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### Case Report

# TRIGEMINO-CARDIAC REFLEX IN BILATERAL TEMPERO-MANDIBULAR JOINT ANKYLOSIS SURGERY: A CASE REPORT

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## ABSTRACT

The trigemino-cardiac reflex is the sudden onset of dysrhythmia and hypotension during manipulation of any of the branches of the trigeminal nerve and it may manifest as bradyarrhythmias, proceeding to asystole or asystole directly. In this case report we present a patient of bilateral TMJ ankylosis who experienced bradyarrhythmias following insertion of Hister's mouth gag to access the oral cavity by dental surgeons.

**Keywords:** Trigemino-Cardiac Reflex, Dysrhythmia, TMJ Ankylosis, Hister's Mouth Gag, Mouth.

## CASE REPORT

A 13 year old female patient having bilateral TMJ ankylosis secondary to trauma at the age of 2 years, was referred to the preanesthetic clinic. She was unable to open her mouth, totally and was thereby only drinking liquids to sustain herself. She was underweight (weight 35 kg) and poorly nourished for her age group. Her parents were uneducated and financially unsound, and did not seek medical attention till their daughter's health was drastically compromised. She was planned for bilateral resection of the ankylotic mass at the TMJ. The patient did not have any medical risk factors. Laboratory workup and chest roentgenogram were normal. Her baseline hemoglobin was 12.5 gm%, however blood grouping and cross matching was done. She reported no allergies or any major hospitalizations in the past. Examination of the airway revealed absolutely no mouth opening. The Modified Mallampatti grade could not be assessed, however the thyromental distance was three fingers. As a result of the above, she was anticipated to have a difficult Airway, with respect to both, mask ventilation and intubation. She was planned and prepared for fiberoptic intubation (Nasal route). She was explained on the night before about the procedure and the need for her cooperation for securing airway, to which she agreed and consented. On the day of surgery after checking her vitals, an intravenous line was secured in the receiving room. At this point she became inconsolable and frightened at the prospects of surgery despite repeated reassurance.

Accordingly she was pre-medicated with glycopyrrolate 0.2mg IV and ketamine 25mg IV, to preserve spontaneous ventilation and calm her. After this she was taken in the OR and monitors as per ASA standards were applied (ECG, SpO<sub>2</sub>, NIBP, EtCO<sub>2</sub> and Temperature probe after intubation). Trans-tracheal block was performed under aseptic precautions, using 2ml of 2% lidocaine. Patient was induced with halothane and oxygen, maintaining her spontaneous respiration. When sufficient depth was attained, fiberoptic bronchoscopy was performed through the nose, and an endotracheal tube (ID 6.5mm) was rail-roaded over the scope after entering the trachea. The tube position was confirmed with EtCO<sub>2</sub> and auscultation, following which anesthesia was deepened with boluses of fentanyl 50mcg up to 100 mcg and paralysis achieved with vecuronium 4mg. She was catheterized and urine output was monitored, along with other parameters during the course of the surgery. A slight head up position was given to reduce venous oozing. Anesthesia was maintained with oxygen, nitrous oxide and isoflurane titrated to depth of anesthesia. Intermittent boluses of vecuronium at about 30 to 45 minutes, were given to maintain adequate muscle relaxation. The patient was warmed with forced air warmer (Bair Hugger) and prewarmed intravenous fluids were used throughout surgery.

The dental surgeons started resection of the right TMJ ankylosis and after its resection, some mouth opening was possible. Hence they inserted Hister's mouth gag, and decided to resect the left ankylosis. Initially after inserting the gag,

when retraction was done to open the mouth, slight bradycardia occurred, which went unnoticed as the surgeons, went back to the right side to complete the job there and removed gag. However the second time, they inserted and retracted, there was significant bradycardia as the heart rate fell from 88 to 50 bpm, alerting the anesthesia resident. The surgeons were told to stop their intervention but this did not help, until they removed the gag and then only did the HR climb back to pre-normal levels. As surgery was to proceed intraorally, again the mouth gag was deployed resulting in similar autonomic response, but this time atropine was given, 0.6 mg. This led to a tachycardic response which was managed with increasing depth of anesthesia, and surgery could go on after the HR balanced out. From this period onwards, the anesthesia personnel and surgeons were keenly monitoring for bradycardia, which did occur but it was not so substantial (HR from 90 to 77 bpm).

