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CASE REPORT

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# Endophthalmitis as a complication of protozoan-fungal keratitis in a contact lens wearer: a case report

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## ABSTRACT

**Introduction:** Contact lens wearers who do not follow proper eye hygiene are at risk of sight-threatening protozoan keratitis, which can be complicated by fungal keratitis. If timely and proper treatment is instituted, the progression of infection can be stopped and serious ocular complications can thus be prevented. *Acanthamoeba keratitis* is often associated with contact lens wear. However, to our best knowledge, its coexistence with *Fusarium* has not been reported in a pediatric contact lens wearer.

**Case presentation:** The aim of the paper is to present a case report of severe protozoan-fungal keratitis in a contact lens wearer. Despite delayed but intensive antiprotozoan, antifungal treatment and corneal transplantation, corneal ulceration resulted in endophthalmitis. The subsequent intervention, i.e., a combination of vitrectomy and corneal transplantation, failed to prevent the spread of infection. As the condition was considered to be life-threatening, a decision was made to perform evisceration.

**Conclusions:** Improper eye hygiene by contact lens wearers promotes the development of corneal infections. Late diagnosis and proper but delayed treatment caused spread of the infection and severe ocular complications.

**KEY WORDS:** keratitis, contact lens, keratoplasty, endophthalmitis, case report.

## INTRODUCTION

Microbial keratitis is a serious vision-threatening condition [1]. Contact lens wearers in developed countries, and especially those who disregard proper eye hygiene, are at the highest risk [2]. Timely diagnosis and early intervention may prevent the spread of infection and permanent damage to the cornea [3]. Combined *Fusarium* and *Acanthamoeba* keratitis is a rare condition and can be difficult to diagnose and manage [4]. To our best knowledge, *Acanthamoeba* coexistence with *Fusarium* has not been reported in a pediatric contact lens wearer.

Endophthalmitis is an inflammation of the interior of the eye with exudate to the vitreous cavity [5]. Scott *et al.* [6] gave a 0.7% to 1.7% range of endophthalmitis development in patients with microbial keratitis. Keratitis-related endophthalmitis is a sight-threatening ophthalmic emergency; its management is extremely difficult. Endophthalmitis may occur following ocular surgery or trauma, both of which may lead to corneal decompensation and scarring [7]. Vitrectomy alone cannot be performed; a combination of vitrectomy and corneal transplantation is used instead [8].

## CASE REPORT

**First hospital admission: from 15.05.2019 to 25.05.2019**

A 17-year-old patient was seen at the Emergency Room with a 1.5-week history of pain, photophobia and right eye redness. The night prior to the onset of the complaint the patient was sleeping in contact lenses. In the morning she removed the lenses and felt severe pain in her right eye. She was using levofloxacin (Oftaquix), ofloxacin (Floxal), dexamethasone and propamidine (Brolene) eye drops prescribed by a local ophthalmologist. The patient was admitted to our Ophthalmology Department for treatment of right eye keratitis. Smear and culture from the lens case revealed molds. Best corrected visual acuity (BCVA) at admission was 20/40 in the right eye (*oculi dextri* = O.D.) with –2.5 diopter spherical lens (Dsph) and 20/20 in the left eye (*oculi sinistri* = O.S.) with –3.0 Dsph. Intraocular pressure (IOP) was 18 mm Hg O.D. and 16 mm Hg O.S. Slit-lamp examination showed conjunctival injection, punctuate epithelial defects and ulceration in the paracentral temporal cornea (Figure 1A – 6.05.2019). Anterior segment optical coherent tomography (AS-

