TASS AFTER CATARACT SURGERY

Diagnosing and managing this rare, but potentially devastating, postoperative complication.

BY ANDREW J. MACKNER, OD

Optometrists are well versed in managing the postoperative complications of cataract surgery, including ocular hyper- and hypotension, retained lens fragments, and posterior capsular opacification. This article focuses on a less common complication: toxic anterior segment syndrome (TASS).

ETIOLOGY

TASS is an acute, sterile inflammation of the anterior segment following anterior segment surgery.[1] This noninfectious condition most often occurs after cataract surgery, but has also been associated with glaucoma surgery and corneal transplantation.

Inflammation is thought to be caused by a substance that enters the anterior segment during or immediately after surgery.[1] Essentially any solution used during surgery can cause TASS.[2] In addition, improper cleaning of surgical instruments, including inadequate flushing of handpieces, the use of enzymatic detergents, and the use of ultrasound baths, have been identified as the most common causes of TASS.[3] There have also been reported cases of IOL contamination that have been associated with TASS. Beyond iatrogenic causes, a study by Yazgan et al suggested that poorly controlled type 2 diabetes, hypertension, and hyperlipidemia may increase the risk of TASS after uneventful cataract surgery.[4]

It is difficult, and in some situations impossible, to determine the exact causative agent of TASS.

DIAGNOSIS

Differentiating TASS From Endophthalmitis

Mild inflammation of the anterior segment is common after cataract surgery. When inflammation is severe, the optometrist must be able

AT A GLANCE

- Toxic anterior segment syndrome (TASS) most often occurs after cataract surgery, but has also been associated with glaucoma surgery and corneal transplantation.
- Inflammation related to TASS usually presents within 12 to 48 hours after surgery.
- Corneal edema is the most common clinical finding in TASS, the second being intense anterior segment inflammation.
- The primary treatment for TASS is to suppress the inflammatory response.

TABLE. Key Differences Between TASS and Endophthalmitis

CONDITION	PATIENT SYMPTOMS	TIME OF ONSET	CORNEAL EDEMA
TASS	Blurred vision	12–48 hours after surgery	Limbus to limbus
Endophthalmitis	Ocular pain	4–7 days after surgery	Focal

Abbreviation: TASS, toxic anterior segment syndrome

to differentiate between TASS and endophthalmitis. This can be difficult because the conditions' signs and symptoms are similar (Table).[3]

A hallmark of TASS is that the inflammation usually presents within 12 to 48 hours after surgery, whereas endophthalmitis typically presents 4 to 7 days after surgery.[2] That said, cases of delayed TASS following cataract surgery and IOL implantation (range, 42–137 days) have been reported.[3] A second differentiator is that conjunctival injection tends to be minimal in cases of TASS and pronounced in cases of endophthalmitis.[3]

Patient symptoms in TASS and endophthalmitis differ greatly. Those with TASS typically present with a chief complaint of blurred vision, whereas pain is the chief complaint for more than 75% of patients with infectious endophthalmitis. Patients with TASS also usually do not experience pain unless IOP is significantly elevated.[1,3]

Common Clinical Findings

Corneal edema is the most common clinical finding in TASS (see *Example Patient Cases*). Whereas corneal edema is common after cataract surgery and tends to be focal, toxic insult causes

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EXAMPLE PATIENT CASES

CASE EXAMPLE NO. 1

Postoperative Day 1

A 73-year-old woman underwent uncomplicated cataract surgery and the implantation of a +20.50 D Tecnis monofocal one-piece IOL (Johnson & Johnson Vision Care) in the left eye. The target refraction was plano. Preoperatively, her UCVA was 20/80, her BCVA was 20/40, and her IOP was 16 mm Hg. Her systemic and ocular history were unremarkable.

One day after surgery, the patient had no complaints and reported no ocular pain or irritation. An examination revealed 1+ limbus-to-limbus corneal edema, a hypopyon smaller than 1 mm, 3+ cell, and fibrin in the anterior chamber that extended across the pupillary margin. Trace, diffuse conjunctival injection was present. The IOL was well centered.

TASS was the leading diagnosis based on the patient's presentation. Therapy with moxifloxacin 0.5% and ketorolac 0.4% three times daily was continued, and the dosing frequency of prednisolone acetate 1% (Pred Forte ophthalmic suspension, Allergan/AbbVie) was increased to hourly.

