OCULAR COMPLICATIONS DUE TO INTRAORAL LOCAL ANESTHESIA: A CASE REPORT

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ABSTRACT:
Intraoral local anesthesia is a common dental procedure. It may often be accompanied by general complications, some of which may be ophthalmological, like: diplopia, ptosis, mydriasis, amaurosis, strabismus [1]. We report the case of a 67-year-old female patient who suffered an extraction of the left maxillary second molar and after intraoral local anesthesia administration she noticed the onset of diplopia, due to left lateral rectus muscle palsy. Ocular complications may occurs during intraoral local anesthesia, which are most of the times remitted and leave no visual sequelae.

Key words:intraoral local anesthesia,diplopia, lateral rectus muscle palsy.

INTRODUCTION

Local anesthesia administered for dental conditions involves many systemic and local risks. Among local complications we may includ: separation of the needle, hyperestesia or burning sensation during anesthetic injection, persistent paresthesia, hematoma formation, which may cause trismus or infection, sloughing of tissues, postanesthetic intraoral lesions and self-inflicted soft-tissue trauma [2].

Distant complications to the eye have been reported more frequently than middle-ear problems [3]. The patients experienced visual or motor impairment after a posterior superior alveolar or an inferior alveolar anesthetic injection [3].

Ocular complications of dental anesthesia are rare, making up about 0.04% to 0.1% of all complications [4,5].

Penarrocha and Sanchis (2000) reported only 14 patients with ophthalmological complications in 50.000

intraoral anesthesia cases treated during a 15-year period (0.03 %) [6].

The first case of ocular complication after intraoral anesthesia was reported by Brain in 1936. He described an unusual case of permanent oculomotor palsy that developed 2 days after a maxillary incision extraction [7].

Cooper reported a woman who developed transient amaurosis followed by diplopia and Horner–like manifestation in 1962 [8].

According to Von Arx, diplopia was the most common (39.8%) among the 108 documented cases of ophthalmological complications. Ptosis (16.7%), mydriasis (14.8%) and amaurosis (13.0%) was less common [9].

Ophthalmologic complications are rarely reported, since most of the times they are transient and the patient is not subsequently referred to an ophthalmologist.

CASE REPORT

We report here the case of a 67-year-old female patient who came to the dentist for a left maxillary second molar extraction. The patient had been informed of the possible complications of the procedure.The intraoral local anesthesia was injected in the left posterior superior alveolar nerve (1.8 ml of 2% lignocaine with a dilution of 1:80000 adrenalin) for the left maxillary second molar extraction.After 10 minutes, the patient complained of blurred double vision due to the left lateral rectus muscle palsy.The extraction was carried out without any other events and after about 2 hours the ocular symptoms were remitted. The patient was referred to an ophthalmologist who did not detect any pathological eye modifications.

DISCUSSIONS

Intraoral local anesthesia is the most common dental procedure [10] and it may be accompanied by various ocular complications due the anesthetic injected either in the lower or upper jaw [11]. This is done by blocking the inferior alveolar nerve (54.2%) or the posterior superior alveolar nerve (30%).

Systemic complications of anesthesia may be due to intravascular anesthetic injection, drug overdose, fast absorption, delayed biotransformation, slow elimination, vasovagal syncope, allergies and anaphylactic reaction [2,12-15].

Ocular complications following local dental anesthesia are uncommon and the frequency is estimated to be 1 in 1000 [16]. Diplopia is the most common ophthalmological complication reported in literature [11].

Other common ocular complications of dental anesthesia are: amaurosis [17-20], mydriais [6,19,21-25], ophthalmoplegia [19,23], ptosis [6,19,21,23,26,27], enophthalmos [6,28], loss of accommodation [2,29,30].

In case of eye complications, the guidelines recommended by Lu, Van der Bijl and Baynes should be followed [11,28,30,31].

The first and most important step is to reassure the patient. The impaired eye should be covered with gauze until the symptoms are diminished or remitted, the patient should be accompanied home, since monocular vision prevents the patient from accurately estimating distances.

