

Case study

Successful treatment for Methicillin resistant staphylococcus aureus conjunctivitis

using 1% Povidone iodine eyedrop: two cases.

Abstract

Purpose: Long-term bedridden patients frequently present with refractory chronic conjunctivitis. Multidrug-resistant bacteria, such as methicillin-resistant *Staphylococcus aureus* (MRSA), are often isolated; infections caused by such bacteria are treated with vancomycin, although refraining from overuse of this drug is recommended. Bacterial resistance to povidone-iodine (PI) has not been observed; hence, it can be effectively used for treating bacterial infections. However, it has not been popularly used for treating ocular surface infections. We report two cases of multidrug-resistant bacterial conjunctivitis treated with PI.

Methods: Case 1: A 90-year-old male hospitalized for pneumonia caused by multidrug-resistant *Pseudomonas aeruginosa*. Case 2: A 56-year-old male hospitalized for brainstem hemorrhage. In both patients, there were signs of conjunctivitis and MRSA was cultured. To avoid overuse of vancomycin, we started 1% PI instillation thrice daily.

Results: Clinical signs of the patients remarkably improved within a week of PI treatment. There were no distinct complications from PI treatment in either case.

20 Conclusions: PI has a wide spectrum, does not induce bacterial resistance, is cheap, and can be
21 obtained worldwide. Though further studies are necessary for wider practical use in clinical
22 settings, PI ocular instillation is a reasonable option for treating ocular surface infections
23 caused by multidrug-resistant bacteria, which are overseen by many general ophthalmologists.

24

25 **Keywords**

26 Povidone iodine; Methicillin resistant staphylococcus aureus; conjunctivitis

27

28 **Abbreviations**

29 PI: Povidone-iodine

30 MRSA: methicillin-resistant *Staphylococcus aureus*

31 **Text**

32 Long-term bedridden patients are usually immunocompromised and present with contaminated
33 eyelid margins, reduced blinking, and dysfunction of tears, leading to refractory chronic
34 conjunctivitis¹. Multiple prescriptions of antibacterial eye drops may be ineffective.
35 Multidrug-resistant bacteria, such as methicillin-resistant *Staphylococcus aureus* (MRSA), are
36 often isolated; infections caused by such bacteria are treated with vancomycin², although
37 refraining from overuse of this drug is recommended because of the possible emergence of
38 vancomycin-resistant strains.

Povidone-iodine (PI) is commonly used for periorerative disinfection. Bacterial resistance to PI has not been observed; hence, it can be effectively used for treating bacterial infections. However, PI has not been popularl for treating ocular surface infections, with only few reports on its use³⁻⁶. We report two cases of multidrug-resistant bacterial conjunctivitis treated with PI.

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Case 1

A 90-year-old male was hospitalized for pneumonia caused by multidrug-resistant *Pseudomonas aeruginosa* at the Nojima Hospital in October 2016, and he was given intravenous antibiotics (ceftriaxone and sultamicillin). The patient was bedridden and was unable to have a conversation. In January 2017, the patient was referred to the Department of Ophthalmology for bilateral eye discharge. Levofloxacin eye drops were used four times a day for 2 weeks, but his symptoms did not improve. Multidrug-resistant MRSA was detected (Table 1), which was resistant to all antibacterial drugs except vancomycin. To avoid overuse of vancomycin, we started 1% PI instillation thrice daily. His clinical signs remarkably improved after 1 week of PI treatment and were resolved in 2 weeks as determined by a negative culture.

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Case 2

A 56-year-old male was hospitalized for brainstem hemorrhage at the Nojima Hospital in May

2015. The patient was unable to move except for movements like blinking and moving his fingertips. He had multiple episodes of fever in June, September, and December of 2015. MRSA was cultured from sputum, and antibiotics (isepamicin, ceftazidime, imipenem, minocycline, teicoplanin, and cefazolin) were administered systemically. Subsequently, he had multiple episodes of fever, and intravenous administration of antibiotics was repeated. He was unable to completely close his left eyelid, and therefore, ofloxacin ointment was continuously applied to prevent exposure keratitis. In December 2015, redness and discharge were noted in his left eye, and MRSA was cultured from conjunctiva. These symptoms were reduced with chloramphenicol instillation in a week. In February 2017, conjunctivitis recurred, and MRSA was cultured again (Table 1). We started 1% PI instillation thrice daily. Ofloxacin ointment was continued to prevent drying of the ocular surface. His clinical signs remarkably improved within a week of PI treatment, but slight redness and corneal epithelial disorder remained because of incomplete eyelid closure. After confirming the negative culture twice at 1 and 2 weeks following the initiation of PI treatment, PI was discontinued.

