fiber afferent axons**)
- **Local anesthetics (LA)** cause:  
reversible block sensory nerve conduction of noxious stimuli from periphery to the CNS

The effectiveness of local anesthetics is improved by the addition of a **vasoconstrictor**:

- increase - **duration** of action
  - **depth** of anesthesia
- decrease - **systemic toxic reactions**
  - **local bleeding**

- To minimize anesthetic failure, the dentist must have a good **knowledge of the anatomy** of the head region, particularly the neuroanatomy of the maxillary and mandibular regions of the face !
- **Onset of action of anesthesia!!!**

# General Potential Complications

- 1. Nerve injury**
  - 2. Injuries to blood vessels**
  - 3. Intraglandular injections**
  - 4. Trauma to muscles**
  - 5. Systematic reactions**
- 
- A decorative graphic consisting of several sets of concentric circles in a lighter blue shade, resembling ripples in water, located in the bottom right corner of the slide.

# 1. Nerve Injury

- 1) **Paresthesia** (loss of sensation)
  - commonly involve the tongue and lower lip
- 2) **Hyperesthesia** (increased sensitivity to painful stimuli)
- 3) **Dysesthesia** (pain following nonnoxious stimuli)
- 4) **Dysgeusia** (impaired sense of taste)



## 5) **Xerostomia** (reduced salivation)

- the chorda tympani is traumatized

## 6) **Ocular and extraocular symptoms**

The passive process of diffusion of anesthetic through the orbit leads to ocular and extraocular symptoms:

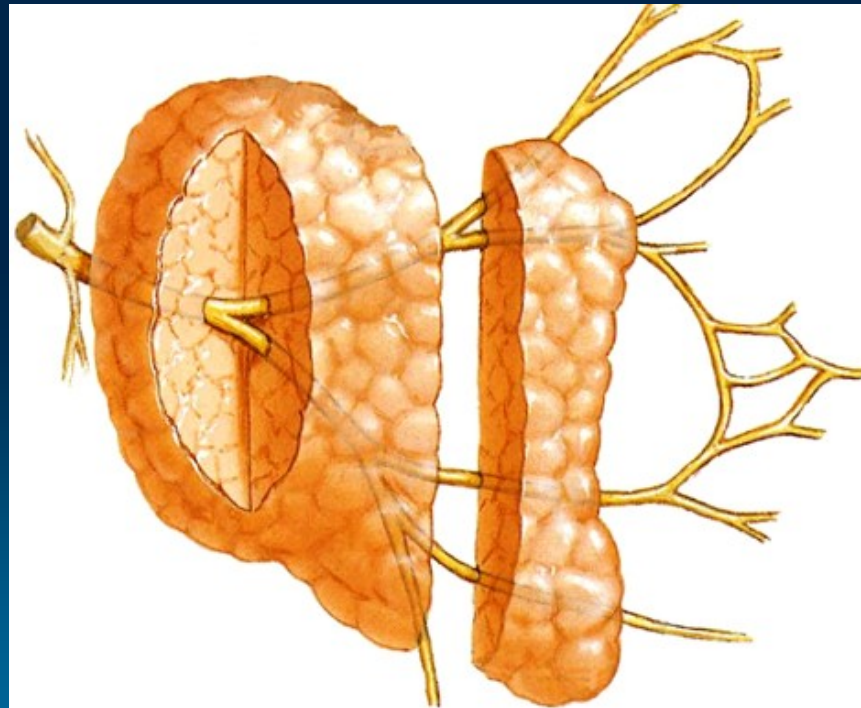
- **paralysis extraocular muscle**
- **diplopia**
- **amaurosis** (temporary blindness)
- **Horner's syndrome** (enophthalmos, miosis, palpebral ptosis)

## 2. Bleeding

- Intravascular injection → vascular damage → hemorrhage with hematoma formation
- If the vein is engaged, the bleeding is minimal and is usually evidenced a few days later
- Artery damage with significant hematoma formation and extensive intra or extraoral swelling
- Potential anesthetizing sympathetic nerve may result vasoconstriction

### 3. Intraglandular injection

Transient paralysis of the ipsilateral facial muscles - caused by anesthesia of the facial nerve in parotid gland



## 4. Trauma of muscle

**Muscle trismus** = spasm of jaw muscles, which restricts mouth opening (temporal and medial pterygoid muscle)

## 5. Systematic complication

Failure of the **cardiorespiratory system**  
**Anaphylaxis**



# Type of local anesthesia

## **I. Local Infiltration**

Small nerve endings in the small area of soft tissue or bone are flooded with small amount of local anesthetic solution

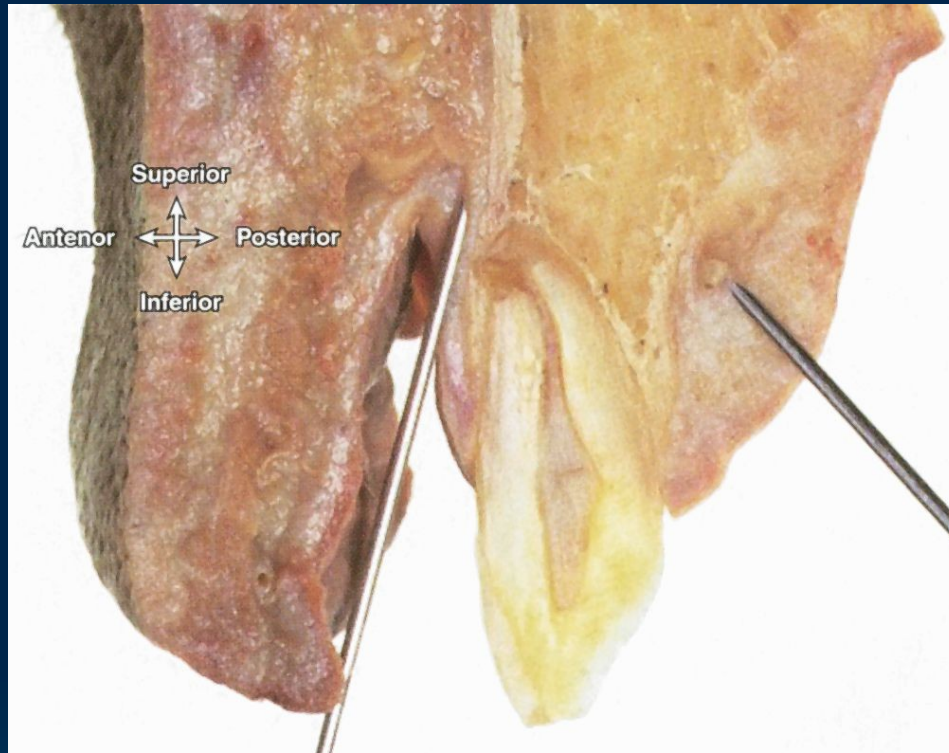
## **II. Nerve Block**

The local anesthetic solution is deposed within close proximity to a main peripheral nerve

## **III. Field blocks**

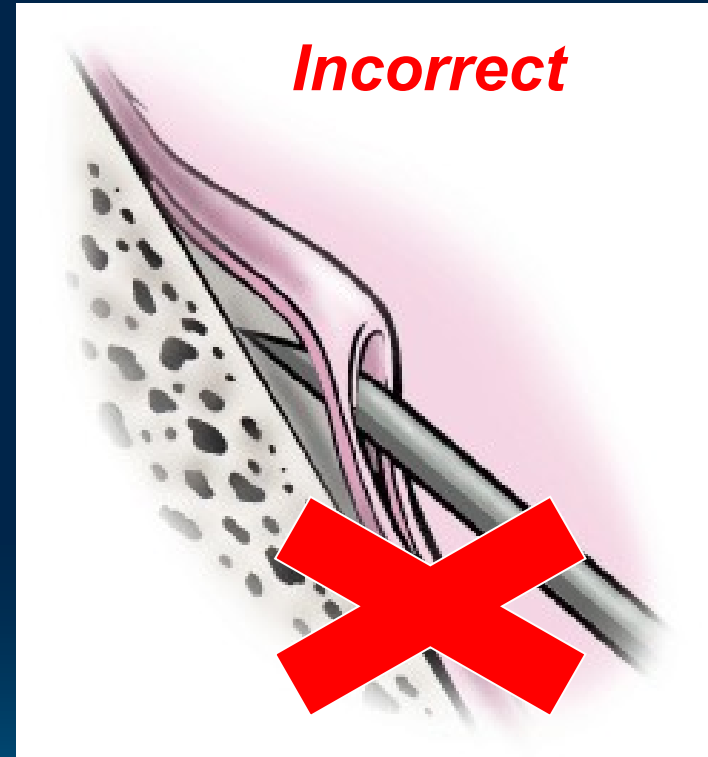
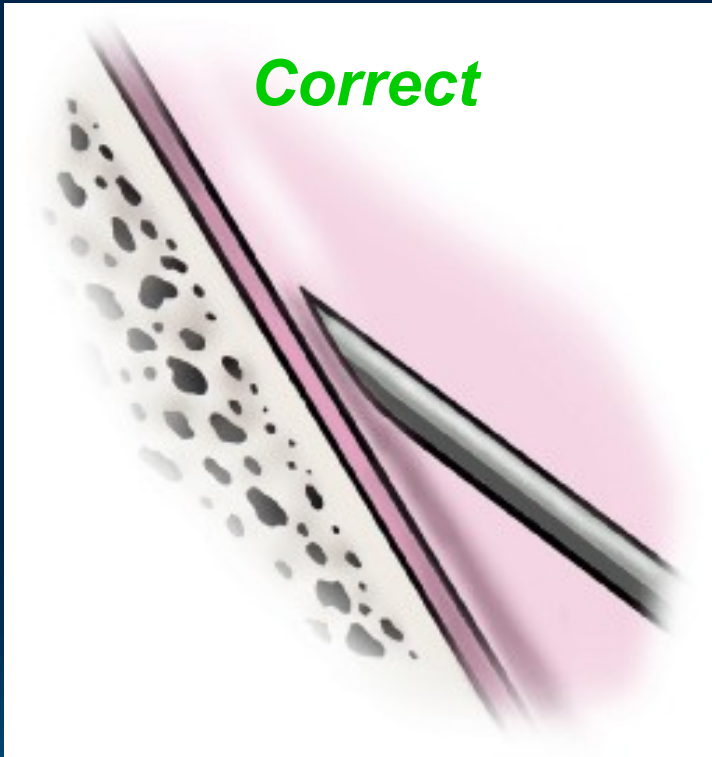
Local anesthetic is deposited near a larger nerve trunks

# I. Local Infiltration



The needle pervade at a height of insertion of mucobuccal fold to the apex and ...

the anesthetic agent is deposited supraperiostally !

