Intraosseous Anesthesias with QuickSleeper

Protocol & Workshop

IMPORTANT: To be read before first use
INTRAOSSEOUS ANESTHESIAS

2 TYPES OF INTRAOSSEOUS ANESTHESIA:
OSTEOCENTRAL ANESTHESIA OR TRANSCORTICAL ANESTHESIA

Presence of a septum at the point of injection?

**YES**

Perform an osteocentral anesthesia

- **EQUIPMENT**
  - DHT 30 G - 16 mm needle for adults
  - DHT 27 G - 16 mm needle for adults
  - for large interdental spaces
  - DHT 30 G - 9 mm needle for children

- **ANGULATION**
  15° to 30° compared to the root’s axis.

- **DEPTH OF PENETRATION**
  A minimum of 3/4 of the length of the needle, in order to approach the apex (higher efficiency) and to move away from the septum (elimination of the risk of necrosis).

- **FEELING DURING THE PERFORATION**
  Easy passing through of various successive layers of bone.

**NO**

Perform a transcortical anesthesia

- **EQUIPMENT**
  DHT 27G - 16 mm needle

- **ANGULATION**
  You must be perpendicular to the cortical plate.

- **DEPTH OF PENETRATION**
  You stop as soon as you feel the “click”, indicating that you have passed through the cortical. In practice, the needle is never penetrated by more than half of its length.

- **FEELING DURING THE PERFORATION**
  Passing through of 1 single thick layer of bone.

Osteocentral and transcortical anesthesias are both intraosseous anesthesias.
**Intraosseous anesthesias**

**The characteristics**

1. **Principle**

Osteocentral and transcortical anesthesias consist of placing the anesthetic product directly into the cancellous bone. The number of teeth anesthetized, the length and the effectiveness depend on three factors:

1. **SITE**: a larger volume of bone at the injection site (posterior sector) requires more product.
2. **PRODUCT**: the higher the concentration of vasoconstrictor, the more effective and long lasting the anesthesia will be.
3. **QUANTITY**: the quantity of anesthetic injected should be adapted to the volume of cancellous bone, to the number of teeth to anesthetize and to the length of procedure time required.

By taking these 3 factors into account, it is possible to anesthetize from 2 to 8 teeth with only one cartridge, injected in one particular spot, with a lasting effect of **45 to 60 minutes**.

2. **Indications**

- **Patients**: Adults - Children.
- **Applications**: All types of treatment, extractions... Recommended for teeth with pulpitis.

3. **Contraindications and limits**

- Access to the superior wisdom teeth. Perform an infiltration anesthesia in this case.
- Infected bone or very small interdental space: perform an intraosseous anesthesia distal to the affected area or perform another technique.
- Specific clinical cases (parodontopathy, periapical infection,...): for more details, refer to page 17 “Questions and solutions”
- Anesthetic products: refer to the recommendations and contraindications given by the manufacturers.
- Use only the DHT needles, made to function with QuickSleeper.

4. **Diffusion**

**Maxilla**: the diffusion is **distal and mesial**. Choose the injection point which provides you the easiest access.

**Mandible**: the diffusion is **mainly mesial**. Choose the injection point distal to the tooth to be treated, especially for teeth devoid of pulp circulation or inflammatory tissues. For asymptomatic teeth, mesial intraosseous injection will also provide sufficient local anesthesia for the tooth just distal of the injection site.

Example of diffusion:

- Injection point
- Teeth generally anesthetized with 1/2 cartridge
- Teeth generally anesthetized with 1 cartridge
The use of a vasoconstrictor is recommended to increase the effectiveness and reduce the systemic toxicity of the anesthetic.

To find out the quantities injectable per appointment, and to make sure that the use of vasoconstrictors is not contra-indicated for your patient (arrhythmia, medical treatment...), please refer to the manufacturer recommendations.

