Case report

Extraocular muscle damage from dental implant penetration to the orbit

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A B S T R A C T
Purpose: To demonstrate an unusual case of orbital trauma due to dental surgery complication.
Observations: An elderly patient who underwent dental implantation to the zygomatic bone was hospitalized in the ophthalmology department with impaired abduction of her right eye, also evident on ocular examination. Head computed tomography demonstrated damage to the lateral rectus and to the inferior oblique muscles. Clinical assessment determined these muscles could not be repaired and reattached. The extent of irreversible damage in the patient was permanent limitation in movement of her affected eye with subsequent strabismus.
Conclusions and importance: Accurate pre-operative planning of dental zygomatic implant insertion, as well as selecting the size and direction of the implant, are imperative. Moreover, performing surgery in multidisciplinary centers with oculofacial plastic surgeons in such cases, may reduce risk of this complication, make it a safer procedure, and allow immediate treatment when required.

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1. Introduction

Dental implants are extensively used worldwide for replacing missing teeth and as an adjunct in the reconstruction of jaws and teeth. Patients with a fully edentulous (toothless) maxilla present a rehabilitation challenge, since bone augmentation is usually required to enable placement of dental implants. Zygomatic implants are long screw-shaped implants developed for use as an alternative to bone augmentation procedures in the severely atrophic maxilla, as demonstrated in prospective studies, zygomatic implants can promote successful rehabilitation in such patients.1,2 Since the zygomatic bone is adjacent to important structures, such as the brain, eyes, nerves and blood vessels, in order to prevent unfortunate outcomes of zygomatic bone augmentation procedures, as serious post-operative complications, these should be performed exclusively by experienced surgeons.

2. Case report

A 61-year-old female was admitted to our department accompanied by her dentist. Earlier that day, she underwent an elective dental surgery, which included placement of dental implants in the lower and upper jaw, bone augmentation and zygomatic implants. During surgery tunnels were drilled in the zygomatic bones, and metal implants were inserted into these tunnels. The procedure was performed in a private dental clinic under general anesthesia. During the procedure the dentist noticed sudden bleeding from the lateral canthus of the patient’s right eye (RE). Upon awakening, some limitation in the patient’s RE movement was also evident. She was referred to our hospital for further evaluation. Upon admission the eye examination revealed limited movements to all abduction positions of the RE, binocular horizontal diplopia, which exaggerated with right gaze and disappeared with left gaze (Fig. 1). Visual acuity (VA) was 6/10, there was no relative afferent pupillary defect (RAPD), optic nerve functions were normal, and the anterior segment was normal, except for a sub conjunctival hemorrhage (SCH) and an infero-temporal rupture of the conjunctival fornix. Computed tomography (CT) demonstrated a zygomatic implant penetrating the lateral part of the right orbit, abutting the insertions of the lateral rectus (LR) and inferior oblique (IO) muscles.
The insertions as well as the muscles appeared intact. An emergent dental surgery was performed to remove the implant from the orbit, through the mouth. No ocular intervention was needed and no bleeding was seen. The conjunctiva remained open to allow spontaneous drainage. The patient was started on systemic antibiotic treatment. No improvement in RE movements was noted during follow-up for two weeks. The patient reported that the diplopia disappeared for far objects but still existed for near. VA and optic nerve function remained stable. Reevaluation on additional CT scan revealed thinning of the RE LR muscle. The patient was discharged for ambulatory follow up, with no further improvement of RE movements. One month later, exploratory surgery was performed. Severe scleral adhesions were seen in the temporal part of the RE, with restriction on forced duction test. The LR muscle was not found, while IO stump was found attached to the infero-lateral sclera. The adhesions were released. Hummelsheim’s procedure (half-tendon transpositions of the superior and inferior rectus muscles to the insertion of the damaged LR muscle) was performed, in an attempt to compensate for the RE esotropia. RE movements did not return to normal and the patient remained with mild esotropia, restricted abduction and elevation of the RE.

3. Discussion

The placement of zygomatic implants should be performed by only very experienced and skilled surgeons, to reduce the risks of post-operative complications, specifically those involving the delicate anatomic structures adjacent to the zygomatic bone, such as the orbit. Moreover, this procedure requires precise pre-surgical planning and a strict drilling protocol. Previous studies noted the potential risk of penetration to the orbit. Two of these studies reported on the incidence of orbital penetration. Duarte et al. performed implantation of quad-zygomatic implants (implantation of 2 implants in right and left zygomatic bones) in 12 patients. Two patients suffered penetration of the orbital cavity. Davo et al. reported on penetration of the orbital cavity in 1/17 cases. No permanent ocular damage was reported in any of these cases. Wu et al. suggested a new technique for reducing the potential risk of orbital cavity penetration, with a technique that involves pre-exposure of the infero-lateral orbital rim by an ophthalmologist. The benefit of this technique is enabling the oral surgeon direct visualization of the orbital margin and control of the drilling direction. To the best of our knowledge, this is the first...
report on penetration of a zygomatic implant into the orbital cavity, causing irreversible damage to the extraocular (LR and IO) muscles. Currently an ongoing global growth of the elderly population with a need for normally functioning jaws and teeth for prolonged years, will consequently lead to an increase in dental implantation procedures in general, and specifically procedures using zygomatic implants.

4. Conclusions

Ophthalmologists should be familiar with this technique of dental implants and have a good understanding of the potential ocular risks involved. Collaboration and coordination between the oral and oculofacial plastic surgeons is needed before performing such a delicate surgery. We suggest that this type of surgery should be performed in large medical centers by trained maxillofacial surgeons, in collaboration with oculofacial plastic surgeons who can perform a risk assessment before the surgery, and alert the oral surgeon to potential orbital complications.

Patient consent

The patient provided oral consent for publication of this report.

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Conflict of interest

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Authorship

All authors attest that they meet the current ICMJE criteria for Authorship.

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