

Case Report

## Contralateral Ocular Complication Following Dental Local Anaesthesia

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### ABSTRACT

**Background:** One of the most important aspects of dental surgery is the injection of local anesthetics, which control pain. Local anesthetics are administered close to certain nerves or fibers to block nerve transmission. Intraoral administration of local anesthetics, on the other hand, can affect other nerves, resulting in complications in the outside of the oral cavity. Ophthalmic problems are uncommon, accounting for about 0.04 to 0.1% of all complications. **Purpose:** The purpose of this case is to discuss the unusual case of contralateral ocular complication following dental local anaesthesia. **Case:** We reported a 41 years old Malay male came to Kuching Armed Forces Dental Clinic for his appointment on surgical removal of impacted left lower wisdom tooth. After the minor oral surgery procedure under local anaesthesia has been done, the patient had a twitching right eye. **Case Management:** The patient's vital signs were checked to rule out the possibility of a stroke or anaphylactic shock. The patient was a sure to be calmed, laid down, and put cold compresses on both eyes with dim lighting. After 45 minutes of review, the patient was allowed to leave, followed by a two-week post-minor surgery check-up. **Conclusion:** Risk of complications from local anaesthesia can be reduced with the effective patient evaluation and anxiety management, correct injection technique, and sufficient knowledge of dental local anaesthesia.

**Keywords:** local anaesthesia; twitching; contralateral; ocular; medicine; dentistry

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### INTRODUCTION

One of the most important aspects of dental surgery is the injection of local anesthetics, which control pain. Local anesthetics are administered close to certain nerves or fibers to block nerve transmission. The nerve connected to the maxillary and mandibular divisions of the trigeminal nerve is the nerve most commonly anesthetized in dentistry (cranial nerve V).<sup>1</sup> Intraoral administration of local anesthetics, on the other hand, can affect other nerves, resulting in complications in the outside of the oral cavity.<sup>1-4</sup> Ophthalmic problems are uncommon, accounting for about 0.04 to 0.1% of all complications.<sup>1,5</sup> The most common complications are diplopia (double vision), amaurosis (temporary blindness), enophthalmos (recession of the eyeball within the orbit), ptosis (droopy eyelid), and mydriasis (pupillary dilation).<sup>3</sup> In the majority of cases, the effects were felt almost immediately after the local injection and lasted for less than several hours.<sup>6</sup> However, only a few cases of permanent complications have been reported in the literature.<sup>7</sup>

This report presents primarily a case involving a patient who experienced fasciculation or hemifacial spasm and subsequent contralateral eyelid closure. The anatomy and

physiology of the orbital and its surrounding soft tissues, as well as pathophysiological explanations for this unusual occurrence, are discussed. It is critical for the dentist to be conscious of such consequences in order to reliably diagnose and manage them and, if necessary, refer patients as soon as possible.

### CASE

A 41-year-old Malay male arrived at Kuching Armed Forces Dental Clinic for his appointment on surgical removal of an impacted permanent lower left third molar (#38). As a member of the aircrew, the patient's previous dental history included frequent visits for dental check-ups; therefore, an annual check-up is required. Before the odontectomy procedure, patient was informed to do the panoramic dental radiography (Figure 1). Mesially impacted #38 should be removed to prevent further caries on the distal of #37 and to restore it (Figure 2). The patient agreed to have the minor surgery performed under local anesthesia and has been informed of all risks and consequences of the treatment.



**Figure 1.** The Panoramic Dental Radiography shown the permanent lower left third molar (#38) position.



**Figure 2.** Surgical removal of an impacted permanent lower left third molar (#38).

The patient appeared fine and calm before receiving local anesthesia. He was given instructions on diaphragmatic breathing, raising his hands whenever he is uncomfortable or in pain, and relaxation techniques. To anesthetize the inferior alveolar nerve (IAN) and provide surgical access to tooth #38, the anesthetic solution was injected to the left side of the mouth.

With self-aspirating syringes, an IAN block of (Xylocaine<sup>®</sup> with epinephrine) 2.2 ml of 2 percent lignocaine hydrochloride and 1:100 000 adrenaline solution was injected, including local infiltration on the buccal of #38. The patient's sympathetic response was observed but not increased during the procedure. The patient experienced increased numbness in the left face, left side of the lips, and tongue shortly after the injection.

