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Case Report
Orthognathic Surgery

Unilateral blindness after orthognathic surgery: hypotensive anaesthesia is not the primary cause

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Abstract. Perioperative vision loss in non-ocular surgery represents a rare but devastating complication and multiple causes have been proposed. Any portion of the visual system may be involved and several authors have tried to relate that complication with deliberate hypotension anaesthetic technique, used to control intraoperative bleeding. We report a patient operated for orthognathism who suffered unilateral blindness. After review of similar cases, we can state that the transmission of forces generated during Le fort I osteotomy is related to the complication. This osteotomy technique is regularly performed in our hospital using a curved osteotome to achieve the pterygomaxillary disjunction and the adverse transmission of forces via the sphenoid bone is the main reason for indirect damage to the optic nerve and its vascular structures causing the neuropathy and blindness. Hypotensive anaesthesia may certainly lead to transient ischaemia but only in specific cases because of decreased ocular perfusion pressured.

Key words: orthognathism surgery complications; orthognatic surgery ophthalmic complications; perioperative visual loss; anaesthesia and controlled hypotensive complications.

Accepted for publication

Vision loss in the perioperative period is a severe complication that has motivated many studies because the mechanism is not always clear. In particular, the onset of blindness in non-ophthalmic surgery has led to the creation of a register by the American Society of Anesthesiologist (ASA). The ASA Postoperative Visual Loss Registry[1] mainly shows postoperative blindness cases after spinal surgery and the authors, using a multicentre case–control design, recently published the risk factors associated with this complication: obesity, male sex, Wilson frame use, longer anaesthetic duration, greater estimated blood loss, and percent colloid administration.

The objective of this paper is to critically review the literature on orthognathic surgery and its relation to vision loss. Since deliberated hypotension is involved in this procedure, it is possible to discuss in more detail the potential anaesthetic etiologic causes for this complication.

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Osteotomy Le Fort I is regularly performed during orthognatic surgery. According to different authors, the pterygomaxillar separation using a curved osteotome produces high transmission of forces and pressures; uncontrolled propagation through the skull base and adjacent structures such as the orbit would result in fractures and vision loss[2,3]. The maxillary downfracture can also contribute to forces being transmitted to the orbit and the optic canal area, as well as to untoward fractures that extend to the sphenoid bone and orbit. Other methods of achieving the pterygomaxillary disjunction, such as the use of a micro-oscillating saw, seem to be less apt to cause untoward fractures[4].

Blindness after orthognathic surgery is usually not from a direct injury to the optic nerve itself, but more commonly is the result of an ischaemic injury to the blood supply to the optic nerve, either directly from a fracture extending through the orbit to the optic canal or foramen, or indirectly from swelling and oedema around the nerve in the optic canal disrupting its blood supply. Hypotensive anaesthesia and/or anomalies of the blood supply to the optic nerve could be possible contributing factors to worsening the ischaemia in selective instances. This could include those cases where there was excessive blood loss and hypotensive anaesthesia was not well controlled and where the mean arterial pressure (MAP) dropped below a certain level for extended periods of time.

Case report

A 41-year-old woman was admitted for orthognathic surgical correction of her malocclusion and temporomandibular chronic pain: body mass index of 23.3 kg/m^2, no remarkable medical history, preoperative haemoglobin of 11.4 g/dL. No abnormalities were found in the complementary tests. The surgery was performed under general anaesthesia. A premedication with midazolam 2 mg was administered intravenously and vasoconstrictor (oxymetazoline) was applied through the nostrils. In the operating room, the patient was monitored by pulse oximetry, capnography, bispectral index analysis (BIS), continuous electrocardiography, and invasive blood pressure. Anaesthesia was induced after preoxygenation (with O_2 at 60% applied during 5 min using a facial mask), propofol 150 mg, fentanyl 100 μg, and rocuronium 40 mg were administered.

The patient was intubated easily through the right nostril. Anaesthesia was maintained with an inspired oxygen fraction of 40% (oxygen/air) and sevofluorane at 2% (according to BIS). Remifentanyl and additional doses of fentanyl and morphine were administered throughout the process to maintain the patient at mean arterial pressure (MAP) values around 65–70 mmHg. The operation lasted 300 min. Le Fort I osteotomy sequence with the pterygomaxillary disjunction was carried out between the maxillary tuberosity and pterygoid plates using a curved Obwegeser osteotome. An important aspect of this technique is the angle given by surgeon to chisel. The chisel should remain in all time under the periosteum, with its tip in the pterygomaxillary suture, angled from lateral to medial and top to bottom. The surgeon's index finger should palpate the palatal region of the tuberosity and pterygoid hamulus to feel their separation.

Intraoperative blood loss was estimated at 900 mL. MAP values ranged around 70 mmHg. The hourly urine output was greater than 80 mL/hour (>1 mL/kg/hour). No intraoperative incidents were registered and the patient was transferred to an intensive care unit for postoperative monitoring, conscious and with spontaneous ventilation. Three hours following surgery the patient first complained to the nurses of being unable to see anything from her right eye. Oedema and ecchymosis could be seen at the lower eyelid. Ophthalmic examination checked that in spite of normal ocular fundus (no papilloedema) there was no light perception in the right eye. An immediate computerized tomography scan (CT) performed on the brain, facial, and sinuses (Fig. 1) showed the existence of a small infraorbital haematoma and emphysema caused by surgery in the right eye, as well as fractures in the pterygoid apophysis suggestive of traumatic pterygomaxillary disjunction (not unusual fracture patterns following Le Fort I osteotomies). Brain pathology was declined. The patient was empirically treated with steroids (intravenous dexamethasone 8 mg/8 hour). The patient was discharged to the ward with complete amaurosis of the right eye and the initial diagnosis of retrobular optic neuropathy. Visual evoked potentials that were performed 4 days after surgery showed abnormalities in pattern reversal stimulation, which were suggestive of right axonal optic neuropathy. The patient was discharged from hospital 7 days after surgery with complete amaurosis of the right eye.

Discussion

Amaurosis or unilateral blindness caused by facial trauma (iatrogenic or not) is a complication attributed by some authors to damage of the optic nerve in the orbital osseous channel whose incidence ranges from 3% to 5%[2–5]. On many occasions the significance of the damage is not proportional to the trauma as very severe injuries are observed on negligible traumatisms. There is a close anatomic correlation among the optic canal, the palatine bones, the pterygoid, and the sphenoid. Direct injuries to the nerve secondary to untoward fractures which extend to the base of the skull, orbit, or pterygopalatine fossa, associated with the pterygomaxillary separation and/or maxillary downfracture, can be the aetiology of blindness. A sec-

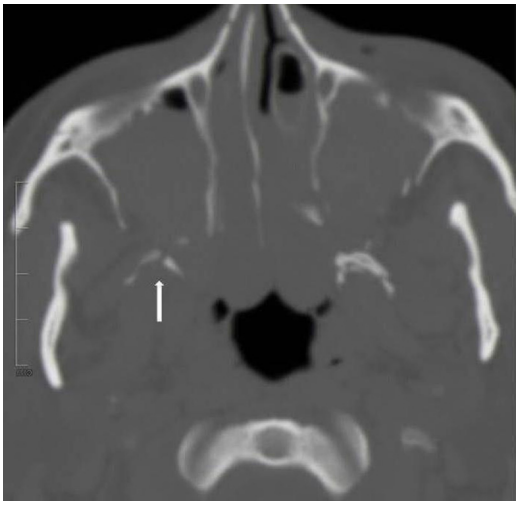

Fig. 1. A CT cut showing a high-level pterygoid plate fracture.

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