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Case Study

Trigeninocardiac Reflex and Your Implication on Oral and Maxillofacial Surgery

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Abstract

Background: The trigeminal cardiac reflex (TCR) is a rare complication associated with maxillofacial surgeries. The occurence of this complication is asscociated with excessives manuevers of the stimulus on trigeminal nerve (pression and manipulation of soft and hard tissue on maxillofacial region). The clinical manifestation of the TCR is associated to hemodynamic disturbance and heart rate alteration, may range from lost of conscious to assistole.

Objective: The aim of this paper is review the mains risk factors associated with development of TCR, describe the pathway, treatment, prevention and make awake of surgeons about the occurrence.

Conclusion: The maxillofacial surgeon should know the possibility to develop the TCR, because only this way is possible the prevention and when of necessity, the treatment.

Keywords: *Trigeminal Cardiac Reflex (TCR); Vasovagal Syncope (VS)*

Introduction

Transient loss of consciousness or vasovagal syncope (VS) is well known phenomenon during the procedure of maxillofacial surgery [1]. The cause of VS is sumarized in three types of ‘‘interruption” in which: (1) loss of consciousness is temporary; (2) recovery is spontaneous, prompt and complete; and (3) the cause is insufficiency of cerebral nutrient supply [2]. On the other hand, the trigeminocardiac reflex (TCR) earlier known as ‘‘oculocardiac reflex” is a another similar phenomenon, also occurs with surgeries around the oral cavity under general or local anesthesia leading to vagal stimulation. TCR is a brainstem reflex that manifests as sudden onset of hemodynamic perturbation in blood pressure (MABP) and heart rate (HR), as apnea and as gastric hypermotility during stimulation of any branches of the trigeminal nerve [3].

When The TCR occurs during local anesthetic procedures, it mimics a VS [1]. This phenomenon can produce bradicardia and asistole during the surgery; this reflex occur due estimulation os afferent pahtway of trigeminal nerve. It’s khown that many procedure can stimulate the trigeminal nerve and can produce the TCR, like maxillary osteotomy [4], bilateral splint sagital osteotomy, skull-base interventions [5-7], minor oral surgery [1], increase intraocular pressure and strabismus surgery, reduction of zygoma and zygomatic arch fractures, temporomandibular joint arthroscopy [8], nasal packing after rhinoplasty [9,10], but independetly of many possibility, the surgeon is already to treatment of this situation?

Anatomic Consideration

The TCR is directilly related wih the stimulus of afferent pathway of the trigeminal nerve, indepedent of dividions (V1, V2 or V3). The afferent fibers go to Gasserian ganglion and then joins to main sensory nucleus of the trigeminal nerve. In this ganglion, we found reticular fibers (internucial fibers) that connect to the efferent pathway, which originates in the motor nucleus of the vagus nerve that inerve the myocardium [4] (Figure 1). In ocasion, when the fibers are stimulated, the internucial fibers block the impulse, suppressingon of sympathetic to heart, fall in all total peripheral resistance due to arteriolar dilatation teads to hypotention, and because this occur the bradicardia or/and asistole during the maxillofacial surgeries.