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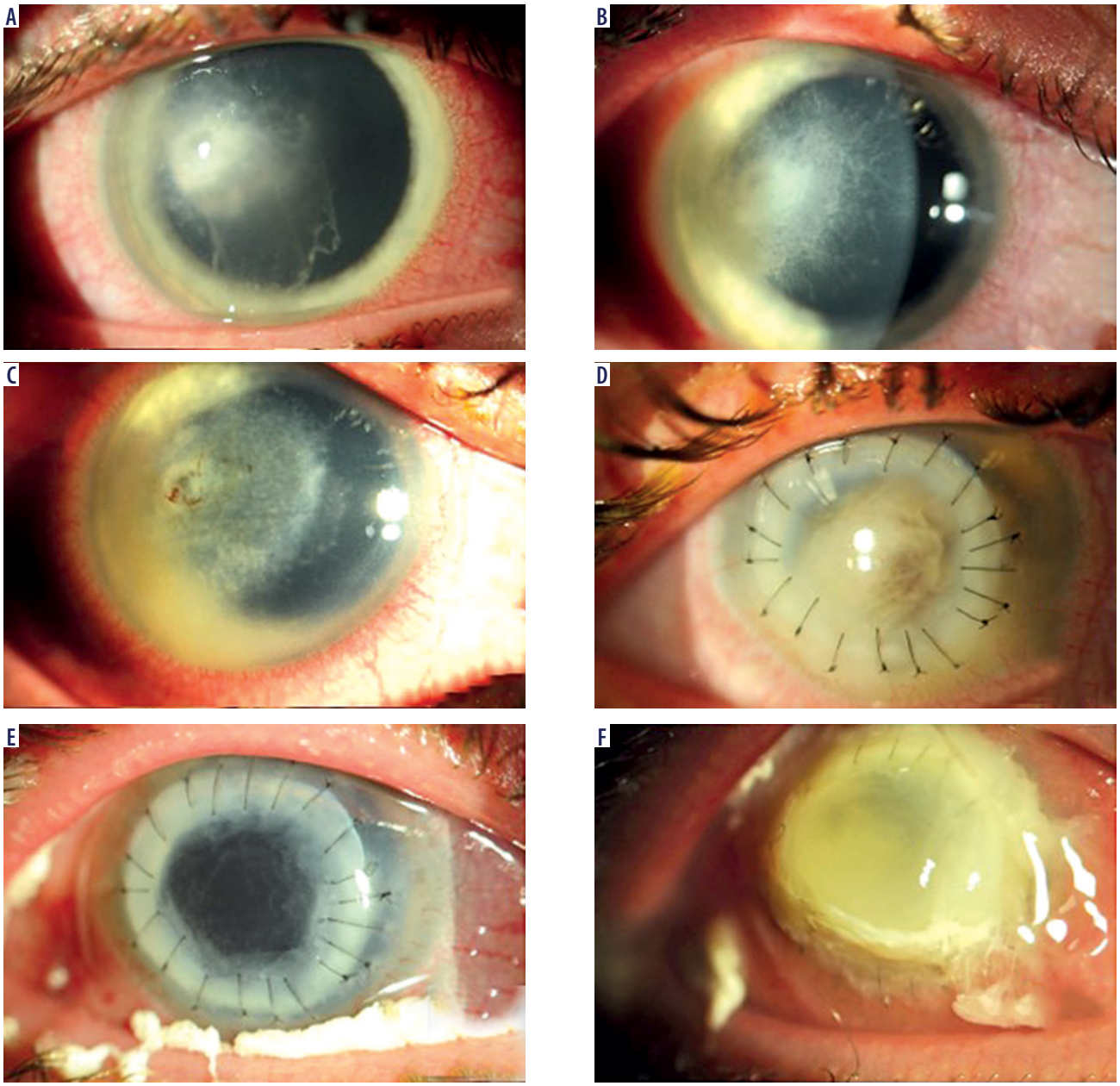


**Figure 1 A-F.** O.D. slit-lamp examination

OCT) revealed corneal thickening in the ulceration area (Figure 2A – 6.05.2019). Conjunctival smears were negative for bacteria and fungi. Confocal microscopy (Figure 3 – 6.05.2019) revealed a multitude of endothelial deposits (A), in the anterior stroma inflammatory cells and amoeba cysts (B). Following ophthalmic examinations, the patient was diagnosed with protozoan-fungal ulcerative keratitis in the *right eye*. Local treatment included propamidine (Brolene), ganciclovir (Virgan) q.i.d., moxifloxacin (Vigamox) q.i.d., fluconazole q.i.d., tropicamide 1% t.i.d. and loteprednol (Lotemax) b.i.d. Systemic acyclovir (Heviran) and fluconazole were also administered. Gradual clinical improvement was noted during hospitalization and the patient was discharged home.

