Local anesthesia in dentistry

2. DM
History of LA

- **cocaine** (Erythroxylum coca leaf) - first widely used anesthetic agent.
- It was extensively used by the Indians of Inca and Peru to alleviate hunger and fatigue and to anesthetize battle wounds.
- 1884 – Koller - is credited with its first use in modern times in topical anesthesia (for ophthalmologic procedures)
- Halsted, also in 1884, was the first to use cocaine in a regional block
- 1905 brought the development of **procaine** (Novacaine) and ushered in a new era of anesthetic practice.
- Löfgren (1948) developed **lidocaine**, now considered the standard in local anesthetic agents because of its low toxicity, potency, stability, and good tissue penetration without addiction.
- **Analgesia** – without pain

- **Anesthesia** – without feeling

... def.: reversible, temporary cessation of painful impulses from a particular region of the body

- Painful procedures cause fear and anxiety enhance the sensation of pain

Note: other sensations such as pressure or vibration are still felt
Types of LA

- Pressure
- Cold
- Mucosal = surface = topical
- Injection – infiltrative, regional (blocks), intraligamental
LA in dentistry

- face, jaws, teeth – inervation Vth cranial nerve – **Trigeminal nerve**:
- splits into 3 branches: ophtalmic, maxillary (sensory), mandibular (sensory and motor)
Advantages of LA (over GA)

- safer procedure - airway and respiration are maintained by the patient
- earlier/smooth recovery from LA
- less physiologic stress
- reduced bleeding when a concurrent vasoconstrictor is used
- patient may assist with maneuvers or responses to questions
- reduced costs
Limitation of LA

- anxiety can be significant problems
- uncooperating patient
- toxicities of the agents, allergies
- medically compromised patients
- the reduced effectiveness in the presence of infection
Indications and contraindications of LA

**I:** any procedure connected with pain (extraction, incision), diagnostic use – to rule out the cause of pain

**KI:** inability to cooperate, alergy, bleeding/coagulatin disorders- uncotrollable hematomas
Topical

- Anesthetics anesthetizes the surface of mucose membrane
- Primary goal is to minimize the sensation of needle penetration into mucosa
- Applied to appropriate site, wait few minutes before administering injection

Gel, spray, solution, ointment

mainly in pediatric dentistry
Topical anaesthesia:

- Spray, gel, ointment (lidocain)
- Pre-injection
- Children
- Onset of action 2min
Infiltration anesthesia

- Penetration and diffusion of LA agent
- Thickness of covering bone plate
- Inject slowly, after aspiration
- Room temperature of solutions
- Distract the patient’s attention – pressure
Infiltration anesthesia

- The aim is to deposit LA supraperiosteally in as close proximity as possible to the apex of the tooth to be anesthetized
- LA will diffuse through periosteum and bone towards the nerves entering the apex
- Reflect the lip or cheek to place mucosa on tension and insert the needle into bucal fold, along the long axis of the tooth aiming towards the bone, in aprox. 45° angle
- At approximate apex, withdraw slightly, aspirate, deposit LA slowly
of upper jaw
Anaesthesia of lower jaw
Inferior dental block (mandibular block)

- Technique of choice for mandibular molars and premolars
- Aim is to deposit LA around the inferior alveolar nerve before it enters the mandibular foramen, underneath the lingula
- The patient’s mouth is widely opened, palpate the landmarks of external and internal oblique ridges and note the pterygomandibular raphe
- Palpating thumb lies in the retromolar fossa, the needle should be inserted at the mid-point of the tip of the thumb, parallel to occlusal plane, lateral to the pterygomandibular raphe
- Direct and indirect method – the syringe is moved horizontally and advanced to make a contact with lingula
- Once bony contact is made withdraw the needle slightly, aspirate, inject the LA.
Mandibular block

- The position of mandibular foramen varies with age!
- If edentulous add approx. 1cm (height of the occlusal plane)

Position of mandibular foramen

- **Primary dentition** — slightly below the occlusal plane
- **6-12 years** — at the occlusal plane
- **≥12 years** — palpate the anterior border of the ramus
Mandibular block
Long buccal block

- Long buccal nerve - Anterior branch of Mandibular nerve (V3)
- Anesthetized by injecting 0.5-1ml of LA posterior and buccal to the last molar, into mucobuccal fold
- Provides buccal soft tissue anesthesia adjacent to mandibular molars
Long buccal block