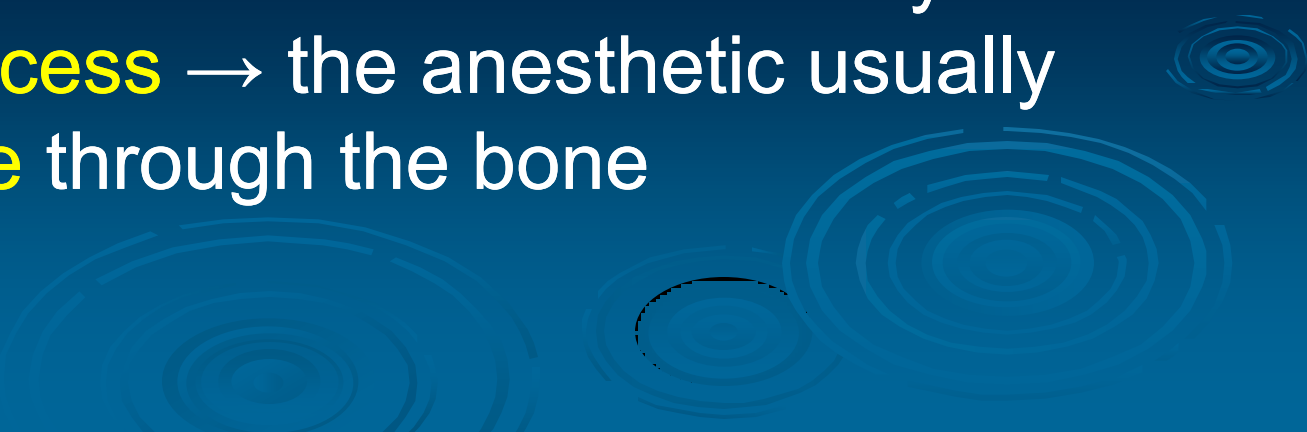


There is **different composition** of the **cortical plate** of maxillary and mandibular alveolar process

## Maxilla

Local infiltration is successful in all parts of maxilla – both buccal and lingual

The problem may be only on buccal plate at the 1st molar, which his roots are covered by the **zygomatic process** → the anesthetic usually **doesn't diffuse** through the bone






## Mandible

The **cortical plate** of the mandible is sufficiently **dense** to preclude effective infiltration anesthesia

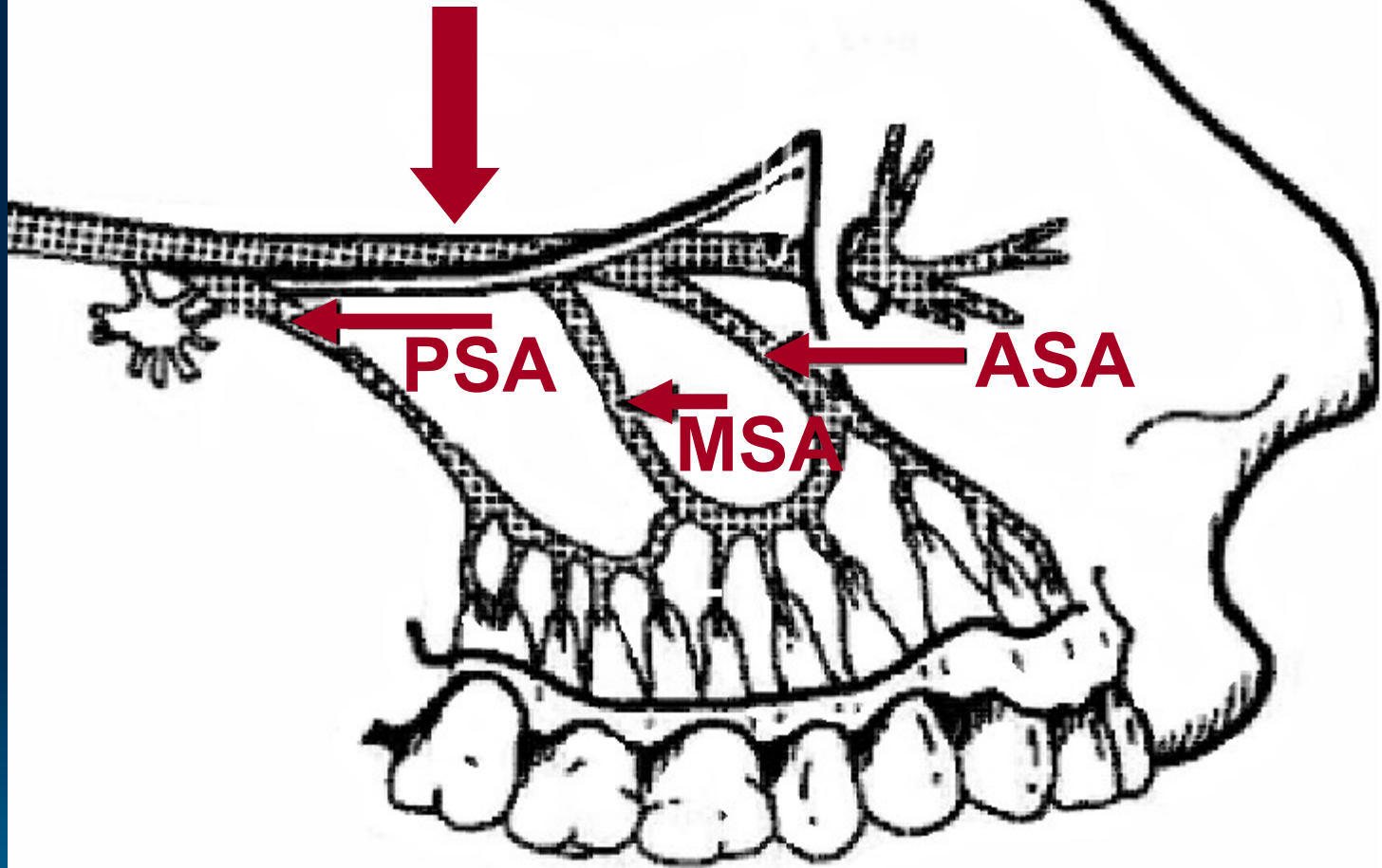
Thus, local infiltration is **ineffective**, **except mandibular incisors** (buccal and lingual)



## II. Nerve Block

1. Posterior superior alveolar - **PSA**
  2. Middle superior alveolar - **MSA**
  3. Anterior superior alveolar - **ASA**
  4. Infraorbital
  5. Greater palatine
  6. Nasopalatine
  7. Alveolar inferior (*Halstead, Gow-Gates, Akinosi*)
  8. Mental
  9. Lingual
  10. Buccal
- 

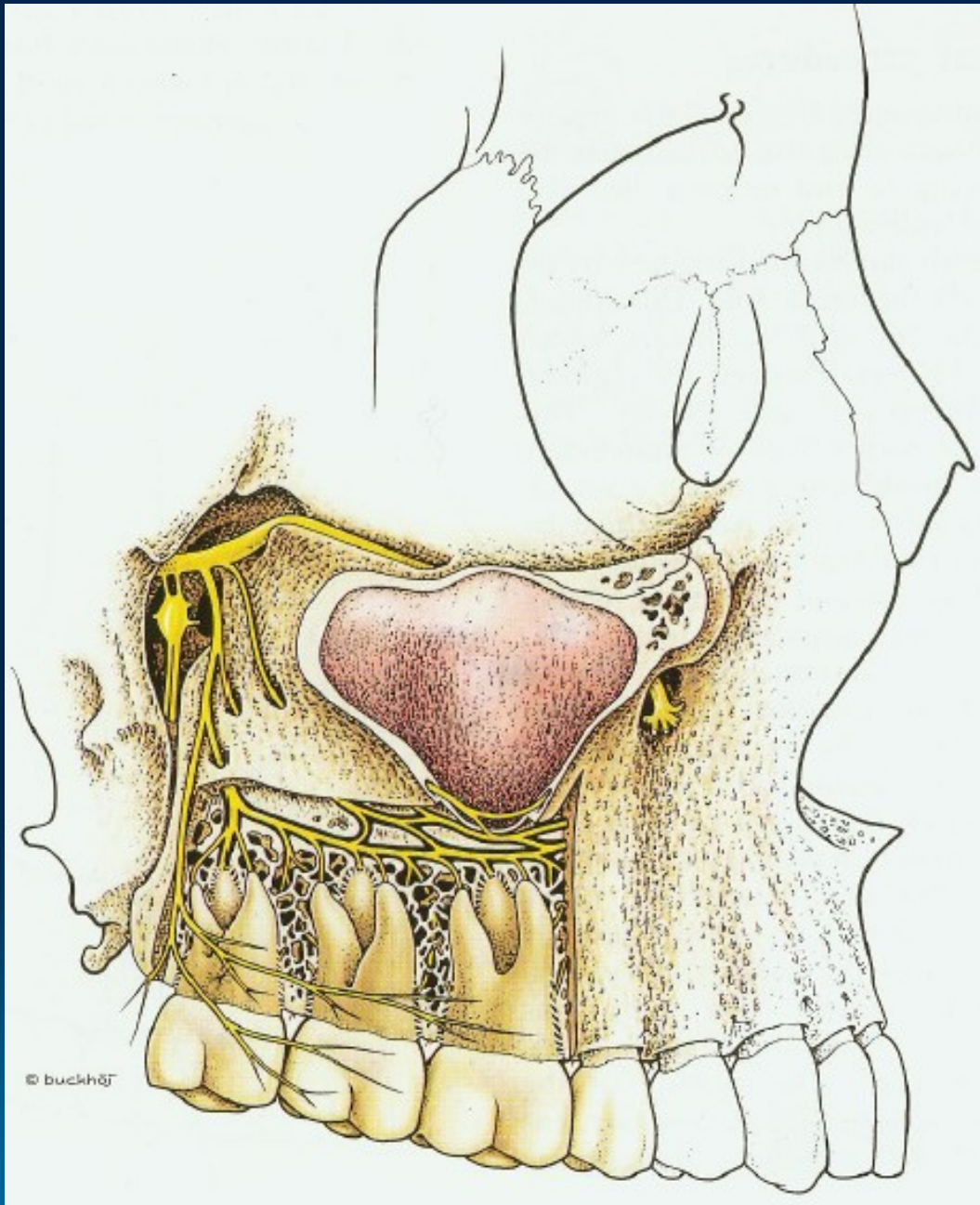
**Infraorbital nerve**

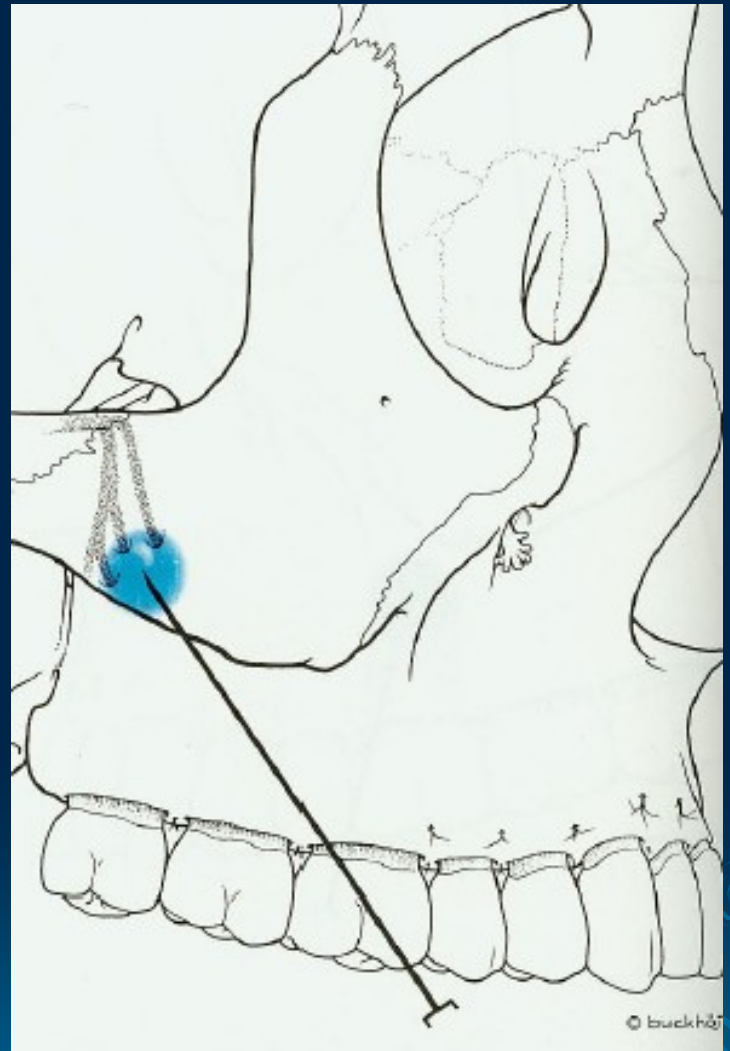
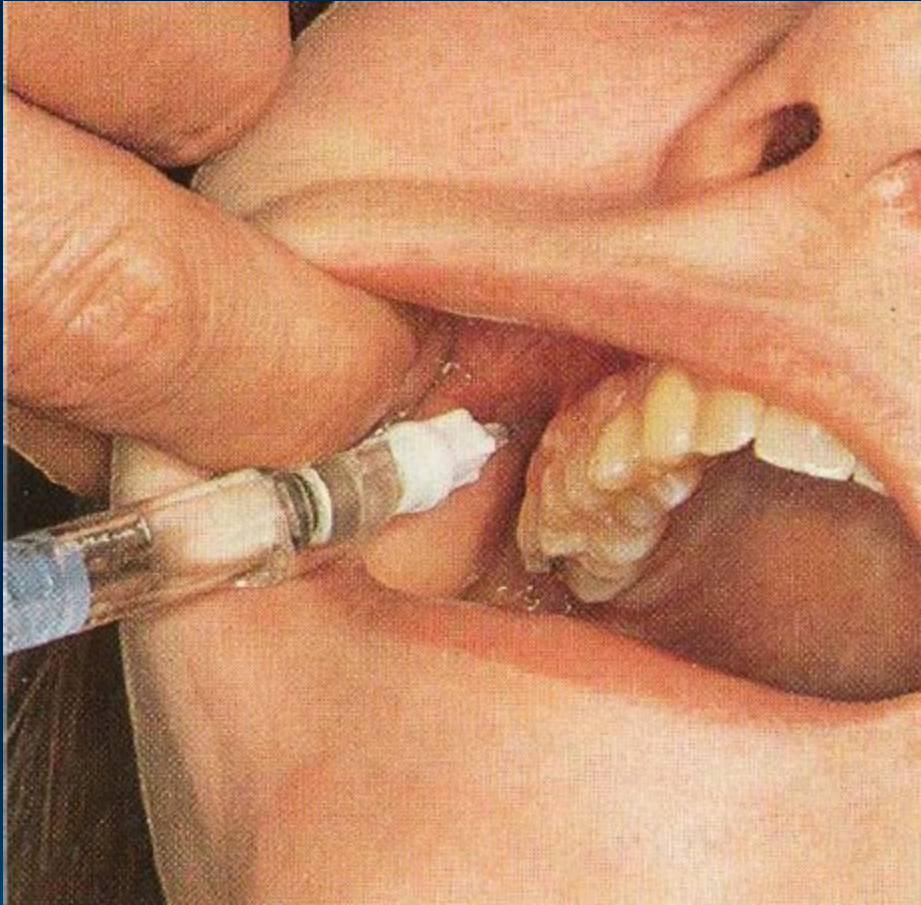


