4.1 Introduction

Pain is one of the most fearful experiences for human beings. Topical anesthetics, infiltration, and nerve blocking have been found helpful in making cosmetic procedures more pleasant and tolerable for the patient (White 1986). However, for a variety of reasons, the vast majority of dermal filler injections are undertaken under insufficient topical or no anesthesia at all. Since one reason may be the lack of familiarity with these procedures, this chapter will describe the most common forms of local anesthesia. In addition to taking time to explain the procedure to novice patients and answering any questions they may have, local anesthesia is one of the most important factors that help to decrease or even avoid anxiety.

4.2 Preoperative Evaluation

The preoperative evaluation determines the type of anesthetic procedure to be used as well as the need for any drug for pain relief after the treatment. Simple procedures rarely require the use of adjunctive agents, except in very anxious patients. Be aware that a medical history must be taken and a physical examination performed prior to the use of any medication (Snow 1982). Preexisting medical conditions such as hypertension and heart diseases may influence the use of anesthetics in combination with epinephrine. A history of alcohol consumption, use of sedatives, and problems with anesthetics dur-
ing dental procedures may indicate that extra care should be taken with these patients. The potential of drug-drug interaction with some of the anesthetic agents should be evaluated before any prescription of analgesics. It is important to ask the patients if they have had any undesirable experience with topical, infiltrative, or blocking procedures. Patients should also be asked about the use of any illegal drugs before the administration of any anesthetic medication.

4.3 Local Anesthesia

Local anesthetics decrease or completely block sensory, autonomic, and motor functions. They act by blocking sodium channels at the cell membrane and interrupting the excitation-conduction process (Carvalho and Mathias 1997). The systemic absorption of the local anesthetics depends upon the vascular flow at the injection site, the chemical and physical characteristics of the agents, and the adjunctive use of vasoconstrictors such as epinephrine. Vasoconstrictors will decrease the absorption and enhance the availability of the local anesthetic to the nerve cells, thus prolonging the duration of action and decreasing possible systemic effects. Care should be taken not to inject local anesthetics into areas of terminal circulation due to an increased risk of necrosis.

4.4 Topical Anesthesia

In most cases, the level of anesthesia achieved with a topical anesthetic will be sufficient to alleviate discomfort during the injection of dermal fillers. There are basically two groups of topical agents: the ester group (cocaine, tetracaine, and benzocaine), and the amide group (lidocaine and prilocaine).

The stratum corneum is a strong barrier to the absorption of drugs through the skin. The skin should be cleaned with antiseptics before applying the topical anesthetic cream; this will allow better permeation of the topical agents. The effect might also be enhanced by rubbing a dry gauze on the surface to remove dead cells and grease. The vasodilatation that results from this rubbing of the skin may also increase the permeation of the drug. Although effective, tape stripping of the skin to remove the outer layer of dead cells and enhance penetration of the topical anesthetic is often impractical (Monash 1957).

One of the most common topical anesthetics is a eutectic mixture of 2.5% lidocaine and 2.5% prilocaine, which is marketed as EMLA cream. It is a nontoxic mixture whose use results in very low plasma levels. The usual dose is 1 g for each 10 cm² of intact epidermis. The cream should be in contact with the skin for approximately 45 min to 1 h with occlusive dressing (Hallen and Uppfeldt 1982).

Cryoanesthesia is another method of inducing topical anesthesia. The simple application of ice bags may enhance the anesthetic effect. In fact, for some patients the use of ice bags alone will provide enough anesthesia. Other topical freezing agents include ethyl chloride or dichlorotetrafluorethane sprays, but these are unlikely to be used when the treatment involves dermal fillers.

4.5 Infiltrative Anesthesia

Direct inhibition of nerve ending excitation may be achieved by infiltrative anesthesia. The drug of choice is generally 1% lidocaine, which is injected intradermally or subcutaneously. Intradermal injection results in a rapid onset and longer duration of anesthesia, but it has the disadvantage of itself being painful and causing tissue distortion. Subcutaneous injection is less painful but has a shorter-lasting effect (Arndt et al. 1983). During infiltrative anesthesia, patients usually feel a prick when the needle pierces the skin and a burning sensation with infusion of the anesthetic itself. Pain results from rapid tissue
distention, and so the use of smaller volumes is advised to avoid this discomfort. The combination of freshly prepared solutions with epinephrine or bicarbonate can greatly reduce the pain during infiltration (McKay et al. 1987). For very anxious patients it may be useful to apply topical anesthetics before administering the infiltrative anesthesia.

### 4.6 Nerve Block

Nerve block anesthesia is effected by an injection of a small amount of local anesthetic around a nerve, resulting in anesthesia within the area supplied by that nerve. The volume of anesthetic used in these procedures is small and so there is a low risk of systemic toxicity. In contrast to the infiltrative method, there is almost no imbalance with nerve blocks and it is associated with less discomfort. However, this method requires good technical and anatomical knowledge to obtain optimal results with few injections and to avoid adverse events. There is the possibility of inadvertent laceration of the nerve and blood vessel injuries. Long-lasting dysesthesia and hematoma or ecchymosis may occur in a few patients, which may be quite distressing (Laskin 1984).

