

Maxillary and mandibular nerve block—two for one deal?

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Patients undergoing maxillofacial surgery report some of the most severe postoperative pain. Effective pain management is closely associated with good patient outcomes. Poor pain management leads to increased immobility and decreased functional outcomes, and indirectly to infection and poor wound healing, prolonged hospital stays, and poor quality of life. Suboptimal pain management may contribute to patient non-adherence to pharmacological and rehabilitative therapies after surgery, which may worsen outcomes. Therefore, postoperative pain management after oral, dental, maxillomandibular, and temporomandibular surgeries are challenging but provides many opportunities for research. Until the beginning of the 21st century, opioids have been the cornerstone of perioperative pain management. Currently, the prescription of opioids even under an appropriate medical indication is being debated. First, because we want to limit chronic misuse of opioids and prevent side effects and even deaths related to opioids. And second, because more and more articles and protocols are being published with the use of low opioid anesthesia, including opioid free anesthesia in all types of surgical settings, and maxillofacial surgery is no exception. To carry out the latter, a multimodal analgesia (MMA) approach needs to be carried out. An integrated approach based on MMA provides the safest path to best practices. MMA strategies described so far in the literature are heterogeneous, and include the use of paracetamol, non-steroidal anti-inflammatory drugs, corticosteroids, gabapentin, ketamine,

glutamate receptor antagonists of the N-methyl-D-aspartate class and alpha-2-agonists among other drugs; as well as the inclusion of nerve blocks with local anesthetics (LA). For the most efficient and safe practice of nerve blocks, it is recommended that they be performed under ultrasound guidance. All of this provides better quality care results. The expansion of ultrasound-guided regional nerves of the face blocks is recent and its publications are growing exponentially. The innervation of the face is mainly provided by the trigeminal nerve, made up of three branches. Specifically, regarding the second branch of the trigeminal nerve or maxillary nerve, we know that effective anesthesia of the maxillary area can be achieved by maxillary nerve block inserting the needle through the pterygomaxillary fissure to the pterygopalatine fossa (PPF)—though with a high risk of causing vascular and nerve puncture (1). However, real-time visualization of the block procedure under ultrasound guidance limits this risk, allowing direct localization of the maxillary artery, with correct positioning of the needle and distribution of the LA within the PPF. Three approaches for maxillary nerve block in the PPF under ultrasound guidance have been described (infrazygomatic in plane, infrazygomatic out of plane, and suprazygomatic out of plane) (2). The suprazygomatic approach from the frontozygomatic angle is one of the safest and most recommended routes for reaching the PPF. This approach limits insertion of the needle in the anterior portion of the foramen rotundum, thus avoiding inadvertent puncture of the infraorbital contents through

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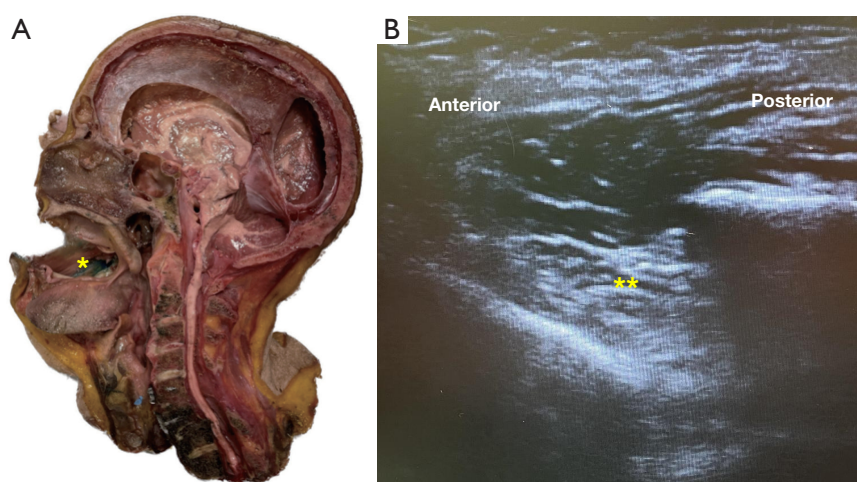


Figure 1 Ultrasound-guided maxillary nerve block using suprazygomatic approach and infrazygomatic window. (A) Dissection of a cadaver after performing a suprazygomatic maxillary nerve block with the injection of contrast into the PPF, showing the dispersion of the contrast* to the branches of the mandibular nerve; (B) ultrasound imaging of the pterygopalatine fossa** delimited by the maxilla (anterior) and the greater wing of the sphenoid (posterior). PPF, pterygopalatine fossa.

the infraorbital fissure. Since the PPF anatomically lies deep and is surrounded by bone, the best ultrasound window for visualization is the infrazygomatic approach—allowing us to monitor the entire axis of the PPF (1,2). Thus, the study with cadavers of Echaniz *et al.* was validated employing suprazygomatic approach and infrazygomatic window for maxillary nerve block (1). The amount of anesthetic injected into the PPF for maxillary nerve block is also controversial. The typical volume of the PPF in adults has been reported from investigations in dry skulls as close to 1 mL (3,4). However, when executing this block clinically, 2 to 5 mm are usually injected (4). Also, even anesthesiologists who are experts in maxillary nerve block in children calculate a local anesthesia dose of 0.15 mL/kg (5). As a result, the excess amount of LA may move intracranially or into the orbit through the infratemporal fossa (1,3,4). Meanwhile, the location of this remaining volume has not been formally investigated.

Some authors suggest that with the injection of sufficient volume into the PPF during the maxillary nerve block, some remaining volume could diffuse to the pterygomandibular space, suggesting a communication between the two (1,6-8). And these data could justify the reported high analgesic power of the maxillary nerve block in maxillofacial surgery, which in addition to blocking the branches of the maxillary nerve itself located in the PPF, could also block branches of the mandibular nerve located in the pterygomandibular space.

Kumita and colleagues (9) reported that with the administration of sufficient contrast in the pterygomandibular space, the inferior alveolar, lingual and buccal nerves are reached; all terminal branches of the third branch of the trigeminal nerve. On the contrary, the mandibular and auriculotemporal nerves are not reached. However, clinical studies report that blocking the inferior alveolar, lingual and buccal nerves are sufficient for pain management in patients undergoing mandibular surgery (10).

Therefore, randomized controlled trials are needed to determine in greater detail the dispersion of the injected volume outside the PPF when the maxillary nerve block is performed. In this way, we could find out if with a single block applying LA in the PPF, we could anesthetize the second and third branches of the trigeminal nerve for surgeries involving the lower two thirds of the face. A cadaveric study of dispersion of volume injected into the PPF via maxillary nerve block is being carried out at our institution (Figure 1).

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