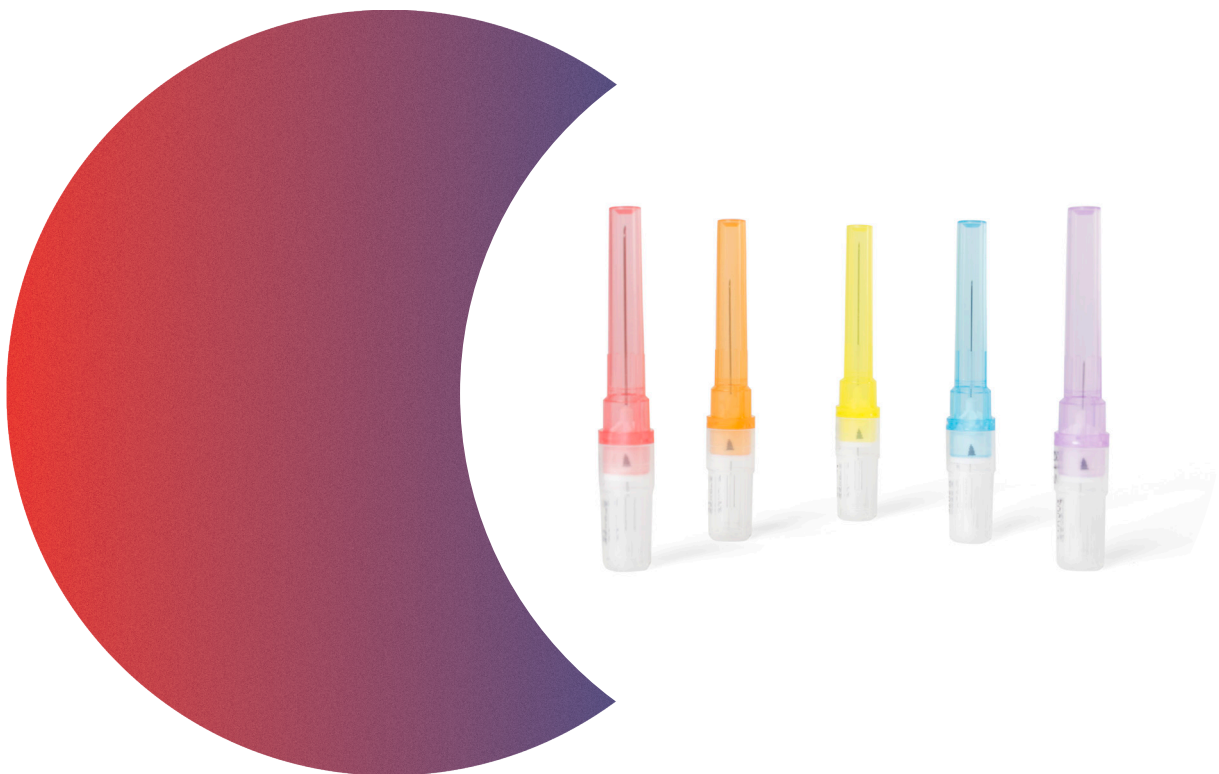


SELECTING THE RIGHT NEEDLE: MAKING THE RIGHT CHOICE FOR LOCAL ANESTHESIA

Making the right choice for local anesthesia

Laura J. Webb, MS, RDH, FAADH



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Needle selection may be influenced by one or more of the following:

- What we learned in school
- What is available at the office
- Employer preferences
- What we think will be most comfortable for the patient

Needle selection should be based on two things: injection type and depth of penetration.

That being said, I should add that hundreds of studies over several decades have indicated that patients cannot tell the difference between 25-, 27-, and 30-gauge needles, even without topical application.

It really is about technique!

Needle anatomy - 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”.

(see Figure 1)

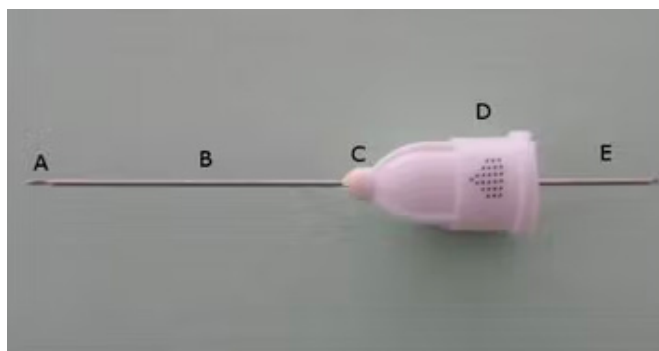


Figure 1: Dental anesthetic needle components: A, bevel; B, shaft; C, hub; D, syringe adaptor; E, cartridge penetration end.

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”.

