

CASE REPORT

Corneal transplant in topical anesthetic abuse keratopathy: To do or not to do?

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Abstract

This study reports the outcomes of corneal transplantation in two cases of topical anesthetic abuse keratopathy. A chart review was performed for two patients who underwent penetrating topical anesthetic abuse keratoplasty (PK) due to keratopathy-related sequelae. The first case presented with unilateral full-thickness corneal perforation and a best-corrected visual acuity (BCVA) of hand motion. A tectonic PK was performed to restore globe integrity; however, the patient continued using topical anesthetic drops, and eight months postoperatively developed graft failure, with a final BCVA of hand motion. The second case presented with a unilateral corneal scar due to topical anesthetic abuse, with an initial BCVA of hand motion. PK was performed for visual rehabilitation, and the early postoperative course was uneventful with BCVA of 20/50. The patient missed scheduled follow-up visits and returned at the third postoperative month with loose sutures and signs of graft rejection. After suture removal and topical therapy, the clinical findings improved, and the final BCVA was 20/100. Psychiatric evaluation of both patients revealed severe anxiety and aggression. These cases highlight that uncontrolled use of topical anesthetic eye drops leads to irreversible ocular surface damage, and corneal transplantation in such patients has limited success due to poor compliance, often resulting in graft rejection and graft failure.

Keywords: Corneal transplant, graft failure, topical anesthetic abuse keratopathy

Topical anesthetic abuse is one of the leading causes of toxic keratopathy with serious visual consequences. It may cause a wide spectrum of ocular surface problems, ranging from punctate keratopathy to corneal perforation. The frequency, dose, and duration of topical anesthetic use, individual susceptibility, and the specific anesthetic agent determine the severity of ocular damage [1–3]. This self-inflicted keratopathy is relatively rare in countries where such medications are not available over the counter. However, in regions where access is easy, its incidence is

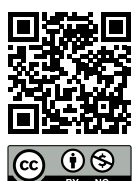
higher. Clinically, this entity can mimic infectious keratitis, particularly *Acanthamoeba* keratitis, which complicates diagnosis [4]. As a result, diagnosis is often delayed, and patients' poor compliance with treatment further worsens the visual prognosis [1]. Persistent epithelial defects, corneal scarring, progressive stromal melting, and corneal perforations are among the most important causes of vision loss in topical anesthetic abuse keratopathy. Although both medical and surgical treatments may help stabilize the ocular surface and prevent further complications, the

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overall anatomical and visual prognosis is usually poor due to patient noncompliance [3,5].

The purpose of this report is to present the outcomes of corneal transplantation in patients with topical anesthetic abuse keratopathy.

Case 1

A 34-year-old female presented to the emergency department with complaints of redness, pain, and vision loss in the left eye for one week. There was no history of ocular trauma, surgery, or contact lens use. Her medical history revealed that she had been diagnosed with corneal epithelial abrasion in the left eye and had been prescribed topical antibiotics (0.3% netilmicin, Netira, SIFI, Italy) and preservative-free artificial tears (0.15% sodium hyaluronate, Eystil SD, SIFI, Italy) six weeks earlier. Since then, she had been using topical anesthetic drops (0.5% proparacaine hydrochloride, Alcaine, Alcon, USA), available over the counter, to relieve ocular pain.

At presentation, best-corrected visual acuity (BCVA) was 20/20 in the right eye and hand motion in the left. Anterior and posterior segment examinations were unremarkable, and intraocular pressure (IOP) was within normal limits in the right eye. Slit-lamp examination of the left eye revealed a full-thickness corneal perforation with a dense, well-circumscribed stromal ring infiltrate and surrounding stromal edema. The infiltrate appeared whitish, sharply demarcated, and involved the mid-peripheral cornea. The Seidel test was positive, the anterior chamber was shallow, and IOP was low.

The patient was hospitalized, and anesthetic eye drops were discontinued immediately. Although the ring-shaped infiltrate initially raised suspicion for infectious keratitis, the patient's history of unsupervised topical anesthetic use and neurotrophic epitheliopathy supported a diagnosis of topical anesthetic abuse keratopathy. Corneal microbiological examination revealed no infectious agents, confirming the non-infectious etiology. Psychiatric evaluation revealed severe anxiety and aggression, and she was prescribed diazepam 10 mg orally twice daily (Nervium, Saba, Istanbul, Türkiye) and indomethacin 50 mg orally twice daily (Endol, Deva, Türkiye). Conservative treatment was initiated with topical antibiotics (0.5% moxifloxacin, Moxai, Abdi İbrahim, Türkiye), preservative-free artificial tears (0.15% sodium hyaluronate, Eystil SD, SIFI, Italy), systemic doxycycline (200 mg/day, Tetradox, Teva Pharmaceuticals, Türkiye), and bandage contact lenses.

