ORAL AND MAXILLOFACIAL SURGERY

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Local anaesthetics in dentistry
The armamentarium
The syringe
The needle
The local anaesthetic cartridge
Additional armamentarium:
- Topical antiseptic
- Topical anaesthetic
- Applicator sticks
- Cotton gauze (2*2 inches)
- Haemstat
The syringe
Breech-loading metallic cartridge-type aspirating.
Breech-loading metallic cartridge-type non-aspirating.
Breech-loading plastic cartridge-type aspirating.
Breech-loading metallic cartridge-type self-aspirating.
Pressure
Jet injector
Safety syringes
American dental association criteria for acceptance of local anaesthetic syringes include the following:

- They must be durable and able to withstand repeated sterilization without damage.
- They should be capable of accepting a wide variety of cartridges and needles.
- They should be permit repeated use.
- They should be inexpensive, self-contained, light weight, and simple to use with one hand.
- They should provide for effective aspiration and be constructed so that blood may be easily observed in the cartridge.
Breech-loading metallic cartridge-type aspirating syringe

- Thumb ring
- Ring grip
- Piston with harpoon
- Needle adaptor
The advantages are:
- Visible cartridge
- Aspiration with one hand
- Autoclavable
- Rust resistant
- Long lasting with proper maintenance
The disadvantages are:

- Heavy weight
- May be too big size for small operators
- Possibility of infection with improper care.
Breech-loading metallic cartridge-type non-aspirating
A slight amount of aspiration may be achieved as follow:

1) Slight pressure on the piston produces a bulge in the rubber plunger

2) Which in turn exerts pressure on the solution in the cartridge, release of this produces suction

3) If the needle tip is in a blood vessel, a thin spiral of blood which rapidly diffuses will be seen in the solution.
Pressure syringes
The advantages are:
- Measured dose
- Overcomes tissue resistance
- Cartridge protected
- Nonthreatening (newer devices)
The disadvantages are:
- Cost
- Easy to inject too rapidly
- Threatening (original devices)
Jet injector
The advantages are:
- Dose not require use of a needle
- Delivers very small volumes of local anaesthetic solution
- Used in topical anaesthesia
The disadvantages are:
- Inadequate for pulpal or regional block
- Some patients are disturbed by jet injection
- Cost
- May damage periodontal tissues
Care and handling

The recommendations concerning care of the syringes as following:
- After each use thoroughly wash and rinse the syringe free of any local anaesthetic solution, saliva, or other foreign matter. Autoclave the syringe in the same manner as other surgical instruments.
- After every five autoclavings, dismantle the syringe and lightly lubricate all threaded joints and where the piston contacts the thumb ring and guide bearing.
- Clean the harpoon with a brush after each use.
- Although the harpoon is designed for long term.
Clinical problems

- Leakage during injection: When reloading a syringe with a second local anaesthetic cartridge and a needle already in place. One should be sure that the needle penetrates the center of the rubber diaphragm. An off-center perforation will produce an ovoid puncture of the diaphragm that permits leakage of the anaesthetic solution around the outside of the metal needle and into the patient's mouth.

- Broken cartridge: A badly worn syringe may damage the cartridge, leading to breakage. This can result from a bent needle at its proximal end may not perforate the diaphragm on the cartridge. Positive pressure on the thumb ring increases intracartridge pressure, which can cause the cartridge to break.
The needle

- Hub
- Bevel
- Shank
- Syringe adaptor
- Syringe penetrating end
The gauge
Length
Care and handling

- Needles must never be used on more than one patient.
- Needles should be changed after three or four tissue penetration in same patient.
- Needles should be covered with a protective sheath when not being used.
- Needles must be properly disposed of after use.
Clinical problems

- Pain on insertion: The use of a dull needle can lead to pain on initial penetration of the mucosa. This may be avoided by using sharp, new, disposable needles and the application of topical anaesthetic at the penetration site.
- Breakage: Bending weakens needles making them more likely to break on subsequent contact with hard tissues such as bone. Never attempt to force a needle against resistance. Smaller gauge needles are more likely to break than larger gauge needles.
- Pain on withdrawal: Pain on withdrawal is more likely that they occur when the needle tip forcefully contacts a hard surface as bone, therefore a needle should never be forced against resistance.
- Injury to the patient or administrator: A major cause is carelessness and inattention by the administrator, although sudden unexpected movement by the patient is also a frequent cause. The needle should remain capped until it is to be used and should be made safe immediately after withdrawal from the mouth.
The cartridge (carpule)
Cartridge contents
The solution contained within the dental cartridge are:

- Local anaesthetic drug: The drug or drugs contained within the cartridge are listed by their percent concentration. The number of milligrams of the agent can be calculated by multiplying the percent concentration (e.g., 2% = 20mg/ml) so a 1.8 ml cartridge of a 2% solution contains 36mg.
- A vasopressor drug is included in some anaesthetic cartridges to increase the safety and the duration of action of the local anaesthetic. Cartridges containing vasopressor also contain a chemical that serves as an antioxidant most frequently used sodium bisulfite.
- Sodium chloride: is added to the contents of the cartridge to make the solution isotonic with the tissue of the body.
- Distilled water: is used as the diluent to provide the volume of solution in the cartridge.
Care and handling

- Cartridge should be stored at room temperature.
- Cartridge should be not used after their expiry date.
- Cartridge should be listed by their percent concentration.
Clinical problems

- Bubble in the cartridge: A small bubble of approximately 1-2 mm diameter will frequently be found in the dental cartridge. It is composed of nitrogen gas which was bubbled into the local anaesthetic solution during manufacture to prevent oxygen from being trapped in the cartridge and potentially destroying the vasopressor. A large bubble which may be present with a plunger that is extruded beyond the rim of the cartridge, is the result of the freezing of the anaesthetic solution, such cartridges should not be used, since sterility of the solution cannot be assured.

- Extruded stopper: The stopper can be extruded when a cartridge is frozen and the liquid inside expands. In this case the solution can no longer be considered sterile and should not be used for injection. Frozen cartridges can be identified by the presence of a large air bubble more than 2mm by the extruded stopper. An extruded stopper without bubble is indicative of prolonged storage in a chemical disinfecting solution and diffusion of the solution into the cartridge.
Burning on injection: A burning sensation on injection of anesthetic solution may be the result of one of the following:

- Normal response to pH of the drug: The pH of the dental cartridge containing vasopressor is lower (3.3-4) than that without vasopressor (5.5-6), so the plain anaesthetics have a somewhat more rapid onset of clinical action and more comfortable. In addition the inclusion of sodium bisulfite as antioxidant into the anaesthetic solution to prevent the biodegradation of the vasopressor by oxygen which might be present in the cartridge during manufacture or which can diffuse through the semipermeable diaphragm after tilling, reacts with oxygen before the oxygen can destroy the vasopressor.

- Cartridge containing sterilizing solution
- Overheated cartridge
- Cartridge containing a vasopressor
- Leakage during injection
- Broken cartridge
Preparation of the armamentarium