During the course of treatment, the corneal epithelium of both the patients was observed under fluorescein staining, and there were no distinct complications from PI treatment in either case. Written informed consent for publication was obtained from patient's family.

77 **Discussion**

78 It was indicated that PI can be used to treat ocular surface infections³. Schuhman et al. used PI
79 for treating 40 cases of conjunctivitis and confirmed that 38 of the 40 subjects had healed and
80 the remaining two showed improvement over a period of 6 days⁴. PI was used for treating 459
81 cases of infectious conjunctivitis in children and demonstrated effects equal to antibacterial
82 agents⁵.

83
84 Similar effects of PI can be expected against multidrug-resistant bacteria. Taylor et al. reported
85 a case of refractory chronic conjunctivitis caused by MRSA in a patient with giant fornix
86 syndrome, which was effectively treated with PI⁶. However, they had used a combination of
87 triamcinolone and vancomycin, which makes it difficult to make a judgment on the effects of
88 PI alone.

89
90 Case 1 was successfully treated with PI alone. Although Case 2 continued to use an
91 antibacterial ointment to prevent drying of the ocular surface (which started before the use of
92 PI), the improvement in the signs of conjunctivitis was thought to be because of the use of PI.

93
94 Short-term use of highly concentrated antibacterial agents, such as eye drops, is less likely to
95 induce resistance. However, long-term or repeated use of antibiotic eye drops has been reported

96 to cause resistance^{7,8}. Long-term bedridden patients may suffer from recurrent conjunctivitis,
 97 resulting in prolonged or repeated vancomycin administration. PI ocular instillation can
 98 prevent the occurrence of resistant strains; therefore, it should be more commonly used to
 99 prevent the overuse of vancomycin.

100

101 There are some problems with PI treatment. First, high-concentration PI ocular instillation
 102 causes irritation to the ocular surface⁹. In a report that compared 1.25% and 5% PI for
 103 preoperative disinfection prior to an intravitreal injection of therapeutic agents, the effects were
 104 equivalent. However, approximately 6% of patients complained of irritation with 5% PI,
 105 whereas there were no complaints of irritation with 1.25% PI¹⁰. Isenberg et al. mentioned that
 106 the concentration was changed from 2.5% (original) to 1.25% because mild stinging was noted
 107 with the former⁵. These reports indicate that PI eye drops (1%–1.25%) are effective and
 108 well-tolerated agents for the treatment of non-specific ocular surface infections.

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110 Second, PI is not suitable for long-term storage because the active free iodine in PI becomes
 111 inactive over time. If it is completely sealed, it can be stored for a long time. However, it is
 112 unknown how long an effective concentration can be maintained because air enters the
 113 container every time it is opened several times a day in cases of eye instillation. Therefore,
 114 even if iodine was still remaining in the bottle, we replaced it with a new bottle once a week.

For practical use, the concentration must be selected to minimize irritation while maintaining a concentration that works effectively. It would be ideal to prepare PI in small sealed containers for individual use.

PI ocular instillation has a wide spectrum of antibacterial activity, does not induce bacterial resistance, is cheap, and can be obtained worldwide. Though further studies are necessary for wider practical use, PI ocular instillation is a reasonable option for treating ocular surface infections caused by multidrug-resistant bacteria.

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152 intravitreal injection. *Jpn J Ophthalmol* 2012;56(5):497–501.

Table. 1

	Case 1		Case 2
	MRSA	MRCNS	MRSA
CMX	R	R	R
CAZ	R	R	R
CZOP	R	R	R
CFDN	R	R	R
FMOX	R	R	R
IPM	R	S	R
GM	R	R	R
AMK	R	S	R
EM	R	S	R
VCM	S	S	S
LVFX	R	R	R
MFLX	R	R	R
GFLX	R	R	R
CAM	R	S	R
MINO	R	S	R
CP	R	R	S