The surgery lasted 7 hours and patient was given morphine nearly half way through the surgery for intraoperative and postoperative pain and also so that she should tolerate the tracheal tube in the SICU, as we did not plan to extubate her. Total blood loss was around 600 ml and was within the allowable losses and was replaced with crystalloids only. At the conclusion of the surgery muscle relaxation was reversed with neostigmine 2mg and glycopyrrolate 0.4mg IV, after the patient started breathing spontaneously. She was not extubated and was put on pressure support mode (with backup), in the SICU to preserve her spontaneous effort. She was sedated with morphine and midazolam “(M & M)” infusion overnight in the SICU. Next morning after stopping her M&M infusion she was assessed and put on a T-piece. Her blood gases were acceptable on T-piece and hence it was continued as the patient was comfortable and tolerating it well. She was fed through orogastric tube, inserted after surgery and was extubated on her third postoperative day. Post-surgery patient’s mouth opening was 4.5 inches and was discharged subsequently.

## DISCUSSION

Bradycardia during facial surgery has been described on several occasions for different operations of the head and neck<sup>1-14</sup>. The cause of bradycardia is considered by the most commentators, to be due to stimulation of structures innervated by the trigeminal nerve. The terms trigemino-cardiac & trigeminovagal reflex (TCR/TVR)<sup>2,3</sup> have been proposed and are interchangeable. The trigemino-cardiac reflex (TCR) is the sudden onset of parasympathetic dysrhythmias, hypotension, apnea, gastric hypermotility during stimulation of any of the sensory branches of the trigeminal nerve. The sensory nerve endings of the trigeminal nerve send neuronal signals via the Gasserian ganglion to the sensory nucleus of the trigeminal nerve forming the afferent pathway of the reflex arc. This afferent pathway continues along the short internuncial nerve fibers in the reticular formation to connect with the efferent pathway in the motor nucleus of the vagus nerve<sup>15</sup>. Clinically the trigeminovagal reflex can also be activated during craniofacial surgery, balloon compression rhizolysis of the trigeminal ganglion,

tumor resection in the cerebellopontine angle, insufflation of the TMJ for temporomandibular arthroscopy<sup>10</sup> and the use of mouth prop to mobilise ankylosed temporomandibular joint<sup>16</sup>. Activation of trigeminovagal reflex is sudden and unexpected. It has resulted in bradycardia<sup>1,3,4,7,9,13,14</sup> terminating in asystole<sup>4,6,7,8,11</sup> and asystole with no preceding bradycardia<sup>4,5,14</sup>. Asystole has been followed by bradycardia and has reverted directly to sinus rhythm.

In several cases the simple stoppage of surgery resulted in the recovery of a normal rhythm<sup>1,4,7,9,12</sup>. In other instances, anticholinergic drugs were used to increase the heart rate<sup>3-8,10,12</sup>. Some cases have been reported in which patients had recurrent bradycardia for a prolonged period despite injection of anticholinergic drugs<sup>4,10,12</sup>. One operation was halted due to recurrent severe bradycardia<sup>13</sup>. There is also one reported death probably following this reflex<sup>9</sup>.

A number of factors has been postulated to predispose patients to the trigeminovagal reflex. High sympathetic activity with parasympathetic stimulation, hypoxemia, hypercarbia and light anesthesia may aid in precipitating the reflex.

Knowledge of this, and subsequent monitoring is of prime importance in the detection and treatment of the resulting bradycardia or asystole. As soon as sudden bradycardia or asystole is detected, the surgery should be paused immediately and any traction on the soft tissues released. Usually cessation of the stimulus will enable the patient to regain a sinus rhythm. Anticholinergics can be given as the reflex is precipitated by parasympathetic stimulation. cardiopulmonary cerebral resuscitation (CPCR) should be reserved for cases where conservative measures have failed to reestablish cardiac output as there is serious morbidity associated with it<sup>17</sup>. Even after the initial treatment one should be vigilant throughout the surgery for further episodes of bradycardia, as they have been shown to recur with further stimulation.

## CONCLUSION

Maxillo-facial surgery may be associated with TCR, and the anesthesiologist and surgeons should be aware of this phenomena in order to respond to this reflex. This is akin to the situation in Laparotomies where we routinely notice vagal bradycardia due to peritoneal retraction and are vigilant for it. The former is a well-established and an accepted teaching, while TCR is still in its infancy with respect to awareness in anesthesia personnel. We therefore recommend that anesthesiologists be vigilant for TCR in Maxillo-facial surgeries.

## REFERENCES

1. Robideaux V. Oculocardiac reflex caused by midfacial disimpaction. *Anesthesiology* 1978; 49: 433.
2. Shelley MP, Church JJ. Bradycardia and facial surgery (letter). *Anaesthesia* 1988; 43: 422.
3. Bamard NA, Bainton R. Bradycardia and the trigeminal nerve. *J Cranio-Maxillo-Facial Surg* 1990; 18: 359-360.