## CASE MANAGEMENT

Szmyd described gaining access to the impacted #38 through a standard envelope flap (200). A mesial distobuccal incision was made from the external oblique ridge to the distobuccal sulcus of the second molar (#37). The incision was then extended anteriorly along the buccal sulcus of the

#37, including the papilla between the #36 and #37, and ended at the mesio-buccal aspect of the first molar (#36). To enable adequate flap retraction, a buccal mucoperiosteal flap was raised to allow for the subperiosteal placement of the Kocher-Langenbeck retractor. The #38 was raised with a #1 coupland and extracted with a forceps. Three interrupted resorbable (Vicryl 4/0) sutures were used to close the wound: a vertical interdental suture to position the papilla between #36 and #37, a vertical suture on the distal of #37, and a horizontal mattress suture in the distobuccal area of the incision.

Unusual reactions from the periorbital facial muscles of the contralateral orbit indicated that his right eye could not stop twitching. Hemifacial spasm, or continuous closing and opening of the eyelids, is the cause of this response. Lacrimation is also seen, and there is little photosensitivity. Nonetheless, facial skin color remained stable, speech and mental acuity were not affected, and no other focal neurological indications were seen.

Next, the patient is given cold compresses for both eyes, performed in a supine position with dim lighting. During the procedure, vital signs are monitored to keep them stable. After about 15 minutes, the contractions subside, and 30 minutes after the eye twitches, the muscle reaction completely stops. After about 45 minutes of observation, the patient was discharged because he had no symptoms and was medically stable. A review of the patient was carried out after two weeks and there were no other symptoms of concern. The patient has given his permission for this case to be written, kept, presented, or published for learning and treatment improvement, but his name must not be mentioned.

## DISCUSSION

Due to the severe various delivery mechanisms and proper site selection, various oral surgical and rehabilitative applications for pain control are possible. Each technique uses a specific level of sensitivity at each site.<sup>8</sup> Patients with systemic conditions such as hypertension or hypotension, cardiovascular disease, renal impairment, or liver failure

may experience significant or even fatal outcomes if the dose exceeds the prescribed limits.<sup>9</sup> Furthermore, the composition of different anesthetic solutions, as well as their effects on tissues, result in multiple clinical procedures that should not be underestimated in their management.<sup>10,11</sup>

When there are ocular or neurologic complications, a local anesthetic drug is frequently administered inaccurately.<sup>8</sup> Deep posterior local administration (e.g., anaesthetizing the facial nerve encompassed by or next to the parotid gland in some cases), indirect intravascular/arterial injection or general diffusion of the local anaesthetic agent into the orbit can all affect cranial nerves.<sup>12</sup> Transient paralysis (nerve paralysis) of the periocular muscles following direct administration of the drug into the parotid gland affecting the seventh cranial (facial) nerve is one of the most common complications.<sup>13</sup> The effects can be observed immediately or relatively late.<sup>8</sup>

In a case reported by Tzermpos et al.<sup>14</sup>, A healthy 20-year-old female has unusual symptoms 24 hours after being given Articane hydrochloride 4% with 1:100000 adrenaline. The symptoms completely disappeared in the same patient after eight weeks of appropriate treatment and follow-up. Amaurosis (temporary loss of vision caused by ischemia) is a rare but very worrisome complication for both the patient and the clinician.<sup>8</sup> It usually occurs following an intra-arterial injection of local anaesthetic combined with a vasoconstrictor, which causes spasm of the central retinal artery and some other blood vessels.<sup>12</sup>