If the symptoms last more than 6 hours, the patient must be referred to an ophthalmologist. In many cases, and also in the case reported here, the dentist continues the treatment, despite the eye symptoms. Nevertheless, the dentist should take into consideration the patient’s anxiety and the

treatment should be postponed at a later visit [11].

The intraoral local anesthetic is administered through an injection cannula of 24-25 gauge (approximately 0.5 to 0.6 mm of external diameter) or of 27-28 gauge (approximately 0.4 mm of external diameter)[9]. Here are the intraoral anesthetics used: lidocaine (68%), articaine (18.5%), procaine (5.8%), mepivacaine (5%), xylocaine, prilocaine (1.6%) and buthemine (0.8%) associated in most cases (90.7%) with vasoconstrictor (epinephrine in a dilution of 1:100000 (64.7%) [11].

Paralyses of the cranial nerves, which innervate the eyeball muscles, i.e. oculomotor (CNIII), trochlear (CNIV) and abducens (CNVI) nerves, were the most common complications involving the eye socket [2,18,29,32-36]. The CNVI emerges from the brainstem between the pons and bulbar pyramid. It courses behind the anterior inferior cerebellar artery and enters the cavernous sinus leaving the skull through the medial and of the superior orbital fissure as it enters the orbit, running on and penetrating the medial surface of the lateral rectus which abducts the eye [37,38] (Fig.1,2).

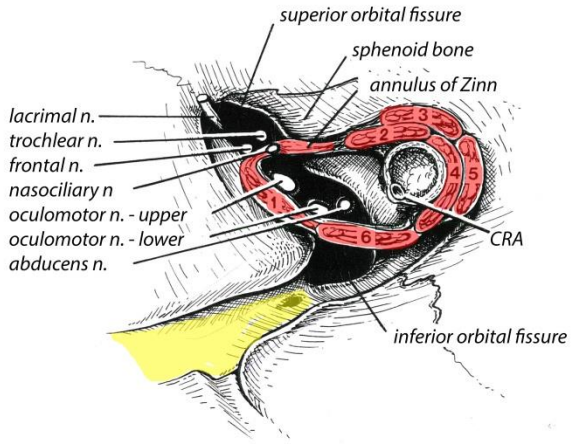

Fig.1. Stylized representation of the orbital apex.The oculomotor nerve; the abducens nerve; the central retinal artery; the optic nerve all enter within the tendinous ring.

1- Lateral rectus muscle
2- Superior rectus muscle
3- Levator palpebrae muscle
4- Medial rectus muscle
5- Superior oblique muscle
6- Inferior rectus muscle [39].

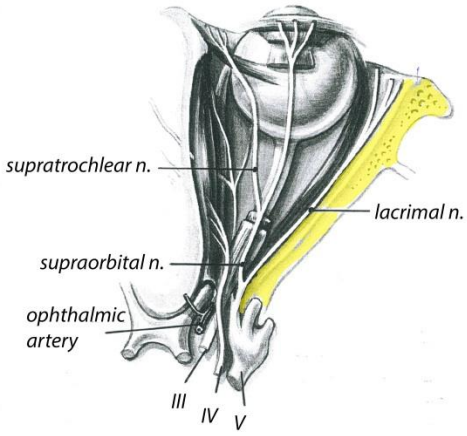

Fig.2.The orbit is shown from above.The oculomotor nerve and the trochlear nerve enter the orbit through the superior orbital fissure. The lateral rectus muscle is in close proximity to the lateral orbital wall

(after Grizzard WS. Ophthalmic anesthesia. Ophthalmology Annual, 1989, ed. Reinecke RD, Raven Press,NewYork,1989,

p.268,271) [39].

The ophthalmic branch of the middle meningeal artery may connect to the lachrymal artery supplying the right lateral muscle and the anesthetic may reach it and paralyze it. Right lateral muscle paralysis is the most common [11]. The meningeal accessory artery has terminal branches with cavernous sinus [16]. The cranial nerves III,IV,V are located within the sinus and may be anesthetized, being carried into the cavernous sinus, the result being the paralysis of the other extraocular muscles. The paralysis of the IIIrd nerve also produces mydriasis, ptosis and loss of accommodation [11].

