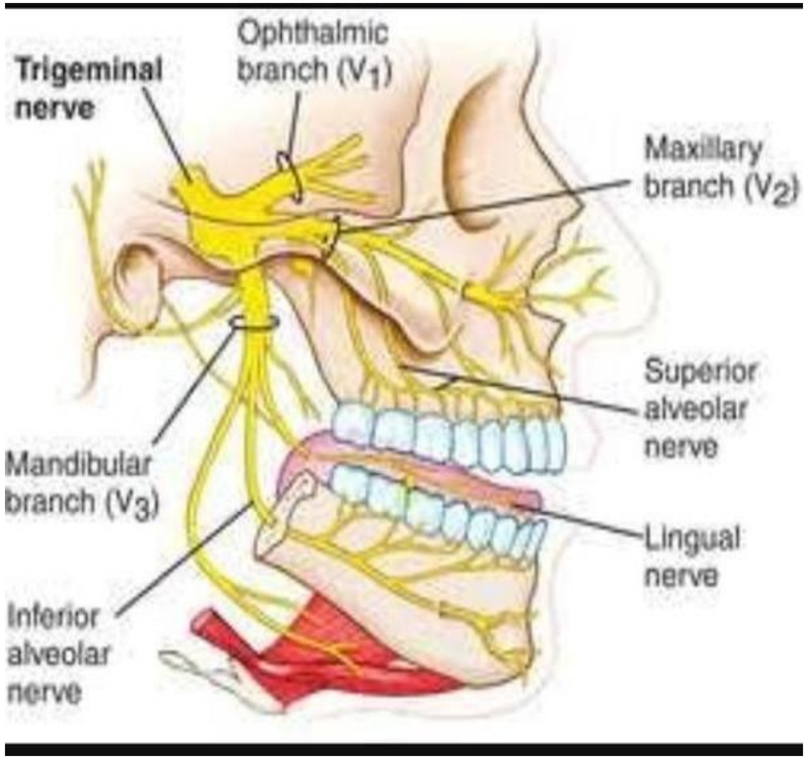
LOCAL ANAESTHESIA IN DENTISTRY 20

Armamentarium of Dental local Anesthesia



PROF.ABBAS AY TAHER

The necessary equipment's for LA:

Syring
Needle
LA cartridge



The syringe is one of three essential components of the local anesthetic armamentarium (others include the needle and the cartridge). It is the vehicle whereby the content of the anesthetic cartridge is delivered through the needle to the patient.

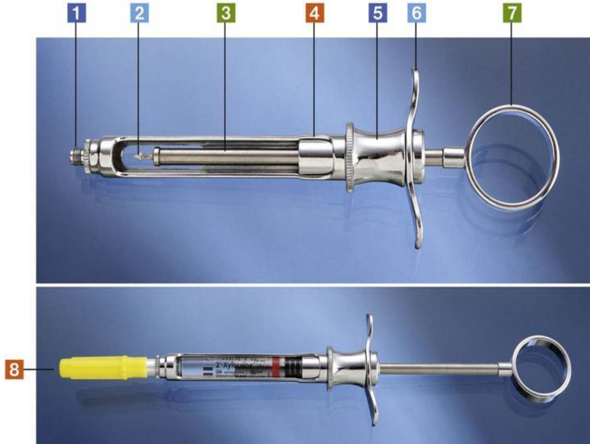
Types of Syringes:

Eight types of syringes for local anesthetic administration are available for use in dentistry today. They represent a considerable improvement over the local anesthetic syringes formerly used.
Nonaspirating syringes are not discussed except to state that their use unacceptably **increases the risk of inadvertent intravascular drug administration**.

The use of aspirating
dental syringes (capable of the aspiration of blood) represents the standard of care.

Syringe Types Available in Dentistry

1. Nondisposable syringes:
   a. Breech-loading, metallic, cartridge-type, aspirating
   b. Breech-loading, plastic, cartridge-type, aspirating
   c. Breech-loading, metallic, cartridge-type, self-aspirating
   d. Pressure syringe for periodontal ligament injection
   e. Jet injector ("needle-less" syringe)
2. Disposable syringes
3. "Safety" syringes
4. Computer-controlled local anesthetic delivery systems



The local anesthetic syringes include:

They must be durable and able to **withstand repeated sterilization** without damage. (If the unit is disposable, it
1-should be packaged in a sterile container.)
2-They should be capable of accepting a wide variety of cartridges and needles of different manufacture, and should permit repeated use.
3-They should be inexpensive, self-contained, light weight,and simple to use with one hand.
4. They should provide effective aspiration and be constructed so that blood may be easily observed in the cartridge.

Eight types of syringes for local anesthetic administration are available for use in dentistry today.

Two of the eight types are used in the UHMDH clinic. These two syringes are non-disposable, breech-loading (cartridge is inserted or loaded), metallic, and cartridge types.

1. Aspirating

Most common, Ha local anesthetic cartridge). Allows for aspiration testing

2. Self-Aspirating

Uses the elasticity of the rubber diaphragm in the anesthetic cartridge to obtain the required negative pressure for aspiration testing
Permits for multiple aspirations easily

With commonly used breech-loading, metallic or plastic,cartridge-type syringes, **an aspiration test must be conducted purposefully by the administrator before or during drug deposition**.

The key word here is ***purposefully***. However, as demonstrated in many dentists do not purposefully perform an aspiration test before injection of the anaesthetic drug.

To increase the ease of aspiration, self-aspirating syringes have been .
These syringes use the elasticity of the rubber diaphragm in the anesthetic cartridge to obtain the necessary negative pressure for aspiration.
The diaphragm rests on a metal projection inside the syringe that directs the needle into the cartridge
Pressure acting indirectly on the cartridge through the plunger shaft distorts (stretches) the rubber diaphragm, producing positive pressure within the anesthetic cartridge.
When that pressure is released—by simply releasing thumb pressure on the plunger—sufficient negative pressure develops within the cartridge to permit aspiration. The use of a self-aspirating dental syringe permits easy performance of multiple aspirations throughout the period of local anesthetic deposition.