Vasoconstrictor concentration for intraosseous anesthesias:
- 1/200 000: treatment on asymptomatic teeth and extractions of teeth with no periodontal problems.
- 1/100 000 or 1/80 000: used to increase the time, treat pulpitis, increase effectiveness, obtained with a smaller volume of dental anesthetic.

The effect of the anesthesia is immediate and does not require any complementary anesthesia lingual or palatal, even for a simple extraction. No multiple injections for the laying of a rubber dam.

The soft tissues are only partially anesthetized (immediate attached gingiva). There is only slight numbness of the adjacent soft tissue, which will disappear after 30 minutes. The risk of necrosis is non-existent with intraosseous anesthesia, as long as you penetrate the needle sufficiently for osteocentral (minimum 3/4 of its length). One should at all times avoid injecting local anesthetic in the cortical part of the septum as it will promote necrosis of the interproximal bony septum.

The cortical and the cancellous bone are not innervated, osteocentral and transcortical penetrations are therefore completely painfree.

You can tell your patient that he/she will hear some noise and mild vibrations but not feel any pain. 5 or 8 QuickSleeper rotation cycles* are generally sufficient to penetrate deep enough the needle for the maxilla and mandible.

* Rotation period of one second followed by a one second pause obtained by pressing continuously on the rotation pedal.
Osteocentral and transcortical anesthesias are performed in 3 steps:

Only step 2 is completely different between an osteocentral and transcortical anesthesia.

**STEP 1**

Attached gum anesthesia (details p.6-7)

**STEP 2**

2a Osteocentral Perforation (details p.8-9)  
2b Transcortical Perforation (details p.10-11)

**STEP 3**

Injection into the cancellous bone and needle withdrawal (details p.12-13)
STEP 1  The painfree attached gum anesthesia

1. Choose your needle according to the type of perforation you wish to perform in step 2 (osteocentral or transcortical).
   - Osteocentral: 30G-16mm for adults, 30G-9mm for children
   - Transcortical or osteocentral for adults with large interdental space: 27G-16mm.

2. Position yourself as shown below and ask patient to move the head in order to obtain the best access and an optimal view of the site.

   **Position of the dentist for inferior and superior inter-incisor points**

   **Position of the dentist for all other points**

   - Turn the patient’s head to +/- 45° to obtain the best access and an optimal view of the site.
   - For left handers, replace 8 to 9 o’clock positions by 3 to 4 o’clock

3. Choose the IO injection mode.
   - Use the Lo mode in case of very sensitive patients.
   - Use a pen grip as close as possible to the needle with efficient support points for perfect control and maximum precision.
Position your needle close to the place of the future osteocentral or transcortical perforation:

- The angulation of the needle almost parallel to the mucosa ensures a minimum depth of penetration, without touching the periosteum (see photos below).
- The indicator on the hub of the DHT Needle should be opposite to the mucosa (see the red circles on the photos below). This specific orientation* enables injection as soon as the penetration starts and reduces the depth of penetration (see illustration on the left).

Position of the needle for inferior and superior inter-incisor points...

Position of the needle for all other points...

Use an angulation almost parallel to the mucosa for a painfree penetration.

Work gently and penetrate the needle under the mucosa by only a few tenths of a millimeter, without reaching the painful zone constituted by the periosteum.

Inject

The appearance of a white circular patch indicates that the periosteum is anesthetized (generally a few drops of anesthetic are enough).

If you are using highly concentrated vasoconstrictors (1/80 000 or 1/100 000), inject only a few drops (1/8th cartridge maximum) to prevent any risk of papilla necrosis.

* The orientation of the hub indicator compared to the bevel is specific to DHT needles. This orientation is therefore not applicable to the other needles on the market.

More info and videos on www.mydentalhitec.com
**STEP 2a**

**Painfree osteocentral perforation**

**Position of the dentist for the mandible**

Turn the patient’s head to +/- 45° to obtain the best access and an optimal view of the site.