4. Lang S, Lanigan DT, van der Wal M: Trigemino-cardiac Reflexes. Maxillary and mandibular variants of the oculocardiac reflex. *Can J Anaesh* 1991; 38: 757-760.
5. Ragno JR, Marcool RM, Taylor SE. Asystole during Le Fort 1 osteotomy. *J Oral MaxillofacSurg*, 1989; 47: 1082-1083.
6. Precious DS, Skulsky FG. Cardiac dysrhythmias complicating maxillofacial surgery. *Int J Oral MaxillofacSurg* 1990; 19:279-282.
7. Shearer ES, Wenstone R. Bradycardia during elevation ofzygomatic fractures. A variation of the oculocardiac reflex. *Anaesthesia* 1987; 42: 1207-08.
8. Bainton R, Lizi E. Cardiac asystole complicating zygomatic arch fracture. *Oral Surg Oral Med Oral Pathol* 1987; 64: 24-25.
9. LoewingerJ, Cohen M, Levi E. Bradycardia during elevation of a zygomatic arch fracture. *J Oral MaxillofacSurg* 1987; 45:710-711.
10. Gomez TM, Van Gilder JW. Reflex bradycardia during TMJ arthroscopy. *J Oral MaxillofacSurg* 1991; 49: 543-544.
11. Bainton R, Bamard N, Wiles JR, Brice J. Sinus arrestcomplicating a bitemporal approach to the treatment of panfacial fractures. *Br J Oral MaxillofacSurg*, 1990; 28: 109-110.
12. Stott DG. Reflex bradycardia in facial surgery. *Br J Plastic Surg* 1989; 42: 595-597.
13. Baxandall ML, Thorn JL. The nasocardiac reflex. *Anaesthesia* 1988; 43: 480-481.
14. Gillespie IA. Bradycardia during elevation of zygomaticfractures. *Anaesthesia* 1988; 43: 608-609.
15. Schallerb. Trigeminalcardiac reflex. A clinical phenomenon or a new physiological entity?. *J Neurol* 2004 June; 251(6); 658-65.
16. Precious DS, Skulsky FG. Cardiac dysarythmias complicating maxillofacial surgery. *Int J Oral Maxillofacial Surgery* 1990; 19; 279-282.
17. Atkinson RS, Rushman GB, Lee JA. Resuscitation. In: *A Synopsis of Anaesthesia*, 10th ed. Bristol, Wright, 1987: 760-769.



Figure 1: Patient's photograph before surgery

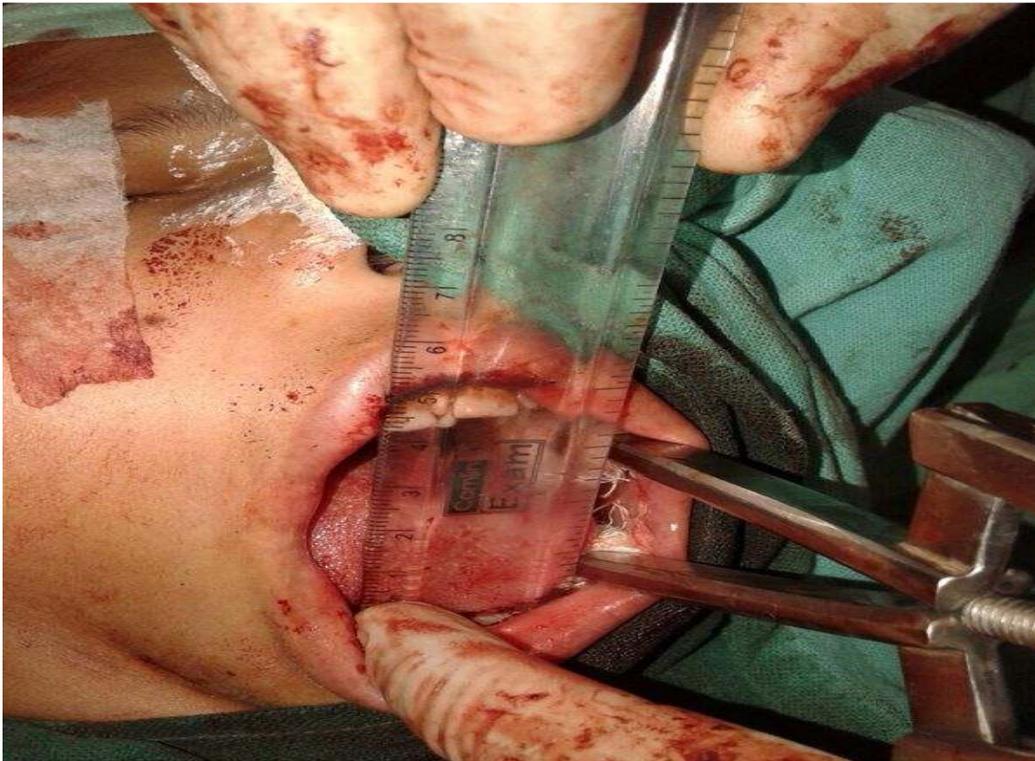


Figure 2: Patient's photograph at the time of mouth opening



Figure 3: Patient's photograph after completion of surgery

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