**Second hospital admission: from 18.06.2019 to 27.06.2019**

The patient was admitted due to recurrent keratitis, neurotrophic keratopathy and associated anterior uveitis in the right eye. She complained of severe eye pain. A decrease in visual acuity was noted in the right eye; BCVA was 20/50 O.D. with –2.5 Dsph; IOP was normal. Slit-lamp examination revealed mixed conjunctival injection and paracentral corneal ulceration with endothelial precipitates (Figure 1B – 18.06.2019). AS-OCT showed ulcer-related corneal thinning (Figure B–18.06.2019). Previous treatment was instituted.

**Third hospital admission: from 29.06.2019 to 18.08.2019**

The patient re-presented to hospital within two days of discharge due to severe pain and redness of the right

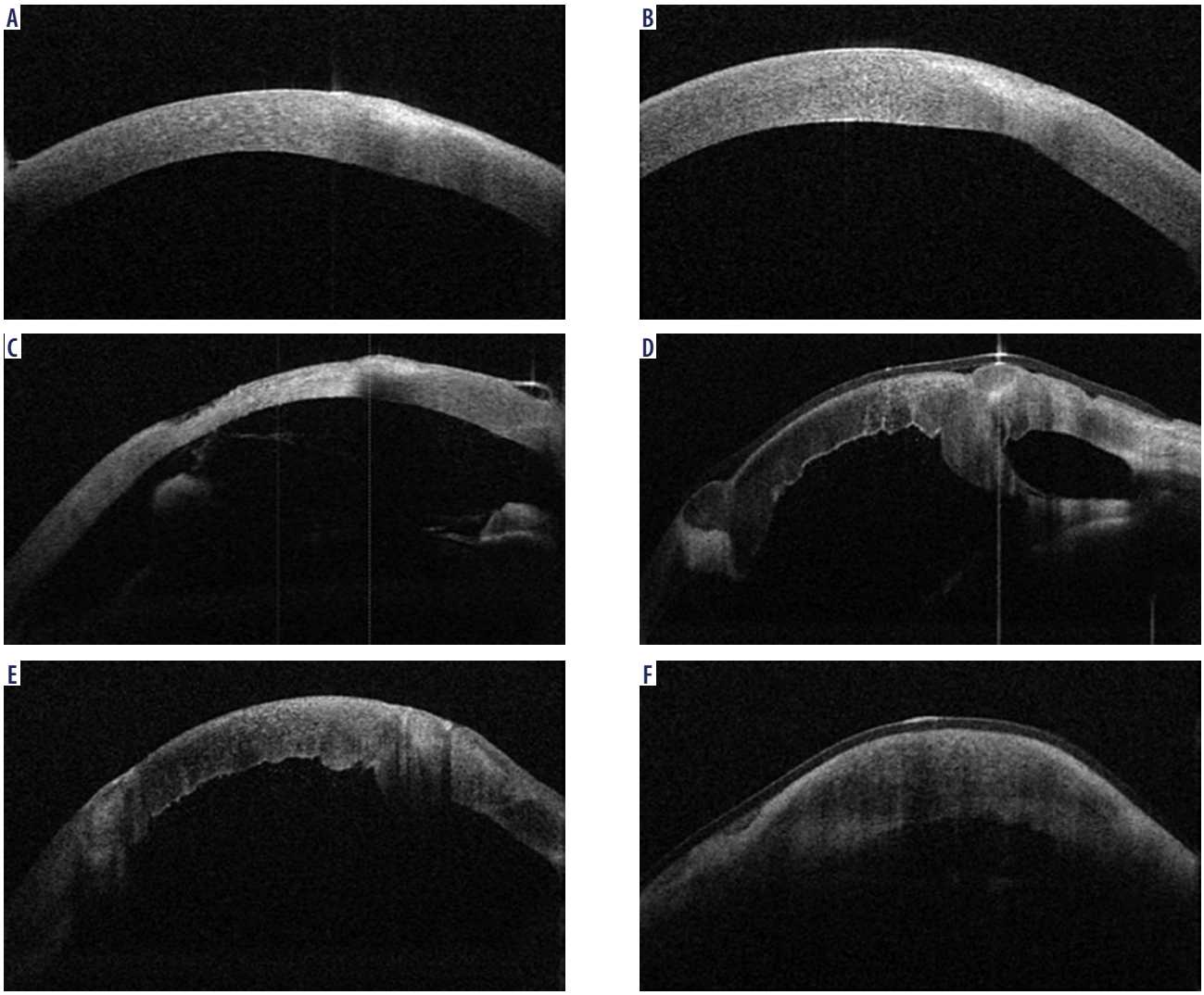


**Figure 2 A-F.** O.D. AS-OCT

eye. Visual acuity in the right eye declined rapidly; she was only able to count her fingers in front of the eye. IOP was 14 mmHg. Slit-lamp examination showed mixed conjunctival injection, stromal keratitis manifesting as whitish ulceration with multiple satellite foci (Figure 1C – 29.06.2019). AS-OCT revealed marked corneal thinning and a tent-like exudate within the anterior chamber originating at the posterior corneal surface and reaching the anterior surface of the opacified lens (Figure 2C – 29.06.2019). Hypopyon was visualized filling one-tenth of the anterior chamber. The fundus was largely opacified with a pinkish appearance. Corneal ulceration and related thinning caused irregular