Advantages and Disadvantages of the Metallic, Breech-Loading, Aspirating Syringe

Advantages	Disadvantages
Visible cartridge	Weight (heavier than plastic syringe)
Aspiration with one hand	Syringe may be too big for small operators
Autoclavable	Possibility of infection with improper care
Rust resistant	
Long lasting with proper maintenance	

Advantages and Disadvantages of the Plastic, Reusable, Aspirating Syringe

Advantages	Disadvantages
Plastic eliminates metallic, clinical look	Size (may be too big for small operators)
Lightweight: provides better "feel" during injection	Possibility of infection with improper care
Cartridge is visible	Deterioration of plastic with repeated autoclaving
Aspiration with one hand	
Rust resistant	
Long lasting with proper maintenance	
Lower cost	

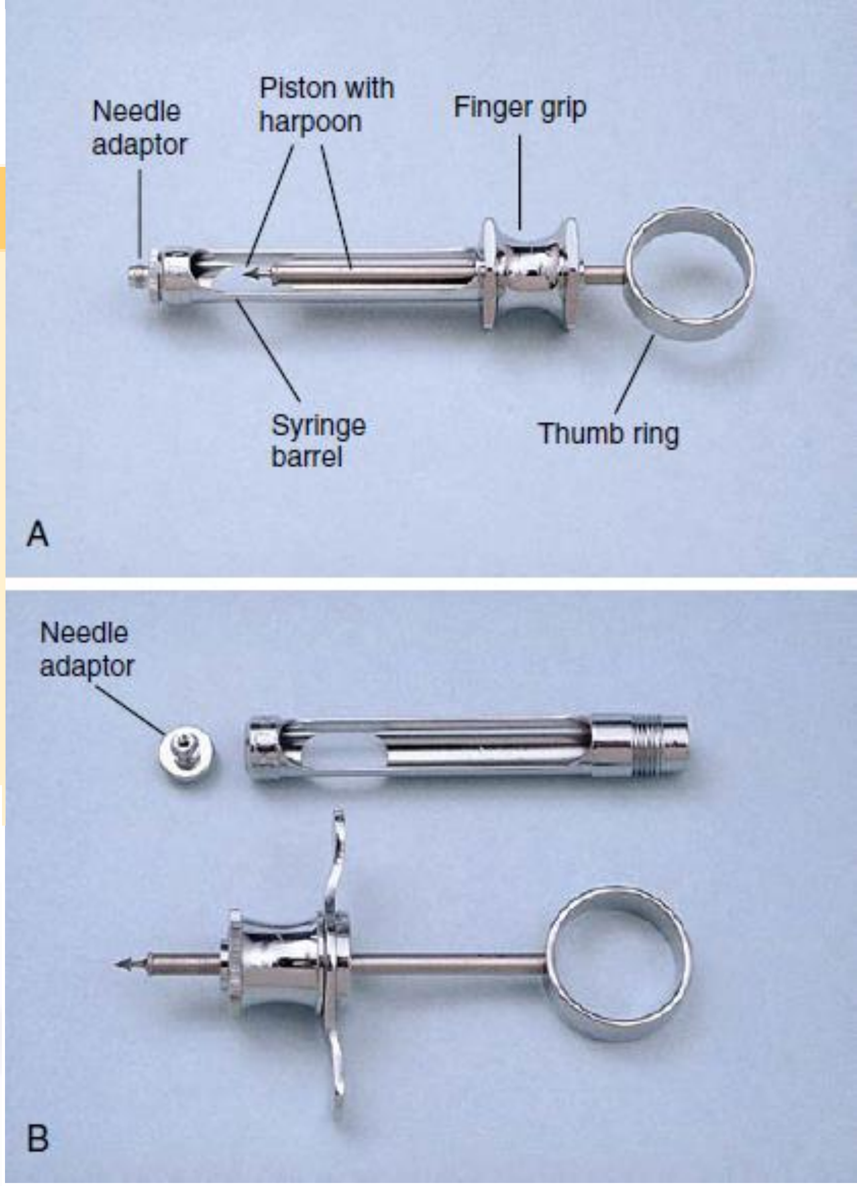
Some dentists believed that the self-aspirating syringe **did not provide the same reliability of aspiration** that was possible with the harpoon aspirating syringe.
It has been demonstrated, however, that this syringe does in fact aspirate blood as reliably as the harpoon-aspirating syringe.

In comparing two self-aspirating syringes with a nonself-aspirating system during inferior alveolar nerve blocks,found the **non-self-aspirating system** to be more reliable positive aspiration than the two **self-aspirating syringes**

Advantages and Disadvantages of the Metallic, Self-Aspirating Syringe

Advantages	Disadvantages
Cartridge visible	Weight
Aspiration is easier with small hands	Feeling of "insecurity" for doctors accustomed to harpoon-type syringe
Autoclavable	Finger must be moved from thumb ring to thumb disk to aspirate blood
Rust resistant	Possibility of infection with improper care
Long lasting with proper maintenance	
Piston is scored (indicates volume of local anes-thetic administered)	

Self-aspirating syringe. (Courtesy of Septodont



A) Breech-loading, metallic, cartridge-type syringe; assembled.
(B) Disassembled local anesthetic syringe

The major factor influencing ability to aspirate blood is not the syringe but the gauge of the needle being used.
In addition, most doctors using the harpoon-aspirating syringe tend to over aspirate, that is, they retract the thumb ring back too far and with excessive force (and, on occasion, disengage the harpoon from the stopper). These doctors feel more insecure with the self-aspirating syringe. Proper technique of aspiration is discussed in .Advantages and disadvantages of the metallic,

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3-Pressure Syringes

(Re)introduced in the late 1970s, pressure syringes brought about a renewed interest in the **periodontal ligament (PDL) injection** (also known as the *intraligamentary injection*).
Discussed
The PDL injection, although usable for any tooth, helped make it possible to achieve more reliable **pulpal anesthesia of one isolated mandibular tooth** where, in the past, nerve block anesthesia (e.g., inferior alveolar nerve block, Gow-Gates mandibular nerve block), with its attendant prolonged soft tissue (e.g., lingual, lip, chin) anesthesia, was necessary.

