

CASE REPORT

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Presumed atypical late-onset toxic anterior segment syndrome after implantable collamer lens implantation: a case report

Hang Qi¹, Xiuli Xie¹ and Qingsong Zhang^{1*}

Abstract

Background Toxic anterior segment syndrome (TASS) is a rare, noninfectious inflammation that occurs after anterior segment surgery. We report a case herein that developed presumed atypical late-onset TASS after V4c implantable collamer lens (ICL) implantation surgery.

Case presentation A 26-year-old man underwent ICL implantation surgeries of both eyes on two separate days. The 1-day and 7-day postoperative routine follow-up visits revealed no abnormalities. However, one month after surgery, dense white spots attached to the posterior surface and scattered ones to the anterior surface of ICL in the left eye were noted on anterior segment examination. His uncorrected distance visual acuity (UDVA) was 20/16 in both eyes and the fundus examination was normal. Despite the absence of typical clinical manifestations, late-onset TASS was suspect and intense topical steroid was administered. After 6 weeks of tapering topical steroid therapy, the white spots disappeared and the patient had no subjective complains throughout the treatment period.

Conclusions This case suggested that the traditionally considered acute and serious TASS could also present as delayed and insidious onset after ICL implantation surgery. Due to its variabilities, the awareness of TASS should be raised to ophthalmologists and regular follow-up visits should be emphasized to patients. Once TASS was suspected, intensive steroid therapy should be implemented in time.

Keywords Toxic anterior segment syndrome, Implantable collamer lens

Background

Implantable collamer lens (ICL) implantation is gaining growing acceptance worldwide due to its efficacy and safety in myopia correction. Toxic anterior segment syndrome (TASS) is a rare but potentially devastating complication that occurs after anterior segment surgery. TASS following ICL implantation have been reported in

very limited studies [1–4]. To the best of our knowledge, most reported cases were rapid-onset or of severe nature. Herein, we first report a presumed late-onset TASS case who presented mild clinical manifestation and resolved after adequate steroid therapy. All relevant literature published were searched from PubMed, Web of science and Google Scholar until Nov 2023.

Case presentation

A 26-year-old man with no history of systemic or ocular disease was presented to our outpatient for refractive surgery. On evaluation his uncorrected distance visual acuity (UDVA) was 2/25 both eyes (OU), which improved

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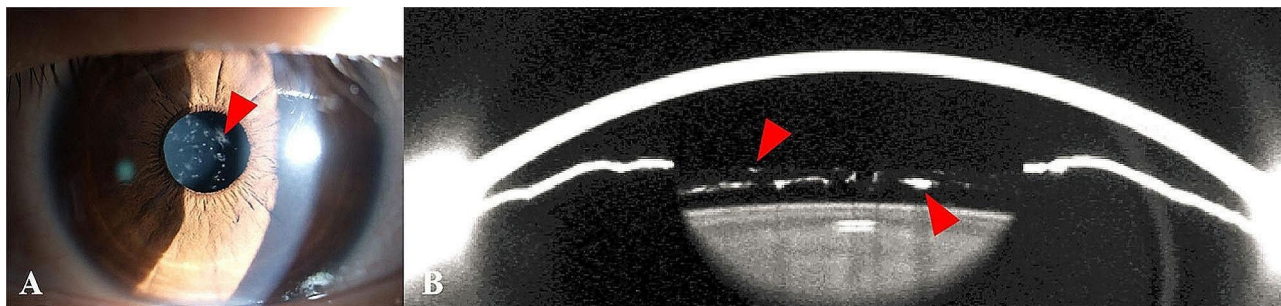


Fig. 1 Slit lamp photograph (x10 magnification) (A) and anterior segment Pentacam image (B) of the left eye at one month postoperatively showing dense white spots (red arrow) attached to the posterior surface and scattered ones (red arrow) to the anterior surface of implantable collamer lens (ICL).

