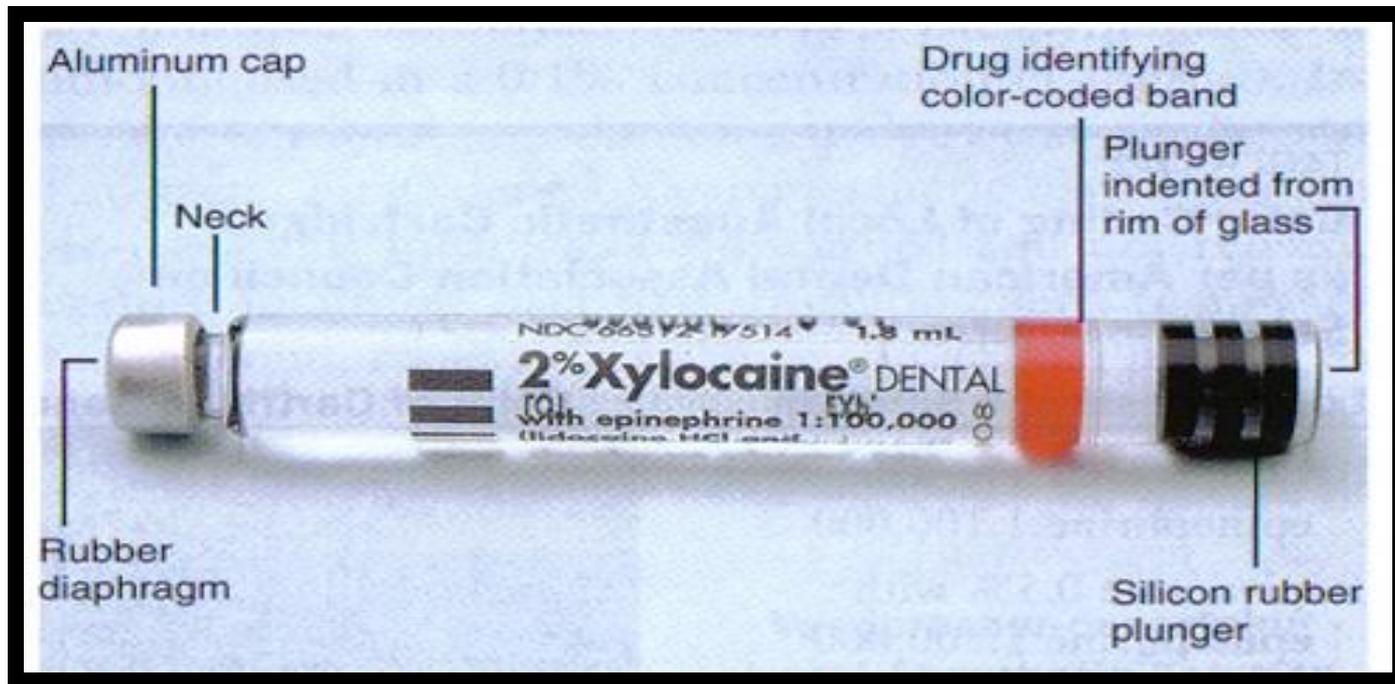


The Cartridge



Components of the Cartridge

The 1.8 ml , or 2ml dental cartridge consists of four parts:

- 1) Cylindrical glass tube
- 2) Stopper (Plunger, Bung)
- 3) Aluminum Cap
- 4) Diaphragm



Carpule = registered trade name for the dental cartridge
introduced by Cooke-Waite laboratories
in 1920