Although "special" syringes such as these are not necessary for a successful PDL injection, several advantages are associated with their use, not the least of which is the mechanical advantage they provide the administrator, making the local anesthetic easier to administer.

This same mechanical advantage, however, makes the injection somewhat "too easy" to administer, leading to "too rapid" injection of the anesthetic solution and patient discomfort both during the injection and later, when the anesthetic has worn off.

However, when used slowly, as recommended by manufacturers, pressure syringes are of some benefit in administration of this valuable technique of anesthesia.

Pressure syringes offer advantages over the conventional syringe when used for PDL injections because their trigger delivers ameasured dose of local anesthetic and enables a relatively physically weak administrator to overcome the significant tissue resistance encountered when the PDL injection is administered properly. This mechanical advantage may also prove to be detrimental if the administrator deposits the anesthetic solution too quickly (<20 seconds per 0.2-mL dose).

Advantages and Disadvantages of the Pressure Syringe

Advantages	Disadvantages
Measured dose	Easy to inject anesthetic too rapidly
Overcomes tissue resistance	Threatening (original devices)
Nonthreatening (new devices)	
Cartridges protected	

All pressure syringes completely encase the glass dental cartridge with plastic or metal, there by protecting the patient in the unlikely event that the glass cartridge cracks or shatters during injection. The original pressure syringes looked somewhat threatening, having the appearance of a gun .Newer devices are smaller and less intimidating.

lists the advantages and disadvantages of the pressure syringe.

4-Jet Injector:

The first report of the use of jet injections in dentistry was published in 1958.Jet injection is based on the principle that **liquids forced** through very **small openings**, called ***jets***, at very high pressure can penetrate intact skin or mucous membrane (visualize water flowing through a garden hose whose opening is being crimped).

The most frequently used jet injectors in dentistry are the **MadaJet** and the **Comfort-in needle-free injection system**.

Neither MadaJet nor Comfort-in supports the traditional dental local anesthetic cartridge. The primary purpose of the **jet injector** is to obtain **topical anesthesia before insertion of a needle**. In addition, it may be used to obtain **mucosal anesthesia** of the **palate**.

Regional nerve blocks or **supraperiosteal injections are still necessary** for complete anesthesia. The jet injector is not an adequate substitute for the more traditional needle and syringe in obtaining pulpal or regional block anesthesia.

Additionally, many patients dislike the feeling that accompanies the use of the jet injector, as well as the possible postinjection soreness of soft tissue that may develop even with proper use of thedevice.

5-Disposable Syringes:

Plastic disposable syringes are available in a variety of sizes with an assortment of needle gauges. Most often they are used for **intramuscular** or **intravenous** drug administration, but they may also be used for **intraoral injection .**These syringes contain a Luer-Lok screw-on needle attachment with no aspirating tip. **Aspiration can be accomplished by pulling back on the plunger of the syringe before or during injection**.

Because there is no thumb ring, aspiration with the plastic disposable syringe requires the use of both hands. In addition, these syringes do not accept dental cartridges. The needle, attached to the syringe, must be inserted into a **vial or cartridge of local anesthetic drug and an appropriate volume of solution must be withdrawn**.

Care must be taken to avoid contaminating the multiuse vial during this procedure. Two-milliliterand 3-mL syringes with **25- or 27-gauge** needles are recommended when the system is used for intraoral local anaesthetic administration. **The plastic, disposable, non–cartridge-containing syringe is not recommended for routine use.**

Advantages and Disadvantages of the Jet Injector

Advantages	Disadvantages
Does not require use of a needle (recommended for persons with needle phobia)	Inadequate for pulpal anesthesia or for regional block
Delivers very small volumes of local anesthetic (0.01–0.2 mL)	Some patients are disturbed by the jolt of the injection.
Used in place of topical anesthetic	Cost
	May damage periodontal tissues

Advantages and Disadvantages of the Disposable Syringe

Advantages	Disadvantages
Disposable, single use	Does not accept prefilled dental cartridges
Sterile until opened	Aspiration difficult (requires two hands)
Lightweight (may feel awkward to the first-time user; tactile sensation better)	

6-Safety Syringes:

There has been a movement toward the introduction of ***safety syringes*** in both medicine and dentistry. **Safety syringes minimize the risk of an accidental needlestick injury occurring to a dental health provider with a contaminated needle after administration of a local anesthetic**.

These syringes possess a sheath that “locks” over the needle when it is removed from the patient’s tissues, minimizing the risk of accidental Needlestick.

The UltraSafety Plus XL aspirating syringe system contains a syringe body assembly and a plunger assembly (see Once the syringe is properly assembled and the injection administered, the syringe may be made “safe” with one hand by gentle movement of the index and middle fingers against the front collar of the guard Once “guarded,” the now contaminated needle is “safe,” so it is virtually impossible for dental health providers to be injured with the needle.

On completion of the injection, the entire syringe is discarded into the proper receptacle (e.g., sharps container). **Dental safety syringes are designed as single-use items**, although they permit reinjection.

Reloading the syringe with a second **anesthetic cartridge** and reinjection with the same sy is **discouraged because this obviates the important safety aspect of the device**. Advantag disadvantages of the safety syringe are listed.