**Position of the dentist for the maxilla**

Turn the patient’s head to +/- 45° to obtain the best access and an optimal view of the site.

To do not support the weight of the handpiece, hold it as vertically as possible.
To improve the access distally to the 6, the mouth is half opened.
For left handers, replace 8 to 9 o’clock positions by 3 to 4 o’clock and 1 o’clock by 11 o’clock.

**Use a pen grip as close as possible to the needle and efficient support points** for perfect control and maximum precision during the perforation. During this step the gripping area may be further away to access the mandible molars.
Check the correct positioning of the needle
- **Contact point** in the middle of the interdental space, at the summit of the papilla,
- **Mesio-distal angulation** parallel to the root’s axis,
- **Bucco-lingual angulation** between 15° and 30° compared to the tooth’s axis.
These indications are valid for the mandible as well as for the maxilla.

**Position of the needle for the mandible**

**Position of the needle for the maxilla**

Always make contact with the bone before starting the needle rotation (1).
Non-compliance with this rule could harm your patient by tearing the mucosa with the needle tip.
Make sure also that the lip-protector will not prevent the needle's progression by touching the adjacent tooth (2).

Work gently. Press continuously on the rotation pedal to start the cortical perforation. During the slow and progressive penetration, do not force the needle but follow it in its progression. With osteocentral anesthesia, it is normal to feel successive layers due to the passing through of 2 or 3 zones with different densities. This sensation indicates that the needle is progressing in the right direction. **Penetrate the needle by at least 3/4 of its length to eliminate the risk of necrosis due to an injection in the septum (see diagram).**
For children, in most cases, you can penetrate the 9 mm needle without any rotation (if using QuickSleeper 5, please refer to p.14 of the User guide to pass from attached gum injection speed to osteocentral).

**To prevent needle breakage:**
- Inform your patients that they are going to hear some noise and experience some vibration to prevent any unexpected movements.
- Never change angulation during the perforation.
- Withdraw the needle without rotation.
**STEP 2b**

**Painfree transcortical perforation**

1. Position yourself as shown below and ask the patient to move the head in order to obtain the best access and an optimal view of the site.

   **Position of the dentist for the retromolar space**

   Use the same positioning for the opposite side. For left handers replace 1 o’clock by 11 o’clock.

   **Position of the dentist for the maxilla, mandible, edentulous areas**

   Use the same positioning as for an osteocentral.

   To do not support the weight of the handpiece, hold it as vertically as possible.

2. **Use a pen grip as close as possible to the needle and efficient support points** for perfect control and maximum precision during the perforation. During this step the gripping area may be further away to access the mandible molars.
Protocol

Edentulous area:
You have the choice between various angulations (diag. 1). In all cases, position your needle to be penetrated at 90° angle to the cortical bone to minimise the thickness of bone to penetrate.
The perforation is performed preferably distally in the mandible, especially in symptomatic teeth (pulpitis).

Distal 8 or 7 (if 8 absent):
The handpiece is parallel to the sagittal plane. Your patients have their mouth open (previously palpate the retromolar space to clearly identify the bone surface).
Position your needle at a 90° angle to the cortical bone (perpendicular to the floor) in the bony depression which you can palpate medial of the external oblique line on the buccal side of the mandible.

Always make bone contact before starting the needle rotation.
Non-compliance with this rule can cause tearing of the mucosa.
Once correctly positioned, press continuously on the rotation pedal to start the perforation of the cortical bone. During the perforation phase, do not force the needle but follow its progression until you feel a “click” (like the perforation into the pulpal chamber). This phenomenon indicates that the cortical bone has been passed and that the orifice of the needle is sufficiently into the cancellous bone.
Immediately stop the rotation and the progression of the needle.
Never insert the needle up to the hub.
Perforation of cortical bone can take up to 10 rotation cycles.

