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Anesthetic Technique for Aesthetic Procedures in the Facial Region

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ABSTRACT

While local anesthesia effectively numbs tissue, its high-volume injections can cause swelling and tissue distortion, increasing bleeding risk and reducing treatment precision. In contrast, nerve block anesthesia is a more accurate technique. By injecting a smaller volume of anesthetic near specific nerves, it achieves targeted pain control without the tissue swelling and deformation seen with local anesthesia. This makes it particularly beneficial for delicate areas like the face. This nerve block technique is particularly advantageous for delicate areas such as the face. We will address the technique of nerve blocks in the facial region using the Neutral Anesthesia of Pithon (SANEP), providing a step-by-step guide for its application at the supraorbital, infraorbital, and mental foramen. Supraorbital Foramen: Located on the superior orbital margin, typically in line with the pupil. For anesthesia, a 30G needle is inserted perpendicular to the skin, without penetrating the foramen. Infraorbital Foramen: Located approximately 1 cm below the infraorbital rim, also in line with the pupil. The intraoral technique involves inserting the needle into the superior vestibular mucosa, near the first premolar. The extraoral technique uses the index finger to palpate the foramen, and the needle is inserted at a 90-degree angle to the skin, without entering the foramen. Mental Foramen: Located on the mandible, between the lower premolars. The intraoral technique is performed via the inferior vestibular mucosa, between the first and second premolars. The extraoral technique involves palpating the foramen with a finger and injecting the needle at a 90-degree angle, directing it toward the foramen without penetrating it. In all cases, the recommended dose of local anesthetic is 0.5 to 1mL. Performing facial nerve blocks is a skill that can be easily and quickly learned. For this, a crucial understanding of the anatomy of the facial nerves is required for effective procedure execution.

Keywords

Anesthesia, Local anesthesia, Nerve block, Facial aesthetics.

Introduction

Pain experienced during treatment negatively impacts the patient's experience, prolongs the therapy time, and ultimately reduces the therapeutic effect. Physicians are constantly exploring methods to more effectively and precisely minimize pain. Surface anesthesia, local infiltration anesthesia, and nerve block anesthesia are the typical anesthetic methods for minimally invasive treatments of the mid- and upper face [1].

Local anesthesia can better numb local tissues by osmosis, but a large injection dose results in tissue swelling and deformation, increasing the risk of bleeding and reducing the accuracy of treatment [2,3]. In the traditional nerve block technique, anesthetics are injected into the peripheral nerve trunk at a single point to numb the area innervated by the nerve, blocking the conduction of nerve impulses, thus avoiding swelling and deformation caused by local anesthesia and reducing the amount of anesthetic [4-6].

Regional nerve blocks are a targeted method of providing analgesia, performed by injecting a local anesthetic near specific nerves that control the sensory innervation to a particular region of the body. Regional nerve blocks offer several advantages over local tissue infiltration. For example, they are beneficial when local infiltration

could cause tissue damage or distortion, particularly in delicate areas such as the face [7]. Furthermore, nerve blocks generally require a smaller anesthetic volume than local infiltration to achieve adequate analgesia. The infraorbital nerve block technique targets explicitly the branches of the maxillary nerve that innervate the midface. Indications for this block include wound closure, dental procedures, trigeminal neuralgia, and other midface procedures in patients with contraindications to general anesthesia [7], as well as facial aesthetic procedures, such as hyaluronic acid fillers, botulinum toxin-A, and thread lift.

Methods

First, perform skin asepsis and then, in the supine position, slowly apply the anesthetic solution. The local anesthetic is prepared minutes before application and can be stored at 8°C for a few hours. It is composed of a neutral anesthetic solution (SANEP) in the following composition: 1.2 mL of lidocaine + epinephrine (2% and 1:200.00), 0.2 mL of sodium bicarbonate (8.4%), and 8.6 mL of sodium chloride (0.9%) The proposed neutral anesthetic solution is based on the composition of Jeffrey Klein's solution [8]. The use of a 27G or 30G disposable needle is recommended for application of the solution.

