

Case Reports

Prolene monofilament suture in Boston Keratoprosthesis surgery

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Summary

Toxic reaction to nylon following uncomplicated cataract surgery and vitrectomy has been documented in the literature. We report the case of an aniridic patient with a known adverse reaction to nylon in whom Prolene suture was used in Boston Keratoprosthesis type 1 (KPro) surgery. During follow-up the cornea was checked for signs of inflammation and toxic reaction; at last follow-up (18 months) the patient showed no signs of complications due to Prolene. Our study suggests that Prolene suture may be used as an alternative to nylon in Boston KPro surgery in patients with a history of nylon toxicity.

Introduction

Surgical outcome is known to be affected by the type of suture used. Historically, nylon replaced silk in most ophthalmic procedures, and new materials continue to be investigated in hopes of minimizing complications and optimizing results.¹ Despite nylon's relative inertness, cases of presumed suture toxicity following use of nylon sutures in uncomplicated cataract surgery and vitrectomy have been reported.^{2,3} We present the case of a patient with a documented adverse reaction to nylon sutures following glaucoma surgeries in whom nonabsorbable polypropylene (Prolene) suture (Ethicon Inc, www.ethicon360.com) was used during Boston Keratoprosthesis type 1 (KPro) surgery.

Case Report

A 51-year-old white woman with congenital aniridia presented to the Centre Hospitalier Universitaire de Montréal-Notre-Dame experiencing progressive vision loss in both eyes. In 1999 she had developed secondary glaucoma in both eyes and was treated with trabeculectomy in both eyes. In 2000 she had undergone tube-shunt implantation in the right eye. Following both glaucoma surgeries, the patient presented with foreign-body sensation, conjunctival hyperemia, and edema during the early postoperative period; symptoms subsided after suture removal. She was diagnosed with toxicity to nylon sutures and was advised accordingly. We believed that the patient had a toxic reaction to nylon and patch

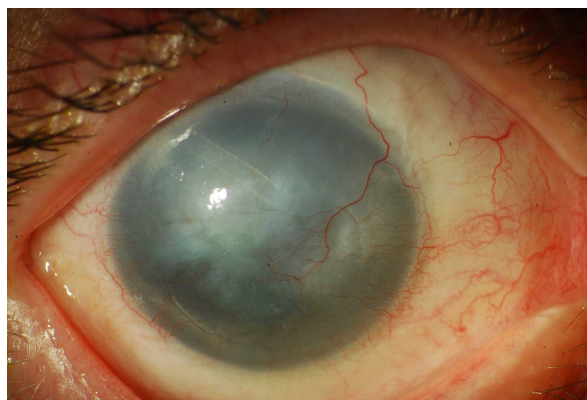


Figure 1. Limbal stem cell deficiency keratopathy in a patient with aniridia.

testing was not performed at presentation. She had no other known allergies.

On examination, visual acuity was counting fingers at 1 meter in both eyes. The patient suffered from congenital aniridia and her right eye was aphakic. The corneas were opaque, with deep stromal neovascularization over 360 degrees. The corneal scarring prevented a clear fundus examination. She was diagnosed with limbal stem cell deficiency keratopathy (Figure 1). A Boston KPro was recommended for visual rehabilitation in the right eye. Due to her past reaction to nylon sutures, a decision was

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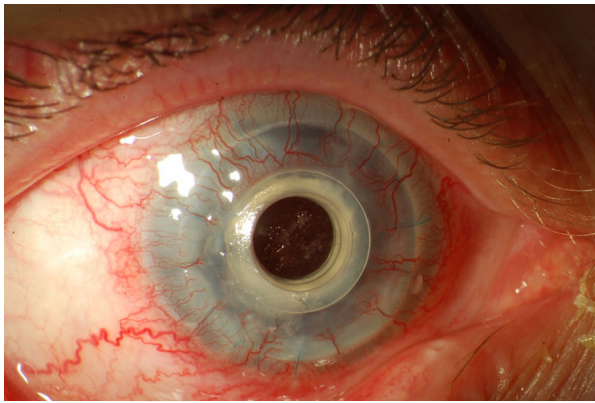


Figure 2. Boston Keratoprosthesis type 1 suture in place with 10-0 Prolene in this patient with known adverse reaction to nylon sutures.

made to use Prolene 10-0. The postoperative course was uneventful. The conjunctiva and cornea remained quiet, with no inflammatory reaction. One month postoperatively, the visual acuity improved to 20/80 +1 in the right eye. No adverse reactions were noted to the Prolene suture. No white sheathing or micro-abscesses along the thread, including extratissular portions, were observed, and no complications resulting from suture tension (either excessive or insufficient) were noted. At last follow-up (18months), the sutures were still in place and well tolerated (Figure 2).

