Allergic conjunctivitis and contact dermatitis following silicone tube intubation

Lacrimal stenting systems have been used to maintain patency of the canaliculi after insults such as surgery, trauma, radiation, and chemotherapy. The first nasolacrimal stents were made of silver wire and used by Graue in 1932.[1] Since then, other materials have been used, including silk, nylon, polyethylene, and polypropylene. Modern-day stents are most commonly made of silicone because this material is pliable, affordable, and widely available. Previously thought to be inert, there is evidence that silicone can elicit a foreign-body and inflammatory reaction.[2] While such reactions have been reported for other medical devices, it has not been discussed in the case of lacrimal intubation apparatuses. The purpose of this report is to describe a case of allergic conjunctivitis and contact dermatitis following endoscopic dacryocystorhinostomy (DCR) with silicone intubation. The collection and evaluation of protected patient health information were compliant with the Health Insurance Portability and Accountability Act of 1996.

Case Presentation

A 74-year-old female blepharitis, Hashimoto's disease, and calcium pyrophosphate deposition disease presented with left-sided nasolacrimal duct obstruction. She underwent uneventful left DCR with silicone tube intubation. In the early postoperative period, she developed a significant left-sided papillary reaction, conjunctival injection, and irritation 29 days after initial surgery (Fig. 1A). The inflammatory reaction completely resolved after the tube was removed 45 days postoperatively (Fig. 1B). More recently, the patient underwent ambulatory cardiac monitoring and had a silicone adhesive patch applied. In this region, she developed an erythematous rash that also completely resolved following removal of the adhesive patch (Fig. 2). She has done well from a lacrimal perspective and remains asymptomatic 4 months after DCR.

Discussion

This case demonstrates contact allergy to silicone lacrimal tubes following endoscopic DCR. Features suggestive of a contact allergy include delayed presentation, unilateral periocular reaction, and similar inflammatory reaction on her chest from another silicone-based product.

Foreign-body and inflammatory reactions to silicone have been described in the systemic literature widely. For instance, following breast augmentation, foreign-body reaction to silicone can result in capsular fibrosis, and coatings that decrease this inflammatory reaction are under investigation.[3] Inflammatory reactions to silicone have been implicated as a cause of cochlear implant extrusion and may be a rare cause of ventriculoperitoneal shunt failure.[4,5]

In contrast, allergic contact dermatitis to silicone is rare and limited to case reports. Medical devices with documented cases of silicone allergy include breast prostheses, pacemaker coatings, tracheal tubes, cochlear implants, dialysis catheters, and continuous positive airway pressure masks.[6–11] Silicone allergy also has been implicated with household items such as swimming goggles.[12]

Many allergies are type I hypersensitivity reactions, characterized by rapid overproduction of IgE in response to a