For some applications, we'll use the fan technique to distribute the anesthetic over larger areas. Fan technique is the process of making multiple linear passes along the same plane over an area without removing the needle or cannula from the tissue. This technique can be particularly useful for the deep malar region and nasolabial fold.

The following procedure outlines the steps for anesthetic blockade (intra- and extraoral) of the facial nerves (subarachnoid, intraorbital, and mental) according to the region of application.

Figure 1A shows the three foramens - supraorbital, intraorbital, and mental. Each foramen is associated with a portion of the trigeminal nerve (cranial nerve V), which is responsible for facial sensation.

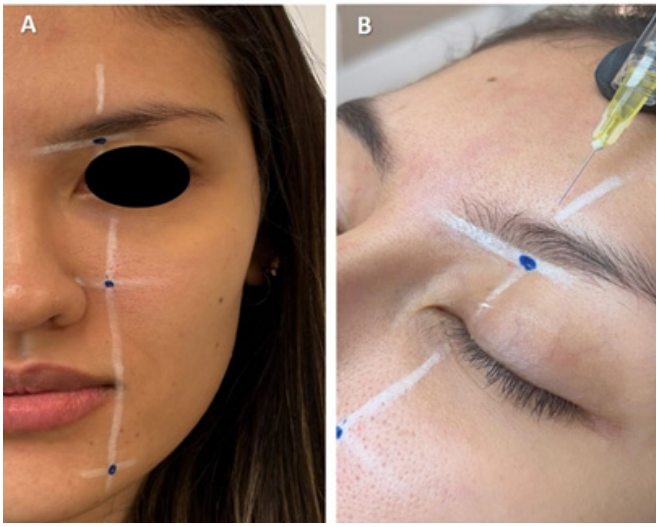

Figure 1: Location of the foramen. A, Foramen: supraorbital, infraorbital and mental (indicated in a sequence of blue dots from top to bottom). B, Blockage of the supraorbital foramen (in blue).

In Figure 1B, the suborbital foramen block point is observed, located at the superior rim of the orbit, usually in the midline of the pupil, approximately 2.5 cm above the orbital margin. The supraorbital nerve, a branch of the ophthalmic nerve (V1), is used to anesthetize the forehead, glabella, upper nasal dorsum, and anterior scalp. For anesthesia, the foramen is felt, a 30G needle is inserted perpendicularly into the skin, without penetrating the foramen, and 0.5 to 1 mL of anesthetic is infiltrated.

The infraorbital foramen is located approximately 1 cm below the infraorbital rim, in the midline of the pupil. Figure 2 indicates the point for intraoral anesthesia (the infraorbital nerve). This is used for anesthetic blockade of the lower eyelid, nasal ala, upper lip, and anterior cheek. For this technique, the upper vestibular mucosa is accessed in the region of the first premolar. The needle is directed superiorly and laterally until it reaches the foramen, where 0.5 to 1 mL of anesthetic is infiltrated.

Extraoral anesthesia (intraorbital nerve) used to block the lower eyelid, wing of the nose, upper lip and anterior cheek, the foramen is palpated with the index finger, a 27G or 30G needle can be used in this region, which is introduced at a 90° angle to the skin, without entering the foramen, with 0.5 to 1 mL of anesthesia being infiltrated (Figure 2B).

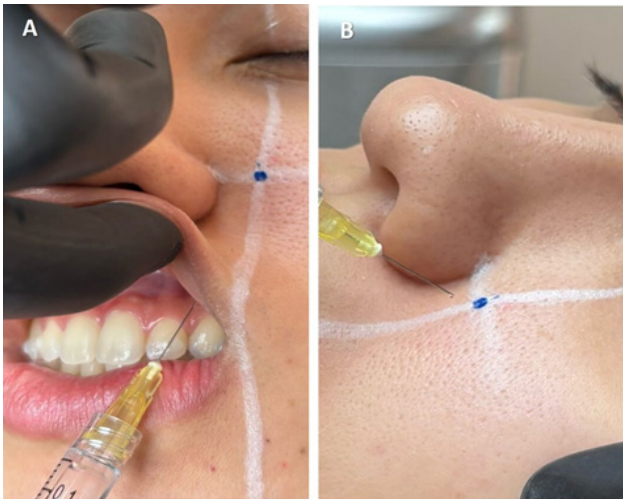

Figure 2: Location of the infraorbital foramen for infraorbital nerve block. A, Intraorbital foramen (lower third of the face – location for anesthesia by the intraoral method). B, Infraorbital foramen (medial region of the face – location for anesthesia by the extraoral method).

