Amorphous anatomy of a toxic anterior segment syndrome outbreak

Howard Larkin
in Las Vegas

OVER the past two years, toxic anterior segment syndrome (TASS) has emerged as a significant problem – so much so that the American Society of Cataract and Refractive Surgeons set up a special task force to study outbreaks. During one four-month stretch in 2006, more than 100 North American clinics reported cases to the task force.

While some of the apparent increase may result from better reporting due to a greater awareness of the problem, and reclassification of conditions that once might have been recorded as sterile endophthalmitis or postoperative uveitis of unknown origin, many experienced investigators believe that the increase is real.

“My own view is that there has been a very significant upsurge in the incidence of TASS. No one really knows why,” says Simon P Holland, MB, FRCS, clinical professor of ophthalmology at the University of British Columbia, Vancouver, Canada, who has investigated TASS outbreaks across North America.

Figuring out why is proving to be a significant challenge. That’s because TASS is thought to result from the introduction of any one of a number of inflammatory substances into the anterior chamber during surgery.

Traces of detergent and debrisor left on instruments after cleaning and sterilisation, and endotoxins left behind after short-cycle sterilisation are thought to be the major causes. But other identified causes include everything from antibiotic surface ointments, to preservatives in intracameral injected anaesthetics and ophthalmic products. All may result from the introduction of any one of a number of inflammatory substances into the anterior chamber during surgery.

While most TASS cases resolve completely with topical steroids applied every hour or half-hour for three days, complications can be severe. In serious or neglected cases, damage to the trabecular meshwork can lead to glaucoma and vision loss. Corneal decompensation can progress to the point that a corneal transplant is required. TASS also can be confused with early stage infectious endophthalmitis, so accurate differential diagnosis is critical to guide treatment.

Dr Holland points out that, unlike many other surgical applications, when it comes to ophthalmic surgery, it isn’t enough to ensure that the instruments in the same agitator as antibacterics in other surgical applications, when it comes to ophthalmology, it isn’t enough to ensure that the instruments are sterilised. Instead, centres need to reassess their sterilisation processes.

“Our assumption has been that shorter surgical times and more efficient surgery reduces infections. But shortening sterilisation and cleaning procedures doesn’t work. We need to be extra vigilant to keep detergents and toxins out of the eye”

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Dr Holland knows first hand how serious TASS can be. In 2004, his clinic experienced an outbreak. They saw two cases of lost vision due to glaucoma out of 1.7. That’s unusually high. Since then he has worked with clinics experiencing outbreaks throughout the US and Canada.

Dr Holland and his colleagues addressed the outbreak as most clinics do – by conducting a thorough review of practice operations and taking multiple steps to address a range of possible causes. These included changes in sterilisation techniques and a switch to disposable cannulae and single-use phaco tips.

In Dr Holland’s case, these internal process changes were enough. But they aren’t always.

In one centre Dr Holland worked with, multiple interventions, including introduction of a new steriliser system, revised steriliser reservoir cleaning protocols, discontinuing the use of reusable tubing and phaco tips, a new filtration system, glove changes, and an addition of an enzymatic cleaning solution all temporarily reduced TASS cases, but sporadic outbreaks continued to occur for more than a year.

It wasn’t until the centre switched to a different brand of BSS that the TASS rate finally fell from 33 per 1,000 during the outbreak to less than one per 1,000 afterward, a statistically significant finding (p<0.0001).

Afterward, an unopened bottle of the commercial BSS that the centre had been using during much of the outbreak was found to be contaminated with endotoxin.

Dr Holland says, “The problem is that many manufacturers of surgical products are outsourcing production. As a result, even brand-name suppliers often no longer have control over production processes. The root of the problem might be several steps down the industrial supply chain – well beyond the control of the operating surgeon.”

This shows that surgeons facing TASS must consider factors well beyond the four walls of the hospital or surgery centre. Dr Holland says, “I personally was frustrated with myself because I missed the BSS connection initially. They had done just about everything they could with the sterilisation system. I never suspected that BSS from a factory could be contaminated with endotoxin. It just shows you the far reaches of the aetiology of TASS.”

Liliana Werner, PhD, a researcher at the University of Utah, US, and the Berlin Eye Research Institute, advises that any solution used in the eye be specifically tested and cleared for intraocular use.

“The solutions have to have appropriate pH, osmolality, chemical composition, and be unpreserved, among other characteristics,” she notes.

While endotoxin-contaminated commercial BSS appeared to be responsible for hundreds of TASS cases last year, Dr Holland says that in his experience, instrument sterilisation and cleaning issues are implicated much more often.

These processes should be well within the control of hospitals and surgery centres. But facilities that perform surgery outside of ophthalmology may not be aware that ophthalmic instruments require much greater care.

Dr Holland points out that, unlike many other surgical applications, when it comes to ophthalmic surgery, it isn’t enough to merely kill bacteria. Their antigens remains, particularly the endotoxins released when bacteria are lysed, must be broken down lest they irritate corneal and other ocular tissues.

In addition, any remaining detergent residue must be removed to avoid irritating sensitive ocular tissues.

“It is really hard for infection control experts, who are used to dealing with non-ophthalmic surgery, to accept less use of detergent,” Dr Holland says.

His investigations of TASS outbreaks have found:

- One centre suffered a TASS outbreak immediately after increasing volume from about 14 surgeries per day to about 20 to 21 – with no increase in cleaning staff. While it was impossible to demonstrate in this case that shorter sterilisation or washing times caused the outbreak, the problem disappeared once sterilisation procedures were updated.

- A hospital that has a TASS outbreak was found to be washing surgical instruments in the same agitator as endoscopes used in other procedures. While no bacteria survived the treatment, the ophthalmic instruments were found to be contaminated with high levels of endotoxins and other antigenic materials from dead bacteria.

Dr Holland recommends that ophthalmic instruments be cleaned and sterilised separately from instruments used in other procedures. He also says that long-cycle high-heat sterilisation is best because it breaks down endotoxins and other antigens that can survive short-cycle sterilisation. However, in cases where long-cycle sterilisation is not possible, short-cycle will work if solutions are changed frequently to avoid build-up of endotoxins.

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simon_holland@telus.net
liliana.werner@hsc.utah.edu