Ocular complications after middle or posterior superior nerve block are twice more common than inferior alveolar nerve block. The posterior superior alveolar nerve is a branch of the maxillary division of the trigeminal nerve arising in the pterygopalatine fossa just before it enters the infraorbital canal. The posterior superior nerve bock is mainly given to achieve anesthesia of maxillary molaris (except for the mesiobuccal root of the first molar and surrounding structures) [1].

The neuro-ophthalmological manifestations triggered by oral anesthesia are due to the following mechanisms [25]:

1) simple diffusion from the pterygopalatine fossa to the orbit through defects in the bone or via the vascular lymphatic and venous networks that link these spaces [29,36].

2) inadvertent injection into the orbit through the inferior orbital fissure [40].

3) inadvertent intra-arterial injection into the superior alveolar artery with retrograde flow to the internal maxillary artery and then to the middle meningeal artery [17,41].

4) inadvertent venous injection into the pterygoid venous plexus [29,31].This plexus communicates with the inferior ophthalmic vein through the inferior orbital fissure [29,31,35].

5) inadvertent scraping of the wall of an artery; the trauma sets up a sympathetic impulse that travels from anterior middle or posterior superior alveolar arteries back to the internal carotid plexus and from there through the ophthalmic artery to the orbit [21].

Rood reported a case in whom 1.5 ml of lidocaine with epinephrine (1:80.000) was injected into the inferior alveolar nerve and the patient experienced vision impairment in the ipsilateral eye, palpebral ptosis and medial strabismus. The patient also experienced palatal mucosa ischemia. Nevertheless, the symptoms remitted after 5 to 45 minutes [32].

Magliocca *et al.* (2006) described the case of a 36 year-old female patient who developed dioplopia and an ipsilateral lateral rectus paresis following anesthetic administration to remove a left maxillary second molar; complete resolution occurred within 3 hours [37].

Jose-Maria Aguado-Gil *et al.* (2011) carried out a review of 19 articles to detect the incidence and type of ocular complications after intraoral local anesthesia. They found out diplopia was the most common complication (65%) and almost all the complications were of a temporary nature with an average recovery time of 68 minutes. The authors appear to indicate that an intravascular injection of anesthetic was the cause of the problem [5].

Stenen *et al.* (2012) reported the case of a patient who experienced right lateral muscle palsy and blurred vision after bimaxillary anesthesia [16].

In our case, diplopia due to left lateral rectus muscle palsy set in about 10 minutes, after intraoral local anesthetic

injection in the left posterior superior alveolar nerve and its effect disappeared after 2 hours.

Lateral rectus muscle palsies may also be due to the over-insertion of the needle during a posterior superior alveolar nerve block, when the anesthetic passes from the pterygopalatine fossa into the eye socket via the inferior orbital fissure. The abducent nerve lies nearest to the fissure and hence the most commonly affected muscle is the lateral rectus, which accounted for 66.6 % of all palsies [42].

The use of long anesthetic needles may be one of the factors which cause these incidents.

Kini *et al.* stated that they used an 1.5 inch (38 mm) needle [27].

Lateral rectus muscle palsies was probably due to anesthetic diffusion in the orbit. Within the orbit, the solution would have to diffuse through fat and fascia. The higher proportion of lateral rectus muscle palsies within diplopia cases after maxillary nerve anesthesia might be explained by the especially vulnerable position of the abducens nerve, lying on the surface of the lateral rectus muscle in the orbital apex [16].

In case of eye complications, the patient's vital signs, consciousness level, eyeball movements, vision, facial muscle movement and blanching should be assessed in order to set a final diagnosis. The patient should be informed that such complications are possible [38].

As far as the patient is concerned, these incidents may be very alarming. The doctor, if he/she is not acquainted with these types of complications, may fail to diagnose such an incident [43] and may even attribute it to a more serious event, like a transient ischemic attack [11,44].

It is therefore vital that the doctor understand the etiology and pathogenic mechanism of these complications [11].

CONCLUSIONS

Ocular complications may occur during intraoral local anesthesia even to the most experienced dentists. The conduct in these cases consists of procedure delaying, depending on the severity of the situation, and of referring the patient to an ophthalmologist in order to document and treat the complications detected.

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