Intravenous and intra-arterial injection of local anesthetics can cause adverse and toxic drug reactions even when administered correctly.<sup>8</sup> Allergies, overdose, and idiosyncratic reactions are common reactions.<sup>13</sup> An exaggerated immunological response is rare in cases of allergic hypersensitivity, including only about 1% of all adverse reactions to local anesthetics being reported worldwide.<sup>15</sup> Among the symptoms are fever, urticaria, angioedema, dermatitis, and photosensitivity, in some cases, may result in anaphylaxis.<sup>8</sup> After injection of local anesthetic into the blood circulation system, the normal pharmacological reactions of the drug usually extend to the tissues and organs of the body, including the brain (central nervous system) and heart.<sup>8</sup> Mild to moderate overdose is characterized by talkativeness, restlessness, and possibly twitching, disorientation, dysarthria, dizziness, loss of consciousness, bradycardia and respiratory depression, tonic-clonic seizures, and possible respiratory and cardiac arrest.<sup>16</sup>

Contralateral hemifacial spasm can be caused by anesthetic solution distributed contralaterally via anastomoses across the median plane, as seen in this case where the IAN block was administered on the left side but eye twitching occurred on the right side. The circle of the Willis arteries in the brain provides a cross anastomosis in the arterial system by connecting the right and left internal carotid vessels, which form the ophthalmic artery. The orbital structures, including extraocular muscles, are supplied by the ophthalmic arteries.<sup>8</sup> The inferior alveolar artery was injected with direct blood flow from the inferior

alveolar artery to the internal carotid artery via the maxillary and external carotid arteries.<sup>8,13,17</sup>

Anesthetic solution movement in the anastomosis or vein that reaches the local tissue surrounding the facial muscles can cause contralateral eye twitching on the injected side. The delicate terminal branches of the facial nerve have a thinner perineal and connective tissue sheath, so even though the anesthetic concentration in the injected local tissue is quite low, it may still be effective. As a result, the anesthetic will have a better pathway to the axolemma's sodium channels. However, it is still unidentified why the patient's facial spasm did not develop ipsilateral to the side of the IAN block closest to the injection site.<sup>8</sup>

A second possibility is that the anesthetic solution has a central effect on the motor cortex ipsilateral to the IAN block, resulting in contralateral muscle dysfunction.<sup>8</sup> According to Malamed (2013), the flow can be reversed from the external carotid artery, most of the anesthetic will be delivered to the middle cerebral artery, which is the larger of the two terminal branches of the internal carotid artery. The middle cerebral artery supplies blood to the motor cortex in the brain.<sup>13</sup> Injection of a local anesthetic into the left motor cortex ipsilateral to the injection site can cause an imbalance in the function of the cranial nerves on the contralateral side.<sup>8,13</sup>

A delicate sympathetic plexus surrounds each artery. The trauma caused by the anesthetic needle scraping against the inferior alveolar or posterior superior alveolar artery wall generates an impulse that travels from the maxillary artery plexus to the ocular artery via the deep petrosal nerve and internal carotid plexus.<sup>7</sup> This hypothesis is supported by the observation of blanching in some circumstances.<sup>18</sup> In their case, Campbell *et al.* speculated that diffusion through the fascial planes may have mistakenly obstructed the stellate ganglion.<sup>19</sup> This process could account for some cases of miosis and enophthalmos.<sup>20</sup>

Once an ocular complication has occurred, Ravi (2016) and Boynes' (2010) recommendations should be followed.<sup>1,7</sup> The first thing to do is reassure the patient. Because the patient's monocular vision complicates distance assessment, the affected eye can be covered with gauze until symptoms subside, and the patient should be taken home. If the symptoms do not subside for more than six hours, they should be advised to consult an ophthalmologist. While there is no danger in accomplishing the surgery, if the patient is concerned, it may be best to postpone it until the next appointment.

## CONCLUSION

Although ocular problems from local anesthetic injections in dentistry are uncommon, they should not be overlooked. The majority of ocular problems are transient and can revert to normal once the anesthetic effect wears off. Ocular issues should be fully understood by dental surgeons, as well as their prevention and early management. Comprehensive clinical evaluation was needed to ensure effective

anaesthesia can all assist clinicians in lowering the risk of such complications. If ocular abnormalities persist after anesthetic wears off, a referral to an ophthalmologist is recommended. Permanent ocular damage can be avoided with early diagnosis and treatment.

## ACKNOWLEDGMENT

The author would like to thank the Dental Services of the Malaysian Armed Forces for the opportunity and kind support for this study.

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