

Techniques of local anesthesia in the mandible

- The technique of choice for anesthesia of the mandible is the **block injection** and this is attributed to the absence of the advantages which are present in the maxilla. The maxilla is a porous bone and the diffusion of the local anesthesia is very easy, but this is not the case in the mandible, the mandible is a dense bone and its density is seven times than that of the maxilla, so for that reason we select the block injections for the mandible.
- However the **local infiltration** could work in specific areas of the mandible like the lower **anterior area** and this is attributed to the presence of multiple foramina in the buccal cortex of the mandible. It could work also for **children less than 6 years** of the age (it is contraindicated to give an ID block for a 6 years old child due to profuse and extensive soft tissue anesthesia caused by this type of injection which is the inferior alveolar nerve block).
- How can you know if this child is less or more than 6 years old ?
you have to notice the eruption of the first molar ..
 1. If it's erupted (more than 6 years old) infiltration would not work.
 2. If it is still unerupted (less than 6 years old) you can perform infiltration for anesthesia of mandible for this age.
- So it could work for children less than 6 years of age or in the buccal area or in the labial area for extraction of incisors, but you have to perform a kind of massage or pressure over the injected solution in order to inforce it entering the foramina.
- We need also infiltration in the mandible to supplement our injections like inferior alveolar nerve or even incisive nerve block, because they give innervation for all structures except mucoperiosteum in the lingual side, so we can supplement our injection by the use of local solution just close to tooth of interest, but the anesthesia of choice or the technique of choice is the block injection.

* Summary ..

- For procedures that we do on the mandible, the anesthesia of choice is Inferior alveolar nerve block except when working on :
 1. Anteriors
 2. Children less than 6 years of age
- Infiltration method constitutes of the deposition of some anesthetic solution just close to the apex and that will provide anesthesia for the whole tissues except the mucoperiosteum on the lingual side, so it has to be supplemented by lingual injection.

- If you follow the steps of ideal technique the success of the anesthesia will be the result (Palpation of coronoid notch, where is the pterygomandibular raphe, approaching from contralateral side, entering 20 mm to achieve the success).
- **Block injection** is the deposition of the local anesthetic solution just close to the **trunk** of the nerve not the terminal branches of the nerve, when you deposit the anesthesia close to the trunk that means you are performing the block injection not the infiltration.
- The incisive nerve is a terminal branch of the inferior alveolar nerve.
Inferior alveolar nerve enters the **mandibular foramen** to supply the teeth, part of the ramus & part of the body of the mandible until reaching the **mental foramen**, where it is divided into 2 terminal branches the first is **incisive nerve** which is inside the hole and the second is the **mental nerve** which supplies the soft tissues .
 (you have to differentiate between incisive and mental nerve blocks, when you perform **extraction** of canine for example you have to do **incisive nerve block**).
- In these blocks we aim to deposit the local anesthetic solution just close to the target area which is the **mental foramen**.
- When our target area is a foramen or anatomical structure the first step is to determine the **location** of this structure (where is the exact location of the mental foramen) because it is very important and crucial for the success of anesthesia. If you deposit the local anesthetic solution distal to it you would not achieve local anesthesia, you will achieve local anesthesia if you inforce the local anesthetic solution inside the foramen and reaching the distal branch of inferior alveolar nerve.
- The location of any anatomical structure has to be determined in **2 planes**:
 1. vertical
 2. anterior posterior
- The location of the mental foramen is subjected to some anatomical variations (different between populations) and to some age changes (old different than child & dentate different than edentulous).
- **The location of the mental foramen :**
 1. **Anterior posterior location ..**
 The usual position of the mental foramen (which means 60% -80%) is located between the 1st and 2nd premolars.
 But it could be in few cases located anterior to this usual position (anterior to the 1st premolar), or it could be located distal to the usual position (close to the apex of the 2nd premolar), or it could be located more distally (distal to the long axis of the premolar).

2. **vertical location ..**

vertically it's located between the alveolar crestal bone and the lower border of the mandible (half of the distance) in dentate adult patient.

But in children you can find it one third of the distance from the lower border of the mandible (which has less thickness and not developed yet) due to the highly developed alveolar bone (because we have deciduous & permanent teeth) so the location of the mental foramen is more inferior.

In edentulous patient it's located between the alveolar crestal bone and the lower border of the mandible but the alveolar bone is resorbed so it will be more superficial and that is the cause of burning sensation in denture wearers.

* **Summary ..**

- Location of the foramen:

1. **Antero-posteriorly ..** The usual location of the foramen (70% of population) is between the 1st and 2nd premolars.. it could be anterior or posterior to this position.

2. **Vertically ..** it is positioned in the midway between the alveolar crest and the lower border of the mandible.

This is the normal position in Adult dentate patients.

Where in children we can find it one third away from the lower border of the mandible because the growth of the mandible is not completed yet.

In edentulous patients we find it in a relatively higher position than that of the dentate patients, due to bone resorption.