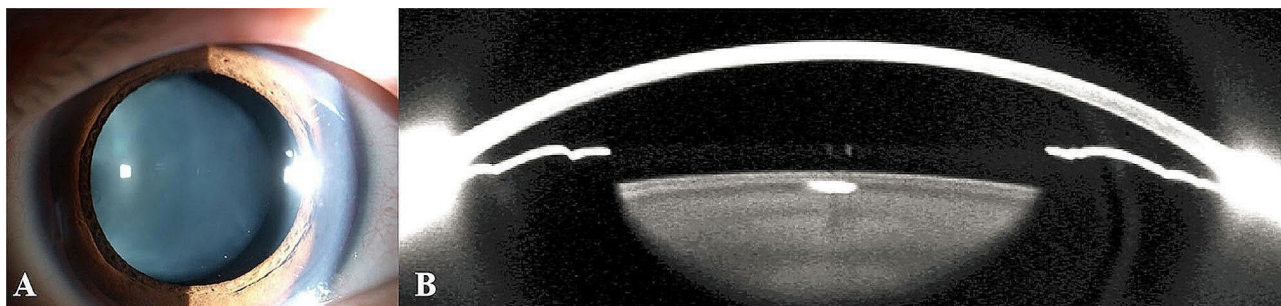


Fig. 2 Slit lamp photograph (x16 magnification) (A) and anterior segment Pentacam image (B) of the left eye after 6 weeks steroid therapy showing the white spots attached to the surfaces of ICL had disappeared and the anterior segment was unremarkable

to 20/20 with a refractive correction of -8.50 diopter sphere (DS) -0.75 diopter cylinder (DC) $\times 165^\circ$ the right eye (OD) and -8.50 DS/ -1.00 DC $\times 25^\circ$ the left eye (OS). The anterior segment examination was unremarkable OU, and the intraocular pressure (IOP) was 15.7 mmHg OD and 16.3 mmHg OS. The central corneal thickness (CCT) was 575 μm OD and 561 μm OS. The microscopy endothelial cell count was 2665 cells/ mm^2 OD and 2734 cells/ mm^2 OS. Corneal topography (Pentacam HR, Oculus, Germany) results were normal OU with keratometric values 42.9@177/43.7@87 OD and 43.0@8/43.5@98 OS. The anterior chamber depth (ACD) was 3.14 mm OU, and white-to-white (WTW) distance was 11.8 mm OD and 11.7 mm OS. The fundus examination demonstrated peripapillary crescent OU without treatable lesions in optic disc and macular region. After a thorough discussion with the patient, regarding the risks and benefits of surgery, a written informed consent was obtained. Subsequently, he underwent implantation of a V4c-ICL (-9.50 DS; overall diameter:12.6 mm; STAAR Surgical) OD under topical anesthesia, and then V4c-ICL implantation (-9.50 DS; overall diameter:12.6 mm; STAAR Surgical) OS the next day. 0.5% tropicamide phenylephrine eye drops were used preoperatively and 1% viscoelastic sodium hyaluronate intraoperatively. Postoperatively, 0.5% levofloxacin, 0.2% brimonidine tartrate and 0.5% loteprednol etabonate eye drops were routinely used for the first week.

On the first postoperative day, both eyes achieved an UDVA of 20/20 with IOP of 13.3 mmHg OD and 13.0 mmHg OS. IOP was measured using a Nidek NT-510 non-contact tonometer. (Nidek CO, Gamagori, Japan) The UDVA was improved to 20/16 OU at the 7-day postoperative visit and the anterior segment was unremarkable. One month after surgery, the UDVA was maintained at 20/16 OU with IOP of 13.2 mmHg OD and 12.7 mmHg OS, and the vault was 350 μm OD and 420 μm OS. However, anterior segment examination revealed dense white spots adhered to the posterior surface and scattered ones to the anterior surface of ICL in the left eye. (Fig. 1) The anterior chamber was quiet without signs of inflammation and the epithelium and endothelium were intact without any damage or edema. No abnormal signs were noticed in the right eye and the patient presented no complains.

The patient was instructed to 1% topical prednisolone acetate 6 times a day OS. After one week of treatment, the white spots on the surfaces of ICL were significantly reduced. Then, we tapered the prednisolone slowly over the next 5 weeks. At 6 weeks post-op, the UDVA was 20/16 OS with IOP of 15.7 mmHg. The white spots disappeared and the anterior segment was within normal limits with a postoperative vault of 350 μm . (Fig. 2)

Discussion and conclusions

Toxic anterior segment syndrome (TASS) is a rare but serious complication characterized by noninfectious inflammation after anterior segment surgery [2, 5, 6]. It was most commonly reported following cataract surgery, and TASS following ICL implantation surgery has only been described in very limited cases [1–4]. In addition, almost all reported cases following ICL implantation were of severe or immediate nature and the longest onset of TASS was 1 week post-op [1]. In present study, we first report a presumed mild late-onset TASS case who developed unilateral TASS 1 month after V4c-ICL implantation and the only clinical manifestation was dense white spots attached to the surfaces of ICL.