To prevent needle breakage:
- Inform your patients that they are going to hear some noise and experience some vibration to prevent any unexpected movements.
- Never change angulation during the perforation.
- Withdraw the needle without rotation.
STEP 3  Intraosseous injection and needle withdrawal

Remember:

Always use a pen grip, as close as possible to the needle for maximum precision.

Use efficient support points to master the progression of the needle and prevent changes in angulation.

Work gently.

Never force the needle during perforation of the cortical bone.

Master the depth of penetration to inject far away from the septum.

To prevent needle breakage:
- Inform your patient that they are going to hear some noise and feel some vibration to prevent any unexpected movements.
- Never change angulation during the perforation or needle withdrawal.
- Withdraw the needle without rotation.

Once the injection is finished, withdraw the needle without rotation.
In order to prevent breakage of the needle, avoid changing the angulation of the device during withdrawal of the needle. Your anesthesia is complete, you can start working immediately.
**Workshop on the Test Mandible**

To acquire good handling, simulate your first intraosseous anesthetics on the test mandible supplied. Mount a cartridge and a DHT needle on your QuickSleeper (see user guide).

**STEP 1**

**Mucosa anesthesia**

Simulate a painless mucosal anesthesia

For molar see picture 1a and for incisors see picture 2a. Proceed according to the protocol described on pages 6 and 7.

**Self-evaluation**

- Check that you took the handpiece like a pen, with support points as close as possible to the anesthetized area.
- Check that the angulation of the needle corresponds to pictures 1a and 2a.
  - Check that the contact area corresponds to the picture 1b and 2b.

**Molars**

The needle is almost parallel to the sagittal plane.

**Inter-incisal point**

The needle is almost perpendicular to the sagittal plane.

Find the video of this step on www.mydentalhitec.com
STEP2 Osteocentral perforation

1/ **Visualize** the contact area of the needle on the gingiva (picture 1).
   It is located in the septum areas.

2/ **Place your needle**
   - **Bucco-lingual angulation** (photo 3a): 15 to 30° with respect to the long axis of the teeth to guide the needle towards the apex.
   - **Mesio-distal angulation** (photo 3b): the middle of the interdental space, parallel to the axis of the adjacent teeth so that the needle does not move towards the ligament.

3/ **Use the needle rotation in order to penetrate** to the level of the apex (pic. 4).
   After checking the support points are correct*, enter the needle in rotation up to minimally 3/4 of its length** to be close to the apices.
   For the comfort of the patient, avoid to touch the tooth crown with the plastic hub of the needle during rotation.

* The support points ensure the stability of the axis during penetration in order to avoid needle breakage.
** It is very important to penetrate deep enough in order to avoid injecting into the septum and consequently avoid risk of necrosis.
Self-evaluation

Validate 4 points in order to ensure the success of your osteocentral anesthesia:

- The penetration point of the needle must be at the top of the septum, at the top of the engraved arrow.
- The needle should not touch the root.
- The needle should be positioned deep enough (minimum 3/4 of its length, the tip should be located at about 5 mm of the apex).
- The needle tip should reach the area shown on diagrams 3a + 3b on the left page. Ideally, the needle tip location should be located more lingual than buccal.

Perform several tests on various sites to learn about this technique. Remember that the osteocentral technique also brings many benefits for the upper jaw.

More info and videos on www.mydentalhitec.com
STEP 3 Transcortical perforation

Retromolar space
In this case, the needle is perpendicular to the external oblique line; the contact point is located in the bony depression medial of the external oblique line on the buccal side of the mandible. In the mouth, palpate this area to identify the depression.

Once the needle is in position on the test mandible, look at its position from the lingual side. Validate 2 points in order to ensure the success of your transcortical anesthesia:

- The penetration point of the needle must be made in the bony depression medial of the external oblique line on the buccal side of the mandible. This is where the retromolar space is the thinnest.