# 1. PSA Block

- Anesthetize the **pulps and periodontal ligaments** of the **maxillary molars**, corresponding **buccal alveolar bone and gingival tissue** and posterior portion of the **maxillary sinus**.  
**Mesiobuccal root 6 can be innervated by middle superior alveolar nerve !**

**Technique** - between 1st and 2nd molar at a height of insertion of mucobuccal fold, angle at  $45^\circ$  superiorly and medially



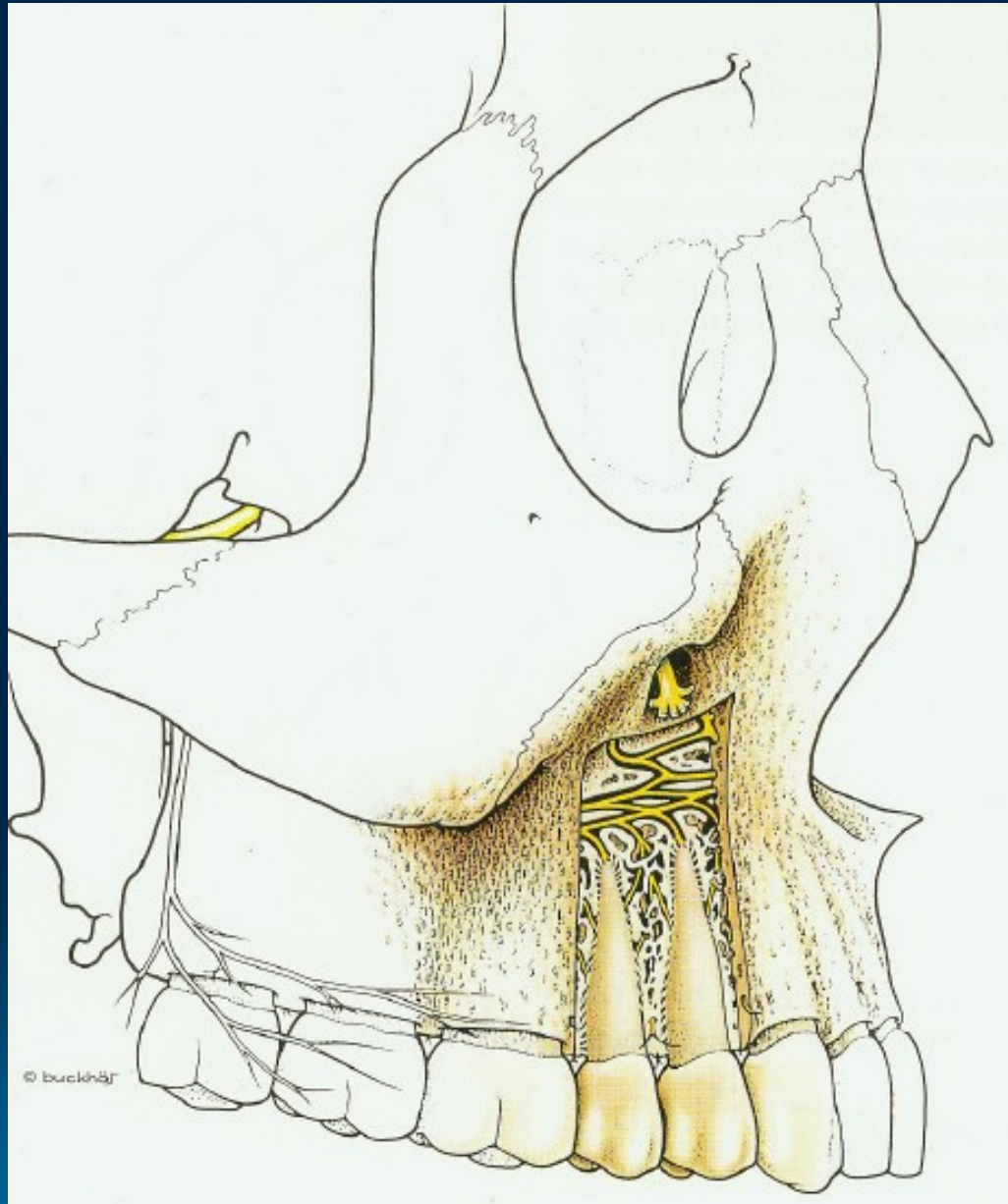


## 2. MSA Block

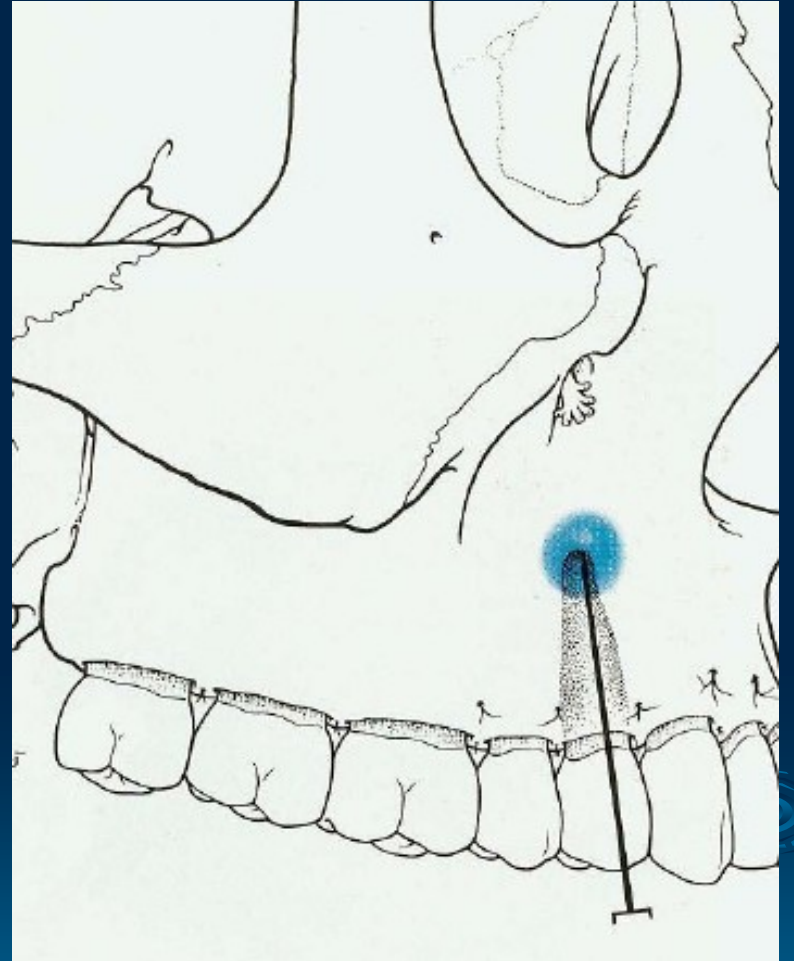
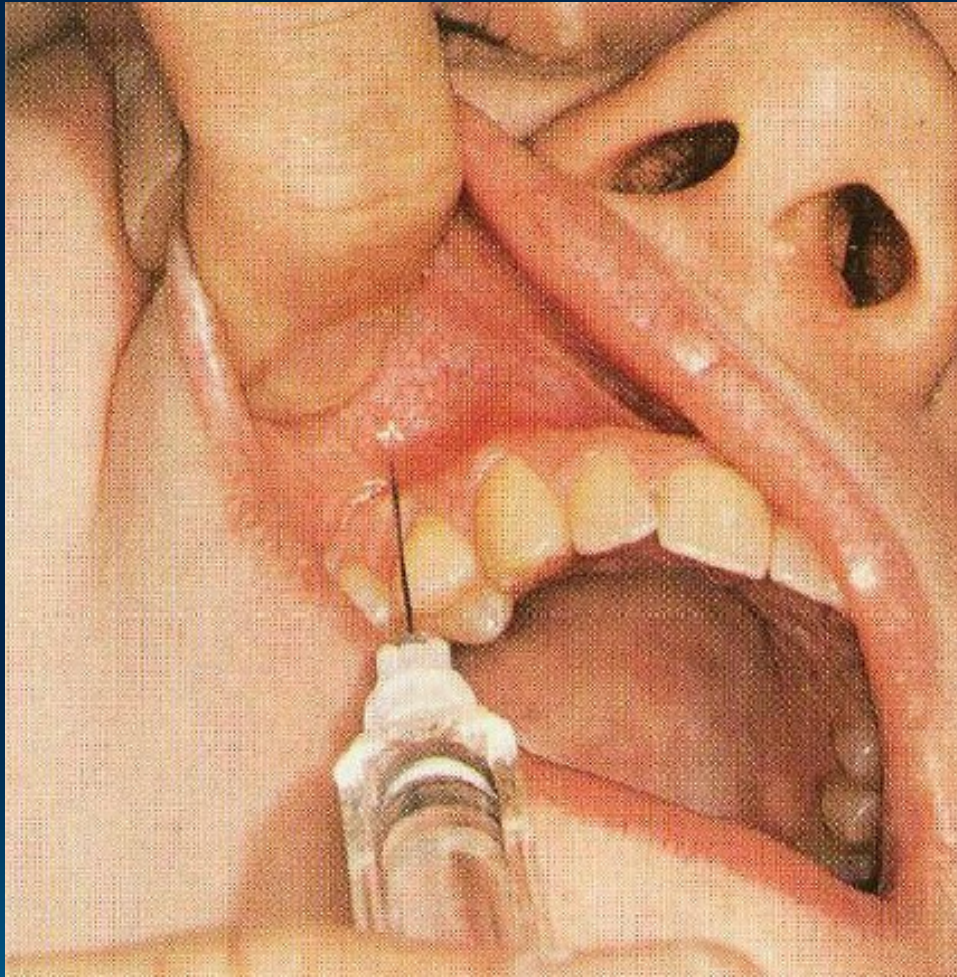
- Anesthetize the **maxillary premolars**, corresponding **buccal alveolar bone and gingival tissue**
- Used if the infraorbital block fails to anesthetize premolars

**Technique** - between 1st and 2nd premolar at a height of insertion of mucobuccal fold

In the Czech republic MSA is a rarely used technique, more often are used local infiltration