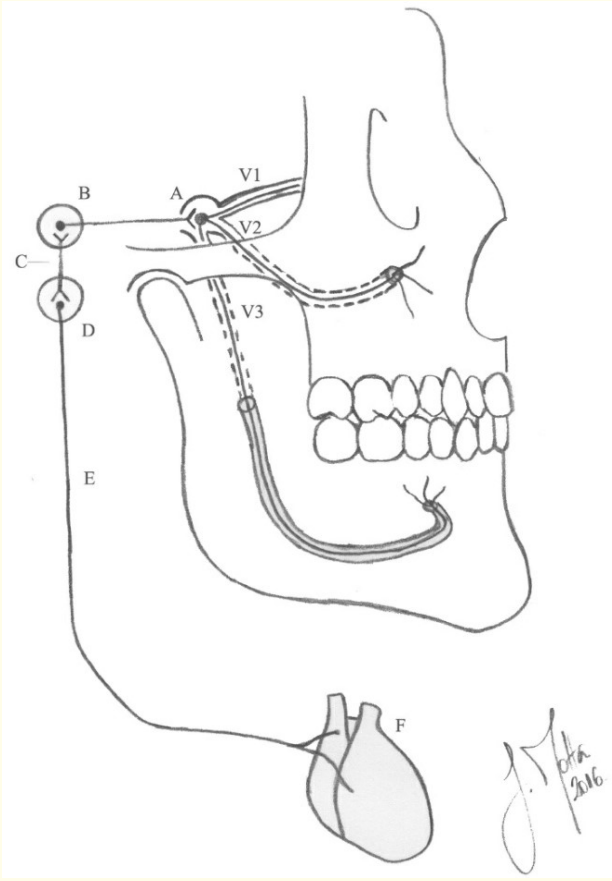

Figure 1: *Pathway of the TCR. V1: Ofthalmic Nerve; V2: Maxillary Nerve; V3: Mandibular Nerve; A: Gasserian Ganglio; B: Sensory Nucleus of the Trigeminal Nerve; C: Internuncial Fibers; D: Motor Nucleus of the Vagus Nerve; E: Vagus Nerve (Heart Branch); F: Heart.*

Clinical Management

The first step is monitoring and observation of the cardiac rhythm during the surgeries, its turn possible the detection of bradycardia or assistole [4]. Ocorrence of TCR during surgeries under local or general anesthesia may be associated to excessive pressure and

manipulation of hard tissue, nerve tissue or both.The management to TCR is remove the stimulus immediatily (traction on tissue soft and hard should be released) and treatment of simptoms; bradicardia with monitoration, assistole with cardiac massage, hypotension with Trendelenburg's position. In severe cases, when the spontaneous return is not achieved, the use of atropine also too indicate. When this treatmen isnt effective and in case of failed the reestablish cardiac output, cardiac massage should be started immediately [11].

Some clinicals situations have predisposition and triggers factors to develop TCR like hypercarbia, hypoxemia and insuficiente anesthesia [8]. Also, some pharmacological agentes can produce potential predispodition to TCR like narcotics, sufentanil, beta-blockers and calcium channel blockers [8]. Besides, it is well know that TCR is more pronouncedly in children because to the resting vagal tone [8,12]. The knowledge about predisposition and triggers factors is the first factor to know, and some times the signs and simptom are the same of VS [1] like hypotension, bradicardia.

Prevention

The main prevention TCR is avoid all procedure that can develop the reflex, but some times its impossible, mainly because of almost procedure in oral and maxillofacial could stimulet the trigeminal nerve. Because this, the monitoring and observation of the cardiac rhythm is very important, mainly in procedures that notoriously should start the TCR; the knowledgement of trigger factors is very important too and the use of some especifics drugs that can reduce the stimulation of trigeminal nerve and the TCR (local anestesia, atropine, antocolinergics) is mandatory.

Discussion

The TCR has been described on several cases in different kind of maxillofacial operations [13]. The bradycardia and asystole that occurs on TCR is considered due to stimulation of structures innervated by the trigeminal nerve. In spit of reflex in eye surgery are the same nerve (trigeminal), the term TCR have been proposed to describe no ocular surgeries.

The TCR is most common in surgeries under general anesthesia, but when this occur under local anesthesia [14], its mimic the VS, with development of hypotension and bradycardia associated with some clinical manifestation of pallor, sweating and weakness resulting in faiting or syncope, the unique diferença between VS and TCR is absence of a "diphasic response" (increase of heart rate and blood pressure followed by bradycardia and hypotension) [1,14], and this signs its very fast and difficult to assess. Independently of diagnosis, is very important for maxillofacial surgeons to be familiar with the possibility that occurs TCR or VS in your treatments.