astigmatism (Figure 4 – 29.06.2019). Confocal microscopy (Figure 5 – 7.07.2019) performed on 7 July 2019 showed active keratitis and related endothelitis (A) with features of fungal neuritis. Superficial structures exhibited multiple thread-shaped structures characteristic of filamentous fungi (A, B). Subconjunctival voriconazole injections were started. Due to lack of improvement, specimens were collected for histopathology and fungal culture test; the anterior chamber was irrigated three times with AmBisome (amphotericin b) and Aprokam (cefuroxime). Considering the risk of corneal perforation, penetrating keratoplasty and cataract removal were performed.

**Fourth hospital admission: from 24.08.2019 to 11.09.2019**

The patient was readmitted due to exacerbation and disease progression (endophthalmitis) and acute graft rejection. Ocular ultrasound of the right globe showed vitreous echodensities highly suggestive of endophthalmitis (Figure 6 – 24.08.2019). VA O.D. was reduced to light perception without full localization. IOP O.D. was 25 mmHg. Slit-lamp examination demonstrated edema and corneal allograft opacification. The anterior chamber contained a compact brownish inflammatory mass; the iris was therefore hardly visible and the fundus could not be visualized (Figure 1D – 26.08.2019). AS-OCT allowed accurate evaluation of the anterior segment showing decompensation of the corneal allograft, a compact inflammatory mass at the anterior lens surface penetrating the allograft flap and subendothelial