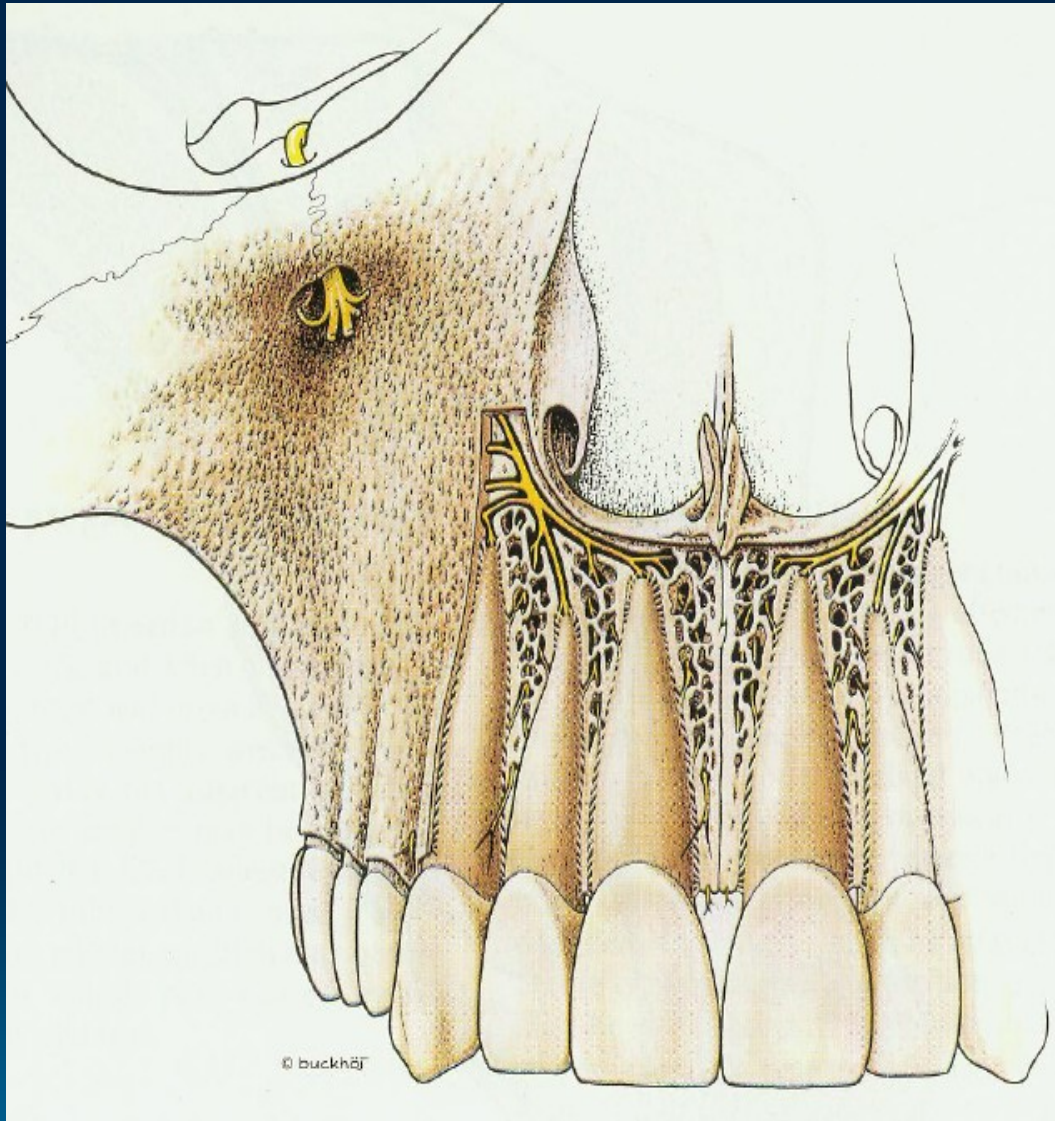


### 3. ASA Block

- Anesthetize the **canine, incisors**, corresponding buccal **alveolar bone and gingival tissue**

**Technique** - the area of lateral incisor at a height of insertion of mucobuccal fold

In the Czech republic MSA is a rarely used technique, more often are used local infiltration

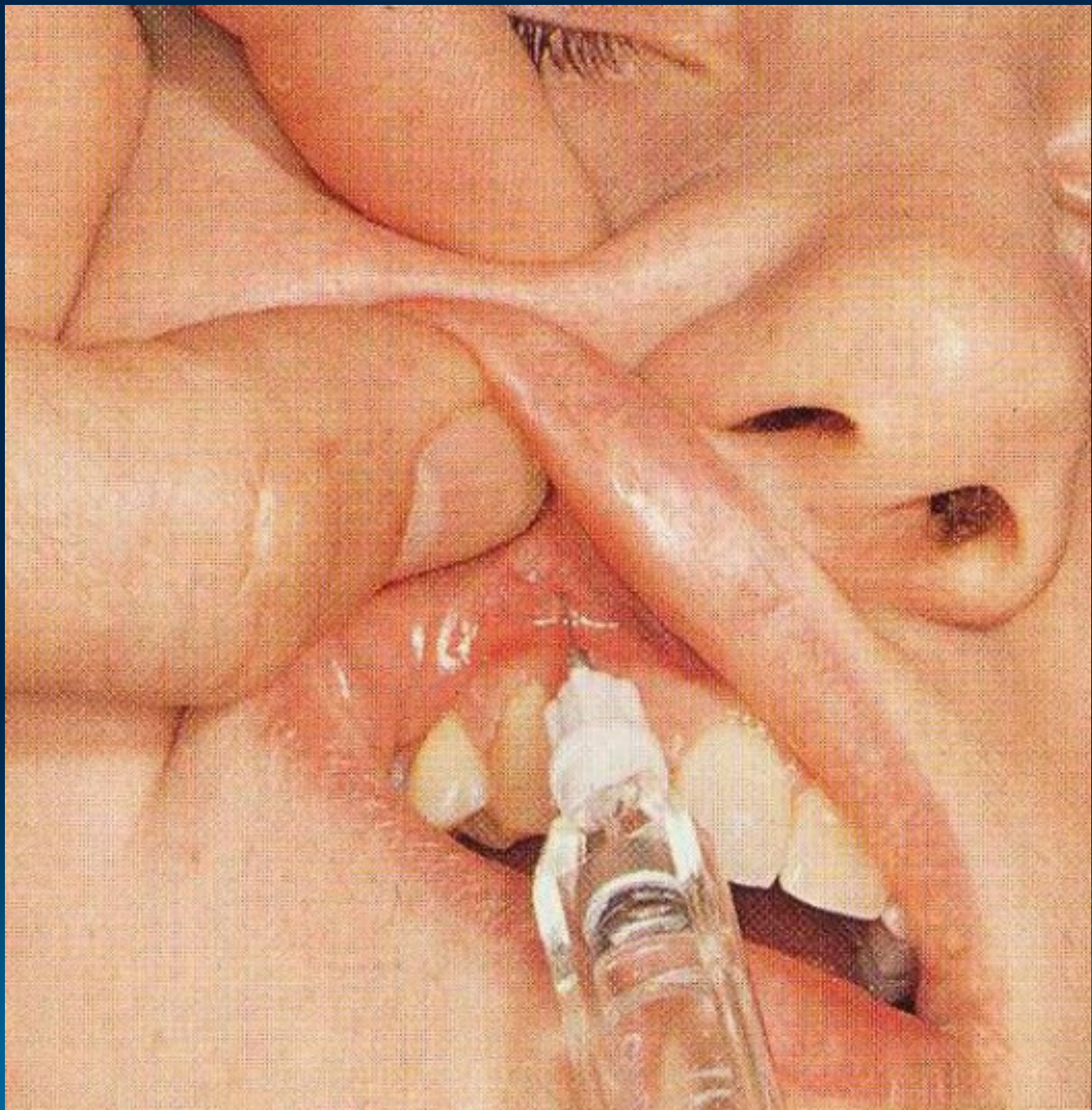


## 4. Infraorbital Nerve Block

- Combine ASA and MSA block
- Anesthetize the **maxillary premolars, canine, incisors**, corresponding buccal **alveolar bone** and **gingiva**, also the terminal branches of infraorbital nerve (**lower eyelid, external nose tissue, upper lip**, the anterior aspect of the **maxillary sinus**)

**Technique** - palpate infraorbital foramen

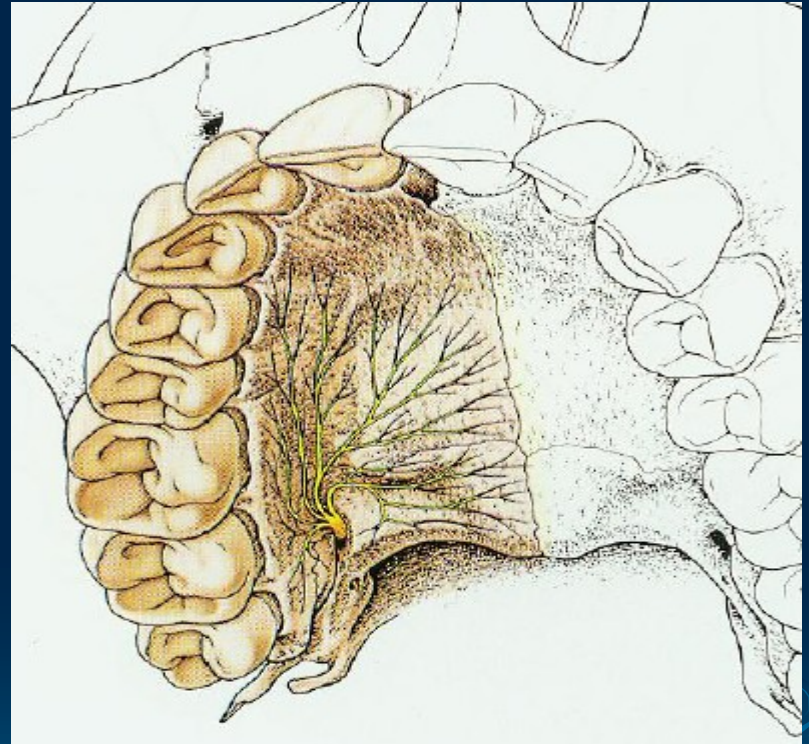
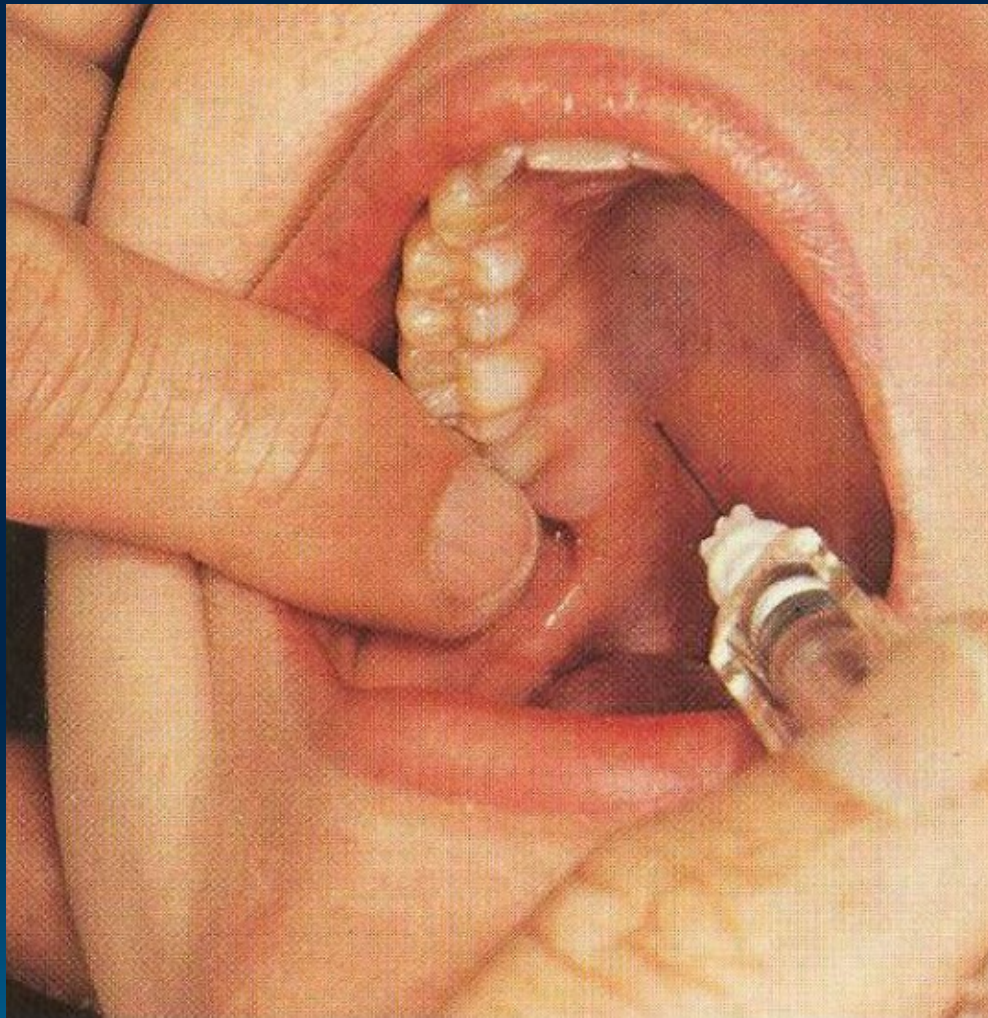
- retract the upper lip → inject to area of 3/4
- contact bone in infraorbital region
- inject 0,9 -1,2ml