The most commum surgeries associated with TCR are midface disimpaction, elevation of zygomatic arch fracture [13,15,16], surgery to ankylosed temporomandibular joint [11], treatment of nasoethmoidal fractures [17], but although the most recurrent procedure associated with TCR, any stimulus on trigeminal nerve can produce the reflex, like a extraction of teeth [1]. The ocurrence of TCR during extractions can be associated beside of nerve manipulation, with some excessives manuevers (pression and manipulation of hard tissue) to do the extraction [1].

In despite of the possibility of occurs the TCR in local anesthesia, we need pay attention on inadequate or failure of local anesthesia. If we considerer that the pathway of impulse to stimulate the TCR is the same of VS, when we don't a good anesthesia , the nerve will be stimulated and the reflex would occur, and this increade the risk factor.

Conclusion

Knowing and familiarity of the TCR and the main area possible to start this reflex make surgeon and anesthesiologist more awake to vigilance to contínuos and meticulous cardiac rhythm monitoration.

Bibliography

1. Arakeri G and Arali V. "A new hypothesis of cause of syncope: trigeminocardiac reflex during extraction of teeth". *Medical Hypotheses* 74.2 (2010): 248-251.

2. Benditt DG and Nguyen JT. "Syncope. Therapeutic Approaches". *Journal of the American College of Cardiology* 53.19 (2009): 1741-1751.

3. Meuwly C., *et al*. "Trigeminal Cardiac Reflex". *Medicine (Baltimore)* 94.5 (2015): e484.

4. Campbell R., *et al*. "Asystole and bradycardia during maxillofacial surgery". *Anesthesia Progress* 41.1 (1994): 13-16.

5. Jaiswal AK., *et al*. "Trigeminocardiac reflex: A cause of sudden asystole during cerebellopontine angle surgery". *Journal of Clinical Neuroscience* 17.5 (2010): 641-644.

6. Schaller BJ., *et al*. "Detection and prevention of the trigeminocardiac reflex during skull base surgery". *Acta Neurochirurgica* 149.3 (2007): 331.

7. Prabhakar H., *et al*. "Sudden asystole during surgery in the cerebellopontine angle". *Acta Neurochirurgica* 148.6 (2006): 699-700.

8. Bohluli B., *et al*. "Trigeminocardiac reflex. A MaxFax literature review". *Oral Surgery, Oral Medicine, Oral Pathology, Oral Radiology, and Endodontics* 108.2 (2009): 184-188.

9. Ozcelik DM., *et al*. "The Importance of the Trigeminal Cardiac Reflex in Rhinoplasty Surgery". *Annals of Plastic Surgery* 75.3 (2013): 213-218.

10. Jayaraman L., *et al*. "Modification of the gum elastic bougie [19]". *Anesthesia and Analgesia* 103.5 (2006): 1336-1337.

11. Precious DS and Skulsky FG. "Cardiac dysrhythmias complicating maxillofacial surgery". *International Journal of Oral and Maxillofacial Surgery* 19.5 (1990): 279-282.

12. Schaller B. "Trigeminocardiac reflex. A clinical phenomenon or a new physiological entity?" *Journal of Neurology* 251.6 (2004): 658-665.

13. Gillespie IA. "Bradycardia during elevation of zygomatic fractures". *Anaesthesia* 43.7 (1987): 608-609.

14. Arakeri G and Brennan Pa. "Trigeminocardiac reflex: potential risk factor for syncope in exodontia?" *Journal of Oral and Maxillofacial Surgery* 68.11 (2010): 2921-2922.

15. Bainton R and Lizi E. "Cardiac asystole complicating zygomatic arch fracture". *Oral Surgery, Oral Medicine, Oral Pathology* 64.1 (1987): 24-25.

16. Loewinger J., *et al*. "Bradycardia during elevation of a zygomatic arch fracture". *Journal of Oral and Maxillofacial Surgery* 45.8 (1987): 710-711.

17. Baxandall ML and Thorn JL. "The nasocardiac reflex". *Anaesthesia* 43.6 (1988): 480-481.

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