The mental foramen is usually located between the mandibular premolars (first and second), in the vertical line of the pupil. Like the intraorbital nerve block, the mental nerve block can be performed intraorally or extraorally. The technique is used to anesthetize the lower lip, skin of the chin, and anterior vestibular mucosa of the mandible. In the intraoral technique, the upper vestibular mucosa is accessed in the region between the 1st and 2nd premolars, with the needle directed superiorly and laterally

until reaching the mental foramen (Figure 2A). 0.5 to 1 mL of anesthesia can be administered. For the extraoral technique, palpate the mental foramen with the index finger and insert the 27G or 30G needle at a 90° angle without penetrating the foramen (Figure 3B). The recommended dose is 0.5 to 1 mL of anesthesia.

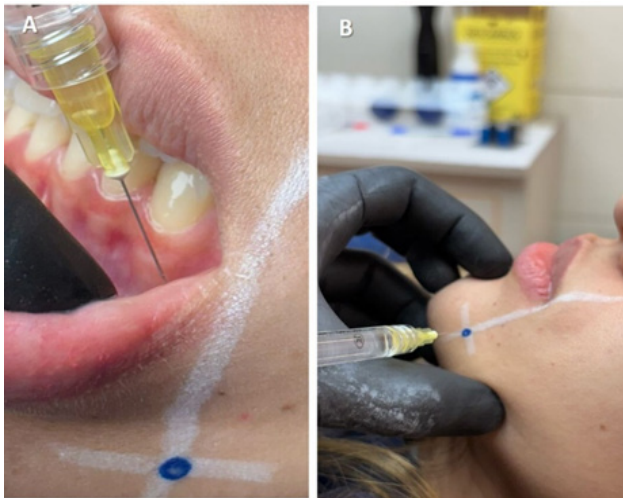

Figure 3: Location of the mental foramen for mental nerve block. A, Mental foramen block visualization by the intraoral method. B, Mental foramen block visualization by the extraoral method.

Discussion

Nerve blocks are effective in providing analgesia in a localized area of the body and offer several advantages over local tissue infiltration. A key benefit of nerve blocks is that they typically require a smaller volume of anesthetic to achieve adequate analgesia compared to local infiltration, thus reducing distortion of surrounding tissues, which is essential in areas such as the face [7].

The supraorbital nerve is one of the terminal branches of the trigeminal nerve. The trigeminal nerve divides into three branches: the ophthalmic nerve (V1), the maxillary nerve (V2), and the mandibular nerve (V3) [9]. The supraorbital nerve is a branch of the ophthalmic nerve. This sensory nerve branches into two separate terminal branches, known as the lesser supratrochlear nerve and the greater supraorbital nerve. The supraorbital nerve exits the skull through an opening above the orbit known as the supraorbital notch or supraorbital foramen, which is located in the medial third of the supraorbital margin, 2 to 3 cm lateral to the midline. The nerve then ascends through the forehead and terminates in the anterior scalp, providing sensory input to tissues as far as the lambdoidal suture (the connection between the parietal and occipital bones). The supratrochlear nerve provides sensory information in a small area near the midline of the face. The supraorbital foramen can be visually identified by asking the patient to look forward and then transecting the pupil at the level of the patient's orbital ridge. Palpation of this region reveals the area of interest for performing this nerve block [10-12].

The area around the eyes is well-vascularized, and we must pay attention to its nerves. Blepharoplasty is currently the most popular cosmetic procedure, improving the appearance of the upper, lower, or both eyelids [13,14]. Extra care is recommended with the supraorbital and supratrochlear nerves [15]. When performing a facelift, facial nerve injuries are among the most serious complications [15].