## 5. Greater Palatine Nerve Block

- Anesthetize **all palatal mucosa** of the side injected and **lingual gingivae posterior** to the maxillary **canines** and corresponding **bone**

**Technique** - on the hard palate between the 2nd and 3rd molars approximately 1cm medially, inject cca 0,3 - 0,5ml

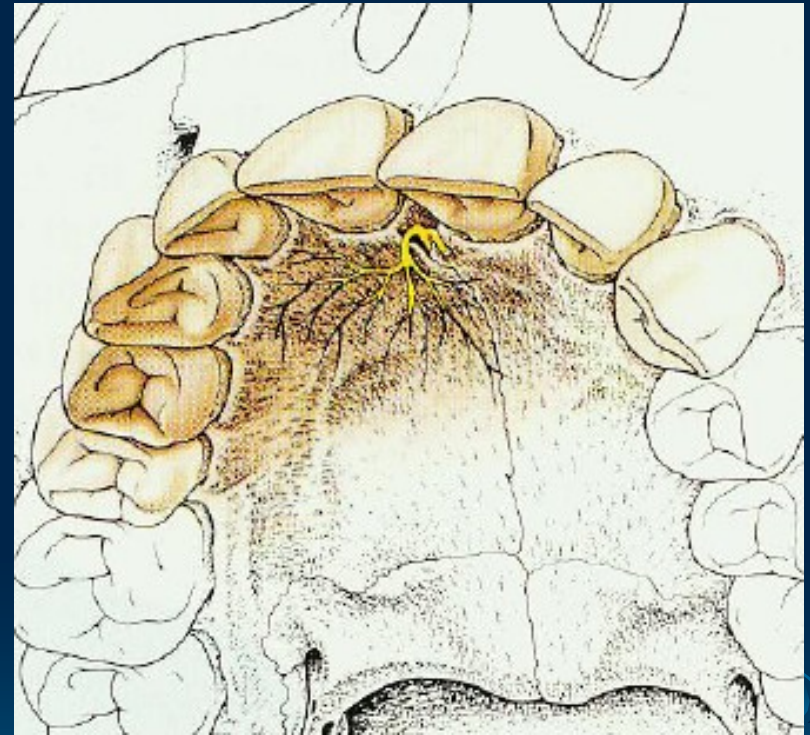
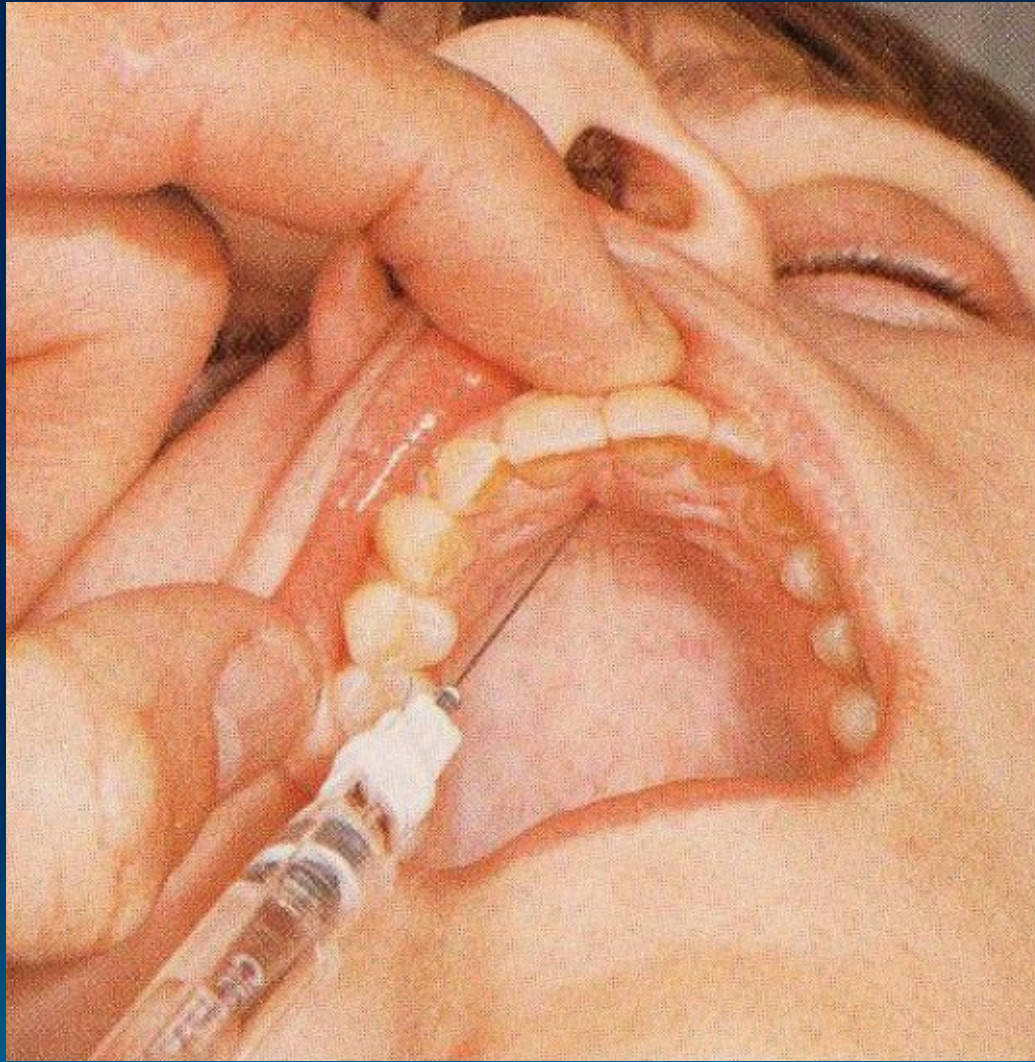


## 6. Nasopalatine Nerve Block

- Anesthetize the **soft and hard tissue** of the maxillary anterior six teeth - **from canine one side to canine other side**

**Technique** - approximately 1,5 cm posterior to the alveolar crest between the central incisors - posterior to the incisive papilla; depth less than 10mm and inject 0,3 - 0,5 ml



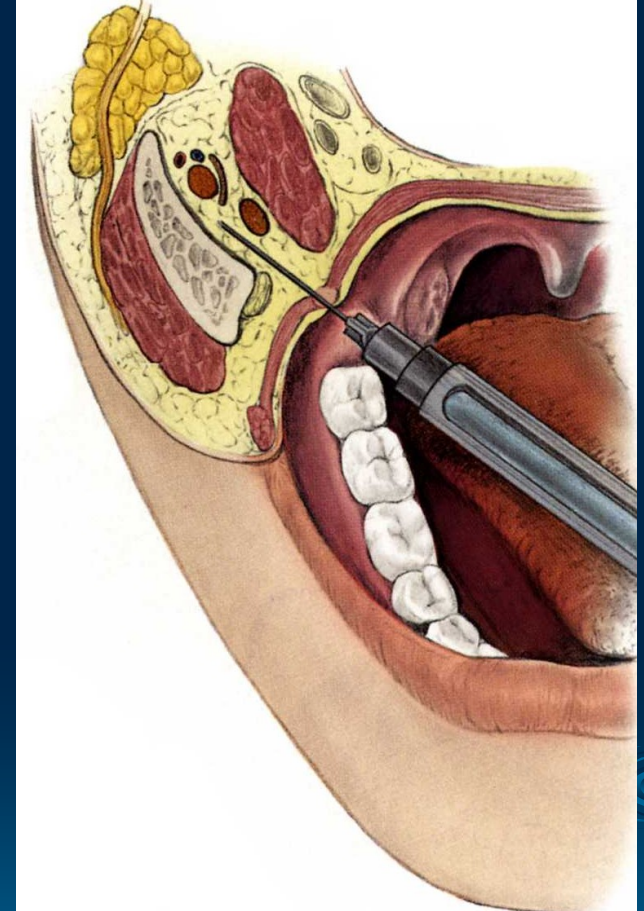
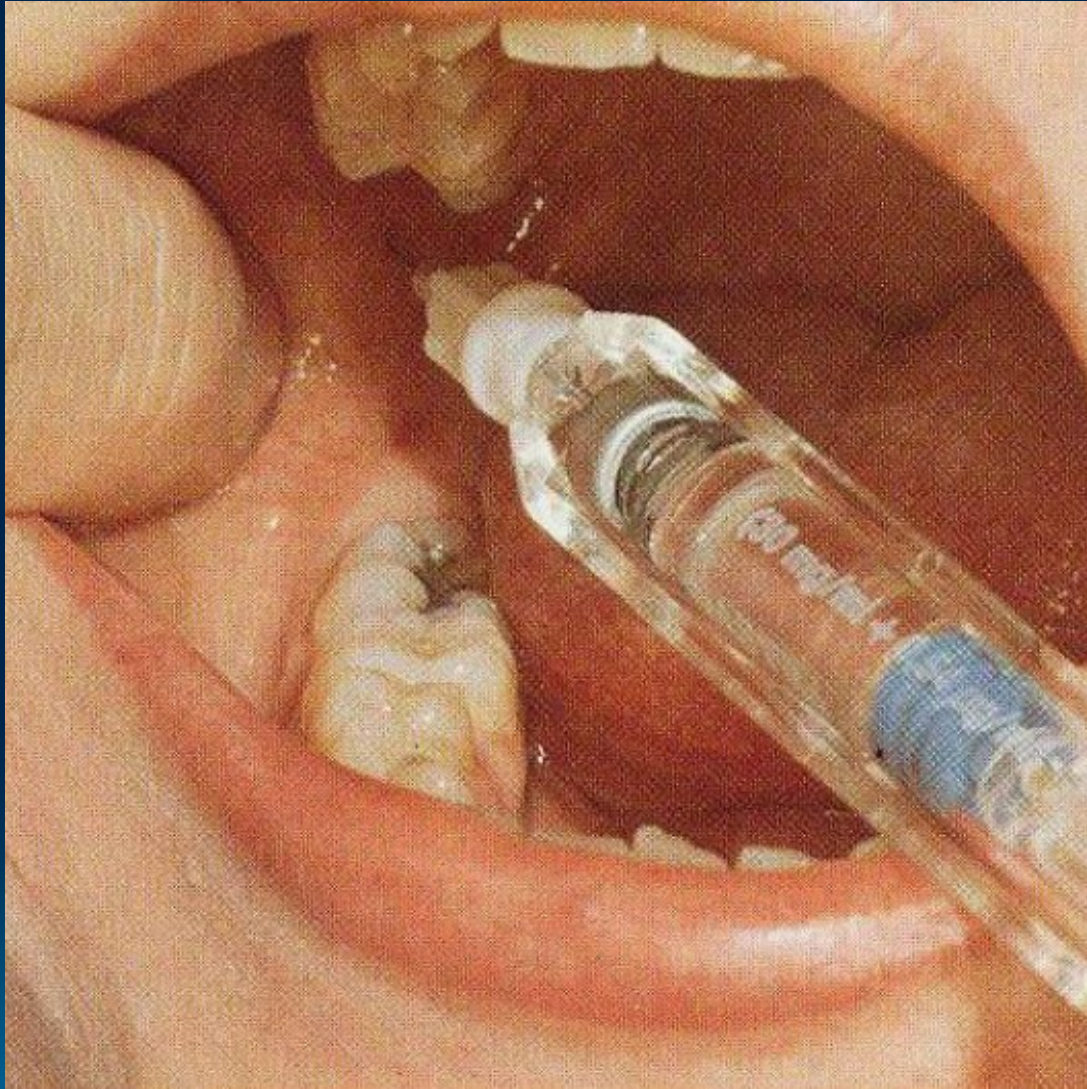


