

Incidence of Orbital Mucocele following Orbital Floor Fracture Repair

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Summary: Mucoceles can often present as a complication after prior sinus surgery or maxillofacial trauma when mucosal drainage is obstructed. Their presence in the orbit following orbital wall fracture and subsequent repair represent an exceedingly rare complication whose occurrence is limited to a few reported cases in the literature. In these patients, continuous cyst expansion and subsequent mass effect may lead to ophthalmic symptoms, including orbital pain, proptosis, diplopia, and globe dystopia. We report the discovery of an orbital mucocele after orbital floor fracture repair and its possible association with the nonporous reconstruction plate utilized for fixation. When a patient with history of orbital wall reconstruction presents with new-onset ocular symptoms, an orbital mucocele should be considered as a potential diagnosis. (*Plast Reconstr Surg Glob Open* 2024; 12:e5917; doi: 10.1097/GOX.0000000000005917; Published online 17 June 2024.)

Orbital floor fractures represent a common finding among patients presenting to the hospital with craniofacial trauma.¹ Orbital floor fixation is often performed when the defect is sufficiently large or the expansion in volume causes enophthalmos or diplopia. When indicated, a variety of alloplastic materials are available to reconstruct the orbital floor and restore the contour of the pretraumatic orbital cone. There are many known complications with this procedure that can involve the surgical approach, plate malposition, and damage or impingement of structures of the orbit.^{2,3} An orbital mucocele is an exceedingly rare complication that can be associated with fixation of orbital fractures, with descriptions limited to a few case reports in the literature.⁴⁻⁶ This case report reviews the incidence of an orbital floor mucocele as a late complication in a patient presenting after orbital floor reconstruction. We postulate that the nonporous plate used, in addition to plate positioning, resulted in the patient's ensuing complication.

CASE

A 68-year-old man presented to our clinic for evaluation of diplopia following a remote history of craniomaxillofacial trauma and subsequent corrective operations.

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Three years before presentation to our service, the patient suffered an assault resulting in bilateral zygomaticomaxillary complex fractures, bilateral Le Fort I fractures and bilateral orbital floor fractures. He underwent surgical fixation shortly after presentation. The left orbital floor fracture was repaired with a titanium-embedded porous polyethylene (MEDPOR) plate. In the interim, the patient had undergone revision of his right orbital floor repair with removal of prior hardware, replacement of hardware, and placement of a bone graft to the orbital floor to correct enophthalmos on the right side.

On presentation to our clinic, the patient's chief complaint was diplopia and impaired vision in the superior field of view from the left eye. His gross visual acuity was intact. Examination was notable for superior vertical dystopia of the left globe resulting in the eyelid obscuring the left pupil (Fig. 1). The extraocular movements were intact, and there was no significant eyelid ptosis or deficiency in levator excursion. A maxillofacial computed tomography (CT) scan was obtained for further evaluation which revealed a large, well circumscribed fluid collection along the left orbital floor measuring 3 cm × 3 cm × 1.2 cm (Fig. 2). This collection was overlying the previously placed reconstruction hardware with the posterior portion also underlying the remaining posterior orbital floor. The globe was superiorly and laterally displaced by this mass.

The patient was taken to the operating room for exploration of the left orbit. A subtarsal approach was utilized to expose the contents of the inferior orbit. Upon exposure, a mucous-lined fluid collection was drained, and the capsule of this collection was excised and sent for surgical pathology (Fig. 3). The prior orbital floor implant was found to be inferiorly displaced into the maxillary sinus

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Fig. 1. Patient on presentation with left vertical dystopia.

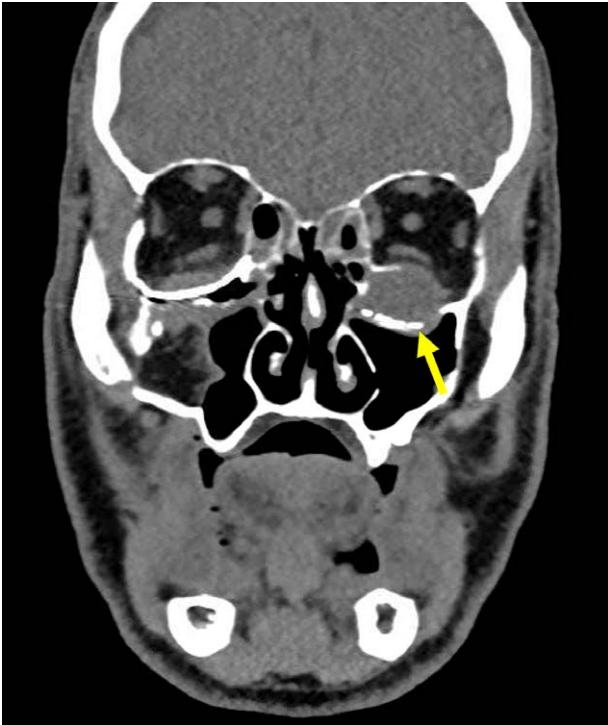


Fig. 2. CT imaging revealing a mucocele incorporating the prior implant.

and was removed. A prebent titanium mesh orbital floor reconstruction plate was then placed to reconstruct the orbital floor and the remainder of the case proceeded without issue.