• **How can we locate mental foramen clinically ?**

1. **Extra oral method ..**

Any line you want to draw you need 2 points, the first one is the pupil of the patient & the second one is the infra orbital foramen which is located half cm below the lowest margin of the infra orbital rim.

The patient should look straight and this line will pass through the mental foramen and this will determine only the anterior posterior location of the mental foramen (this is an imaginary line).

2. **Intra oral method ..**

To feel the mental foramen, you can insert your finger (your thumb) in the buccal vestibule and move it ant post until you feel roughness this is the border of mental foramen and if you press against the bone the patient will feel a burning sensation (this is an accurate method).

The roughness you feel is the location of mental foramen.

3. **radiographs ..**

The radiograph of choice is the OPG, but you can use periapical.

If I want to do an implant in the location of 4 or 5 it's very important to take an OPG to determine the location of mental foramen, but if I want to do an extraction it's not important to take an OPG.

- **Techniques ..**

1. In old techniques you have to stand behind the patient and retract the cheek and insert the tip of the needle inside the foramen, it's necessary to insert the tip of the needle inside the foramen to make your anesthesia successful, but in new techniques it's not necessary and it may cause injury of the neurovascular bundle (temporary or permanent), so the new method says that the target area is the mental foramen only so we can insert the solution by finger instead of the needle to avoid making compression inside the canal that may cause irreversible damage of the nerve, so you have to set in front of the patient or even stand in front of the patient but setting will give you more control.
2. The insertion point is **5mm anterior to the mental foramen** then you insert it until you reach your target area (bony border of mental foramen) then you inject your solution which is one third of the carpule.
3. When I reach the mental foramen I insert the tip of the needle anterior to it and advance the needle until reaching my target area then you put your finger over the solution and start to inject your solution to enforce the solution to enter inside the foramen (in incisive nerve block you have to put your finger and make pressure but in mental nerve block you don't have to put your finger).
4. Every incisive nerve block includes mental nerve block but not every mental nerve block includes incisive nerve block.
5. Biopsy for the lip (we need anesthesia for mental nerve only)
Extraction (we need incisive nerve block)
(the technique is the same but they differ in applying the finger pressure)
6. Finger pressure should be maintained for at least **2 minutes** (to enforce the solution to enter inside the foramen to avoid pulping).
7. after incisive nerve block we will get anesthesia for the whole soft and hard tissues except lingual mucoperiosteum which anesthetized by lingual nerve block or lingual infiltration.
Incisive nerve block will give pulpal anesthesia and anesthesia for periodontal ligaments on buccal and lingual sides and alveolar bone on lingual and buccal sides, except periosteum and gingiva supplemented by lingual infiltration

- **Rule:** Intral oral injection is better than extra oral injection (for dentists and for patients) and the healing intraorally is better than the skin.

*** Summary ..**

- Techniques of mental nerve block:

1. Old technique..

the operator stands behind the patient and retract the cheek then inserts the needle **into** the foramen.

2. New technique ..

the operator sits in front of the patient and inserts the needle into the estimated position of the foramen by around **5mm**, then advance the needle until you reach the anterior border of the foramen and inject the recommended volume (less traumatizing).

- **Anatomy:** Inferior alveolar nerve enters the mandibular body until reaching the mental foramen (it gives nerve supply for 3rd molar 2nd molar 1st molar and 2nd premolar) so the 2nd premolar is supplied by the distal segment of the inferior alveolar nerve, then it divides into 2 terminal branches at the region of the mental foramen (incisive nerve which goes in a straight way and mental nerve that exits the mental foramen to supply the soft tissue)
 - * If we want to anesthetize central, lateral, canine or 1st premolar we need incisive nerve block .
 - * 2nd premolar ideally supplied by the distal part of inferior alveolar nerve, it could be anesthetized by incisive nerve block but this depends on the location of mental foramen. if it's close to the apex of 2nd premolar (the usual position) or distal to the usual position it works, if it is anterior to the usual position (near the 1st premolar) it wouldn't work because local anesthetic solution need to pass along the distance until reaching the distal segment of inferior alveolar nerve.
 - * Inferior alveolar nerve has a curve way, if we want to put an implant we have to put it **5 mm** anterior to the bony margin of the mental foramen to be in the safe area, because inferior alveolar nerve makes a curve anterior to the anterior bony margin of mental foramen of about 3mm.

Notes:

*bilateral inferior alveolar nerve block is contraindicated, coz this may lead to bilateral lingual anesthesia (patient discomfort)

*If we have 6 teeth need to be extracted, then block IAN on one side (will make lingual anesthesia) and block the incisive nerve on the other side(won't make lingual anesthesia) → no discomfort (instead of bilateral ID block)

The recommended solution in the incisive/mental nerve block is 1/3 of the *carpule (0.7 ml)

*Duration of finger pressure has to be maintained at least 2 minutes to make sure that the solution enters the canal

*Clockwise pressure on the right side and anticlockwise on the left side (intra oral massage).