Highlights

- Unsupervised use of topical anesthetic eye drops can lead to severe keratopathy, permanent vision loss, and poor graft survival after corneal transplantation
- Corneal transplantation in patients with anesthetic abuse keratopathy shows limited success due to continued drug use and poor compliance with follow-up
- Psychiatric consultation and strict regulation of over-the-counter anesthetic availability are essential for prevention and better clinical outcomes

After five days without significant improvement, tectonic penetrating keratoplasty (PK) was performed due to corneal perforation secondary to anesthetic abuse. During keratoplasty, 7.5–7.75 mm vacuum-punch trephines were used, and the donor button was sutured with interrupted 10-0 nylon. No intraoperative complications occurred. Postoperatively, she received topical corticosteroids (0.1% dexamethasone, Maxidex, Novartis, Switzerland), antibiotics (0.5% moxifloxacin), cyclosporin (0.05% cyclosporin A, Depores, Deva, Türkiye), and preservative-free artificial tears. Early postoperative follow-up was uneventful, with a clear graft and intact epithelium.

Eight months later, she presented with redness, pain, and blurred vision in the left eye. BCVA was hand motion, and slit-lamp examination revealed graft failure with edema and neovascularization. Anamnesis revealed continued topical anesthetic use and poor compliance with prescribed treatment. She declined repeat PK, and her condition remained stable over eight years of follow-up with a final BCVA of hand motion. Written informed consent was obtained.

Case 2

A 38-year-old male presented with photophobia and vision loss in the left eye for three months. He had a history of multiple visits to ophthalmology clinics with persistent epithelial defect and reported prior exposure to arc welding flash. Following this, he began using topical anesthetic eye drops (0.5% proparacaine hydrochloride, Alcaine, Alcon, USA), obtained over the counter.

At presentation, BCVA was 20/20 in the right eye and hand motion in the left. Anterior and posterior segment examinations were unremarkable, and IOP was within normal limits in the right eye. Slit-lamp evaluation of the left eye revealed corneal neovascularization and a dense stromal opacity involving the visual axis (Fig. 1). Fundus visualization was not possible, though ultrasonography and IOP were normal.

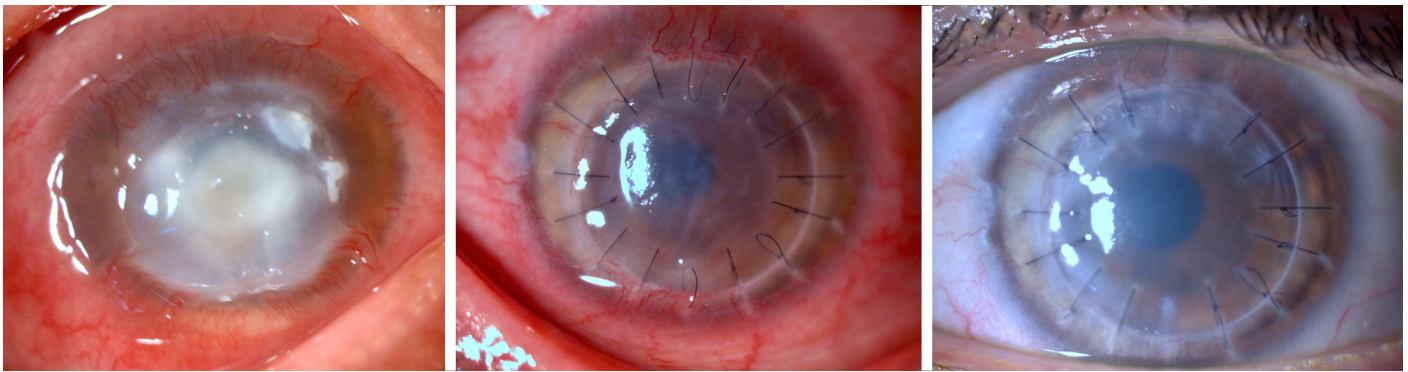


Fig. 1. Anterior segment photograph of Case 2 showing preoperative corneal neovascularization, ring-shaped infiltration, and dense stromal opacity involving the visual axis; three months after penetrating keratoplasty, loose sutures and graft edema are evident, with subsequent improvement following suture removal.

The patient was counseled about the harmful effects of anesthetic eye drops and the importance of discontinuation. Psychiatric evaluation revealed symptoms of anxiety and aggression, and he was prescribed diazepam 10 mg orally twice daily and indomethacin 50 mg orally twice daily. A PK was performed for visual rehabilitation due to corneal scarring from anesthetic abuse. No intraoperative complications occurred.

