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CASE REPORT

Rare Complications following posterior superior alveolar nerve block (PSANB) for tooth extraction: A report of two cases and review of literature

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ABSTRACT

PSANB is the most common nerve block given for maxillary posterior teeth in dentistry. The most common complication associated with this block is Hematoma. However, in reality ocular complications and facial nerve palsy are practically unheard of when they occur they can be extremely unnerving not just to the patient but also to the surgeon. Patients generally panic which makes it tougher for the clinician to assess the situation. In this article one case of ocular complications and one case of facial and nerve palsy following PSANB are discussed and management guidelines are highlighted.

Key Words: Diplopia, Dental nerve block, Ophthalmic complications.

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INTRODUCTION

Administration of LA is an integral procedure in dentistry. Daily hundred thousand local anesthetic agents are injected across the globe, without much complications. Common local complications can be encountered after posterior superior alveolar nerve block are hematoma formation (most common complication), trismus , needle breakage, infection, edema.[1,2] However rarely reported complications associated with this nerve block includes - amaurasis, diplopia, mydriasis , palpebral ptosis sand facial nerve palsy , permanent loss of vision in one eye.[3] Malamed SF had stated that even after following strict injection protocol, complications may occur due to anatomic variations of patients soft tissues and hard tissues structures. This article presents two cases, one with ocular complications and other facial nerve palsy following PSANB and also how to avoid and manage these complications are highlighted in this article.

CASE REPORT – 1

A 25 year female reported with pain in the right maxillary third molar secondary to irreversible pulpitis.After detailed case history, clinical and radiological examination, it was decided to extract the offending tooth. Patient was placed in recumbent position and 2% lidocaine with 1:100000 adrenaline was administered using PSANB. PSA nerve block was administered using 25 mm needle and LA was administered distil to the 1st molar with needle directed in upward , backward and inward 45 degree angulation . The depth of penetration was about half the needle, aspiration of needle was done which yielded negative aspiration and 1.5 ml LA was injected followed by greater palatine nerve block with 0.3 ml solution. After appropriate anaesthesia was achieved tooth was elevated and delivered using standard flapless forceps technique.The entire procedure lasted for 10 minutes.

Soon afterwards, patient complained of double vision.

Patient's vital signs were recorded which were within normal limits. On Ocular examination- pupils were

equally round and reactive to light.Patient was unable to abduct her right eye past mid line.Diagnosis- transient diplopia. Patient was assured of temporary nature of this condition. Patient's right eyelid was taped in the closed position and was sent home. On contact with the patient in the evening, she reported her vision had returned to normal. Patient took an ophthalmologist consultation, who confirmed our diagnosis and deemed that no further treatment was necessary.

CASE REPORT – 2

A 30 yr old male patient visited our unit for upper left 3rd molar extraction.He was in good health with no H/O hospitalization. Patient was placed in recumbent position 1.5 mL of 2% lidocaine with 1:100000 adrenaline was administered using 26 gauge needle for PSA nerve block followed by GP block with 0.3 mL solution.After appropriate anaesthesia was achieved tooth was elevated and delivered using standard flapless forceps technique.Post extraction instructions were given and patient was sent home.However the next day patient returned to our unit with chief complaint of generalised weakness of left side of face, inability to close his left eye which appeared same morning.On clinical examination facial muscles of left side of patient were immobile. Left side of his face was flat and expressionless in appearance. Obliteration of nasolabial fold and drooping of the corner of the mouth , unable to raise his left eyebrow or close his left eyelid were also present. On attempt to smile, his mouth drawn to right side. In order to exclude facial paralysis of central origin, a neurologist consultation was sought. After ruling out pathologic entities our diagnosis was narrowed down to delayed facial nerve palsy. In cooperation with the ophthalmologist and neurologist the steroidal therapy was given for 4 weeks.
Four weeks after the beginning of the treatment patient showed improvement. Symptoms completely subsided within additional 4 weeks follow up.

Pathomechanism of rare complications-

1. Direct diffusion of local anaesthetic agent from pterygopalatine fossa and inferior orbital fissure into the orbit.[1]

In case of facial nerve involvement, there are cases in which the gland fails to envelope the nerve and its divisions leading to chances of direct exposure to local anaesthetic solution.

2. Inadvertent venous injection in to the pterygoid venous plexus and thereby reaching the cavernous sinus. The cranial nerves 3,4 & 6 are located within the sinus and may get anaesthised, resulting in paralysis of extraocular muscles leading to diplopia, mydriasis, amaurosis and loss of accommodation.[3-6] (fig 1)

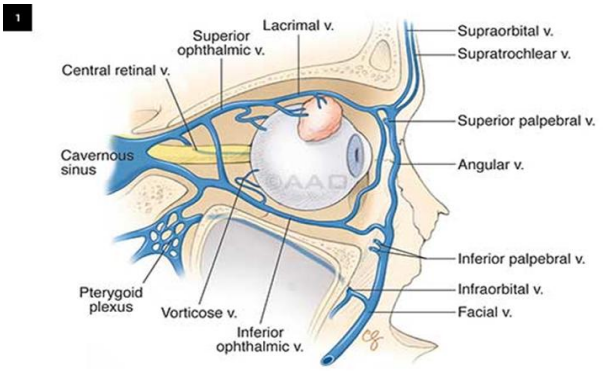

Figure 1: Pterygoid venous plexus connection with cavernous sinus (Color Figure Online)

