

An alternative antiseptic solution to 5% povidone-iodine for regional ophthalmic blocks in patients who are allergic to iodine

Currently many ophthalmic surgeries are performed under regional anaesthesia, which includes percutaneous (e.g. peribulbar block) or transconjunctival approaches (e.g. sub-Tenon's block). Anaesthetists need to apply a safe and effective antiseptic solution prior to performing these regional ophthalmic blocks.

Five percent povidone-iodine solution is the most commonly used antiseptic for ophthalmic blocks. It is inexpensive, widely available, and effective against a broad range of organisms including bacteria, viruses and even spores. Its brown colour confirms that it has been applied. Povidone (polyvinylpyrrolidone), a water-soluble polymer, combines with iodine to form povidone-iodine complex. Iodine is slowly released from the complex and confers antimicrobial action. When it is applied on the conjunctival sac, it reduces the bacterial colonies by 91% and bacterial species by 50% after 30 seconds¹. Ten percent povidone-iodine solution may result in conjunctival hyperaemia in some patients¹.

Recently, we had a patient presenting for cataract surgery who reported an iodine allergy. When patients report allergy to iodine or seafood, clinicians frequently avoid the use of povidone-iodine preparations as an ophthalmic antiseptic solution². Saline is an ineffective antiseptic solution as it does not produce any significant reduction in bacterial colonies and species¹. Therefore, we reviewed the literature for a safe and effective alternative antiseptic solution for these patients.

Chlorhexidine is a biguanide, effective against a broad range of Gram-positive and Gram-negative bacteria, some viruses and fungi³, and the bactericidal effect persists some hours after its application⁴. It is widely used as a surgical and skin cleansing antiseptic but the disinfected area is not visually obvious because it is colourless. Chlorhexidine is presented in different commercial formulations including aqueous, alcohol and detergent, and a warning label clearly displays "avoid contact with the eyes". Formulations with alcohol or detergent cause irreversible damage to the cornea and may require corneal transplantation⁵. Only the aqueous formulation is relatively safe to the cornea depending on the concentration chosen.

Different aqueous concentrations of chlorhexidine have been studied in rabbit eyes. Chlorhexidine 2% and 4% solutions were toxic to the corneal epithelium and conjunctiva⁴. Chlorhexidine at $\leq 1\%$ did not delay corneal healing but 1% solution caused mild conjunctivitis. Chlorhexidine as low as 0.1% produced a nearly 100-fold decrease in bacterial count when compared to saline control, and its bactericidal effect persisted over a two-hour

period after a single application. Aqueous chlorhexidine concentrations of 0.05% and 0.1% have been used as a routine antiseptic for intravitreal injection in humans. In a retrospective case series of >40,000 intravitreal injections⁶, chlorhexidine was applied 30–90 seconds before injection. It was well tolerated by all the patients. There were three cases of endophthalmitis, which gave an incidence of 0.0074%, a rate which compares favourably to that of 5% povidone-iodine, which had a pooled rate of 0.028% (range 0–0.11%) from more than 500,000 cases in a large retrospective case series⁷.

In one report, when 0.5% chlorhexidine/0.1% cetrimide was inadvertently used instead of 0.05% chlorhexidine before intravitreal injection, severe pain was experienced in some eyes for several days and two cases developed marked corneal oedema⁶. Precautions should also be taken to avoid chlorhexidine entering the auditory canal, as it is toxic to the middle ear and has been associated with deafness when used as a skin disinfectant for myringoplasty³.

An allergy to seafood or iodinated contrast media is not a contraindication to the use of topical povidone-iodine². Povidone-iodine can cause an irritant effect, less commonly contact dermatitis, and rarely anaphylaxis. If necessary, previous studies suggest that 0.05% or 0.1% aqueous chlorhexidine applied for at least 30 seconds is a safe and effective alternative. Applying 1–2 drops of topical local anaesthetic agent (e.g. 1% tetracaine or 0.4% oxybuprocaine) to the eye prior to chlorhexidine generally improves patient comfort.

The 'off label use' of existing approved drugs is a contentious issue, notwithstanding its common practice in medicine⁸. Pharmaceutical companies are often discouraged by the length of time and expense in conducting necessary clinical trials to obtain formal approval of additional indications. Whilst the off label use of drugs is not illegal, shared decision-making with the patient and informed consent would be preferred.

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References

1. Apt L, Isenberg S, Yoshimori R, Paez JH. Chemical preparation of the eye in ophthalmic surgery. III. Effect of povidone-iodine on the conjunctiva. *Arch Ophthalmol* 1984; 102:728-729.
2. Wykoff CC, Flynn HW Jr, Han DP. Allergy to povidone-iodine and cephalosporins: the clinical dilemma in ophthalmic use. *Am J Ophthalmol* 2011; 151:4-6.
3. Lim K-S, Kam PCA. Chlorhexidine—pharmacology and clinical applications. *Anaesth Intensive Care* 2008; 36:502-512.

4. Hamill MB, Osato MS, Wilhelmus KR. Experimental evaluation of chlorhexidine gluconate for ocular antisepsis. *Antimicrob Agents Chemother* 1984; 26:793-796.
5. Tabor E, Bostwick DC, Evans CC. Corneal damage due to eye contact with chlorhexidine gluconate. *JAMA* 1989; 261:557-558.
6. Merani R, McPherson ZE, Luckie AP, Gilhotra JS, Runciman J, Durkin S et al. Aqueous chlorhexidine for intravitreal injection antisepsis: a case series and review of the literature. *Ophthalmology* 2016; 123:2588-2594.
7. Merani R, Hunyor AP. Endophthalmitis following intravitreal anti-vascular endothelial growth factor (VEGF) injection: a comprehensive review. *Int J Retina Vitreous* 2015; 1:9.
8. Furey K, Wilkins K. Prescribing "off-label": what should a physician disclose? *AMA J Ethics* 2016; 18:587-593.

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