- The needle should be positioned deep enough (maximum half of its length). According to the patient’s anatomy, this position can vary from a patient to another; consequently, the penetration point and the angulation will have to be corrected.

Find the video of this step on www.mydentalhitec.com
Specific clinical cases

Tooth with pulpitis
The most important factor is the distance between the tip of the needle and the apex! The latter should be the shortest possible to limit the dilution of the active ingredient in this zone.

It is very important that the orifice of the needle is close to the level of the affected tooth's apex. Because a local anesthetic's efficiency will be decreased in the presence of the inflammed tissue's high acidity, it is paramount that an anesthetic solution is chosen with a higher concentration of vasoconstrictor (1/80 000 or 1/100 000). This will also increase the time one will have to perform the procedure.

Tooth without pulpal circulation
In case of acute infection, it is advised to inject both mesial and distal of the tooth or to increase the volume of anesthetic, injected distal of the tooth.

Slanted tooth
In this case, during the performance of osteocentral anesthesia, the perforation must be made distally to the slanted tooth. This rule is applicable mainly for the mandible because the vascularisation in the mandible is from posterior to anterior and that therefore a distal approach to administer the intraosseous anesthesia is preferred, especially in symptomatic teeth.

Extractions
- For extractions in non-inflamed tissues, use vasoconstrictors with a concentration of 1/200000 maximum to prevent dry alveolitis.
- When an extraction is planned in an inflamed area, it is justifiable to use a higher concentration of vasoconstrictor (1/80 000 or 1/100 000) to counteract the inactivation of the local anesthetic due to the high acidity and to achieve adequate anesthesia.

Implantology
Use the QuickSleeper to anesthetize the soft tissues pain free and comfortable for the patient. By anesthetizing the mucosa the periosteum will be adequately anesthetized. You can perform intraosseous anesthesia if you need.

Periodontitis
As the anesthetic must be injected into the cancellous bone and this condition has altered the horizontal bone level around the tooth, it is better to use the transcortical approach. Periodontitis necessitates a more apical approach than under healthy conditions.

Difficulties during the procedure

Pain during the attached gum anesthesia
This pain can have several origins:
- Too deep penetration, wrong needle angulation in the mucosa or wrong bevel orientation. This implies a better control of the action with correct support points.
- Too fast injection which rapidly expands the mucosa.
Make sure that the injection is performed in IO or Lo injection modes.
Imperfect anesthesia
This problem may have several causes:
- Too small quantity or too low vasoconstrictor concentration.
- The patient can be less susceptible to local anesthesia due to several reasons, such as substance abuse, a medical condition or chronic medication intake. In these cases, consult the appropriate sources to verify if increasing the administered volume is justifiable.
- In case a surgical procedure is performed where significant bleeding occurs, the local anesthesia will last less long than usual.

In those cases it may be better to use a local anesthetic with a higher concentration of vasoconstrictor.

Pain during the intraosseous injection
This can be caused by two factors:
- A fragment of bone is obstructing the needle and preventing the flow of the anesthetic. When the pressure builds up to the point that the fragment is expelled, a small quantity of anesthetic will suddenly enter the cancellous bone startling the patient. To avoid this effect, decrease the pressure put on the needle during the bone perforation and move your needle back by 1-2mm before starting the injection.
- Dense bone may have difficulty accepting the regular flow mode of the anesthetic delivered by QuickSleeper.
- In that case one should stop the injection immediately and wait a few seconds. Subsequently the injection can be resumed at slow speed in order to allow the anesthetic to disperse inside the cancellous bone.

Pain during perforation
The bone is not innervated. Its perforation is therefore painfree. If the patient shows a perception of pain, the perforation should be stopped immediately. Possible causes:
- Ineffective attached gum anesthesia.
- The tip of the needle is close to the ligament. The practitioner should therefore observe the angulation of the needle and start again. Prior examination of a radiograph may be very helpful in assessing the interdental space.