Technique

Apply topical

Insertion distal and buccal to last molar

Target - Long Buccal nerve as it passes anterior border of ramus

Insert approx. 2 mm, aspirate

Inject 0.5 ml of solution, slowly
Mental nerve block

- Mental foramen lying apical to and between first and second premolars
- LA injected in this region will diffuse through the mental foramen and provide limited anesthesia of premolars and canine, and to some degree to the incisors of that side
- Provides effective soft tissue anesthesia
- Place the lip on tension and insert the needle parallel to the long axis of the premolars angling towards the bone and deposit LA, after aspiration
- Do not attempt to inject into the mental foramen as this may traumatise the nerve
Mental nerve block
Sublingual nerve block

- Anterior extension of lingual nerve can be blocked by placing the needle submucosally lingual to the premolars
- Inject 0.5ml
Posterior superior alveolar block

- used for achieving anesthesia for the maxillary molars
- Needle is inserted distal to the upper 2nd molar and advanced towards tuberosity – inwards, backwards and upwards (medially, posteriorly, and superiorly)– close to bone for about 2cm
- LA deposited high above tuberosity after aspiration
- NOTE! Avoid the pterygoid plexus
Infraorbital block

- Palate the inferior margin of the orbit
- Infraorbital foramen lies approximately 0.5-1cm below
- In the line of pupil
- Hold the index finger over this point while lifting upper lip by thumb
- Inject at the depth of buccal fold above 1st premolar towards index finger
- Aspirate
- Inject LA around infraorbital nerve
Nasopalatine block

Nasopalatine block – pass the needle lateral to incissive papilla, inject small amount of LA 0,3-0,5ml slowly

Extremely painful
Greater Palatine Nerve Block

**Technique**
- **Position**: open wide, extend & turn head
- **Cotton swab**: identify landmarks, topical
- **Approach**: bevel to tissue, advance to bone
- **Aspirate; inject**: 0.5 ml slowly

**Landmarks**
- Greater palatine foramen
- Junction of alveolus and palatine bone

**Area of Insertion**
- Soft tissue anterior to foramen, from opposite side
Intraligamental anesthesia

PDA – periodontal anesthesia

- Anesthesia of the individual tooth
- LA injected along the periodontal membrane using small amount of LA delivered via specially designed system – high pressure syringe, fine needle
- Rapid onset, isolated tooth
Armamentarium

- Sterile disposable needles
- Risk of cross infection
- Anesthetics - Store in cool dark place, use before expiry date
- Warm cartridge to decrease discomfort and load into the syringe immediately prior to use
- Aspirate before injecting
Requirements for local anesthetics

- Deep, fast onset, long time effect
- Minimal toxicity
- Good tissue tolerance
- No harmful unwanted effects
- Chemical stability
- Good water-soluble
- Combined ability with vasonstrictor
Composition of local anesthetic

1. Main effective anesthetic substance
2. Vasoconstrictive ingredient
3. Preservative substances and stabilisers
Main effective anesthetic substance

- In the present time commonly used anesthetics can be divided into 3 groups
  1. **Esters of paraaminobenzoic acid** – procain (not used for frequent allergic reactions), only for topical tetracain, Gingicain spray
  2. **Amids-acetanilids**: lidocain, Neolidocaton, xylocain spray, trimecain=Mesocain, mepivacain=Mepivastesin
  3. **Thiophens** articain=Supracain, Ubistesin (1:200 000 adrenalin), Ubistesin forte (1:100 000 adrenalin)
vasoconstrictor

- Epinephrine is included in dental local anaesthetic:
  - increase the depth and duration of action
  - haemostasis for surgical procedures
  - epinephrine increases systolic blood pressure and heart rate and decreases diastolic blood pressure
  - in young patients with cardiovascular anomalies - transplanted hearts are supersensitive to catecholamines - and significant increases in heart rate
Complications

- Pain on Injection
- Paresthesia
- Hematoma
- Trismus
- Infection
- Facial Nerve Paralysis
- Broken Needles
After LA

- A numb feeling is produced following the local anesthetic procedure
- Numbness can cause postoperative problems
- may be avoided by explaining ahead of time the numb feeling
- Lip, tongue and cheek biting may also result from this numb feeling
- Self-inflicted wounds - a warning should be given immediately after the injection procedure and repeated following dental treatment.