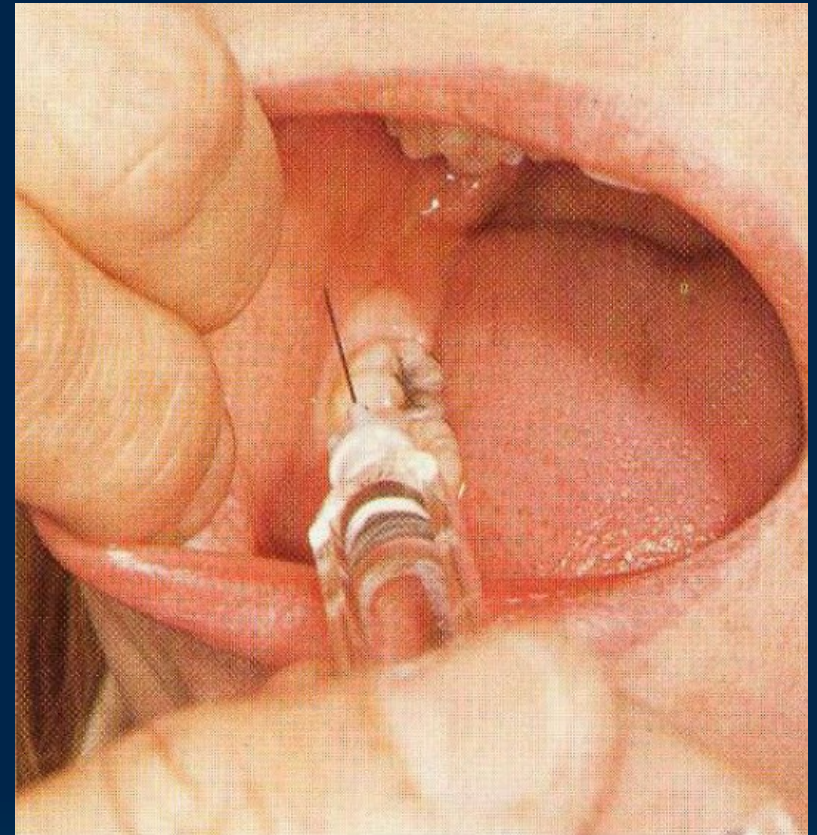
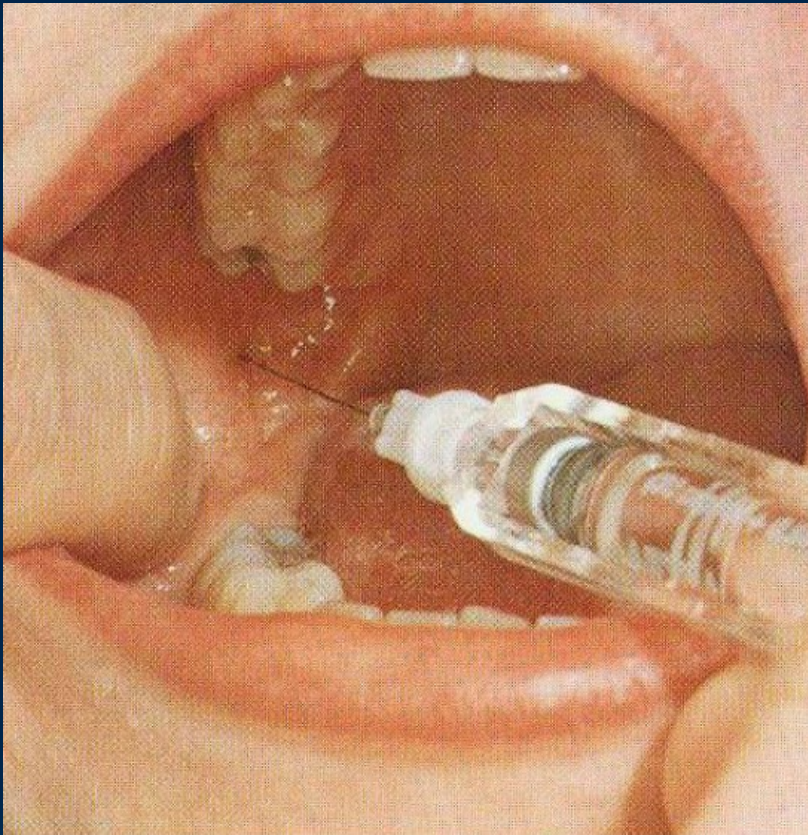
# 7. Inferior Alveolar Nerve Block

- Individual variations in the locations of the mandibular foramen
- Be aware of the proximal extremity of the maxillary artery. **Aspiration !**
  - a) Halstead method**
  - b) Gow-Gates method**
  - c) Akinosi method**

## a) Halstead Open-Mouth method

- The finger in the **retromolar fossa** with the fingernail pointing backward
- A line is sighted from **occlusal surfaces of the premolars of the opposite side** to the midpoint of the fingernail
- Inject 0,5 - 1ml solution
- Continue to inject 0,5ml on removal from injection site to anesthetize the **lingual branch**



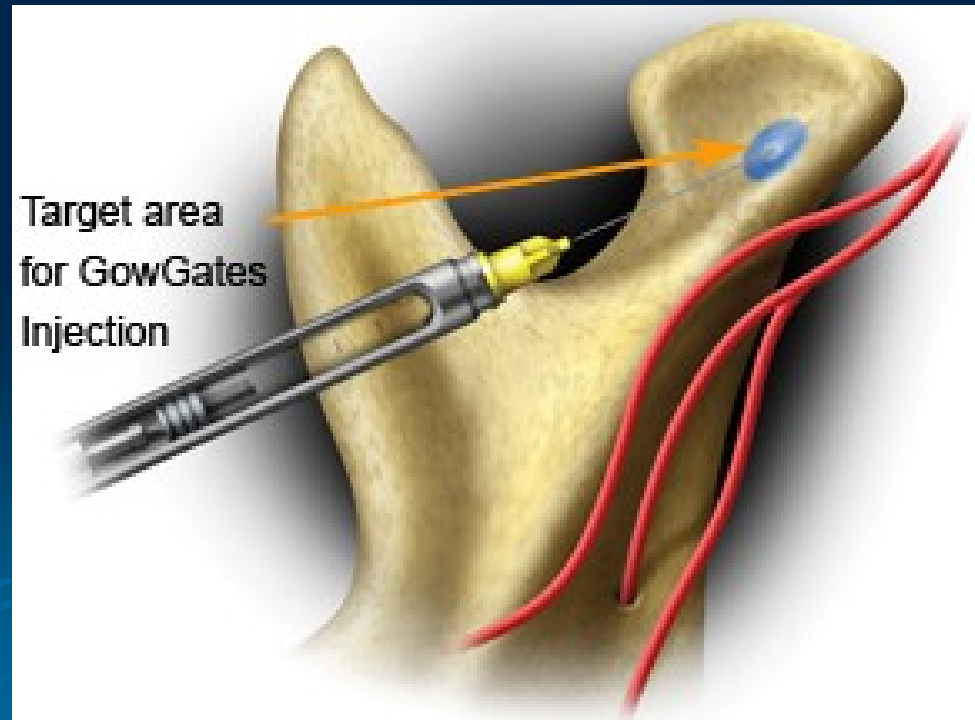


- Inject remaining anesthetic into coronoid notch region in the mucous membrane distal and buccal to most distal molar to perform a **long buccal nerve block**

## b) Gow-Gates method

- **Field block** anesthesia
- The injection site is higher than Halstead
- **Below** the insertion of the **lateral pterygoid muscle** at the **anterior side** of the **condyle** at maximal opening in relatively avascular area
- The injection line is parallel with the external line from the **intertragal notch** to the **angle of the mouth**

- The diffusion of the anesthetic solution reach all three oral **sensory portion of mandibular branch V.n.** and other sensory nerves in this region
- High success rate, fewer complication x slower rate of onset





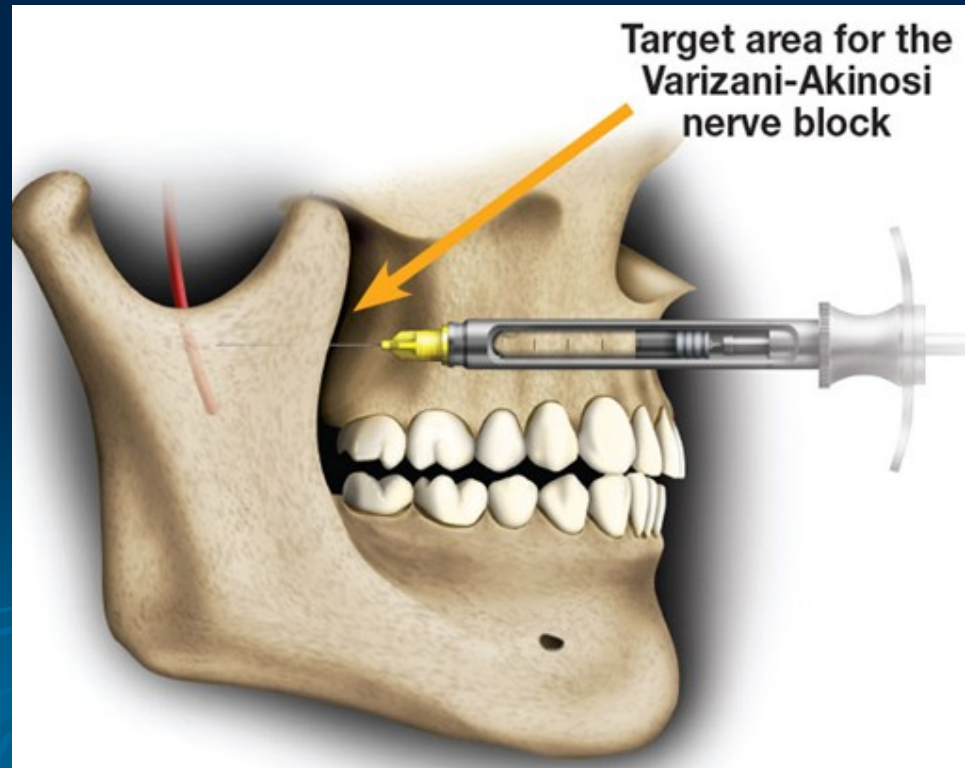


## c) Vazirani-Akinosi closed mouth method

- **Field block** anesthesia
- For patient with limited opening due **trismus**, **ankylosis**, **fracture**

The **gingival margin above** the maxillary **2nd** and **3rd molars** and the **pterygomandibular raphae** serve as landmarks for this technique

- The needle is advanced through the mucous membrane and buccinator muscle to enter the **pterygomandibular space**
- Penetrate to a depth 25mm
- Remaining anesthetic in **long buccal nerve** area



# 8. Mental Nerve Block

- Terminal branch of the inferior alveolar nerve, exits the mandible via the mental foramen
- The position of this foramen is most frequently **near the apex of the mandibular 2nd premolar**
- The foramen open **upward and slightly posteriorly!**