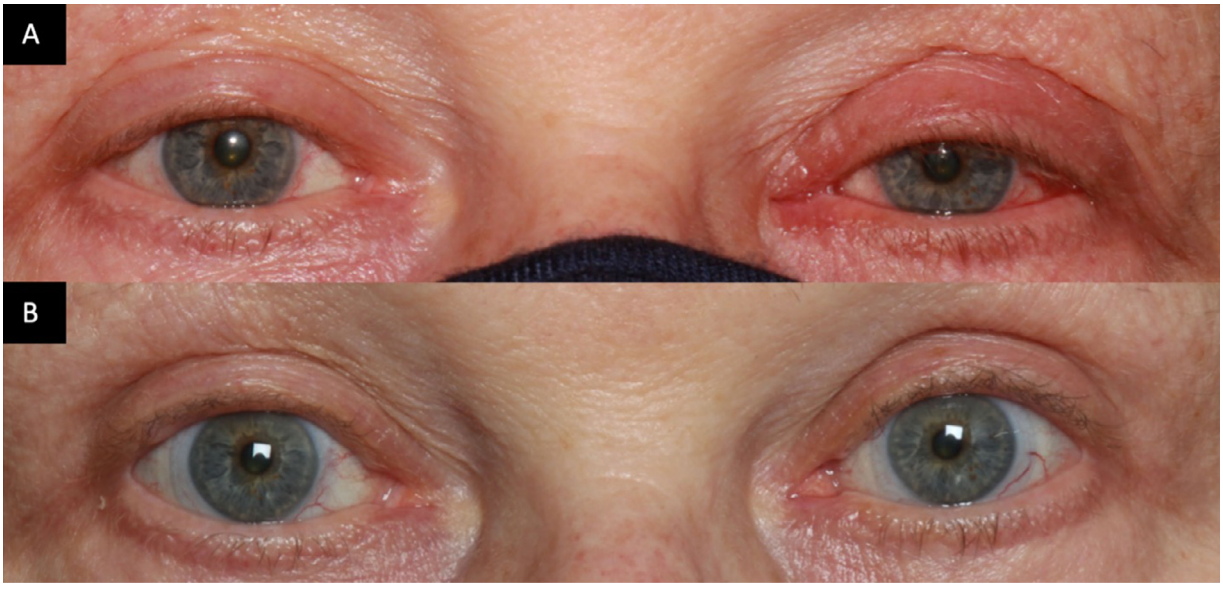

Fig. 1—(A) Left-sided papillary reaction and conjunctival irritation 29 days after initial surgery (B) Resolution of inflammatory reaction after tube removal 45 days post-operatively.

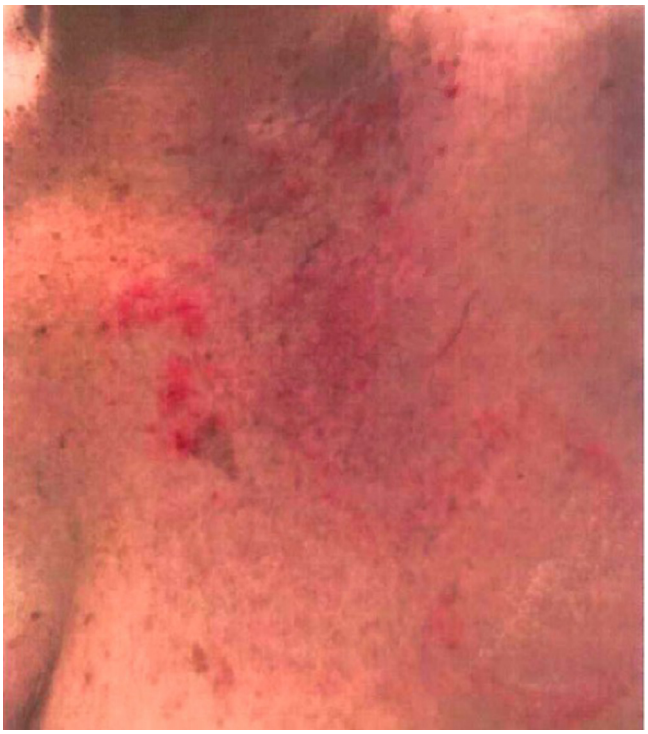

Fig. 2—Rash in area of silicone-based ambulatory cardiac monitor.

particular antigen. Type IV hypersensitivity reactions represent a slower, cell-mediated response to an antigen. While some studies have found increased levels of IgE and silicone antibodies in patients following insertion of a silicone implant, others have concluded that reactions to silicone are more in keeping with nonspecific foreign-body reactions.[13,14]

In addition to a direct immunogenic response to silicone, another potential etiology of inflammation is the components used in manufacturing, such as the chemicals for fixing additives and product sterilization.[15] Another proposed mechanism of chronic inflammation is low-grade bacterial contamination of implant surfaces rather than a direct reaction to silicone.[16]

With respect to the lacrimal system, prolonged intubation with silicone tubes can result in chronic inflammation and granulation tissue formation.[17] Ruby et al.[18] also found that the number of inflammatory cells on silicone tubes was positively associated with the length of intubation.[18] Postoperative histopathologic changes in lower nasolacrimal duct mucosa following silicone intubation have been studied in rabbits, and these authors concluded that longer intubation times were associated with increased transforming growth factor beta 1 activity, granuloma formation, progressive fibrosis, and adhesion of surrounding tissues.[19] Though there are no prior reports of contact allergy to silicone in the setting of lacrimal system intubation, when considered with the case presented here, these prior studies are suggestive of the immunogenic activity of silicone lacrimal tubes.