(see Figure 2)

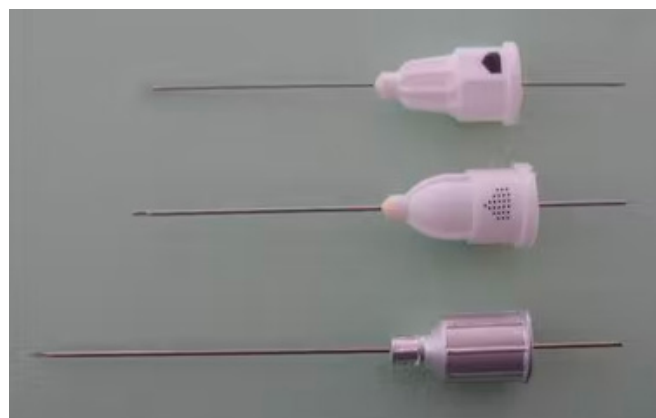


Figure 2: Bottom, 25 gauge long with metal hubcomplex; Middle, 25 gauge short with plastic hubcomplex; Top, 27 gauge short with plastic hubcomplex. Note: bevel indicators on plastic hubs.

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.¹

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.¹⁻³

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-gaugeneedles.⁴

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 (see Table 1).¹⁻³

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 non traumatic entry into tissues. (see **Figure 3**) 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.¹⁻³

Some manufacturers has developed a needle with an innovative scalpel designed bevel.

(see **Figure 4, middle**).

INJECTION	25 LONG	25 SHORT	27 SHORT
Inferior alveolar block	X		
Gow-Gates mandibular block	X		
Incisive block		X	X
ASA-infraorbital approach block	X		
ASA-supraperiosteal			X
Middle superior alveolar block (MSA)			X
Posterior superior alveolar block (PSA)		X	
Nasopalatine block (NP)			X
Greater palatine block (GP)			X
Anterior middle superior alveolar block (AMSA)			X

Table 1: Needle length and gauge recommendations for normal adult size skull using traditional syringe.

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 (see **Figure 4, left**).



Figure 3: Standard bevel.



Figure 4: Bore designs: left, large; middle, scalpel; right, standard triple bevel.

Although not critical to the success of injections, bevel design remains a topic of discussion and study.⁵

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.^{2,3}

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.

(see Figure 1)

Special considerations

When contact with bone is required prior to deposition, the contact should be gentle. A fishhook-type barb may be observed on the tip of the needle (see Figure 5) due to a manufacturing error, but more often it is caused from the needle contacting the bone forcefully during an injection.

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.

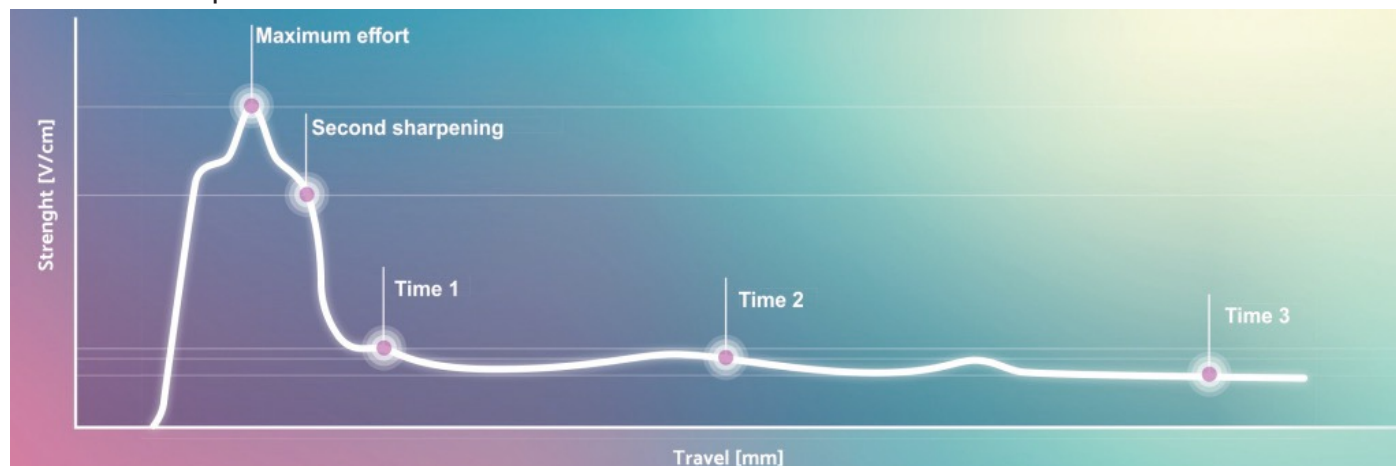
It is important that the main criteria for needle selection include type of injection to be administered, the distance to target, and the vascularity of tissues.



Figure 5:
Fishhook-type barb.

How to choose among different dental needles?

Laboratory tests are used to measure the force needed for a needle to penetrate the tissue. The force needed to pierce the membrane through the needle is transformed into an electric field and measured in volts per cm. The lower is the force required to pierce the membrane and the better will be the needle performance.



Comparative studies demonstrate that less force is required for the Orabloc needles to penetrate the tissue. In fact they have: bevel indicators to orient the tip direction; a sharpening to reduce pain perception and a perfectly siliconized external needle surface to facilitate tissues penetration for a smooth injection.

Orabloc Dental Needles are manufactured in Italy and checked in every single phase with the use of high standard technologies.



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