Postoperatively, he received topical corticosteroids (0.1% dexamethasone), antibiotics (0.5% moxifloxacin), cyclosporin (0.05% cyclosporin A), and preservative-free artificial tears. The early postoperative course was uneventful, with a BCVA of 20/50. However, the patient did not attend scheduled follow-up visits. Three months later, he presented with foreign-body sensation and blurred vision. Biomicroscopy revealed loose sutures, corneal edema, and keratic precipitates. BCVA was 20/400. The loose sutures were removed, and intensive topical corticosteroids and antibiotics were initiated with a diagnosis of allograft rejection. With treatment, the clinical picture improved, and the final BCVA was 20/100. Written informed consent was obtained.

Discussion

Regular instillation of topical anesthetics without medical supervision causes severe keratopathy by damaging the corneal microvilli and triggering cell death. Apart from its direct toxic effect on the epithelium, it disrupts normal corneal healing by damaging epithelial motility complexes [6–8]. Impaired corneal healing leads to persistent epithelial defects, corneal neovascularization, corneal scarring, and even blindness [1,9]. For this reason, it is not advisable to sell topical anesthetic drugs over the counter. These two cases occurred during the period when such agents were available without prescription in Türkiye. Fortunately, the Turkish Government prohibited the sale of these drugs in

pharmacies on March 29, 2012, preventing further such consequences.

Early diagnosis and timely treatment are extremely challenging in topical anesthetic abuse keratopathy, as it can mimic infectious etiologies, especially *Acanthamoeba* keratitis. The presence of stromal inflammation resembling ring infiltration, severe pain disproportionate to clinical findings, and lack of response to broad-spectrum antibiotics complicate diagnosis [4]. Superinfection may also occur, as the damaged cornea is highly susceptible to secondary infections. Therefore, microbiological assessment of the affected cornea is valuable to exclude infectious keratitis [10,11]. In addition, physician awareness of the clinical features of anesthetic abuse keratopathy accelerates diagnosis. It is essential to include topical anesthetic abuse in the differential diagnosis and to take a detailed history along with clinical findings [1,5].

The outcome of topical anesthetic abuse cases is usually poor. Besides delayed diagnosis, patients' poor compliance with treatment also worsens long-term visual prognosis [1,2,5,12]. Rosenwasser et al. [1] reported poor final visual acuity in six patients with this condition. Informing patients and discontinuing anesthetic eye drops are the first and most critical management steps. However, motivating patients to adhere to treatment is often difficult, as they resist discontinuing the drug. Psychiatric consultation is highly recommended, since psychiatric disorders and other substance abuse frequently accompany these patients [12]. In our report, both patients exhibited severe anxiety and aggression, and were prescribed benzodiazepines and systemic analgesics to improve compliance.

The main goals of medical treatment are to promote re-epithelialization, stabilize the tear film, suppress ocular surface inflammation, and prevent devastating complications such as corneal perforation. First-line options include preservative-free artificial tears, autologous serum eye drops, topical anti-

inflammatory agents (cyclosporine and corticosteroids), systemic anti-collagenases (oral doxycycline), and prophylactic topical antibiotics to prevent secondary infections [3,10].

In persistent and progressive cases, surgical options such as amniotic membrane transplantation (AMT) have been reported to be beneficial [10,13]. Burcu et al. [13] emphasized the advantages of early AMT application in anesthetic abuse patients. However, despite these efforts, some patients develop serious sight-threatening complications such as stromal melting and corneal perforations, necessitating tectonic penetrating keratoplasty (PK). In many cases, the cornea heals with a dense stromal scar, resulting in permanent vision loss. Thus, PK is performed not only to restore anatomical integrity but also to provide visual rehabilitation [1,3,9].

The prognosis following PK in topical anesthetic abuse cases is generally poor. Continued anesthetic use in the postoperative period and poor compliance with follow-up contribute to graft rejection and failure. Furthermore, pre-existing ocular surface inflammation increases the risk of graft rejection and reduces graft survival [3,5,10]. Patients should be thoroughly informed of these risks, and postoperative follow-up should be carried out meticulously in close cooperation with the patient. Psychiatric support should also be included in the management.

Systemic analgesics are frequently needed in these cases due to the severe pain caused by discontinuation of the anesthetic. A multimodal approach targeting both nociceptive and neuropathic pain is often required. Nonsteroidal anti-inflammatory drugs (NSAIDs) or opioids may improve comfort and treatment adherence [14,15].

In conclusion, uncontrolled use of topical anesthetic eye drops results in permanent ocular surface damage. Even with close monitoring and intensive treatment, long-term prognosis is generally unfavorable. Early identification and treatment of patients at risk of anesthetic abuse are essential to prevent irreversible vision loss requiring corneal transplantation. Public awareness should be raised, and strict regulations should be enforced to prevent over-the-counter sales of topical anesthetics.

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