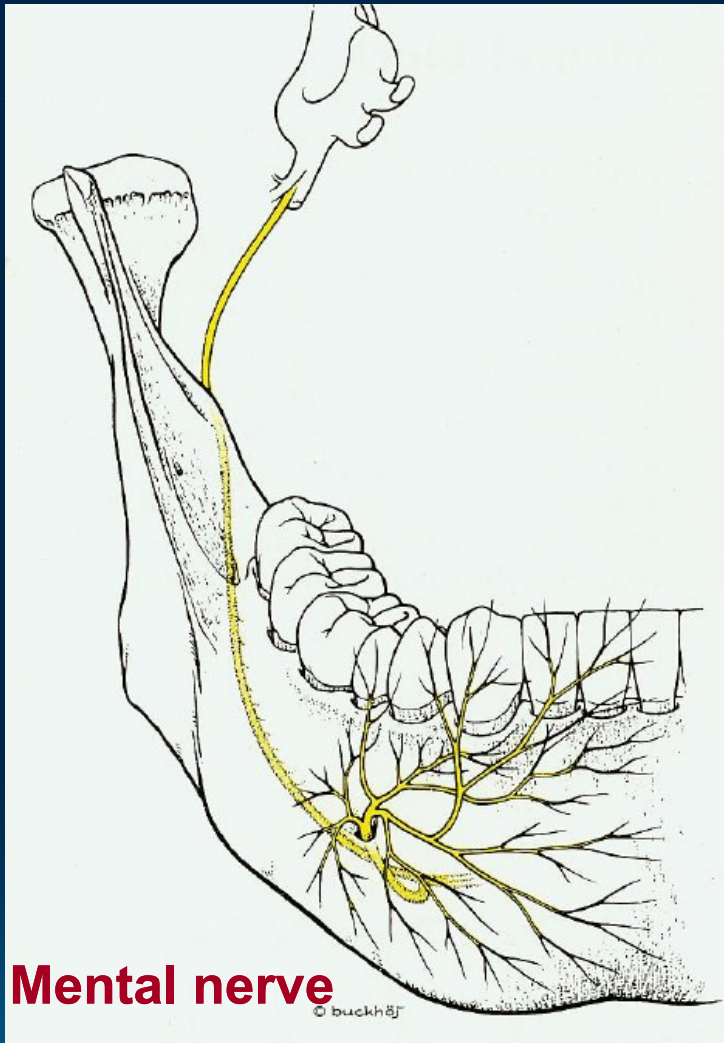
- Anesthetized **lower lip, chin**, labial gingiva, alveolar mucosa, pulpal/periodontal tissue for the **canine, incisors** and **premolars** on side blocked

## Technique

The tip of needle be **directed** or **anterior** to approximate the position of the foramen, but **not enter the foramen !**

Penetrate to a depth 5 mm, inject 0,5 - 1,0 ml

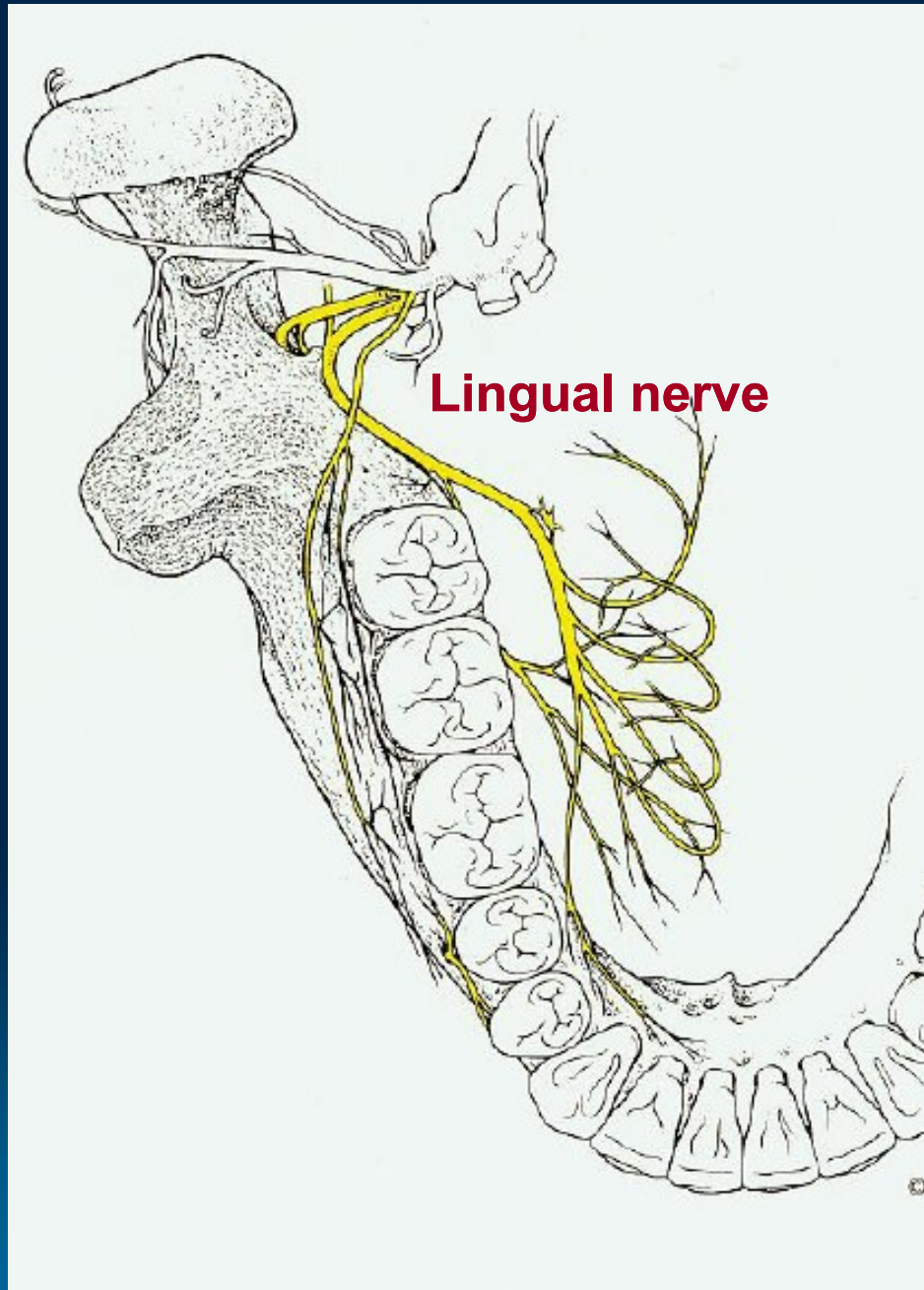
To provide **incisive nerve anesthesia** via the application of **finger pressure over the foramen** after local anesthetic solution is deposited there





# 9. Lingual Nerve Block

- Nerve passes from the infratemporal fossa into the floor of the mouth, in the vicinity of the 2nd and 3rd molars, is quite vulnerable
- Is anesthetized **during the inferior alveolar nerve block** or with a **bolus of anesthetic solution** injected after an inferior alveolar nerve block
- Anesthetized **anterior  $\frac{2}{3}$  of the tongue, lingual gingiva and adjacent mucosa**

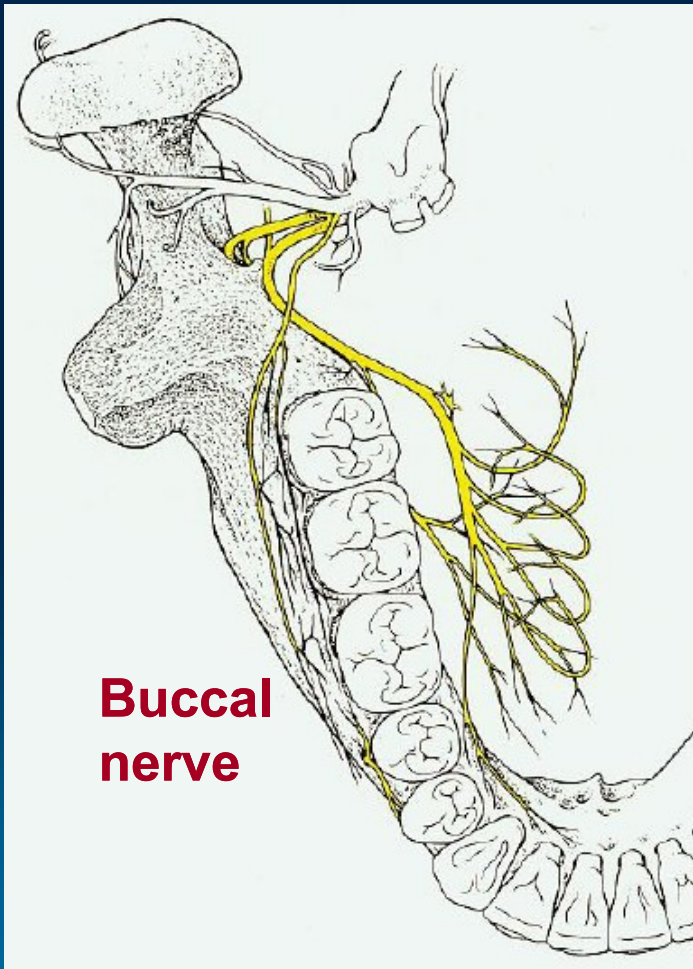


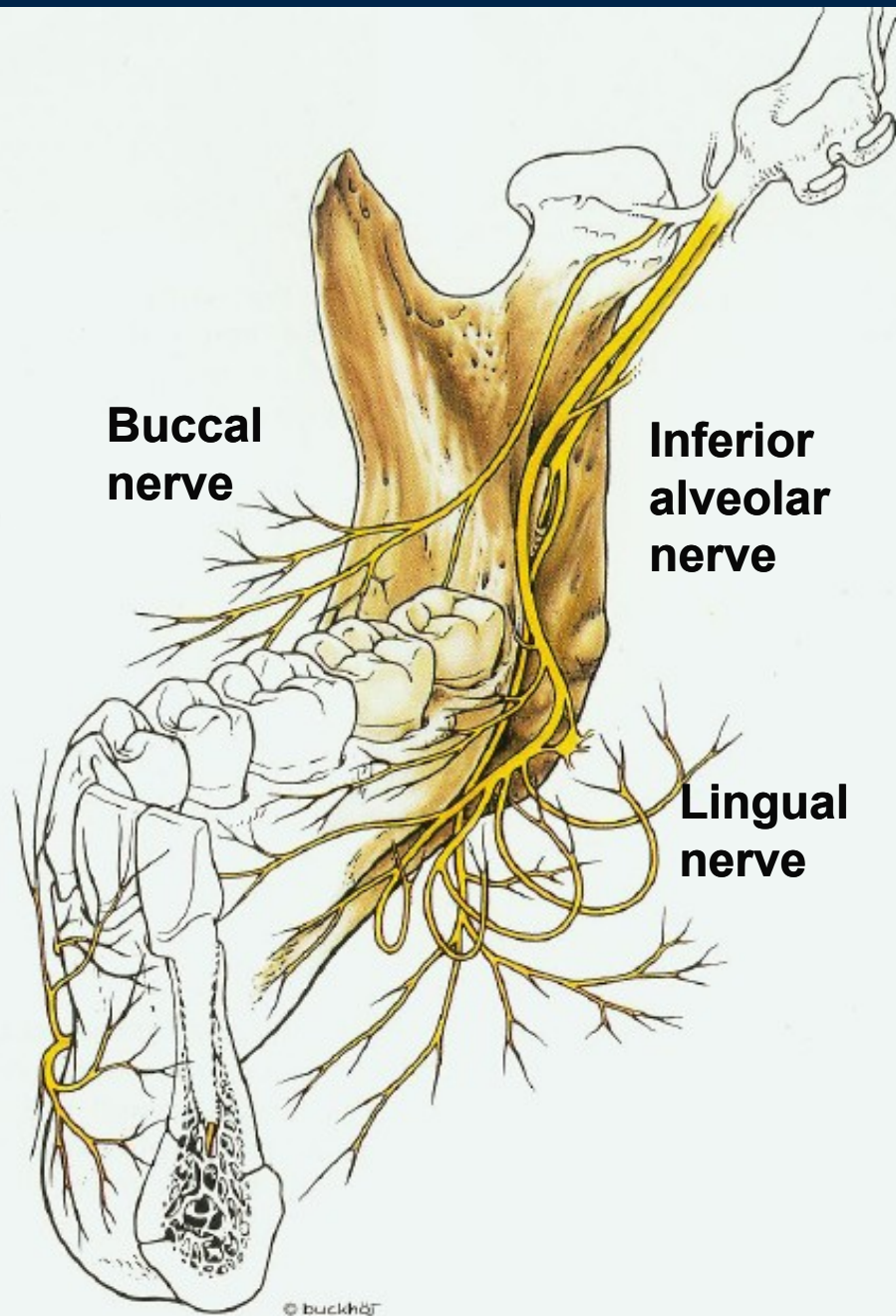


# 10. Buccal Nerve Block

- Arises in the infratemporal fossa and crosses the anterior border of the ramus to give multiple branches
- Supplies **buccal gingiva and mucosa** of the mandible for a **variable length**, from the vicinity of the **3th molar to the canine**

