

Studies offer clues for preventing DLK outbreaks

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in San Diego



Simon Holland

THE causative organisms of diffuse lamellar keratitis (DLK) may be lurking somewhere in your operating theatre. Most outbreaks could likely be prevented with appropriate instrument preparation and cleaning, a new survey reveals.

Canadian researcher Simon Holland MD FRCSC investigated 11 recent outbreaks of DLK at ten laser refractive clinics in nine European countries. He visited each clinic

and conducted a retrospective chart review, along with a review of the surgical system in use and an analysis of the epidemiology of the outbreaks. When possible, he also examined the air quality and other elements of the surgical environment, observed surgery and sterilisation techniques, and conducted microbiologic sampling.

DLK outbreaks were resolved in eight of ten clinics. In several cases the outbreaks were linked to the sterilisation process used by the clinic- short-cycle steam sterilisation. Two outbreaks were linked to specific surgical sponge. A microkeratome blade was implicated in another outbreak.

Microbiological investigations conducted at six of the clinics revealed the presence of *Ralsitoina*, *Burkholderia*, *Pseudomonas* species in steriliser reservoirs and ultrasound baths.

The outbreaks resolved with changes in sterilisation and instrument cleaning protocols. Clinics changed from short-cycle steam sterilisation to either the dry heat or long-cycle steam methods. Clinics also instituted improved instrument preparation and cleaning protocols.

"Most of these European outbreaks of DLK were resolved by changing the method of instrument sterilisation and by improved instrument cleaning. These measures are consistent with avoiding endotoxin or instrument contamination of the surgical field," he reported.

Dr Holland described in detail the case of two outbreaks at one facility that were particularly problematic. The surgeons involved had attempted multiple interventions with no effect on DLK incidence.

Dr Holland made a three day visit and observed operating procedures. Two different surgeons shared the facilities.

"We saw marked contrasts between the two surgeons who

used the facility. One used full gown and gloves, the other didn't. One used dry sterilisation, the other used short-cycle steam. One cleaned the ultrasound gear, the other didn't. One used disposable cannulae the other didn't. This provided an interesting comparison of technique," he commented.

A majority, 16 of 24 cultures taken, were positive for Gram-negative bacteria, including enteric bacteria. Contaminated sites include the steriliser reservoir, brushes used for cleaning, the dehumidifier, and the still water supply. Interestingly, organisms were not isolated from the laser and tubing, microkeratomes or air-conditioning ducts- all of which has been suspected by the surgeons involved.

"This outbreak resolved with some difficulty following the institution of routine operating area cleaning improvements in sterilisation. However, both clinics subsequently closed within eight months, so we have no long term follow-up information."

He reported that multiple strategies were employed in response to DLK outbreaks, based on the specific situation at each clinic. Successful strategies included: improved sterilisation and cleaning of steriliser reservoirs and internal tubing cleaning in seven cases; changing surgical spears in three cases; and increased use of disposables.

"The consequences of ongoing outbreaks of DLK may be severe. Laser surgery was discontinued completely at two clinics sites. All eleven outbreaks were eventually controlled, but one can expect frequent recurrences, if a clinic returns to previous practices.

Dr Holland is a recognised authority on the subject, having reported the first outbreak of DLK associated with refractive surgery in 1998, at a clinic in Vancouver, British Columbia, Canada. That outbreak was controlled by revising steriliser cleaning protocols and returned when those protocols were discontinued. It was at this time that he developed the theory that the problem could be traced to endotoxin released by steriliser reservoir Gram-negative biofilm.

The initial Canadian DLK outbreak drew a lot of attention from public health authorities, who ultimately made DLK a notifiable disease in British Columbia. They defined a DLK outbreak as two or more patients developing the problem in a three-day period.

"We now have data from 12 clinics over five years from 49,000 eyes. We found an overall DLK incidence of five per 1000. We have since assisted in 55 new or recurrent outbreaks in 41 clinics internationally. Endotoxin contamination of surgical system has

provided the explanation in the majority of cases," he reported.

He noted that the incidence of DLK outbreaks in Europe appears to be in the same range as that seen in other parts of the world. He admitted some surprise at this, and commented that he might have expected a lower level in Europe, because of increased use of disposables and greater concern about CJD infection.

Dr Holland initially presented his results at the ESCRS Winter Refractive Surgery meeting in Barcelona. He updated his results at the San Diego at the annual American Society of Cataract and Refractive Surgery Symposium on Cataract, IOL and Refractive Surgery.

Interestingly, neither gowns, gloves, or air quality were implicated to the DLK outbreaks reported by Dr Holland. Other investigations of DLK outbreaks have implicated various factors including silicone residue on surgical gloves, microkeratome blades, epithelial defects, blepharitis, cleaning detergents, and air quality.

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