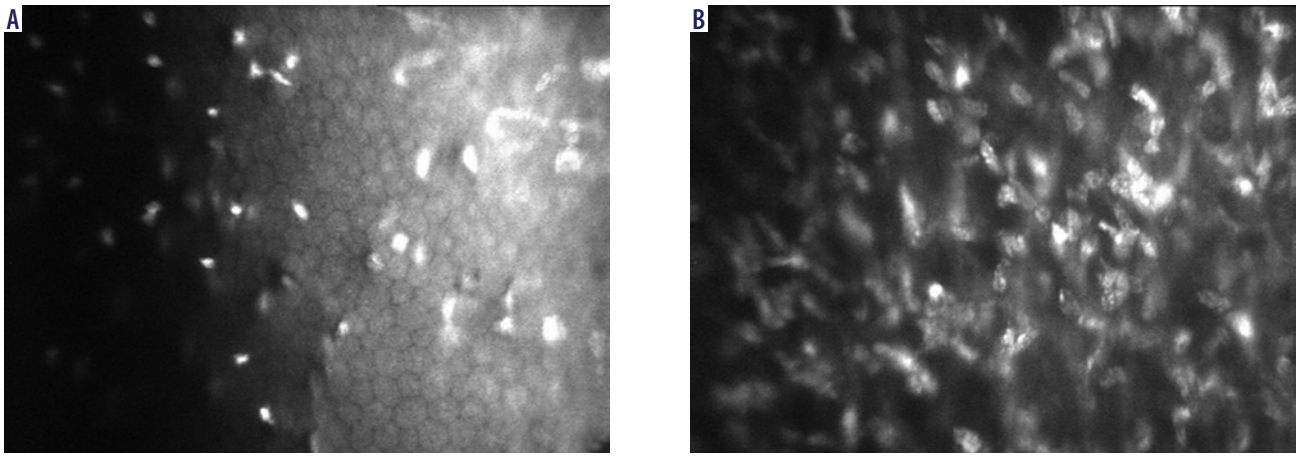


**Figure 3.** O.D. corneal confocal microscopy from 5/16/2019

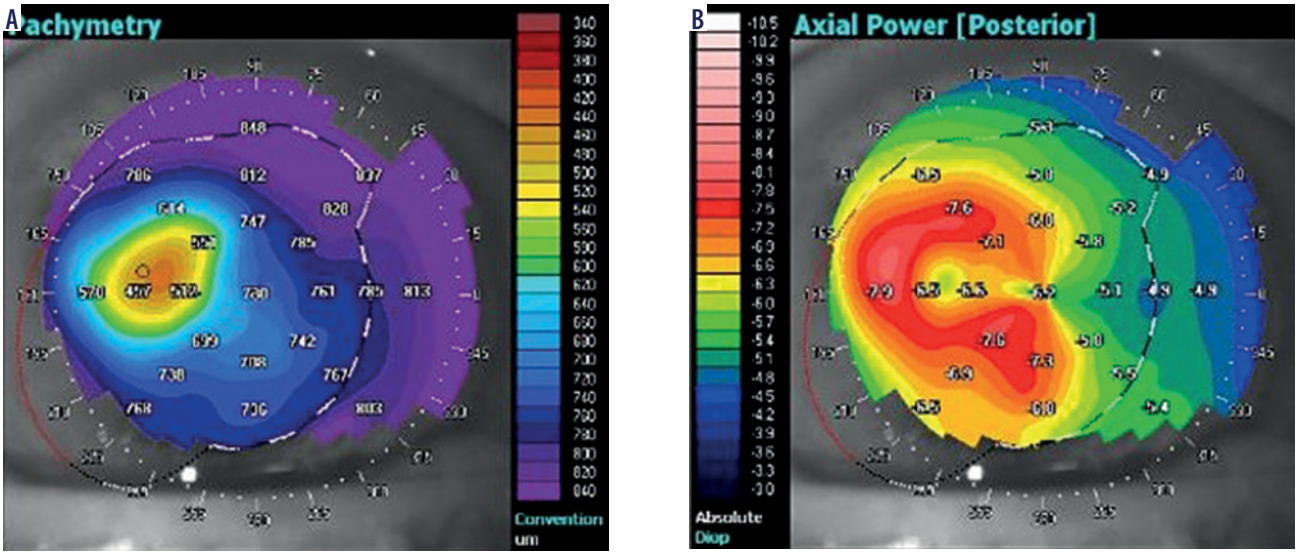


**Figure 4.** O.D. corneal pachymetric and dioptric map

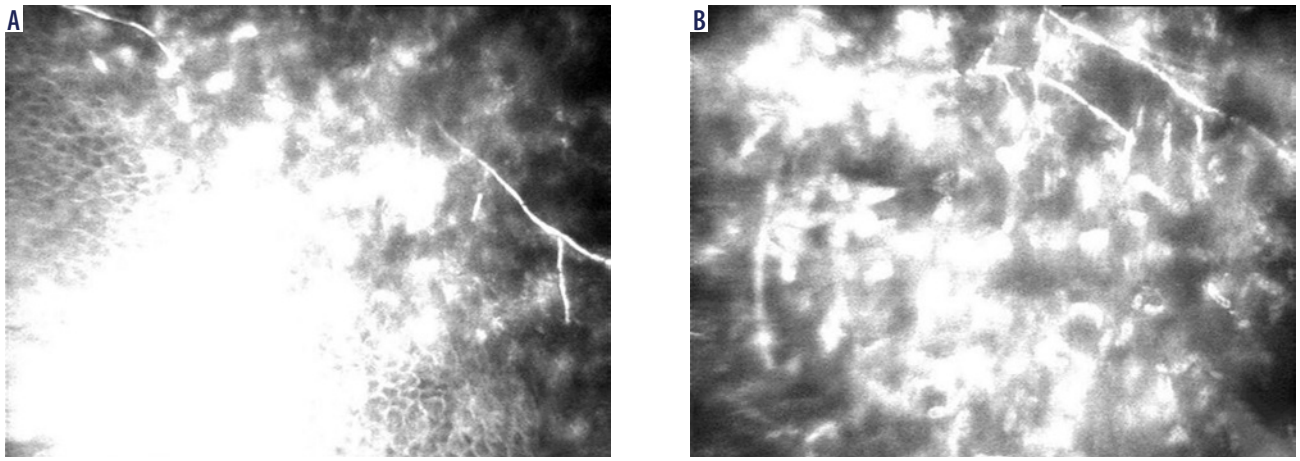


**Figure 5.** O.D. corneal confocal microscopy from 7.10.2019

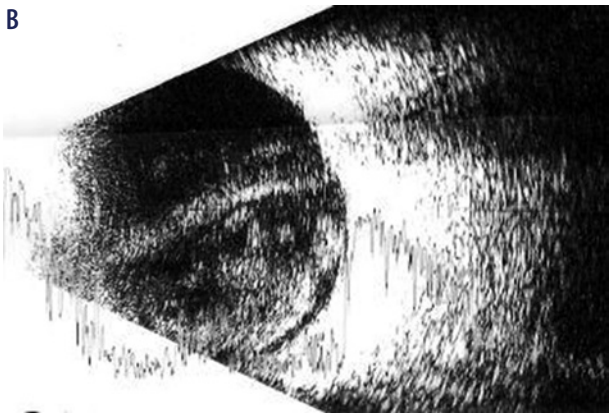


**Figure 6.** O.D. ultrasonography

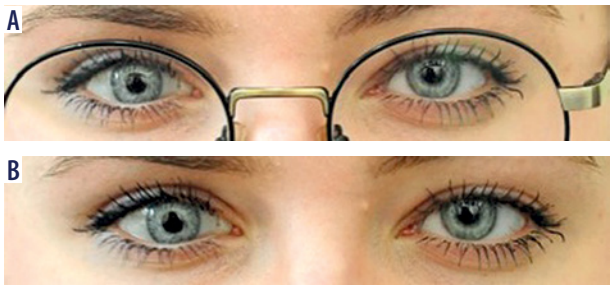


**Figure 7.** O.D. prosthesis

inflammatory cells. The corneal surface was covered with bandage lens (Figure 2D – 26.08.2019). Local voriconazole, loteprednol, dorzolamide/timolol, ofloxacin and atropine were applied as well as systemic vancomycin, methylprednisolone, dexamethasone, voriconazole, fluconazole, acyclovir, cyclosporin, paracetamol, potassium and a probiotic. Magnetic resonance of the orbit, performed on 28 August 2019, confirmed right endophthalmitis. Due to progressive infection involving the vitreous, posterior vitrectomy was performed on 29 August 2019 with silicone oil injection, retinal endophotocoagulation and epiretinal membrane peeling. Voriconazole was injected into the vitreous. Vitreous specimens cultures proved positive for *Fusarium* species. Local natamycin was instituted.