Advantages and Disadvantages of the Safety Syringe

Advantages	Disadvantages
Disposable, single use	Requires additional training
Sterile until opened	May feel awkward to a first-time user
Lightweight (better tactile sensation)	

7-Computer-Controlled Local Anesthetic Delivery Systems

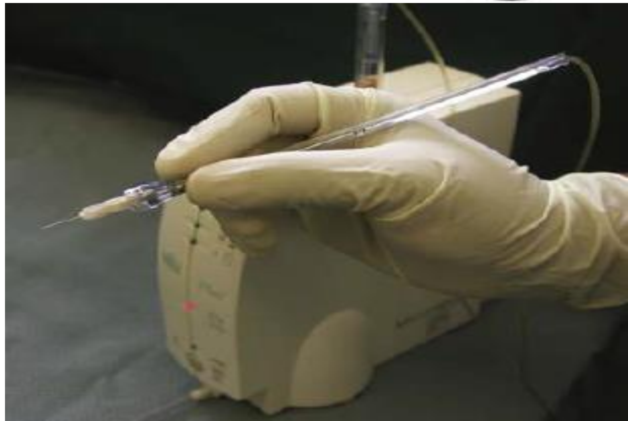
The standard dental syringe described previously is a simple mechanical instrument The dental syringe is a drug-delivery device requiring that the operator simultaneou attempt to control the variables of drug infusion and the movement of a **penetrating needle**. The operator's inability to precisely control both of these activities during an injection can compromise injection technique. In addition, a traditional syringe is held with a palm-thumb grasp, which is not designed for ideal ergonomics or needle control during the injection.

For certain practitioners—those with small hands—just holding a syringe with a full cartridge of anesthetic may be difficult.

In 1997 the first computer-controlled local anesthetic delivery (C-CLAD) system was introduced into dentistry.

This system enabled a **dentist or hygienist to precisely manipulate needle placement** with fingertip accuracy and deliver the local anesthetic with a lightweight handpiece held in a pen-like grasp, provides increased tactile sensation and control compared with the traditional syringe.

The flow rate of local anesthetic delivery is computer controlled and thus remains consistent from one injection to the next.



C-CLAD systems represent a significant change in the manner in which a local anesthetic injection is administered.
The operator is now able to focus attention on needle positioning and insertion, allowing the motor in the device to administer the drug at a preprogrammed rate of flow.

It is likely that greater ergonomic control coupled with fixed flow rates is responsible for the improved injection experience demonstrated in many clinical studies conducted with C-CLAD devices in dentistry.
The investigators concluded that the new system provides comfortable anesthesia for patients and can be a good alternative for conventional manual syringe injection. The Wand STA system also has a training mode feature that provides clinicians with spoken instructional guidance on its use, thereby minimizing the learning curve when the system is used for the first time. Advantages and disadvantages of The Wand STA system are listed.

Advantages and Disadvantages of The Wand STA Single Tooth Anesthesia System

Advantages	Disadvantages
Dynamic pressure-sensing technology provides continuous real-time feedback when an injection is performed, resulting in a more predictable injection site location	Requires additional armamentarium
Allows the periodontal ligament injection to be used as a predictable primary injection	Requires additional training
Can be used for all traditional injection techniques	
Recommended device for newer injection techniques such as anterior middle superior alveolar nerve block, palatal anterior superior alveolar nerve block, and STA periodontal ligament injection	
Reduces pain-disruptive behavior in children and adults	
Reduces stress for patient	
Reduces stress for operator	

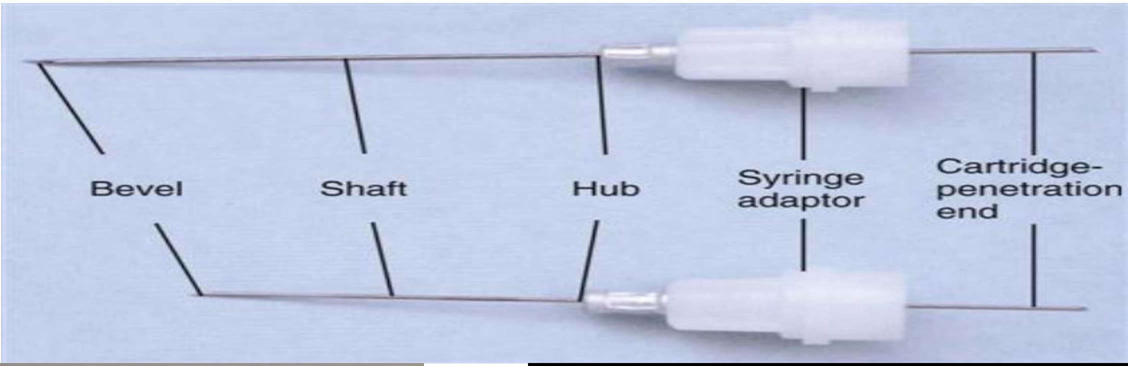
Dynamic pressure sensing on the STA Single Tooth Anesthesia System computer-controlled local anesthetic delivery device provides both visual and audible feedback regarding placement of the needle tip during the periodontal ligament (PDL) injection. Horizontal color bars (arrow) indicate pressure at the tip of the needle. Red means pressure is too low. Orange and dark yellow mean increasing pressure but not yet adequate. Light yellow means correct pressure for PDL injection. At this point the STA unit will also provide an audible clue “PDL, PDL, PDL” that the needle tip is properly situated

diaphragm, allowing leakage of the anesthetic solution around the outside of the metal needle and into the patient's mouth (local anesthetics are unpleasant tasting)

Broken Cartridge

A badly worn syringe may damage the cartridge, leading to breakage. This can also result from a **bent harpoon**. A needle that is bent at its proximal end may not perforate the diaphragm on the cartridge. Positive pressure on the thumb ring increases pressure within the cartridge, which may cause the cartridge to break.

Needles



The main components of the dental anesthetic needle include the bevel, shank, hub, syringe adaptor, and cartridge penetration end. The syringe adaptor/hub complex is commonly referred to as the "hub

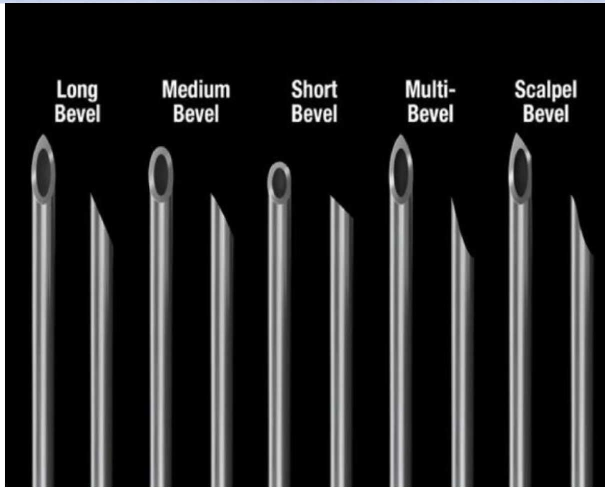
Needle selection factors: Needle selection should be based on three things: **A-injection type, B-depth of penetration**.