The infraorbital nerve, a branch of the maxillary nerve (V2 of the trigeminal nerve), runs along the floor of the orbit and is responsible for the sensory innervation of the lower eyelid, lateral region of the nose, upper lip and upper anterior teeth, including incisors, canines, premolars and part of the first molar on the same side of the face [7]. The precise anatomical location of the infraorbital nerve is crucial in several procedures. Infraorbital nerve block is a procedure performed under anesthesia during maxillofacial surgery, for postoperative pain management, and in the treatment of trigeminal neuralgia [16,17]. Additionally, this nerve is also crucial in various surgeries such as rhinoplasty, facial tumor surgeries, orbital floor fractures, Le Fort I fractures, malar fractures, and placement of malar and facial implants [18,19]. It is worth noting that the presence of an accessory infraorbital foramen increases the complexity of this area and should be taken into consideration by anesthesiologists and maxillofacial surgeons [20]. The exact anatomical location of the infraorbital artery is crucial in several procedures, especially in plastic surgery, where infraorbital artery-based flaps can be used for nasal alar reconstruction [21]. The location of this artery is also present in one of the facial danger zones, and an injection of dermal filler in this area can lead to arterial occlusion with associated stroke and blindness [22]. Several studies in the literature have shown significant variability in the shape and location of the infraorbital foramen between different populations and ethnic groups, which can be problematic for many surgeons [23].

The two most common anesthetic agents for infraorbital nerve block are lidocaine and bupivacaine. Lidocaine has a faster onset and shorter duration of action compared to bupivacaine. Lidocaine typically begins to take effect 2 to 3 minutes after injection, while bupivacaine can take 10 to 20 minutes to take effect. Generally, only 1 to 3 mL of the agent is required, making toxicity rare. The total dose of lidocaine with epinephrine should not exceed 7 mg/kg (0.7 mL/kg of 1% lidocaine) and 5 mg/kg without epinephrine [24].

The inferior alveolar nerve runs along the mandibular canal. The mental nerve is a terminal branch of the inferior alveolar nerve, emerging from the mental foramen along with the mental vessels. The mental nerve divides into four branches upon emerging from the mental foramen: (a) the angular branch, which innervates the area around the angle of the mouth; (b) the medial and (c) the inferior lateral labial branches, which innervate the skin of the lower lip, oral mucosa, and gingiva posterior to the first molars; and (d) the mental branch, which innervates the skin of the mental region [25]. The mental foramen is located in the vestibular cortex of the mandibular bone, just below the corner (chelion) of the lip, on both sides and in close relation to the root of the second

mandibular premolar tooth. It moves posteriorly during jaw development [26]. Variations in the position and location of the mental foramen have been reported within and between various adult population groups [27,28].

The mental nerve supplies sensation to the lower lip, buccal mucosa, and the skin of the chin ventral to the mental foramen. Mental nerve blocks provide excellent anesthesia during a variety of procedures [29]. Procedures near the mandibular midline may require bilateral mental nerve blockade. The technique can also be applied to dermatologic surgery [30]. Syverud et al. [31], described two techniques for performing this nerve block: intraoral and extraoral. When comparing the two approaches, they found that intraoral blockade with topical anesthesia is less painful than extraoral injection [31].

Special considerations include avoiding injections into the infraorbital foramen, as this can lead to long-term neuropathy due to nerve compression, damage to the orbital floor, or injury to the orbit [7]. For the mental nerve, needle entry into the mental foramen is unnecessary for successful nerve anesthesia and may increase the risk of permanent nerve damage or accidental intravascular injection [32]. Therefore, extra-foramen injection is safer and still provides complete anesthesia to the skin and soft tissues anterior to the nerve [29]. It is beneficial to have a good understanding of the location of the facial nerve branches, retaining ligaments, and the soft tissue plane of the face to decrease the incidence of facial nerve injury [15].

Conclusion

Performing nerve blocks on the face is a skill that can be learned quickly and easily. Some of the nerves vulnerable to this procedure have been presented to help you understand the anatomy, which is crucial for effective blockade execution.

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