Loss of reflex tearing after maxillary orthognathic surgery: a case report

Running title: Loss of tearing and orthognathic surgery

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Abstract

Background: Few reports have described the ophthalmic complications that occur after maxillary orthognathic surgery. Since cases of decreased reflex tearing after maxillary orthognathic surgery are extremely rare, we describe 2 cases of loss of reflex tearing after maxillary orthognathic surgery. Case presentation: The patients who were 18-year-old and 32-year-old Asian women suffered from unilateral dryness and irritation caused by maxillary orthognathic surgery. In both patients, Schirmer’s test (II) showed reduced reflex tearing in 1 eye. Computed tomography showed that the pterygoid plate had been fractured in both patients. Conclusions: The location of the pterygopalatine ganglion and its associated fibers in the pterygopalatine fossa may be injured during Le Fort osteotomy.

Keywords: reflex tearing loss - orthognathic surgery - complication
Background

Few reports have described the ophthalmic complications that occur after maxillary orthognathic surgery [1]. The Le Fort osteotomy technique, which is used during maxillary orthognathic surgery, frees the maxilla from the remainder of the facial skeleton through a transmaxillary fracture that includes the maxillary sinuses, lateral margin of the nasal fossa, and nasal septum. Subsequently, the maxilla can be moved upward, downward, anteriorly, or posteriorly. Incidents of vision loss, extraocular muscle dysfunction (3rd/6th cranial nerve palsy), neuroparalytic keratitis, lacrimal drainage obstruction, and keratitis sicca have also been reported [1-4]. Since cases of decreased reflex tearing after maxillary orthognathic surgery are rare, we herein present reports of cases along with the findings of radiological analysis and a review of the literature. To our best knowledge, it is the first report describing the loss of reflex tearing after maxillary orthognathic surgery in Asia.

Case presentation

CASE 1

The first patient was an 18-year-old woman who presented with the chief complaint of decreased reflex tearing in the right eye. The patient had undergone maxillary orthognathic surgery at a dental clinic 1 month before presentation. She developed symptoms of decreased tearing in the right eye 1 week after surgery and reported that only the left side of her nose became congested when she developed a cold.

At the time of her visit, the patient’s corrected vision was 20/20 for both eyes. No relative afferent pupillary defect was observed. Upon slit-lamp examination, punctuated epithelial erosion was observed on the cornea of the right eye. Hypoesthesia to light touch in the malar area, which is the domain of the zygomaticofacial nerve, was also confirmed. The patient’s tear film breakup time was 5 s in the right eye and 7 s in the left eye. The findings of Schirmer
The results of the Schirmer II test, which measures the degree of reflex tearing by irritating the nasal cavities, were 4 mm for the right eye and 12 mm for the left. The computed tomographic (CT) image obtained at the dental clinic immediately after the surgery confirmed a Le Fort I fracture across both pterygoid plates and both maxillary sinuses (Figure 1).

To improve the patient’s symptoms, an ophthalmic ointment and preservative-free artificial tears were prescribed for the right eye, and her progress was monitored. The patient continued to experience decreased tearing in the right eye, but overall, the symptoms had improved 6 months after the surgery. After treatment, the Schirmer I test measurements were 5 mm for the right eye and 10 mm for the left eye, and the Schirmer II test measurements were 7 mm for the right eye and 12 mm for the left eye.

CASE 2

The second patient was a 32-year-old woman who presented with the chief complaints of decreased tearing in the right eye and excessive tearing in the left eye. The patient had undergone maxillary orthognathic surgery at a dental clinic 6 months before presentation.