**Technique** - anterior ramus of the mandible at the level of the mandibular molar occlusal plane in the vicinity of the retromolar fossa





**Buccal  
nerve**

**Inferior  
alveolar  
nerve**

**Lingual  
nerve**

**Mental  
nerve**

# Alternative delivery methods

1. Intraosseous injection
2. Intraligamentary injection
3. Intrapulpal injection
4. Topical anesthetic patches



# 1. Intraosseous Injection

- Involves the placement of anesthetic solution **directly into the cancellous bone** adjacent to the tooth to be anesthetized, and allows for rapid onset of profound pulpal anesthesia
- The site of injection involves the **attached gingiva 2mm apical to the gingival margin** and interproximal relative to the teeth
- Provide anesthesia of a **single tooth or multiple teeth in a quadrant**



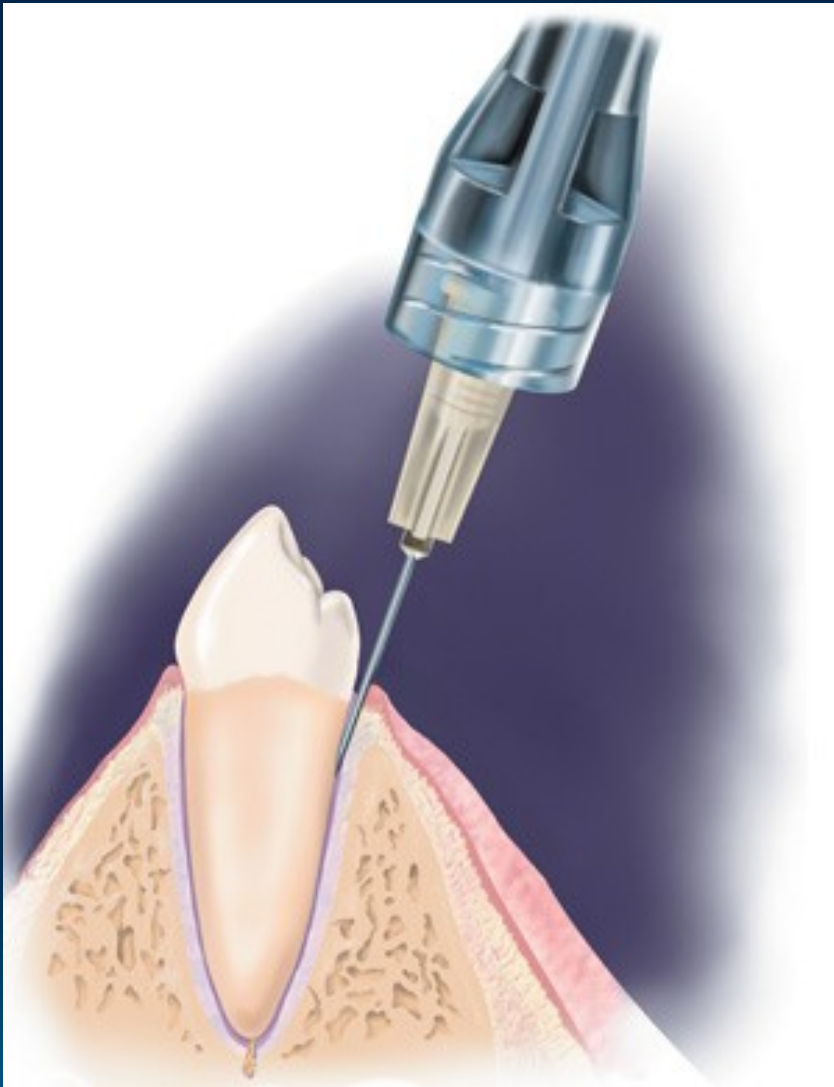
**The first step** - to drill a small hole through the soft tissue and cortical bone to a depth of 5 – 8mm



**The second step** - inserting a needle to the same depth and manually injected the desired volume of anesthetic solution into the cancellous bone

## 2. Intraligamentary Injection

- Is occasionally used as the **sole technique for anesthetizing a single tooth**
- The needle is inserted, directly along the long axis and as apically as possible, through the gingival sulcus and **into the periodontal ligament** between the tooth and the alveolar bone
- Slowly injected approximately **0,2ml** of anesthetic solution under pressure to control the pain of the associated tooth



## Contraindication:

- deciduous teeth
- periodontal infection



### 3. Intrapulpal Injection

- When **pulp chamber has been exposed** and treatment can't proceed

**Technique** - a small needle is inserted into the pulp chamber until resistance is encountered → injected under the pressure

- As the injection is started there will be a brief moment of **intense discomfort**



## 4. Topical anesthetic patches

- Be indicated to **minimize the sensation of needle insertion** or for very brief relief from **painful mucosal lesions**
- A **bioadhesive patch** impregnated with 10% or 20% lidocaine
- Typically, is used to anesthetize only the **outer 1-3 mm of mucosa**, not deeper structures

Spray



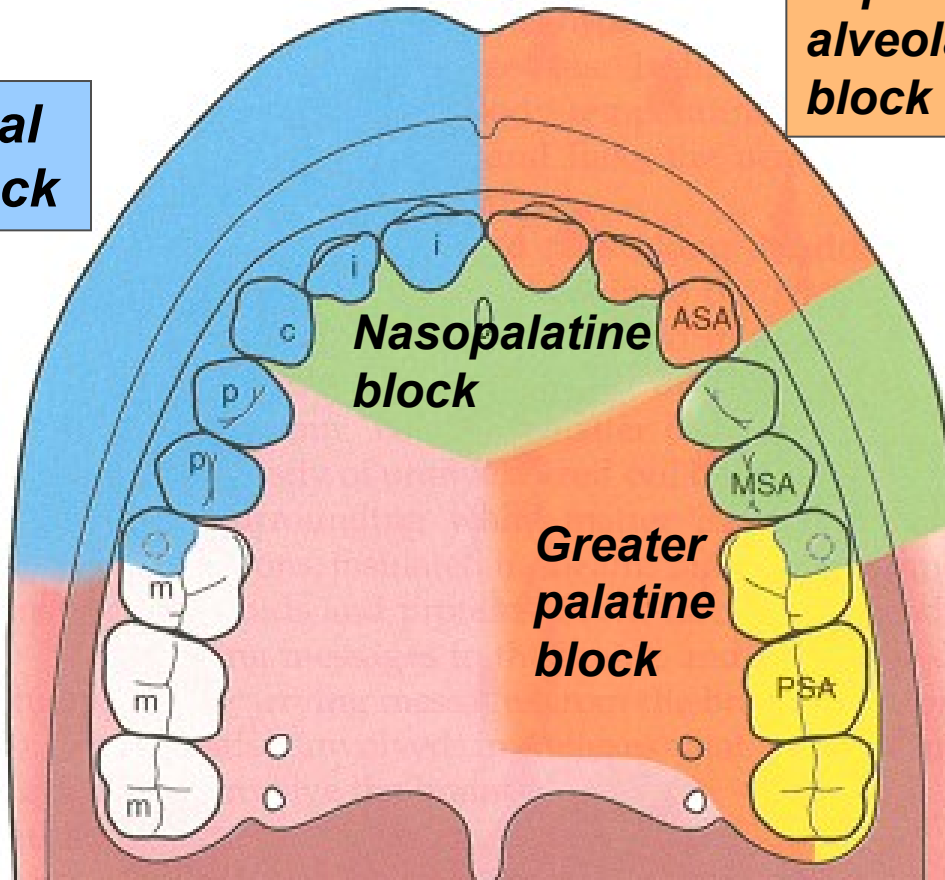
Gel



# Maxilla

**Infraorbital  
nerve block**

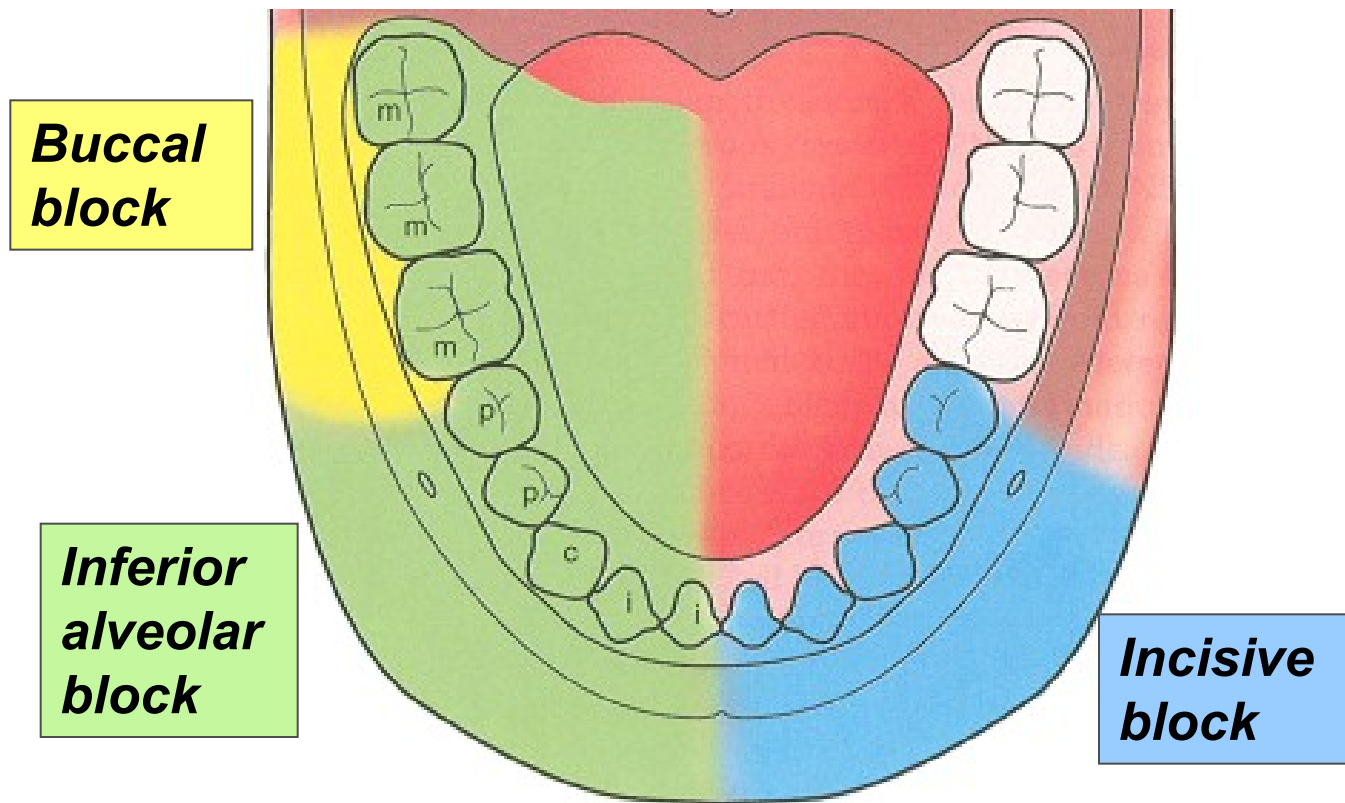
**Anterior  
superior  
alveolar  
block**



**Middle  
superior  
alveolar  
block**

**Posterior  
superior  
alveolar  
block**

# Mandible



**Buccal  
block**

**Inferior  
alveolar  
block**

**Incisive  
block**