Impossible to inject
Impossibility to inject is indicated by a long beep followed by the light(s) on the handpiece going off.
- If the needle is inside the lamina dura, change the penetration point and angulation.
- If the needle is blocked, change the needle.

Impossible to perforate
There are 4 possibilities:
- Small interdental space (only for osteocentral). Change site.
- Needle in the lamina dura (only for osteocentral). Withdraw the needle and change angulation.
- Very hard bone (transcortical). Change technique.
- Needle already used for another perforation in the same patient. Change the needle.

After several rotations, the needle is not progressing?
Withdraw the needle, replace it and change the point of penetration by 1 or 2 millimeters.

After having penetrated several millimeters into the bone, the needle has stopped progressing?
The needle is in the lamina dura. Withdraw the needle, replace it and modify your angulation.

How do you control the pressure on the needle during the perforation and prevent needle blockage at the mandible?
Turn your patient's head so as to always perform the perforation with the handpiece in a vertical position. Then, simply retain the weight of the handpiece so as to exert an ideal pressure on the needle (the weight of the device should be sufficient for the needle to perforate the cortical bone). If this is respected, the lights on the handpiece should not flash during the perforation.
**Post-operative side effects**

**Labiomental anesthesia**
This phenomenon generally appears when you inject a full cartridge of anesthetic or where there is a small volume of bone. This numbness will soon wear off (after approx. 60 minutes) because of the highly irrigated nature of the cancellous bone. The appreciated numbness of the lip is significantly less than the one experienced after a mandibular nerve block has been administered. The patient will not be able to injure the lip.

**Post-operative pain**
An error of angulation can produce inflammation of the ligament. The practitioner will have become aware of this during the perforation. The pain is similar to that of post-operative arthritis which generally occurs after an intraligamentary injection.

**Pain in the palate**
Between 11 and 21, with a wrong needle angulation, the dentist can pass through the palatal cortical and inject into the palate. The patient will feel pain for some days. Normally a second “click” will be felt when passing through the palatal cortical.

**Swelling of the mucosa**
This phenomenon is the result of a leak of the anesthetic. 2 possible causes:
- An off-centred needle having caused an enlarged or oval perforation allowing the anesthetic liquid to rise to the level of the mucosa.
- The impossibility to inject, as the tip of the needle is still in the cortical bone.
In both cases, a deeper penetration will solve the problem.

**Tearing of the free mucosa (transcortical anesthesia)**
This may cause a slight pain during the first few days of healing. The reason is the failure to put the needle in contact with the bone before starting the rotation. An off-centred needle can amplify this problem.

- Always make contact with the bone before starting the rotation of the needle.
- When performing the attached gum anesthesia do not bend the needle by applying excessive pressure.
- When working in the free mucosa, make sure that your needle is not or only slightly off-centre. When it is, stretch the mucosa tight across the bone, or stretch the phrenum of the lip.

**Necrosis**
Necrosis results from several actions:
- Use of an excessively concentrated vasoconstrictor in a tissue that has a low blood irrigation (papilla, ligament, summit of the septum),
- Septic injection site,
- Multiple punctures.

For an osteocentral anesthesia, make sure that 75% of the needle length is inserted into the tissues, in order to limit the risk of necrosis, even with vasoconstrictors up to 1/80 000.

**Tachycardia**
Performing intraosseous anesthesia will always cause a moderate increase of the heart rate during a limited amount of time (45 seconds). The latter is inherent to the technique and can be kept as minimal as possible by respecting a slow speed injection technique.

The consequences are not serious. Indeed, it is worth mentioning that an adult at rest produces 0.014 milligrams of adrenaline per minute, the equivalent of the adrenaline contained in a 1/100 000 cartridge.

It is important to inform the patient of this phenomenon prior to administering the local anesthetic and to use if necessary the Lo injection mode.

The patient’s stress level remains the main source of adrenaline.

More info and videos on www.mydentalhitec.com
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contact our advisors:

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