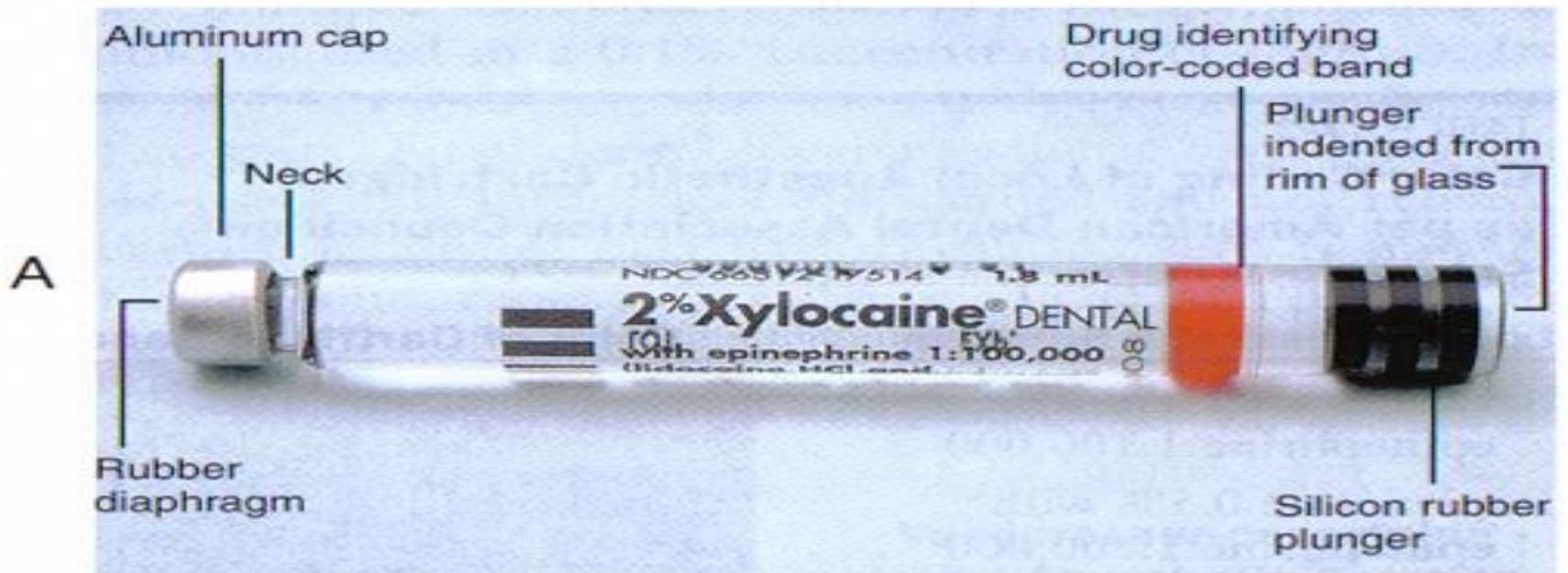


Figure 7-1. A and B, Components of the glass dental local anesthetic cartridge.

Parts of the Cartridge

- Rubber stopper should be lightly indented
- Flush or extruded stoppers: don't use
- Aluminum cap holds the diaphragm in position
- Diaphragm is latex rubber through which the needle penetrates the cartridge (no allergies ever reported)
- Liquid can diffuse through the diaphragm and contaminate the local anesthetic solution (alcohol common culprit)
- Mylar plastic label surrounds glass with content information and color coded band to identify the anesthetic

TABLE 7-1

**Color-Coding of Local Anesthetic Cartridges,
as per American Dental Association Council on
Scientific Affairs**

Local Anesthetic Solution	Color of Cartridge Band
Articaine HCl 4% with epinephrine 1:100,000	Gold
Bupivacaine 0.5% with epinephrine 1:200,000	Blue
Lidocaine HCl 2%	Light blue
Lidocaine HCl 2% with epinephrine 1:50,000	Green
Lidocaine HCl 2% with epinephrine 1:100,000	Red
Mepivacaine HCl 3%	Tan
Mepivacaine HCl 2% with levonordefrin 1:20,000	Brown
Prilocaine HCl 4%	Black
Prilocaine HCl 4% with epinephrine 1:200,000	Yellow

What is in the Cartridge?

- Local Anesthetic:** provides anesthesia; resists heat
- Sodium Chloride:** produces isotonicity with body tissue
- Sterile Water:** provides volume only
- Vasopressor:** increases safety, duration and depth of anesthetic
- Sodium (meta) Bisulfite:** antioxidant (preservative)
- Methylparaben:** bacteriostatic agent and antioxidant
 - only found in multi-dose drugs, ointments, creams
 - bacteriostatic, fungistatic and antioxidant
 - removed due to single use and paraben allergies

Care and Handling

- local anesthetic drug** is stable and can be sterilized, heated, autoclaved, or boiled without being broken down
- problem is that **the diaphragm and vasopressor** is heat labile and can easily be broken down, so cartridges should not be autoclaved
- “blister packs”** should be stored at room temperature and in the dark
- bacterial cultures** taken off newly opened “blister packs” produce no bacterial growth when cultured
- cartridges** are ready to be used when removed from the package there is no need to rub the diaphragm with alcohol
- cartridges should not be permitted to soak in alcohol** or other sterilizing solutions because the diaphragm will allow diffusion

Cartridge Warmers

- cartridge warmers are not necessary; the patient cannot discern between warmed and room temperature local anesthetic
- patients do not complain of the local anesthetic solution feeling cold upon injection
- local anesthetics that are warmed too much, i.e., **> 80 F** will be described as too hot or burning upon injection



Problems

Bubble In The Cartridge: 1-2 mm bubble can be found in the cartridge which is nitrogen gas that is inserted into the cartridge when it is sealed to keep oxygen out; avoids oxygen oxidizing the vasopressor

Extruded Stopper: liquid was frozen at some point leading to extrusion sterile environment of the solution can no longer be guaranteed

Alcohol to diffuse it only takes one day for alcohol to diffuse through the diaphragm; alcohol is neurolytic and can cause extended lengths of parasthesia; do not soak cartridges in alcohol

Cracked Cartridge Glass

- there is no need to hit the thumb ring with excessive force when engaging the stopper with the harpoon
- controlled pressure with the palm of the hand will provide adequate engagement
- some have a tendency to engage the harpoon too aggressively which is a bad habit that leads to cracked glass cartridges

Change in the color of the solution may oxidize especially on prolonged exposure to sunlight this results in turning of the solution brown and this discoloration is an indication that such a solution must be discarded.

Expiration date

Allergic reaction

References

- Hand book of local anesthesia 7th edition
Stanely F. Malamed , Elsevier.2019
- Google images.