Postoperative maxillofacial CT imaging displayed proper positioning of the new hardware with appropriate contour of the orbit. The surgical pathology of the fluid-filled mass was consistent with a mucocele lined by respiratory- and conjunctival-type mucosa. The patient presented for follow up at 2 and 6 weeks postoperatively. At the time of his final postoperative visit, his diplopia had resolved, and he no longer had vertical dystopia (Fig. 4).

DISCUSSION

Sinus mucoceles are mucous-filled, epithelial-lined masses that form when egress of mucous is obstructed from these maxillofacial cavities.⁷ A majority of mucoceles occur in the frontal or ethmoid sinus, with the maxillary sinus accounting for about 10% of cases.⁷ Ophthalmic symptoms have been reported in mucoceles of the frontal



Fig. 3. Prior placed MEDPOR implant removed in index case.



Fig. 4. Postoperative resolution of vertical dystopia.

sinus and posterior aspect of the ethmoid sinus due to mass effect of the expanding cyst.^{7,8} These symptoms include orbital pain, proptosis, diplopia, and globe dystopia. Aside from idiopathic sinus obstruction, a history of sinus surgery or maxillofacial trauma is often noted in these patients' histories.⁸

Although the presence of sinus mucoceles with extension into the orbit has been reported, the occurrence of mucoceles originating in the orbit and related to orbital wall reconstruction is exceedingly rare and limited to case reports in the literature.^{5,6,9,10} Tan et al⁵ described two patients presenting with orbital mucoceles who underwent orbital floor repair with a silicone implant for 5 years before onset of symptoms. Their report postulates that the silicone may have served as an anchor for the mucosal cells displaced by the fracture. Park et al⁶ presented a patient who was found to have a mucocele extending from the ethmoidal sinus that was associated with a silastic implant placed for medial wall reconstruction 10 years prior. During endoscopic decompression, they found the mucocele to be immediately behind the silastic implant.

They again related this occurrence to the transplantation of mucosal cells to the orbital cavity.

The patient in our report sustained a severely comminuted orbital floor fracture that was repaired with a titanium plate that was coated on either side with MEDPOR. Intraoperative examination found that there were fragments of orbital floor superior to the MEDPOR implant secondary to the comminuted nature of the fracture, with the implant lying between the maxillary mucosal side of the bone and the maxillary sinus. As mucoceles are known to form when mucosal drainage is impeded, it is possible that nonmeshed implants, like the MEDPOR implant, can contribute to the formation of these cysts by preventing mucosal egress. In the additional cases noted earlier, the orbital implants used in reconstruction were also made of nonporous material. When combined with the displacement of sinus epithelium, these implants may be implicated in this complication.

CONCLUSIONS

Orbital mucocele should be considered as a potential diagnosis when a patient with history of orbital wall reconstruction presents with new-onset ocular symptoms of diplopia, dystopia, and proptosis. This is of unique concern when a patient has a history of a highly comminuted fracture with reconstruction utilizing a nonporous implant.

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DISCLOSURE

The authors have no financial interest to declare in relation to the content of this article.

PATIENT CONSENT

The patient provided written consent for the use of his image.

REFERENCES

1. Kelley P, Crawford M, Higuera S, et al. Two hundred ninety-four consecutive facial fractures in an urban trauma center: lessons learned. *Plast Reconstr Surg*. 2005;116:42e–49e.
2. Joseph JM, Glavas IP. Orbital fractures: a review. *Clin Ophthalmol*. 2011;5:95–100.
3. Pierce K, Holck D. Complications of orbital fracture repair: a ten year review [abstract]. *Invest Ophthalmol Vis Sci*. 2007;48:3580.
4. Neves RB, Yeatts RP, Martin TJ. Pneumo-orbital cyst after orbital fracture repair. *Am J Ophthalmol*. 1998;125:879–880.
5. Tan CS, Ang LP, Choo CT, et al. Orbital cysts lined with both stratified squamous and columnar epithelia: a late complication of silicone implants. *Ophthalmic Plast Reconstr Surg*. 2006;22:398–400.
6. Park J, Kim J, Choi J, et al. Mucocele after orbital fracture repair masquerading as optic neuritis. *J Craniofac Surg*. 2016;27:1041–1043.
7. Capra GG, Carbone PN, Mullin DP. Paranasal sinus mucocele. *Head Neck Pathol*. 2012;6:369–372.
8. Plantier DB, Neto DB, Pinna FR, et al. Mucocele: clinical characteristics and outcomes in 46 operated patients. *Int Arch Otorhinolaryngol*. 2019;23:88–91.
9. Lee J, Choi YJ, Rha EY. Orbital reconstruction using a polyetheretherketone patient-specific implant after removal of a mucocele developing after orbital fracture repair. *J Craniofac Surg*. 2023;34:2321–2322.
10. Oh SY, Choi JS, Lim JS, et al. Eyeball deviation by orbital mucocele after midface sinus injury. *Arch Craniofac Surg*. 2020;21:53–57.