Slit-lamp examination showed whitish natamycin deposits within the conjunctival sac and on the bandage lens (Figure 1E – 30.08.2019). The corneal allograft was transparent but folds were seen on the Descemet membrane (Figure 2E – 30.08.2019). No signs of inflammation were noted in the anterior chamber. Reddish reflex from the fundus was seen.

A week later (6 September 2019) a repeat intravitreal voriconazole injection was administered to the right eye due to anterior chamber inflammation.

**Fifth hospital admission: from 2019-09-14 to 2019-09-21**

Acute corneal graft rejection was the reason for another hospital admission (Figure 1F – 14.09.2019). AS-OCT allowed visualization of the bandage lens, complete decompensation of the corneal allograft, Descemet membrane folds and marked shallowing of the anterior chamber (Figure 2F – 14.09.2019). VA O.D. was reduced to light perception without localization of light direction; hypotony might have evidenced a leak at the corneal suture line. The patient reported eye pain; examination disclosed graft dislocation and a large amount of purulent discharge from the right eye's interior. Corneal sutures were broken with loose ends seen within the lesion. A bandage contact lens was placed. Infection involving the entire eye globe indicated an enormous risk of further spread within the orbit. Considering all this as well as vision loss and severe pain, a case conference was held and a decision of right eye evisceration was made.

The ocular prosthesis provided an outstanding cosmetic effect. Hence, despite grievous bodily injury, the patient's psychological status and quality of life improved significantly (Figure 7 – 31.10.2019).

## DISCUSSION

*Acanthamoeba* keratitis is typically associated with contact lens wearers [9, 10]. Fungal keratitis, a common and severe condition, poses considerable diagnostic problems partly due to technical difficulties with confirming fungal growth despite evident clinical manifestations [11, 12].

Combined *Fusarium* and *Acanthamoeba* corneal infection can cause both diagnostic and therapeutic challenges. Diagnosis can be helped by biopsy or corneal confocal microscopy, non-invasive examination which allows *in vivo* assessment of the entire cornea, thus eliminating the need for a biopsy and related pain/emotional discomfort on the part of the patient. Confocal microscopy helps assess keratocyte appearance and identify fungal cells or amoeba cysts. Hence, even if culture results prove negative, the final diagnosis can be made quickly and targeted therapy can be timely instituted [13]. Prior to the first examination in our Emergency Room, the patient did not receive any antifungal medication. Clinical manifestations of fungal keratitis were confirmed by confocal microscopy.

Contact lens wearers have a significantly higher risk of microbial keratitis [14]. *Herpes simplex* keratitis promotes the development of fungal infections [15]. Corneal co-infections may easily hamper timely and accurate diagnoses.

The use of infected contact lenses and lens cases is the major reason for filamentous fungus *Fusarium* species infection. Fusarium has the ability to form biofilms that are resistant to antifungal preparations [16].

Due to an extended spectrum of antimycotic activity and the ability to penetrate the cornea, voriconazole is frequently chosen to treat fungal infections. Nevertheless, it is a high-cost antifungal agent, which limits its availability [17].

Prompt initiation of correct treatment can stop disease progression and thus prevent severe ocular complications. Although new antifungal agents have been introduced in the last few decades, no standards have so far been developed for treating fungal keratitis [18].

Although collagen cross-linking (CXL) is gaining popularity for the treatment of corneal infections, it seems to be controversial in fungal and *Acanthamoeba* keratitis. This method is limited to selected ophthalmic centers which use CXL for treatment of keratoconus [18, 19].

In patients with endophthalmitis, vitrectomy in combination with penetrating keratoplasty can be an eye-saving procedure (3). Due to little penetration of antifungal drugs into ocular tissues, both fungal keratitis and endophthalmitis are associated with little chance for a good visual outcome [3, 20].

## CONCLUSION

Contact lens use should be restricted in the pediatric group and mainly reserved for treating high refractive errors, anisometropia or used as a bandage lens. Improper eye hygiene by contact lens wearers promotes the development of corneal infections. It should be remembered that fungal keratitis may lead to blindness. Late diagnosis and proper but delayed treatment caused spread of the infection and severe ocular complications.

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## DISCLOSURE

The authors declare no conflict of interest.

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