The sensitivity and motion of the face are dependent on the fifth pair of cranial nerves (Fig. 4.1). The main trigeminal branches have independent exits from the skull. The ophthalmic branch is more superior and passes inside the orbit, forming the frontal branch, which bifurcates into the supraorbital and supratrochlear nerves. The other two branches are the maxillary nerve, which produces the infraorbital nerve, and the mandibular nerve, which is the largest and the only one to contain motor fibers, and which produces the mental nerve. Nerve block is usually achieved with 1 or 2% lidocaine. A combination of epinephrine and lidocaine is preferable when a quicker and longer-lasting anesthetic response is required. Care should be taken not to inadvertently inject this into the blood vessels. Epinephrine should also be avoided in patients with hypertension or cardiovascular diseases.

Pain results from tissue expansion during the injection and as a result of irritation from the anesthetic itself. Gentle injections are preferable and provide a quite tolerable nerve block.

![Fig. 4.1 The areas supplied by the main facial nerves (de Maio 2004)](image-url)
4.6.1 The Supraorbital Nerve

4.6.1.1 Anatomy and Territory

The supraorbital nerve exits the skull through the supraorbital foramen, which lies along the supraorbital ridge in the midpupillary line. It supplies the forehead.

4.6.1.2 Technique

Inject 0.5–1 ml lidocaine right into the depression in the internal third of the eyebrows (supraorbital notch) with the needle pointed toward the forehead (Figs. 4.2 and 4.3).

4.6.2 The Supratrochlear Nerve

4.6.2.1 Anatomy and Territory

The supratrochlear nerve exits the skull along the medial corner of the orbit. It supplies the medial portion of the forehead.

4.6.2.2 Technique

Inject 0.5–1 ml lidocaine at the junction of the root of the nose and the upper rim of the orbit, just below the medial portion of the eyebrow (Fig. 4.4).

4.6.3 The Infraorbital Nerve

4.6.3.1 Anatomy and Territory

The infraorbital nerve exits the infraorbital foramen in the midpupillary line about 1 cm inferior to the infraorbital ridge. It supplies the lower eyelid, nasolabial fold, upper lip, and part of the medial cheek and nose.

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Fig. 4.2 Anatomy and blocking of the supraorbital nerve. 1=external branch of the frontal nerve; 2 and 3=internal branch of the frontal nerve (de Maio 2004)

Fig. 4.3 Blocking of the supraorbital nerve

Fig. 4.4 Blocking of the supratrochlear nerve
4.6.3.2 Technique

The infraorbital foramen can usually be palpated. There are two ways of blocking it: by a cutaneous or a mucosal approach. For cutaneous injections, the needle should be placed 1 cm below the inferior orbital rim in the midpupillary line and 0.5 ml lidocaine injected around but not into the canal. The needle should be advanced through the mucosa then through the superior labial sulcus, aiming at the iris at the canine level. A total of 1 ml lidocaine should be injected using a retrograde technique. Control of the needle is undertaken externally with palpation (Figs. 4.5 and 4.6).

4.6.4 The Mental Nerve

4.6.4.1 Anatomy and Territory

The mental nerve exits the mental foramen approximately 2.5 cm from the midline of the face in the midpupillary line. It supplies the lower lip and chin.

4.6.4.3 Technique

Inject 1 ml of lidocaine through the inferior labial sulcus, inserting the needle between the sec-
ond and third inferior premolars aiming at the foramen mentalis (Fig. 4.7).

### 4.7 Adverse Events

Adverse events can result from the anesthetic itself, but are usually more common when epinephrine is used concomitantly. Short-term systemic reactions to epinephrine include tremor, tachycardia, restlessness, palpitations, headache, increased blood pressure, and chest pain (Grekin and Auletta 1988). Systemic reactions to local anesthetics can occur when toxic levels are reached. The use of larger volumes than recommended and inadvertent intravascular injection are the most common causes of toxicity.

Systemic toxicity of local anesthetics is characterized by central nervous and cardiovascular impairment. Signs and symptoms of toxicity depend on the velocity of injection and plasma concentration of the drug. The diagnosis of severe toxicity is mandatory: lip and tongue paresthesia, blurred vision, motor fasciculations, tinnitus, seizures, unconsciousness, coma, and respiratory and cardiovascular depression (Mather and Cousins 1979). Local anesthetics block sodium channels, causing myocardial depolarization and a reduction in nerve conduction velocity. Aesthetic treatment involving local anesthetics should therefore be carried out in conjunction with support measurements such as ventilation, oxygenation, and cardiovascular optimization.

Allergic reactions to anesthetics are rare, but have been known to occur with ester preparations (Brown et al. 1981).

### 4.8 Disadvantages of Local Anesthetics

The eutectic mixture of 2.5% lidocaine and 2.5% prilocaine may decrease the visibility of fine wrinkles, thus making it impractical for treatments involving very fine fillers such as colla-
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4.9 Tips and Tricks

Never let the patients feel pain during aesthetic procedures. Any negative experience may mean that patients will refuse to continue with facial improvement. Anesthesia should be seen as one of the most important steps during aesthetic treatment with fillers.

References