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Letter to the Editor

Toxic anterior segment syndrome in a tertiary Australian healthcare institution

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Toxic anterior segment syndrome (TASS) is an acute sterile inflammatory disorder that follows intraocular exposure to foreign substances. It commonly occurs within 12 to 48 hours after anterior segment surgery. TASS presents in a similar fashion to acute post-operative endophthalmitis, but differs in its time-course and represents a sterile inflammatory response.

Cases were identified in a retrospective audit of patients presenting to our institution for cataract surgery between November 2011 and September 2012. A total of 11 cases of TASS were identified over 12-months (Table 1). This represented 3.6% of the total number of cases of intraocular surgery performed. Of these, 9 cases occurred within a 4-week period.

The first of the cases occurred in November 2011. Following this, a cluster of seven cases was recognised within a fourteen-day period in May 2012. Intraocular surgery was immediately suspended and a multi-disciplinary investigative committee convened.

Routine cataract surgery was performed in all cases. Patients were followed up in the Ophthalmology clinic on day 1 post-operatively. The following criteria for TASS were used:

- Marked atypical inflammatory response within 48 hours postoperatively
- Significant diffuse corneal oedema
- Anterior chamber inflammation marked by either evidence of fibrin formation or hypopyon
- Minimal vitreous involvement

Upon identification of marked intraocular inflammation, 6 patients underwent vitreous and aqueous biopsies, and received intravitreal injections of vancomycin,

ceftazidime and dexamethasone. Microbiology testing was performed on all specimens and was negative in all cases. Remaining patients were placed on an initial regimen of intensive topical corticosteroid therapy and reviewed regularly. Patients received regular review.

Preliminary investigations revealed a need to update cleaning and sterilisation workflow processes, and optimise inventory management of sterile stock supplies and medications. Steps were taken to address these issues.

Instruments had been cleaned on a prolonged sterilisation cycle, which can result in a breakdown of electroplated metal coatings. Consequent exposure of the intracameral environment to metal ions may precipitate a toxic response. [1] Reusable ophthalmic instruments were henceforth cleaned and sterilised separately on a shorter cycle

Use of reusable cannulas was not compliant with American Society of Cataract and Refractive Surgery (ASCRS) recommendations and all intraocular cannulas were replaced with disposable single-use equivalents. [2 3]

Medications and Ophthalmic Viscosurgical Devices (OVD) used within the perioperative period have also been identified as precipitants by other investigators. The use of intracameral agents has been reported to be associated with the generation of free radicals, which may contribute to TASS. Most commonly, contaminants such as endotoxins or other impurities have been identified as triggers. [2] None of these factors were identified as likely causes. Interestingly, the use of OVD materials may protect against endothelial damage in this instance by acting as scavengers of free radicals that may have been produced by intracameral agents or through phacoemulsification. [4]

A search for airborne and waterborne environmental microbial or lipopolysaccharide contamination did not find any significant sources of risk.

All patients were followed, and reported a reduction in symptoms. Final visual outcomes were favourable in all cases (Table 2). Symptoms, inflammation and corneal oedema resolved within six months in all cases. In one case, complete symptomatic and clinical resolution occurred within one week. No cases of secondary glaucoma occurred.

Surgery was recommenced after root cause analysis was completed, initially with a reduced caseload. However, two further cases of TASS were encountered and intraocular surgery was re-suspended. Another in-depth case review, led by our Quality Improvement team, did not identify any further precipitants. Following these investigations, a further case of TASS was identified three months following this third cluster. No further cases were identified between September 2013 and February 2017, despite more than 1000 cataract surgeries having been performed in this time.

TASS typically occurs in an outbreak fashion, with a large recent retrospective case series reporting an incidence of 0.22%. [2] Incidence rates of up to 38% have been reported during the outbreak period. [5] Investigations into the likely cause of TASS can be fraught with challenges given the diverse range of possible precipitants. This has been extensively investigated by the ASCRS Task Force, which has provided an analysis of the most commonly reported risk factors for TASS. [3]

A thorough multidisciplinary approach in the investigation of potential causes of TASS is often warranted. More commonly, as reflected by our experience, a definite

aetiology cannot be identified, despite review of all perioperative possibilities. Similar experiences have been reported regarding difficulties in establishing a definite precipitant for these clusters of cases. [6] It is important for clinicians to consider acute postoperative endophthalmitis in the differential diagnosis of TASS, since endophthalmitis, which requires prompt treatment to minimise the risk of visual loss, may present with features typically associated with TASS. [7]

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TABLES

Table 1: Demographic characteristics

Cluster	Patient	Age	Sex	DM / HTN	Operated Eye	POHx	Operation
1	1	50	M	HTN	Right	Blunt injury OD	PKE/PCIOL
2	2	65	F	NA	Left	Nil significant	PKE/PCIOL
2	3	72	F	DM	Right	Nil significant	PKE/PCIOL
2	4	78	F	HTN	Right	Glaucoma, blepharitis	PKE/PCIOL
2	5	75	F	HTN	Left	Fuchs endothelial dystrophy	PKE/PCIOL
2	6	70	F	NA	Left	Pseudoexfoliation syndrome	PKE/PCIOL
2	7	74	F	DM	Right	Nil significant	PKE/PCIOL/IVTA
2	8	61	M	NA	Left	Right amblyopia	PKE//PCIOL
3	9	70	M	DM	Right	Nil significant	PKE/PCIOL
3	10	76	F	NA	Left	Blepharitis	PKE/PCIOL

4	11	71	F	DM	Right	Glaucoma	PKE/PCIOL

Table 2: Clinical progress

Patient	Vision				Clinical signs and symptoms		
	Preop VA	Postop VA D1	Final BCVA	Time to BCVA	Resolution of inflammation	Resolution of oedema	Resolution of symptoms
1	HM	6/36	6/5	POM3	POM1	POW1	POM3
2	6/36	6/12	6/6	POM3	POW1	POW1	POW1
3	6/18	CF	6/9	POM3	POM1	POM3	POM1
4	6/24	6/12	6/9	POM3	POM1	POM1	POW1
5	6/12	6/60	6/9	POM1	POM3	POM2	POM3
6	6/12	6/18	6/6	POM3	POM3	POM1	POM6
7	6/60	6/24	6/6	POM14	POW1	POW1	POW1
8	6/36	6/12	6/6	POW1	POM3	POM3	POW1
9	6/9	6/24	6/6	POW2	POM1	POW1	POW1
10	6/12	6/24	6/9	POM9	POM3	POM3	POM3
11	6/18	6/12	6/6	POM6	POW1	POM1	POM1

POM, postoperative month, POW, postoperative week