C-The needl's gauge

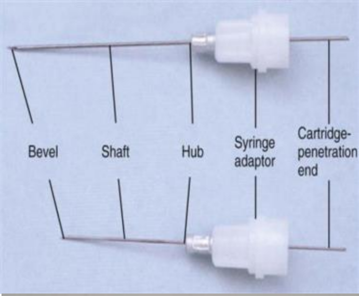
Needle length :

Dental needles are available in **three lengths**: **long**, **short**, and **ultra-short**. The two **most common lengths of needles used for intraoral injections with the traditional syringe are the "long" and the "short" .**

The length of the needle can vary some by manufacturer, but usually, from hub to tip, a long needle is about 32 mm (1.5 inches) and the short is about 20 mm (1.0 inch)



The long needle is required for mandibular blocks, because the depth of penetration ranges from **20-25** mm for an average adult **(20-25 mm for the inferior alveolar and 25 mm for Gow-Gates mandibular block techniques).**
It is extremely important to avoid insertion to the hub, the **weakest part of the needle**.
At the hub, the needle can break **more easily**. If the needle does break, and if there is not at **least 5 mm** of it exposed, it would likely be lost in the tissues and very difficult to retrieve.
The long needle is also recommended for **the anterior superior alveolar (ASA)/infraorbital approach injection**. A short needle is usually preferred for the posterior superior alveolar injection (PSA) to avoid overinsertion, for supraperiosteal injections, and also tissue infiltrations



Needle gauge :

The gauge of the needle represents the diameter of the lumen, the hollow tunnel within the needle. In dentistry, common gauges include:
25, 27, and 30 (the 30-gauge needle is no longer recommended)-the larger the number, the smaller and thinner the gauge.
As mentioned above, **patients are unable to distinguish between 25-, 27-, and 30-gauge needles**.
With the larger gauge (25 or 27) needles, because they are more rigid, there is resistance to needle breakage and less deflection as it advances through deeper tissues, which then results in greater accuracy for reaching the desired target. **More importantly, aspiration is more reliable since the larger lumen facilitates ease of aspiration.**
The 25-gauge needle has been recommended for all injections, but it is strongly recommended for all injections with a high risk of positive aspiration and/or with a significant depth of penetration. The 27-gauge needle is restricted for other injections where depth of penetration and risk of positive aspiration are minimal .
The 30-gauge needle is not recommended for supraperiosteal or block injections, but can be useful for localized infiltration (injecting the papillae, for example, to obtain hemostasis

Needle bevel

The bevel is the **slanted surface of a needle**, which creates the tip and facilitates nontraumatic entry into tissues.

Manufacturers often describe **bevels** as **short, medium**, or **long**.

Experts have discussed that the angle of the **bevel** as it relates to the long axis of the needle may affect the **degree of needle** deflection.

Septodont has developed a needle with an innovative scalpel designed bevel .

The purpose of the design is to allow for smoother penetrations, less tissue displacement, less deflection, and less force required of the clinician. They also have developed a needle with a larger inner bore design, with the intent to reduce pain during injections

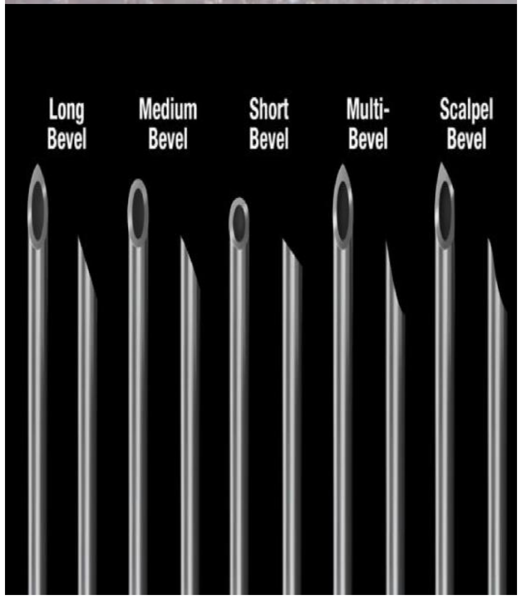
Although not critical to the success of injections, bevel design remains a topic of discussion and study.

The orientation of the bevel should be toward the bone during injections that are close to the periosteum.

Doing so **increases patient comfort and reduces trauma to the periosteum if bone is contacted**.

Some clinicians consider adjusting the bevel to facilitate placement of anesthetic closer to nerves.

Others assert that during deeper penetrations, **deflection can cause deposition away from a target if bevel orientation is not adhered to**



Metal versus plastic hubs

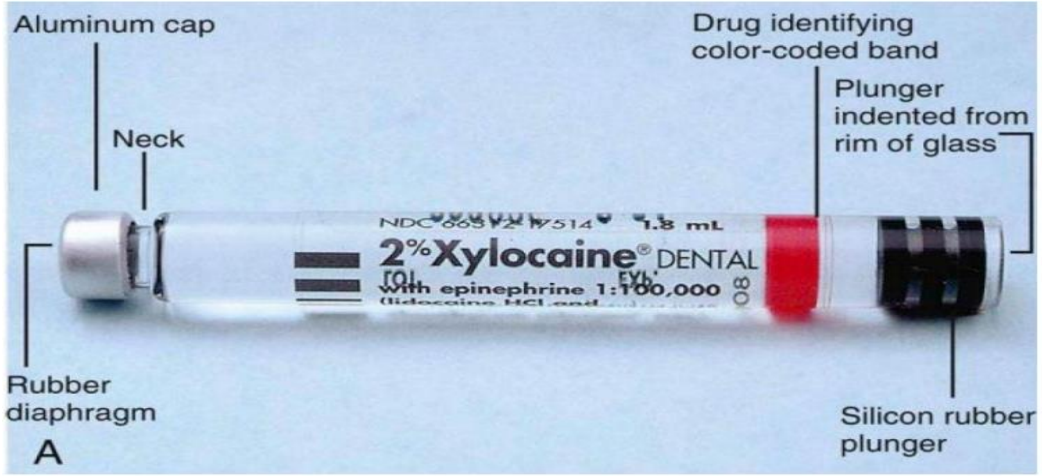
The metal or **plastic needle syringe adaptor/hub complex, the "hub,"** attaches **the needle to the syringe**.