Postoperative Day 2

The patient's UCVA was 20/30 OS, and her IOP was 19 mm Hg. She reported adhering to the prescribed topical therapy and stated that her vision had improved and she was experiencing no pain.

An examination revealed trace limbus-to-limbus corneal edema, diffuse conjunctival injection, and 3+ cell. The fibrin had resolved, and there was no visible hypopyon. The patient was advised to maintain the prescribed drug regimen and to return in 3 days.

Postoperative Day 5 and Beyond

Five days after surgery, the patient's UCVA was 20/30 OS, her BCVA was 20/20- with a manifest refraction of -0.75 +0.75 x 117°, and her IOP was 16 mm Hg. She reported adhering to the prescribed topical therapy and stated that her vision was stable and she was experiencing no pain.

An examination revealed trace cell and resolution of the stromal edema. The patient was advised to continue treatment with ketorolac 0.4% three times daily, to continue treatment with moxifloxacin 0.5% three times daily for 3 more days and to then halt the drug, and to taper the prednisolone acetate 1% to three times daily for 3 weeks.

The patient underwent uncomplicated cataract surgery on the right eye 1 week later. Her left eye was monitored for

EXAMPLE PATIENT CASES, CONT'D

1 year at 4-month intervals. She experienced no IOP elevation, and her BCVA remained stable. Observation was extended to 6-month intervals, and stability has been maintained thus far.

CASE EXAMPLE NO. 2

Postoperative Day 1

A 72-year-old man underwent uncomplicated cataract surgery and the implantation of a +22.50 D Tecnis Eyhance IOL (Johnson & Johnson Vision Care) in the right eye. The target refraction was -2.50 D. Preoperatively, the patient's UCVA was counting fingers at 3 feet OD, his BCVA was 20/50, his VA with a -2.50 D loose lens was 20/400, and his IOP was 10 mm Hg. His medical history was significant for hypertension, and his ocular history was unremarkable.

One day after cataract surgery, the patient reported hazy vision and ocular irritation but no pain. An examination revealed 2+ to 3+ limbus-to-limbus corneal edema, trace conjunctival injection, a 2-mm hypopyon, 4+ cell, and 1+ flare. There was dense fibrin throughout the anterior chamber across the pupillary margin and extending to the incision site. The IOL was centered.

Based on the clinical presentation, the retina specialist on call was contacted to discuss a potential vitreous tap and injection. The specialist recommended treating the situation as TASS and monitoring the patient closely. Therapy with moxifloxacin 0.5% and ketorolac 0.4% four times daily was continued, and the dosing frequency of prednisolone acetate 1% was increased to hourly.

Postoperative Day 2

The patient's UCVA was counting fingers at 3 feet, his VA with a -2.50 D loose lens was 20/400, and his IOP was 11 mm Hg. An examination found 2+ limbus-to-limbus corneal edema, a 1-mm hypopyon, 4+ cell, and 1+ flare. There was dense fibrin throughout the anterior chamber across the pupillary margin and extending to the incision site. The retina specialist on call recommended continuing topical therapy because the hypopyon was shrinking.

Postoperative Day 3

The patient's UCVA was counting fingers at 2 feet, his VA with a -2.50 D loose lens was 20/400, and his IOP was 15 mm Hg. An examination revealed 1+ to 2+ limbus-to-limbus corneal edema, a hypopyon smaller than 1 mm, 4+ cell, and 1+ flare. The amount of fibrin had decreased, but it was still diffusely present throughout the anterior chamber. The retina specialist on call recommended continuing topical therapy. The patient was scheduled to return in 2 days.

Postoperative Day 5

The patient's UCVA, VA with a -2.50 D loose lens, and IOP remained the same as at the previous visit. An examination revealed no changes in the corneal edema, hypopyon, cell, flare, or fibrin. The pupil was dilated, but there was no view of the posterior segment. The patient was advised to continue topical therapy and referred to the retina service.

Postoperative Day 7

The patient's UCVA was counting fingers at 2 feet, and his IOP was 14 mm Hg. An examination by the retina specialist found trace stromal edema, 3+ cell, a consolidated 0.05-mm hypopyon, and fibrin at the incision site. B-scan ultrasonography showed vitreous debris but no choroidal thickening.

