Bradycardia During Temporomandibular Joint Gap Arthroplasty

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Vagal stimulation may occur during maxillofacial and dental surgery [1]. Painful stimulation of oral or facial structures may lead to a vagal reflex thereby causing hypotension, bradycardia or even cardiac arrest. The trigeminovagal reflex (TVR) is a rare entity. We report a case in which transient bradycardia and hypotension was observed during TMJ gap arthroplasty.

Case Report

A 13-year-old female with limitation of mouth opening and retrognathia was diagnosed as unilateral TMJ ankylosis. History and general examination were unremarkable and did not reveal any sign of systemic illness. TMJ arthroplasty with temporal fascia interposition was planned. The pre-operative vital signs were within normal limits BP 124/82 mm Hg, pulse 70 beats/min, temperature 36.4°C and respiratory rate of 18 breaths/min. Electrocardiogram demonstrated normal sinus rhythm at 67 beats/min, normal axis and intervals, and no dysrhythmias.

Preoperatively she was administered antibiotics (Ceftriaxone Sulbactam 1.5 gm tid and metrogyl 400 mg t.i.d), dexamethasone 8 mg and 0.5 mg atropine sulphate. Intra-operatively the patient was monitored by a multiparameter device. Blood pressure, electrocardiogram, oxygen

saturation and pulse were monitored continuously. Patient was preoxygenated and anesthesia was induced with 5 mg propofol, 100 mg fentanyl and 40 mg artacurium intravenously in divided doses.

Fibreoptic assisted nasotracheal intubation was done and a 7 mm internal diameter cuffed endotracheal tube was placed nasotracheally and anesthesia was maintained with halothane at an end-tidal concentration of 0.3–0.91%, nitrous oxide at 70% and oxygen at 30%. The lungs were ventilated to maintain CO₂ of 29–38 mm of Hg. Temperature was maintained at 36.0 to 36.4°C. HbO₂ saturation was 99–100%; pulse ranged from 70 to 80 beats per minute & BP 115/70–140/90 mm of Hg. No dysrhythmias were noted at any stage.

The TMJ was exposed via Al-Kayat and Bramley incision and the ankylotic mass was exposed. When the soft tissue flap was retracted the surgeons were alerted by the anesthetist. The pulse rate reduced from 70 to 50 beats/min. The heart rate promptly returned to normal upon relaxing the retractors. The surgeons proceeded with the surgery with minimal traction on the soft tissue and removed the ankylotic chunk of bone. The Fergusson's mouth gag was applied and as the jaw was forced open the anesthetist again warned the surgeon about falling heart rate. The heart rate had fallen to 50 beats per min. At this juncture the anesthetist injected 0.25 mg atropine sulphate. The heart rate returned to the normal value. This allowed the operators to achieve mouth opening of 35 mm. Temporal fascia was interpositioned and closure of wound was completed as usual.

During the post-operative phase physiotherapy was instituted, the patient was again connected to the multiparameter. It was observed that there was slight reduction in heart rate on forceful mouth opening and physiotherapy. The pulse fell from 90 to 60 beats per min. However these

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reflexes were blocked by anaesthetizing the third division of Trigeminal nerve by the Gow-Gates nerve block. The patient was advised to do mild physiotherapy and lie supine with lower extremities raised during jaw exercises.

Discussion

The Oculocardiac reflex (OCR) which is a type of TVR is a widely established phenomenon, induced by stimulation of ocular and periocular structures innervated by the ophthalmic division of fifth nerve (V1). OCR was first described by Aschner [2].

TVR is manifested by the sudden development of the bradycardia or asystole with arterial hypotension. This may be due to stimulation of V1, V2 or V3 [3, 4].

Several procedures carried out in the maxillofacial region have been implicated in the TVR [3, 4]. The probable pathway of the TVR suggested by various authors is as follows [5, 6] (Fig. 1).

The vagal stimulation causes inhibition of the myocardium leading to sudden onset bradycardia, hypotension, asystole and even cardiac arrest. The TVR has been reported in maxillary and mandibular osteotomies [5], repair of nasal complex fracture [7] and TMJ arthrotomy. Even simple maneuvers such as mouth opening, have been known to cause life threatening TVR mediated cardiac asystole [8].

Precious and Skulsky [9] reported occurrence of dysrhythmia in two healthy patients during TMJ arthrotomy.

Morey and Bjoraker [10] reported an incident of asystole during TMJ arthrotomy which they attributed to TVR and the condition was reversed by the injection of atropine. Anaesthetizing the branches of fifth nerve have been known to block the TVR, this was demonstrated in our case by

Fig. 1 Trigemino-vagal reflex pathway

anaesthetizing the mandibular nerve. Blocking the auriculotemporal nerve which sends sensory supply to TMJ, disrupted the afferent pathway and prevented the TVR. Mendelblatt et al. [11] suggested that retrobulbar blocks could prevent OCR. Certain anaesthetic agents have a tendency to disrupt the autonomic nervous system activity by depressing the sympathetic activity [12]. Fentanyl and other opiates have central vagotonic effects and the use of Halothane and Fentanyl may precipitate TVR.

We have described a case of TVR occurring during temporomandibular surgery. TVR may occur during the procedures undertaken in the maxillofacial region other than the ophthalmic procedures. It is therefore mandatory to have communication with the anaesthetist to prevent a mishap.

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