Metal **hubs are pre-threaded** and **must screw** down tight to avoid loosening and often the bevel or syringe window will be out of position.

Once screwed down tight, they can then be more difficult to **remove**, removing the needle adaptor of the syringe (if present) with them.

The plastic hubs are usually **self-threading** and **usually fit all syringes well**, including syringes which have needle **adapters** that are **stripped or have defects**.

They are easy to rotate for bevel alignment and they are resistant to removing the needle adaptor. **Many manufacturers of plastic needle hubs include a dot or arrow indicating the location of the bevel**



Dental Cartridge (Carpule):

The dental cartridge is a **glass cylinder** containing the local anesthetic solution. It consists of:

1.Cylindrical glass tube.

2.Stopper located at the end of the cartridge that receives the hook of the aspirating syringe.

3.The aluminum cup is located at the opposite end of the cartridge from the stopper to hold the diaphragm in its position.

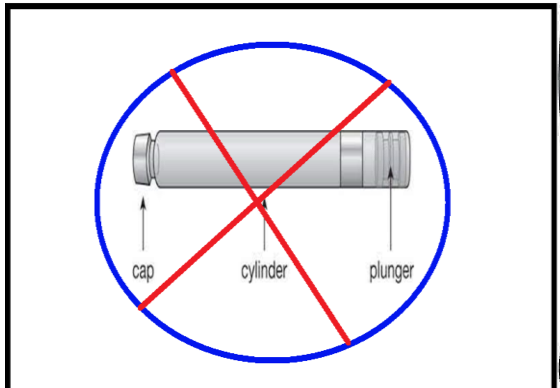
4.Diaphragm. Care and handling of the dental cartridge

Glass dental cartridges should not be autoclaved.
The **seal on the cartridge** cannot withstand extremes of temperature of autoclaving.
The dental cartridge should be stored **as aseptically as possible**; they should be stored dry in their original container and covered with a lid all the time, at room temperature and in dark place.

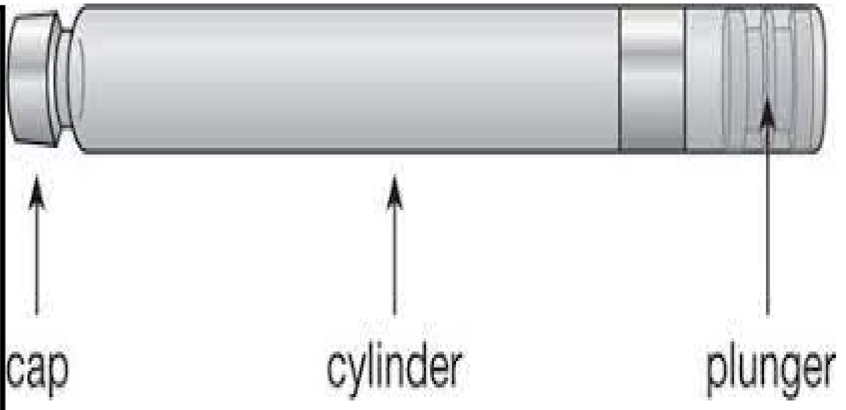
- The dental cartridges should not be left exposed to direct sunlight because some contents may undergo accelerated deterioration.

- Cartridges should not be permitted to **soak either in alcohol** or in **other cold sterilizing solutions** because the **permeable rubber plunger will allow diffusion of this solution into the dental cartridge.**

This leads to contamination of the **local anesthetic solution** resulting **in post-injection pain, edema and trismus.**



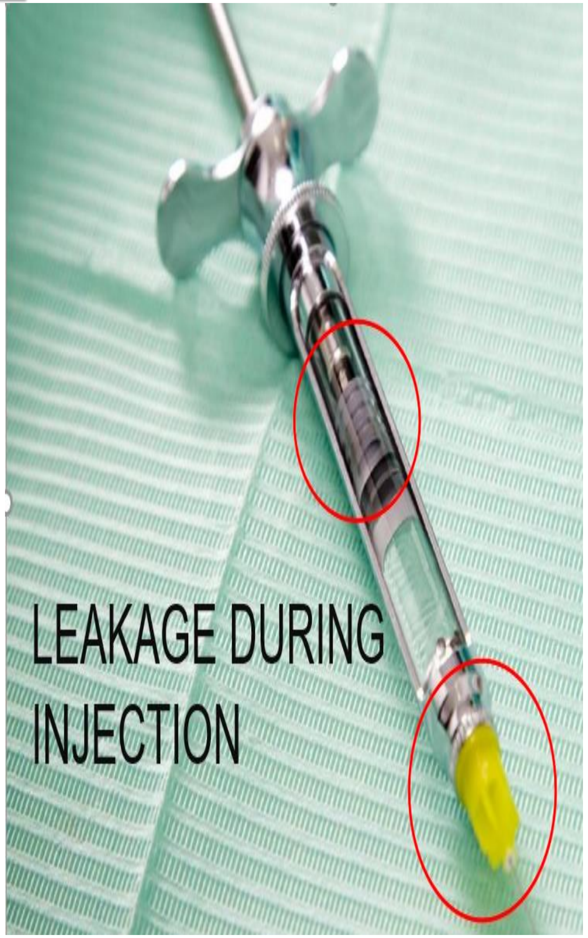
No soak either in alcohol or cold sterilizing solutions



Clinical problems associated with the equipment used in local anesthesia

A- Clinical problems related to the dental syringes

1- Leakage of the solution during injection:



The leakage of the anesthetic solution into the **patient's mouth during injection** will occur **if the cartridge** and **the needle are improperly mounted into the syringe**. When the needle is properly placed on the syringe after the cartridge is inserted; the needle produces a **centric perforation of the diaphragm that tightly seals itself around the needle**.