3. Inadvertent intraarterial injection of LA within posterior superior alveolar artery leads to retrograde flow to the middle meningeal artery and then to the recurrent meningeal division of Lacrimal artery. Lacrimal artery supplies the lateral rectus muscle, lacrimal gland and outer half of eyelids.[6] Also retrograde flow to middle meningeal artery and then into petrosal artery which supplies the sheath of facial nerve can lead to facial nerve palsy.[7,8] (fig 2)

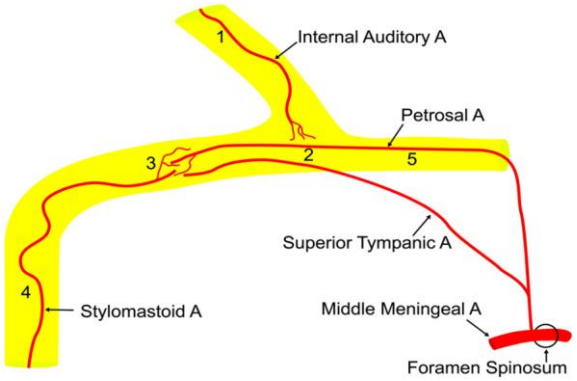

Figure 2: Intracranial Arterial Blood Supply to Facial Nerve (Color figure online)

4. Sympathetic vascular reflex – Local anaesthetic solution or its by-products or injury to vesselwall by needle in the supply area of common carotid artery may activate sympathetic fibres and cause angiospasm.
   - A reflex vasoconstriction of ophthalmic artery and the central retinal artery may harm the optic nerve and the retina leading to amaurosis.
   - A reflex vasoconstriction of stylomastoid artery petrosal artery which supplies the facial nerve leading to ischemic neuritis and secondary edema which causes delayed facial nerve paralysis.[4]
5. Reactivation of HSV(Herpes Simplex Virus) genomes from the geniculate ganglion following trauma during dental anaesthesia procedure can cause Bell's palsy.[9-11]

DISCUSSION

Rare complications like delayed facial nerve palsy and visual disturbances are uncommon following the administration
of LA and have been reported in few publications. Brain et al reported first ophthalmic complication in 1936.

M. Panarrocha et al[1] presented 14 cases with ophthalmic complication after PSANB which includes diplopia, mydriasis and palpebral ptosis. They proposed the direct theory of anaesthetic solution in to the orbit. The abducen nerve lies nearest to the inferior orbital fissure and hence the most commonly affected muscle is the lateral rectus.

In our first case, patient experienced transient diplopia after administration of PSANB which is possibly due to direct diffusion of LA into the orbit. Intravascular injection seems to be less probable due to adequate aspiration.

Chun keeLee[14] reported ophthalmic complications after inferior alveolar nerve block and he hypothesised the intravascular injection of LA theory.

Rishiraj et al[2] reported a case of permanent loss of vision in one eye following administration of LA for dental extraction. He proposed that intraarterial injection flows retrograde from middle meningeal artery to ophthalmic artery leading to occlusion of retinal and choroidal vasculature. In 4% of patients ophthalmic artery arises not from internal carotid artery but from middle meningeal artery.

P.LBernsen[12] reported a case of delayed facial nerve palsy after local upper dental anaesthesia . He postulated the theory of retrograde flow of LA to petrosal artery which supplies the sheath of facial nerve.

Nicholas D Frevan et al[13] in cadaveric study stated that improper placement of the needle could lead to damage of pterygoid plexus or local anaesthetic will reach the inferior portion of the parotid gland anaesthetizing the cervicofacial division of the facial nerve.

In our 2nd case delayed facial palsy could result from sympathetic vascular reflex[6] or from effect of aromatic alcohols on the nerves. These aromatic alcohols are sometimes formed by alternative pathways for the breakdown of local anaesthetic solutions leading to prolonged nerve damage.[8,9,10] Although predicting the possibility of above mentioned complications is virtually impossible but still prevention is better than cure.

The following guidelines can be helpful to avoid and manage these rare complications:

1. Take detailed history with special emphasis on previous extractions.
2. Use small gauze and size needle.
3. Careful Aspirate in minimum two directions.
4. Inject slowly with least possible pressure.
5. The patient have to be reassured about transient nature of these complications.
6. The affected eye has to be covered with dressing.
7. Patient should be escorted by responsible adult.
8. Patient must take ophthalmic consultation in case complications last for longer than five hours.

CONCLUSION

The clinicians should be aware of all possible complications and their management. Even the etiology can only be speculated with some degree of confidence based on sound knowledge of anatomical structures and pathways. Most of these complications are temporarily. They can be revert back to normalcy after anaesthetic affect wears off. Prompt diagnosis and appropriate management prevents permanent nerve damage.

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