While intubation is commonly performed in DCR surgery, the necessity of this step has been debated in the literature.[20] A number of studies have reported similar success rates following DCR regardless of whether or not silicone tubes were used.[21,22] Similarly, the length of intubation does not appear to influence success rates, and the duration of planned intubation varies widely among surgeons.[23] Although the high success rate of routine DCR surgery makes it challenging to identify small improvements in outcomes attributable to silicone intubation, the case presented herein emphasizes that silicone intubation may not be a completely benign procedure. It may be so that in certain cases silicone intubation may positively affect outcome, but in others the opposite may be the case.

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Originally received Mar. 16, 2022. Final revision May. 23, 2022. Accepted Jun. 25, 2022.

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Footnotes and Disclosure

None of the authors have any financial disclosures or conflicts of interest to report, and no financial assistance was received in support of this research.

Supported by: This work is supported by an unrestricted grant from Research to Prevent Blindness, Inc., to the Department of Ophthalmology at UCLA.

Follicular lymphoma isolated to the superior oblique muscle

A 76-year-old female presented with bilateral peripheral visual field constriction. She had a past medical history of left common iliac vein stenting secondary to compression from the iliac artery, left lower extremity deep vein thrombosis requiring angioplasty, bilateral lower extremity lipodermatosclerosis, hyperlipidemia, vitamin D deficiency, diverticulitis, and generalized anxiety disorder. Her regular medications included apixaban, clopidogrel, venlafaxine, and montelukast. She denied smoking or alcohol use.

She presented as a telemedicine patient during the COVID-19 pandemic with a 1-year history of progressive, painless bilateral peripheral vision loss. After initial development of bilateral peripheral vision loss, she underwent bilateral cataract extraction with intraocular lens placement and subsequent yttrium aluminum garnet (YAG) laser capsulotomy of the right eye with progressive vision loss thereafter. Composite findings from external and subsequent examinations revealed that her visual acuity was 20/40 OD and 20/30 OS. Slit-lamp biomicroscopy and intraocular pressures were normal. Hertel exophthalmometry revealed proptosis—18 mm OD and 15 mm OS. Extraocular movements were normal. Her confrontation visual fields were equally narrowed at 1 m and 2 m testing ("tunnel vision"), and her saccades were accurate outside of a 5 degree island bilaterally. Fundus examination showed a cup-to-disk ratio of 0.3 OU with mild optic disc pallor and peripapillary atrophy bilaterally. Global optical coherence tomography showed retinal nerve fibre layer thickness of 81 μm OD and 85 μm OS. Automated perimetry (Humphrey visual field 24-2) was constricted to a 5 degree central island bilaterally with a mean deviation of −28.09 dB OD and −28.49 dB OS.

Magnetic resonance imaging of the brain and orbits showed asymmetric enlargement of the right superior oblique muscle, enhancement in the adjacent intraconal and extraconal fat, and enhancement of the floor of the adjacent anterior cranial fossa (Fig. 1). Right orbital biopsy and right extraocular muscle biopsy were performed via endoscopic orbitotomy and ethmoidectomy. The biopsy showed an infiltrate of predominantly small lymphocytes found to be positive for CD20 with coexpression of CD10 and BCL2 and moderate intermixed CD3 T cells. Immunohistochemistry was negative for CD5, cyclin D1, Epstein−Barr virus by in situ hybridization, c-MYC, MUM1, and kappa and lambda light chains. These findings were consistent with low-grade follicular lymphoma. Further malignancy staging