At the time of her visit, the patient’s vision was 20/20 in both eyes. Upon slit-lamp examination, blepharitis was observed. The height of the tear meniscus was 0.5 mm for the right eye and 1 mm for the left eye. The Schirmer I test measurements were 7 mm for the right eye and 9 mm for the left eye, and the Schirmer II test measurements were 5 mm for the right eye and 11 mm for the left eye. A syringe test revealed normal results for the right eye but regurgitation from the opposite punctum in the left eye. Dacryocystography was performed, revealing complete obstruction of the nasolacrimal duct at the junction of the sac and duct in the left eye. In the CT image obtained at the dental clinic immediately after surgery, a Le Fort III fracture was observed across both pterygoid plates, the lateral and distal
walls of both maxillary sinuses, and both zygomatic arches. The patient underwent endonasal dacryocystorhinostomy (DCR) in the left eye 7 months after the maxillary surgery. The DCR restored normal tear function in the left eye. Preservative-free artificial tears were prescribed for the right eye. These treatments improved the patient’s complaints of dry eye. However, the patient still complained of decreased tearing in the right eye 8 months after the initial visit to our clinic.

Conclusions

Decreased reflex tearing after maxillary orthognathic surgery is rare. To the best of our knowledge, there are only 3 cases in the current literature. In 1976, Tomasetti et al. [3] first reported a case of decreased tearing after Le Fort I osteotomy. The authors suggested that the decrease in tearing was related to a pterygoid plate fracture during surgery. In 1993, Lanigan et al. [2] used CT images to confirm fractures in both the pterygoid plate and the posterolateral wall of the right maxillary sinus, resulting in decreased tearing after surgery. The authors believed that these fractures extended to the pterygopalatine fossa, thereby damaging the pterygopalatine ganglion [1]. Although decreased reflex tearing after maxillary orthognathic surgery has rarely been reported, decreased tearing after surgical removal of juvenile nasopharyngeal angiofibromas has been well documented. In such cases, damage to the pterygopalatine ganglion during surgery results in reduced reflex tearing [5-9]. If the pterygoid plate is fractured when a Le Fort osteotomy extends to the base of the skull, structures such as the foramen lacerum, pterygoid canal, inferior orbital fissure, and pterygopalatine fossa are damaged. Nerves can be immobilized between bone fragments or fracture gaps, leading to nerve damage in the pterygopalatine ganglion, postganglionic parasympathetic fibers, and the zygomatic branch of the maxillary nerve. In particular, postganglionic parasympathetic fibers are nonmyelinated fibers and are more vulnerable to
damage than myelinated fibers; thus, these fibers can be selectively damaged under equal amounts of outside force [3].

Other possible explanations for loss of reflex tearing include a spread of the postsurgical inflammatory response to the pterygopalatine ganglion region, causing damage to nearby tissue or to the descending palatine or maxillary arteries, which in turn causes ischemic damage to the pterygopalatine ganglion [2]. Nasolacrimal duct obstruction after maxillary orthognathic surgery has previously been reported by Jang et al. [4] On the basis of the clinical and radiologic findings, the authors have concluded that nasolacrimal duct obstruction after orthognathic surgery may develop because of a postsurgical inflammatory response to indirect damage of the nasolacrimal duct at the time of surgery.

In the present study, we have reported that decreased reflex tearing could arise as a complication of a Le Fort fracture after a maxillary orthognathic surgery. It is important to educate patients adequately on the ophthalmic complications that can occur after maxillary orthognathic surgery. Le Fort fractures involving both pterygoid plates were observed in postsurgical CT imaging studies and were thought to have led to pterygopalatine ganglion damage. The symptoms improved over time with conservative treatment in both patients.

Consent

Written informed consent was obtained from both of the patients for publication of this case report and any accompanying images. A copy of the written consent is available for review by the Editor of this journal.

List of abbreviations

computed tomography (CT), dacryocystorhinostomy (DCR)
**Competing interests**

Non-financial competing interests.

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References


**Figure legends**

**Figure 1.** a A computed tomography (CT) scan (axial view) of Case 1. Note fractures in the lateral walls of both maxillary sinuses (arrows) and both pterygoid plates (arrowheads). b CT scan (coronal view) of Case 1. Note the fracture in the right pterygoid plate (arrows).

**Figure 2.** a A CT scan (axial view) of Case 2. Fractures in the medial and lateral walls of both maxillary sinuses, both zygomatic arches (arrows), and b both pterygoid plates (arrows).