The exact incidence of TASS is uncertain since it often occurs sporadically or as part of a cluster of cases [5]. The American Society of Cataract and Refractive Surgery (ASCRS) recorded 1454 cases of TASS worldwide out of approximate 66,000 procedures between June 2007 and March 2012 [7, 8]. However, there is a paucity of data regarding TASS after ICL implantation surgery. Eissa et al [9] reported that 1 eye out of 54 eyes developed TASS following ICL implantation. Li et al. [1]. retrospectively analyzed the data from their refractive center and reported an estimate incidence of 0.24% following ICL implantation. The patient we described herein was the 1262th patient who underwent V4c-ICL implantation surgery in our refractive center from January 2023 to July 2023, translating to an approximate incidence of 0.04%, which is much lower than that of aforementioned studies.

TASS has generally been described as a severe complication which most commonly manifested as blurry vision, corneal edema, and anterior segment reaction [10]. In current case, the patient had no subjective complain and the clinical sign seemed atypical which only presented as dense white spots adhered to the surfaces of the ICL. Though milder, the abnormal manifestation resembled those reported in previous studies [1, 4, 11]. We suggest that it might be due to such a very early detection of the late-onset TASS that more severe signs following the widespread breakdown of blood–aqueous barrier did not appear. Our observation was similar to Suzuki's [12] in which they revealed that inflammation was a late event of TASS after cataract surgery and it was both mild and limited to the anterior chamber. In view of a good UDVA with normal IOP, unremarkable cornea, quiet anterior chamber, and the delayed onset of disease, we basically excluded the diagnosis of endophthalmitis in this study and did not consider oral steroid treatment.

Though TASS usually occurs within the initial 12–48 h postoperatively, late-onset TASS has been reported in a few studies [1, 11, 12]. Suzuki et al. [12]. illustrated that the mean time to onset of TASS was 38.44 ± 32.29 days (range 0–161 days) after cataract surgery. Interestingly,

Lee et al. [11]. also described a case who developed mild TASS 11 days after cataract surgery. However, they suggested that it was masked during early postoperative time under steroid treatment and mimicking delayed onset TASS. In the case we report herein, the patient had stopped using steroid eye drops one week after surgery, so we suppose it was probably late-onset. Although a few hypotheses have been proposed in published literature, the exact causative agent is usually difficult to identify due to its multifactorial etiology [5, 13, 14]. Acute-onset TASS typically occurs as a result of inadequate sterilization and cleaning of surgical instruments and disposable medical devices, (e.g., viscoelastic devices, disinfectants and medication), while late-onset TASS is often linked to intraocular lens contamination [7, 8, 15]. We reviewed the surgical video carefully but discovered no clear clues. Additionally, other six patients who underwent ICL implantation surgery on the same day showed no abnormalities. Hence, we could hardly determine the accurate cause of the presumed TASS in this case, however, viscoelastic devices residues or inadequate sterilization of surgical instruments might be possibilities.

In summary, the traditionally considered acute and serious TASS could also manifest as delayed and insidious onset after ICL implantation surgery. Therefore,

ophthalmologists should raise the awareness of TASS even its nature is mild, and emphasize the importance of regular follow-up visits to patients. Once TASS is suspected, adequate implement of intense steroid therapy is essential to avoid inevitable permanent damage.

Abbreviations

ICL	Implantable collamer lens
TASS	Toxic anterior segment syndrome
UDVA	Uncorrected distance visual acuity
OU	Both eyes
OD	Right eye
OS	Left eye
DS	Diopter sphere
DC	Diopter cylinder
IOP	Intraocular pressure
CCT	central corneal thickness
ACD	Anterior chamber depth
WTW	White-to-white
ASCRS	American Society of Cataract and Refractive Surgery

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Author contributions

HQ collected the data and wrote the main manuscript text. XLX performed the clinical examination. QSZ designed the manuscript and revised it. All authors reviewed the manuscript.

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Data availability

No datasets were generated or analysed during the current study.

Declarations

Ethics approval and consent to participate

This study was approved by the institutional research board (IRB) of the Wuhan Aier Ophthalmology Hospital and was performed in accordance with the ethical standards of the Declaration of Helsinki.

Consent for publication

Written informed consent was obtained from the patient for publication of this case report and any accompanying images.

Competing interests

The authors declare no competing interests.

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