The risks and benefits of, and alternatives to, an intravitreal tap and inject with vancomycin and ceftazidime versus observation were discussed. The patient elected observation and continued topical therapy. He was asked to follow up in 2 days.

Postoperative Day 9

The patient's BCVA was 20/30-2 and his IOP was 12 mm Hg. An examination by the retina specialist found trace stromal edema, 1+ cell, a consolidated and improving hypopyon, and a resolution of the fibrin. The patient was advised to taper the prednisolone acetate 1% to every 2 hours.

Postoperative Day 16

The patient's BCVA was 20/30+2 with his old prescription, and the IOP was 13 mm Hg. An examination by the retina specialist found a quiet anterior segment.

The patient was advised to taper the prednisolone acetate 1% to four times daily and to discontinue the moxifloxacin and ketorolac. He was cleared by the retina specialist and asked to return to the optometry service for continued management.

EXAMPLE PATIENT CASES, CONT'D

Postoperative Day 21
The patient's BCVA was 20/20- with a manifest refraction of -2.50 D spherical, and his IOP was 15 mm Hg. On examination, the anterior segment was quiet.

The patient was advised to taper the prednisolone acetate 1% to twice daily for 2 weeks and to then discontinue the medication.

He chose to delay cataract surgery on his left eye and was scheduled to follow up in 3 months. The management of this case is ongoing.

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widespread damage to the corneal endothelial cells, resulting in diffuse limbus-to-limbus corneal edema.

The second most common clinical finding associated with TASS is intense anterior segment inflammation. A diffuse breakdown of the blood-aqueous barrier increases the number of inflammatory cells in the anterior chamber. As these cells settle in the anterior chamber, a hypopyon forms. Fibrin may also form in the anterior chamber and may extend across the iris and pupil and onto the lens and incision sites.[3]

TREATMENT

The primary treatment for TASS is to suppress the inflammatory response. Intensive therapy with topical corticosteroids is the mainstay for controlling inflammation and limiting ocular damage from the immune response.[1] Patients should be treated with topical prednisolone acetate 1% (Pred Forte ophthalmic suspension, Allergan/AbbVie) or difluprednate 0.05% (Durezol ophthalmic emulsion, Alcon) every 1 to 2 hours and closely observed for resolution during the first several days following onset.[1] Their IOP should also be monitored closely.

Clinical resolution of TASS is directly related to the level of inflammation after surgery.[1] Corneal edema and inflammation tend to clear over the course of several days to weeks in eyes with mild inflammation versus weeks to months in eyes with moderate inflammation. In the latter group, as the inflammation resolves, residual corneal edema may be present.[1] Patients who have a severe initial reaction often develop permanent damage and ocular complications. The corneal edema may not resolve, and a corneal transplant may be required. These patients may also develop chronic cystoid macular edema.[1,3]

> **PATIENTS WITH TASS ... USUALLY DO NOT EXPERIENCE PAIN UNLESS IOP IS SIGNIFICANTLY ELEVATED.**

Another potential long-term complication of TASS is damage to the iris that may result in thinning of the tissue and a fixed, dilated pupil. TASS may also damage the trabecular meshwork and cause peripheral synechiae, both of which increase the risk of glaucoma. Close observation is required even after any initial IOP elevation is resolved. These glaucoma cases tend to be more resistant to topical therapy and may require further surgical intervention.[1,3]

BE PREPARED FOR TASS

TASS is a rare but potentially devastating postoperative complication of anterior segment surgery that optometrists can manage successfully. It is crucial that providers be able to differentiate between TASS and endophthalmitis. If endophthalmitis is a possibility, patients should be immediately referred to a retina specialist for evaluation. If endophthalmitis can be confidently ruled out, patients should be treated with intensive topical steroids and monitored closely for resolution. It is imperative to report cases of TASS to the surgeon and surgical center regardless of resolution with treatment so that they can take steps to prevent other cases. ■

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ANDREW J. MACKNER, OD
- Optometrist, Edina Eye Physicians and Surgeons, Edina, Minnesota
- mack9321@pacific.edu
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