The maxillary nerve inside the infra orbital canal = infra orbital nerve → before it exits from the infra orbital foramen it gives the anterior superior alveolar nerve → then the infra orbital nerve exits from the infra orbital foramen and supply soft tissue only (same story of the ID nerve when it gives 2 branches, one for soft tissue and one for bone)

*Now if you give infra orbital nerve block with massage and finger pressure then you're performing anterior superior alveolar nerve block, without massage and finger pressure then you're performing infra orbital nerve block, SO →

**The equivalent injection in the maxilla to the incisive nerve block in the mandible is anterior superior alveolar nerve block (exam question!) → BOTH sharing massage and finger pressure to enforce the solution inside the canal

**The equivalent injection to the infra orbital nerve block is mental nerve block.

Long buccal nerve block

*Long buccal nerve, buccinator nerve, buccal nerve

*It's located Anterior, superior and slightly lateral to the IAN, While lingual nerve is located anterior, medial to the IAN by about 1 cm.

*If you block the IAN and the patient tells you that only his lip becomes numb this means your insertion was not deep enough to reach the IAN and actually you block the long buccal nerve instead of the IAN (you are more superior to IAN).

*Now the long buccal nerve crosses over the anterior border of the ramus laterally at the level of occlusion, till now it's a trunk, then it gives 3 terminal branches : one to the buccal mucosa, one to the depth of the vestibule and one to the buccal gingiva → injection in any of these terminal branches = infiltration, injection in the trunk itself = block (most distal and buccal aspect of the wisdom tooth at the level of occlusion contacting the anterior border of the ramus, if there's no wisdom then suppose there's a wisdom)→ this block is responsible for anesthesia of the whole mucoperiosteum on the buccal side which has to be supplemented in case of IAN block, it's a must to block the long buccal if the soft tissue on the buccal side will be manipulated in case of extraction for ex. But not in case of endo treatment! coz it gives only mucosa and periosteum(only soft tissue).

*long buccal nerve gives soft tissue until the area of the mental foramen(second premolar), now anterior to the mental foramen it's supplied by incisive nerve(not mental nerve).

*when you want to extract the second premolar give long buccal infiltration to anesthetize the distal segment of the long buccal nerve→transition area

IAN block

*The most common administered injection in dentistry, and it cause the highest figure of failure and positive aspiration.

*Positive aspiration 20% → IAN block without aspiration then 2 out of 10 patients will be given vascular injection (toxic effect) !!

*We should apply the direct technique not the indirect one.

*Now our target area in the IAN block is the mandibular foramen, you have to locate the foramen in anterior-posterior and vertical dimensions.

*Ant-pos → it's located 2/3 from the anterior border of the ramus.

*Vertically → it's located 1 cm above the occlusal plane of the mandible in normal skeletal relationship (class 1).

*Class III (prognathic mandible) → inferiorly located than the previous usual position (at the level of occlusion).

*Class II → superiorly located than the usual position (above the usual position)

*Young patient → the ramus is not completely developed → at the level of occlusion → with age the ramus elongates vertically → above the occlusal plane

*Adult patient → above the level of occlusion.

*the second target area is the pterygomandibular space, the space between the medial pterygoid muscle and the inner surface of the ramus, in this space there is a very important anatomic structure >> IAN, artery and vein.

In the direct technique we approach this space from the contra lateral side.

Now where is the insertion point of the needle ?

you should notice 2 important landmarks :

1- coronoid notch: put your finger on the anterior border of the ramus and pass it up and down until you feel depression, stop there !

2- pterygomandibular raphe : has two lines in its path → horizontal then turns superiorly to become vertical this is the deepest point of the raphe.

draw imaginary line between the previous 2 landmarks (coronoid notch and the deepest point of the raphe) this line is the vertical level of the insertion point.

*ant level of the insertion point → 2/3 from the tip of your finger or 1/3 from the deepest point of the raphe.

the cross of the 2 lines is the insertion point approaching from the contra lateral side.

*BUT you have to achieve adequate depth of penetration for normal sized patients = 20mm

Some tall patients = 25mm (longer ramus)

Short or thin patients = 15 mm or 17 mm

*When you achieve this depth of penetration AND bone contact then deposit the local anesthetic solution.

*Use long needle (32mm)

*Don't insert the whole needle

Lingual nerve block

*While making IAN block and before you withdraw the needle completely deposit little amount of the local anesthetic solution to block the lingual nerve.

*Infiltration of the lingual nerve is possible by injecting the terminal branches of the nerve.

Ramus divergence

To know it look at the tragus of the patient, we have:

Flat tragus

Mildly divergent tragus

Widely divergent tragus

Straight ramus(flat) →early bone contact →no adequate depth of penetration
→move the syringe more anteriorly and the needle more posteriorly until you achieve adequate depth of penetration AND bone contact.

Note: the syringe was between the premolars, just move it anterior to premolars

Widely divergent ramus → over insertion →late bone contact .

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