

Rare Complications of Two Most Common Nerve Blocks: Posterior Superior Alveolar and Inferior Alveolar Nerve Block: A Mini Review

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Administration of local anesthetic agents is a safe procedure. However, various localized, distant and systemic complications have been reported. Posterior superior alveolar nerve block (PSAB) and inferior alveolar nerve block (IANB) are the two most common nerve blocks in the jaws. In this mini review, we tend to describe rare complications of these two methods. Rare complications of IANB include necrosis of the chin skin of, neuritis of the facial nerve, trismus, ischemia and blanching of skin, anemia in the face, numbness of the ear, diplopia, taste disturbance, infra condylar abscess, burning sensation in eye, reduction in visual acuity and atrophy of the optic nerve. Some Rare complications of PSA are diplopia, amaurosis, epiphoria, paralysis, esotropia, hematoma, pupillary dilation and ptosis, paresis of the lateral pterygoid muscle and trismus. Since complications of dental anesthesia are inevitable, their prevention and management are essential. Management of complications requires comprehensive knowledge regarding the management of complications and injection techniques to prevent these complications

Keywords: Complication; Local anesthesia; Posterior superior alveolar nerve; Inferior alveolar nerve

Introduction

One of the most common procedures in oral and maxillofacial surgery is using local anesthetics. Local anesthetics administered carefully and within recommended dosage have established a desirable record of safety (1). Although lives threatening systemic reactions do occur, most adverse effects or complications are local and temporary. Localized responses to anesthetic injections are common (2).

The inferior alveolar nerve block (IANB) is a common procedure in dentistry. This procedure involves the insertion of a needle close to the mandibular foramen in order to deposit a local anesthetic solution in the nerve periphery before it enters the foramen. In this region, inferior alveolar artery and vein are present (1). Also, the pterygoid plexus is located at superior and posterior to this area. Several techniques and their associated modification have been published regarding this nerve block. Failure of anesthesia has been reported to be mainly due to technical errors in the local anesthetic administration technique and not because of the anatomic normal variations present in some patients. Some operators often may fail to identify the anatomical landmarks useful in applying the IANB (3-5).

The posterior superior alveolar block (PSAB) technique has varied over time with regard to the depth and angle of penetration, the location for deposition of the anesthetic agent, and the number of injections necessary to achieve adequate

anesthesia to the maxillary molars. PSAB holds the second highest complications among intraoral injections. With changes in armamentarium and technique, the complication incidence has declined and mostly are associated with anatomical considerations with respect to neurovascular anatomy and/or anesthetic solution (6).

Rare complications of the IANB:

- 1) Necrosis of the chin skin (2, 7) which is secondary to vascular spasm of the terminal branches of the inferior alveolar artery.
- 2) Neuritis of facial nerve (facial nerve paralysis) (1, 8-10) resulting from inadvertent deposition of anesthetic into the tissue of the parotid gland and facial nerve numbness.
- 3) Trismus (1, 11-13) resulting from one of the following reasons: diffusion of alcohol or sterilized cooled substances or muscle necrosis caused by inadvertent deposition into the muscle, extensive prolonged bleeding and Infection.
- 4) Ischemia and blanching of skin (1) which is ensued from desquamation of epithelium and sterile abscess.
- 5) Anemic area of the face (14) which is caused by maxillary artery anastomosis, rapid injection, wrong needle direction and diffusion of anesthetic substance in the upper region of the mandible.
- 6) Numbness of the ear (15) is due to inadvertent deposition into the auriculotemporal nerve.

- 7) Diplopia (16-19) and abducent nerve palsy (17, 20) resulting from following reasons: Fat embolism of the central retinal artery, deposition of the drug into the inferior alveolar artery, mandibular canal or posterior superior alveolar (PSA) artery and by reverse flow of the anesthetic agent to the internal maxillary and middle meningeal arteries. The anesthetic is spread via venous, lymphatic or neural routes through the anastomosis of orbital branch of middle meningeal artery with the lacrimal branch of the ophthalmic artery.
- 8) Taste disturbance (21) due to direct injury to the chorda tympani and lingual nerves during administration of the local anesthetic and atrophy of the ipsilateral fungiform papillae.
- 9) Infra condylar abscess formation (22) resulting from the injection of local anesthetic with a vasoconstrictor.
- 10) Other complications include reduction in visual acuity, atrophy of the optic nerve (23) and burning sensation in the eye (1, 24).

Rare complications of PSAB:

- 1) Diplopia (16, 18, 25-28) caused by following reasons: The inadvertent deposition of the local anesthetic solution passes through the inferior orbital fissure, and reaches the inferior ophthalmic vein via the pterygoid plexus or its communicating branches. This vein contains no valves and connects directly with the extrinsic muscles of the eye via the infraorbital foramen. An intraluminal injection may easily reverse the flow within the vessel, causing the muscles susceptible to the effect of the anesthetic solution. Dreg of the anesthetic agent within the PSA artery causes a back flow into the connecting maxillary artery and into the middle meningeal artery later on. There exists a persistent anastomosis between the orbital branch of the middle meningeal and the recurrent meningeal division of the lacrimal branch of the ophthalmic artery. This lacrimal artery supplies the lateral rectus muscle, the lacrimal gland, and the outer half of the eyelids, which due to these anatomical considerations may explain these symptoms. The local anesthetic solution extends to abducent nerve within the cavernous sinus through the infratemporal fossa and the pterygoid plexus and its connecting emissary veins crossing through the foramen Ovale and Lacerum.
- 2) Amaurosis (17, 27) (temporary blindness) which is ensued from the followings: atrophy of the optic nerve, central retinal artery vasospasm, diffusion of substances in the arteries of the inferior alveolar, mandibular canal and PSA artery, back flow to orbital branches of the internal maxillary artery that anastomoses with lacrimal branches of the ophthalmic artery intravenous injection or infiltration of the cavernous sinus causing temporary paralysis of the muscles

of the short ciliary and anastomotic vein, inferior ophthalmic vein and pterygoid plexus.

- 3) Epiphoria (1, 17) due to diffusion of the anesthetic from pterygopalatine fissure into infratemporal space.
- 4) Paralysis (17, 28-30) resulting from followings: diffusion of the anesthetic substance from maxillary artery to middle meningeal artery and reaching petrosal artery that supplies the facial sheath, and numbness in the PSA artery.
- 5) Other complications include : esotropia (17, 31) (medial rotation of the orbit), hematoma (1), pupillary dilation and ptosis (28, 32), paresis of the lateral pterygoid muscle (33) and trismus (34).

Conclusion

Since Complications of dental anesthesia are unavoidable, it is required to be prevented and managed properly. Management of complications requires adequate knowledge about rare complications and prevention requires correct technique of injection.

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