When pressure is applied **to the plunger during injection**, all of the solutions will be directed into the **lumen of the needle**.

When **reloading a syringe with a second cartridge** and the needle already in place an eccentric ovoid perforation may occur in the diaphragm and with pressure on the plunger some solution will be directed into the lumen of the needle and some may leak out of the cartridge between the needle and the diaphragm and runs into the patient’s mouth.

2- Broken cartridge The breaking of the cartridge may result from a **bent needle** at its proximal end, **which may not perforate the diaphragm of the cartridge**, positive pressure on the thumb ring increases **intracartridge pressure leading to breakage**.

A broken cartridge may also result from a **bent hook of an aspirating syringe**.

Care and Handling of Syringes

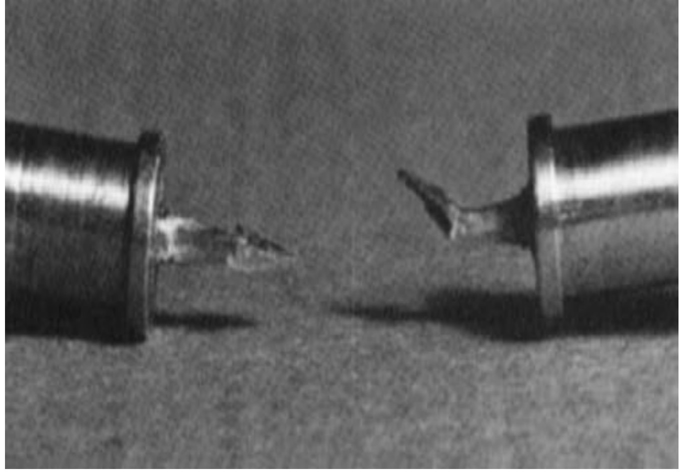
When properly maintained, metal and plastic reusable syringes are designed to provide long-term service. The following **is a summary of manufacturers' recommendations concerning care of these syringes:**

1. After each use, the syringe should be thoroughly washed and rinsed so as to be free of any local anesthetic solution,
saliva, or other foreign matter. **The syringe should be autoclaved in the same manner as other surgical instruments.**
2. After every **five autoclavings**, the syringe should be dismantled and all threaded joints and the area where the piston contacts the thumb ring and the guide bearing should be lightly lubricated.
3. The harpoon should be cleaned with a brush after each use.
4. Although the **harpoon is designed for long-term use**, prolonged use will result in **decreased sharpness** and failure to remain embedded within the **stopper of the cartridge**.

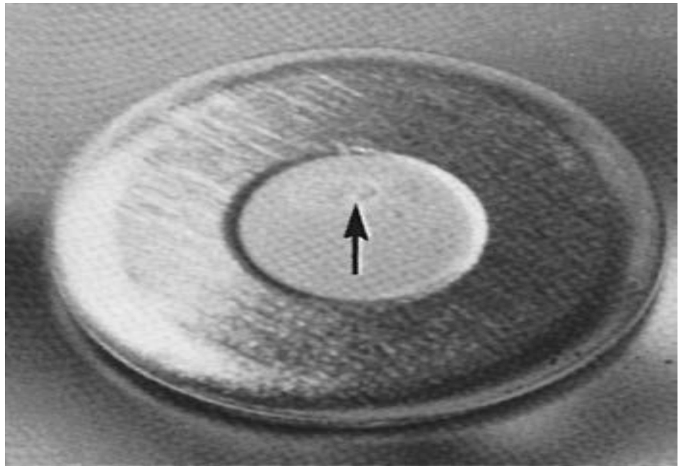
Replacement pistons and harpoons are readily available at low cost.

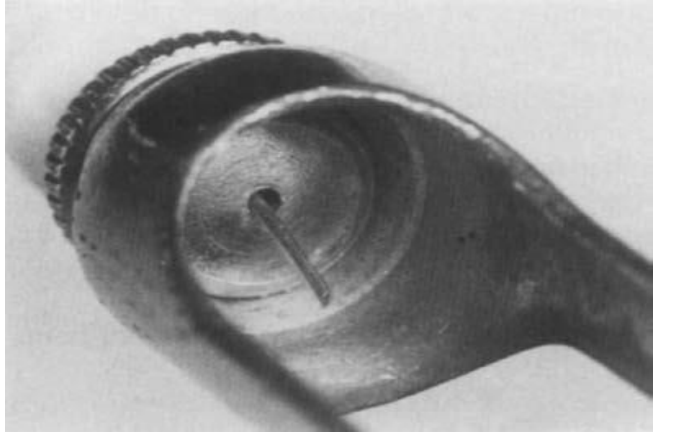
Leakage During Injection

When a syringe is reloaded with a second local anesthetic cartridge and a needle is already in place, care must be taken to ensure that the needle penetrates the center of the rubber diaphragm. An off-center perforation produces an ovoid puncture of the

