Secondary Infection Affecting One of Two Simultaneously Placed Orbital Wall Implants

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ABSTRACT

A 10-year-old boy experienced traumatic injuries to the right bony orbit, which were repaired with a nylon foil and a barrier porous polyethylene orbital implant. Three years after surgery, he presented with maxillary and ethmoid sinusitis with infection of the nylon foil plate. This plate was removed, yielding complete recovery.

KEYWORDS: Orbital wall implant, orbital fracture repair, nylon foil, porous polyethylene

The use of alloplastic implants in orbital repair has increased dramatically with the development of high-strength materials that boast low postoperative complication rates. Nylon foil (Supramid, Suprafoil, S. Jackson Inc, Alexandria, VA) and porous polyethylene (Medpor, Porex, Newnan, GA) plates are frequently used in craniofacial reconstruction.

CASE REPORT

A 10-year-old boy was tackled at a football game and fell onto the arm of a metal chair at the sidelines. He sustained right orbital medial wall and right orbital floor blowout fractures. Surgery was performed 13 days later. A 32 × 22-mm, 0.8-mm nylon foil plate was secured to the orbital floor with a 1 × 4-mm titanium screw. A barrier porous polyethylene flexblock plate measuring 22 × 14 mm was chosen for its ease of molding and stabilization to cover the medial wall defect. The inferior edge of medial wall plate was placed approximately 90 degrees to the medial edge of the floor plate to create a continuous repair. The patient tolerated the procedure well and recovered without any immediate postoperative complications.

Three years after surgery, the patient presented with gradually worsening periocular swelling and mild

erythema of the right lower eyelid of several days' duration, following an upper respiratory infection. Examination demonstrated visual acuity of 20/15 in both eyes. Ocular motility was full, and visual fields were full by confrontation. The pupils were equal and responded briskly to light without an afferent pupillary defect. Soft tissue swelling and erythema of the right lower eyelid extended below the inferior orbital rim. Oral antibiotics were prescribed, but the patient reported increased swelling and the onset of vertical diplopia the following day. Examination revealed no change in visual acuity but an increase in lower eyelid swelling and erythema. The patient had pain on upgaze with mild limitation of supraduction. No symptoms or motility compromise was elicited upon lateral and medial gaze. Orbital computed tomography revealed inflammatory changes of the right maxillary sinus and ethmoid air cells and thickening of the right inferior and medial rectus muscles with concurrent orbital fat stranding (Fig. 1). Orbital implants were found to be in place, with mild bony overgrowth at the inferomedial junction (Fig. 2).

The patient was taken to the operating room for removal of the orbital floor implant, to which the clinical symptoms of infection could be attributed. During the procedure, significant inflammation and a capsule

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Craniofacial Trauma Reconstruction 2009;2:113-116. Copyright © 2009 by Thieme Medical Publishers, Inc., 333 Seventh Avenue, New York, NY 10001, USA. Tel: +1(212) 584-4662.

Published online: April 14, 2009.

DOI 10.1055/s-0029-1215876. ISSN 1943-3875.

Figure 1 Orbital computed tomography depicts right maxillary and ethmoid sinusitis, right inferior and medial rectus thickening, as well as orbital fat stranding.

containing serous fluid were noted along the orbital floor surrounding the nylon foil plate. No such inflammation was noted medially. The patient was treated for 24 hours with intravenous antibiotics and was discharged on oral antibiotics. His pain on upgaze and diplopia had both resolved by the time of discharge the following day. Bacterial culture of inflammatory fluid yielded coagulase-negative *Staphylococcus* and *Streptococcus pneumoniae*.

DISCUSSION

The patient received both nylon foil and barrier porous polyethylene orbital implants following traumatic inju-

ries to the right orbit. Each was exposed to the same conditions (e.g., bacterial load, immune system competence) at the time of this initial surgery. Subsequent infection and soft tissue reaction throughout the inferior right orbit caused clinical symptoms only in the region of the nylon foil plate, though one would expect both foreign bodies to be affected.

Nylon foil and other nonporous implants have been reported to have an association with postoperative complications. These may be related to the formation of capsules around the implants, which can serve as foci of infection, or potential spaces for hemorrhage from fine vessels.¹ Custer et al reported four such capsular hemorrhages and one capsular abscess in a series of 41 patients, notably occurring several years after receiving nylon foil orbital implants.² Park et al conversely reported a complication rate of 1.7% in 181 orbits undergoing repair with nylon foil, though follow-up time was, on average, only 1 year after surgery. The study indicates that the rate of complications with nylon foil may be lower than previously determined, and these complications may have been due to factors other than the choice of implant. A large implant or lack of implant fixation may predispose to postoperative complications.³

Porous polyethylene implants have been associated with low complication rates and favorable functional results in previous literature.⁴⁻⁷ This has been attributed to fenestrations in the material that encourage fibrovascular ingrowth, preventing capsular formation and extrusion. Although some porous polyethylene barrier plates consist of one "smooth" side around which a capsule may form, the implant does not become completely enveloped, maintaining the benefits of tissue incorporation. Increased blood supply to the affected area may also allow for the enhanced delivery of immune system elements, or systemic medications, to reduce or resist infection.⁴ Porous polyethylene implants have thus been increasingly utilized in recent years.

SUMMARY

In the patient described herein, a porous polyethylene and a nylon foil plate, whose edges were placed in direct communication, were both exposed to orbital infection. Clinical symptoms necessitated removal of the nylon foil plate but not of the porous polyethylene implant. Although it is possible that material choice alone contributed to this phenomenon, it is more likely that the capsule surrounding the nylon foil plate allowed inflammation and infection to persist, and antibiotics and immune system elements could more easily reach the porous polyethylene plate via vascular ingrowth. As such, the patient recovered completely without explantation of the polyethylene orbital implant.

Both nylon foil and porous polyethylene implants are reasonable choices for orbital fracture repair. Despite

Figure 2 Orbital computed tomography, identical to Fig. 1 (enhanced with UltraVisual Color Ramp "Inverse Grayscale Presentation LUT" [Emageon, Birmingham, AL]), shows positions of nylon foil (solid) and porous polyethylene (dashed) implants prior to removal of the former. Plates are in contact at a 90-degree angle.

proper materials selection and placement, postoperative complications still occur. Infected orbital implants, in general, require prompt removal but often do not require replacement after the infection subsides and local tissues heal.

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