Discussion

Nylon suture is most widely used in ophthalmic surgery and is considered to be relatively inert, inciting low degrees of inflammation and providing satisfactory wound strength.³ In 1979 Prolene monofilament was commercialized and appreciated for its high resistance to physical and chemical agents, its ability to maintain its tensile strength longer, its handiness and its hydrophobic properties.^{1,4} In the field of ophthalmology, the use of Prolene has seemed to be less appealing for corneal surgery whenever the suture was not completely intratissular: Turut et al⁵ have demonstrated micro-abscesses and white sheathing along the thread, especially on extratissular parts, on 6 of 7 patients who had keratoplasty using Prolene sutures. A later study,⁴ by contrast, showed Prolene monofilament sutures to be a good alternative to nylon sutures for penetrating keratoplasty, with Prolene offering better control of both residual astigmatism and refraction than nylon and being well tolerated by patients.

Our patient had a documented history of toxic reaction to nylon sutures. The early postoperative course follow-

ing the two previous glaucoma surgeries was marked by conjunctival hyperemia and edema, which only subsided following suture removal. The reaction was more severe and earlier in onset after the second surgery. These findings may be suggestive of a delayed-hypersensitivity reaction (type 4).⁶ Similar cases of possible toxic/allergic reaction to nylon have been reported,^{2,3,6} although nylon is considered a nontoxic material.⁷ Hypersensitivity reactions to suture materials are rare and have been mostly associated with chromic catgut and silk.

To avoid the possibility of an adverse reaction to nylon, we opted for a different material to suture the Boston Keratoprosthesis. Since it is important for the stability of the KPro that a permanent suture be used to maintain the integrity of the graft–host wound, we resorted to Prolene, which is nonabsorbable. We felt that the chances of a cross-reaction between Prolene and nylon were slim due to their different properties. In addition to their different chemical properties (nylon is a polyamide polymer whereas Prolene is a polypropylene polymer), the two behave differently in situ, the main difference being that Prolene does not adhere to tissue and is biologically inert.¹ Furthermore, we found no references to nylon's cross-reactive allergens in the literature. The patient tolerated Prolene well, without any related complications. The procedure was a success and our patient, who otherwise could not have undergone this surgery, benefited greatly. The possibility of using Prolene as an alternative to nylon in Boston KPro surgery will allow this surgery to be accessible to patients with a history of nylon toxicity or allergy.

Literature Search

The authors searched PubMed and MEDLINE (English, French, and Spanish articles, without date restriction), for the following terms: *nylon suture toxicity*, *nylon suture allergy*, *nylon cross-reactive allergens*, *Prolene suture toxicity*, and *Prolene keratoplasty*.

References

1. Kelly SE, Ehlers J, Llovera I, Troutman RC. Comparison of tissue reaction to nylon and prolene sutures in rabbit iris and cornea. *Ophthalmic Surg* 1975;6:105-10.
2. Balyeat HD, Davis RM, Rowsey JJ. Nylon suture toxicity after cataract surgery. *Ophthalmology* 1988;95:1509-1514.
3. Schechter RJ. Nylon suture toxicity after vitrectomy surgery. *Ann Ophthalmol* 1990;22:352-3.
4. Faggioni R, de Courten C. [Short and long-term advantages and disadvantages of prolene monofilament sutures in penetrating keratoplasty]. *Klin Monatsbl Augenheilkd* 1992;200:395-7.
5. Turut P, Florin P, Courtin J. [Complications caused by prolene]. *Bull Soc Ophthalmol Fr* 1981;81:601-3.

6. Elosúa de Juan I, López García S, Bové Guri M, et al. Supposed nylon allergy after cataract surgery. Arch Soc Esp Oftalmol 2001;76:263-6.
7. Aronson SB, McMaster PR, Moore TE Jr, Coon MA. The pathogenesis of suture toxicity. Arch Ophthalmol 1970;84:641-4.