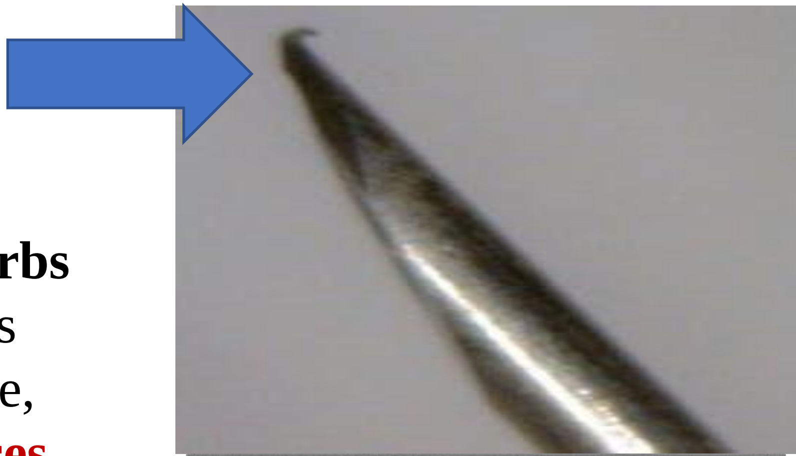


Bent Harpoon





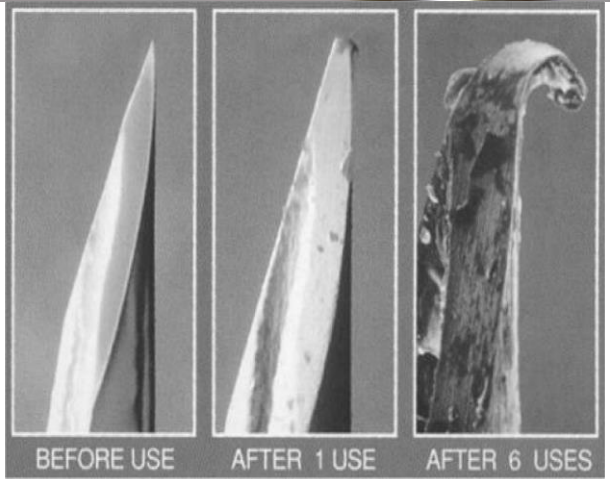
B- Clinical problems related to the dental needle



1 - Pain on withdrawal:

Pain on withdrawal of the needle from the tissue can be produced by **fishhook barbs on the tip**, these barbs may be produced during the manufacturing process but it is more likely that they occur when the needle tip forcefully contact a bone, therefore, needle should not be forced against resistance. **As a result, the patient experiences pain during withdrawal**.

Over time, **most of us adapt our techniques** so that, **regardless of the features** of **our armamentarium**, we can reach our targets for successful anesthesia. However, **needle selection** is an **important component for safe and effective provision of local anesthesia**. It is important that the main criteria for needle selection **include type of injection** to be administered, the distance to **target**, and the **vascularity of tissues.**



2 - Pain on insertion:

This may be **avoided by using sharp**, new disposable needles and the application of topical anesthetic at the penetrating site.

3 - Breakage of the needle:

In general, **bending of the needle during insertion weaken the needle** and **making them more likely to break on subsequent contact** with the hard tissue such as **bone**.

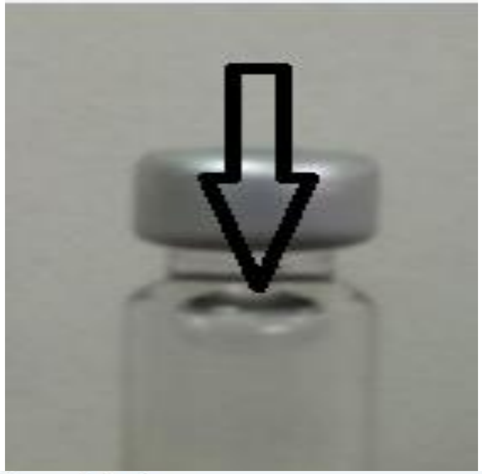
4 - Injury to the patient or the administrator:

Major cause of injury is carelessness by the operator, although sudden unexpected movement by the patient is also a frequent cause, therefore the needle should be capped until its use and should be recapped immediately after withdrawal from the patient's mouth.

C- Clinical problems related to dental cartridge

1 – Bubbles in the cartridge

A small bubble approximately 2 mm in diameter will frequently be found in the dental cartridge. It is composed of nitrogen gas which was bubbled into the local anesthetic solution during its **manufacture to prevent oxygen from being trapped in the cartridge and potentially destroying the vasopressor.**



2 – 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. Also, an extruded stopper may be due to prolonged storage in a chemical disinfecting solution and diffusion of the solution through the rubber diaphragm into the cartridge.

Extruded plunger

3-Damaged cap

A damaged cap (at the aluminum side or at the diaphragm rubber side) indicates that the seal of the cap is not guaranteed and the solution could exit from the neck of the cartridge into the mouth of the patient (Leakage effect).

It also means that air may have entered the cartridge causing contamination and/or degradation of the vasoconstrictor inside. In the case of a damaged cap, discard the cartridge and inform the manufacturer of the issue providing full details of the complaint (lot number, defect description, etc.)

5 – Burning on injection

A burning sensation on injection of the anesthetic solution may be the result of one of the following:

a.Normal response to the PH of the drug**:** The PH of the dental cartridge containing **vasopressor is (3.3- 4)** which is lower than that without **vasopressor (5.5 – 6)** because of this, plain anesthesia has somewhat more rapid onset of clinical action and **more comfortable (less burning on injection).**

b. Cartridge containing sterilizing solution:

This occurs when the cartridges are stored in a disinfectant solution for a long period so we get diffusion of the disinfecting solution into the cartridge upon injecting, it will cause a burning sensation.

c. Overheated cartridge:

Local anesthetic solution injected at room temperature **is well tolerated by the patients**, **overheated cartridge produces burning on injection**

NOTICE:

- **Topical antiseptic** may be used to prepare the tissue at the site of injection before the initial needle penetration, to minimize the risk of post-injection infection. Antiseptic like betadine is applied on an applicator stick and placed at the site of injection for 15 – 30 seconds. If a topical antiseptic is not available, a sterile gauze wipe serves to prepare the tissue adequately.
- **A topical anesthetic** could be used to reduce the discomfort during injection.
- **Applicator sticks:** they are wooden sticks with a cotton swab at one end. They can be used to apply topical antiseptic or topical anesthetic to the mucous membrane.
- **Hemostat** will be helpful to remove the needle from the soft tissue; in the event of needle breakage.
- **Finally, proper care and handling of the local anesthetic equipment can prevent or at least minimize the development of complications associated with needle, syringe and the cartridge.**

- Dental cartidge and needles are disposible and never used in more than one patient .

- Needles should be changed after several tissue penetration in the same patient .

- Needles should be coverd with a protective sheath when not being used .

- Administor should be aware the position of the needle tip ,whether inside or outside patient mouth to minimize the risk of injury to the patient or the operator .

- Cartridge should be stored at room tempreture and should never used after their expiry date .