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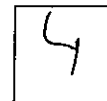
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SHORT REPORTS

Efficacy of gentian violet in the eradication of methicillin-resistant *Staphylococcus aureus* from skin lesions

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Summary: The efficacy of gentian violet (Gv) in eradicating methicillin-resistant *Staphylococcus aureus* (MRSA) in decubitus ulcers was investigated. Decubitus ulcers (a total of 18 cases) were scrubbed with Gv aqueous solution 0.1% and ointment containing Gv 0.1% was applied daily. MRSA was not detected in these lesions for 3–34 days (average, 10.5 ± 2.5 days) after the application of Gv ointment. Before this trial, all patients were treated with povidone-iodine and antibiotics; however, those treatments were not effective in eradicating MRSA from skin lesions. Skin irritation and other systemic side effects caused by Gv were not observed. Our data suggest that Gv is a useful agent for treatment of the decubitus ulcers infected with MRSA.

Keywords: Gentian violet; decubitus ulcers; methicillin-resistant *Staphylococcus aureus*.

Introduction

MRSA is sometimes isolated from decubitus ulcers of the long-term bedridden patients. While all institutions wish to eradicate methicillin-resistant *Staphylococcus aureus* (MRSA) from all patients and the inanimate environment, past experience has shown that this is frequently not possible.¹ A more reasonable goal is to eradicate MRSA from the skin lesions which may act as a continuing source of MRSA cross-infection. Traditionally, these lesions are treated with povidone-iodine and local antibiotics and/or systemic antibiotics, but sometimes there are failures.

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Table I. Effect of 0.1% gentian violet (Gv) ointment on the eradication of MRSA in decubitus ulcers

Patient No.	Age/sex	Underlying disease	Grade/region of decubitus		Days required for eradication
1	63/F	Cancer (endstage)	II*	Sacral	3
2	81/M	Cancer (endstage)	II	Scapular	8
3	69/M	Cancer (endstage)	II	Sacral	4
4	79/F	Cancer (endstage), DM	III	Sacral	4
5	71/M	Cerebral infarction	II	Sacral	3
6	72/M	Cancer (endstage)	III	Sacral	8
7	83/M	Arteriosclerosis, DM†	III	Sacral	8
8	81/M	Depression, DM	IV	Sacral	34
9	79/F	Cerebral hemorrhage	II	Sacral	3
10	79/M	Subdural hematoma	III	Sacral	21
11	64/M	Spinal cord tumor	III	Sacral	4
12	87/M	Cerebral infarction	III	Sacral	8
13	82/M	Cancer (endstage)	II	Sacral	6
14	86/F	Paraplegia	III	Sacral	8
15	59/M	Cancer (endstage), DM	IV	Heel	28
16	66/M	Cerebral hemorrhage	II	Sacral	8
17	69/F	Cerebral infarction	III	Sacral	5
18	47/M	Cancer (endstage)	III	Sacral	33

* Shea's grade.

† A patient with iodine hypersensitivity.

DM, diabetes mellitus.

It was reported as long ago as 1938 that gentian violet (Gv), which is a triphenylmethane antiseptic dye, is effective against some Gram-positive cocci, particularly *Staphylococcus* spp., and pathogenic yeasts such as *Candida* spp.² Gv has been used in an aqueous solution at a concentration of 1–2% for a long time,³ but hypersensitivity to Gv has been rarely reported.⁴

The effect of Gv is not abolished by contact with body fluid exudates in decubitus ulcers, while the effect of povidone-iodine is destroyed by contact with the body fluid.⁵

We have demonstrated that Gv possesses a significant *in vitro* bactericidal effect on MRSA isolated from clinical specimens.⁵ We therefore investigated the efficacy of Gv for eradication of MRSA in patients whose ulcers were infected or colonized with MRSA.

Materials and methods

Between May 1990 and March 1993, 18 patients (ages 47–87 years) with MRSA-infected decubitus ulcers were enrolled in this clinical trial. Decubitus ulcers were classified according to Shea,⁶ where grades III and IV indicate a deep ulcer. As shown in Table I, all patients had underlying diseases and had been bedridden for sometime. Four patients (nos 4, 7, 8 and 15) had concomitant diabetes mellitus (DM). Although all patients

were treated for 2–24 weeks with local administration of povidone-iodine and antibiotics (gentamicin and tobramycin) and/or with systemic administration of antibiotics (vancomycin, cefmetazole, minocycline, fosfomycin and imipenem), this was not effective in eradicating MRSA from the skin lesions.

Gentian violet (Gv, Wako Pure Chemicals Co., Osaka, Japan) was prepared as (i) an aqueous solution (0.1%) or (ii) an ointment containing 100 mg of Gv (0.1%) in 5 ml sterilized distilled water and 95 g polyethylene glycol (Macrogol ointment; Solbase, Dainippon Pharmaceutical, Osaka, Japan). After the decubitus ulcers were scrubbed with Gv aqueous solution 0.1%, Gv ointment 0.1% was applied daily to the skin lesions. The protocol was approved by the ethics committee of the First Hospital, Nippon Medical School, and informed consent was obtained.

S. aureus was isolated from skin lesion swabs of patients and MRSA were detected by the method of the National Committee for Clinical Laboratory Standards (NCCLS).⁷ After failure to isolate MRSA for three successive days, the treatment was considered effective.

Data was expressed as the mean \pm SE. Significance was allowed for by Welch's unpaired *t*-test.

Results and discussion

MRSA was not isolated from all skin lesions for between 3 and 34 days (10.9 ± 2.5 days) after the Gv treatment. As shown in Table I, eradication of MRSA by the Gv therapy required 5.0 ± 0.9 days for the grade II lesions (seven patients) and 14.6 ± 2.5 days for the grade III and IV (11 patients). In cases of patients with deep ulcers (Shea's grade III or IV), including both those patients with and without DM, a longer period was required to eradicate MRSA than in cases of patients with grade II lesion ($P < 0.025$). The length of time for eradication of MRSA also appeared to be different in the grade III group. In patients 4, 6, 7, 11, 12, 14 and 17 (grade III), who received proper debridement of necrotic tissues, MRSA was eradicated from the skin lesions in four to eight days after starting the Gv treatment. When the debridement of necrotic tissues was inadequate (patient nos 10 and 18), a longer time for eradication was noted. Debridement of necrotic tissues appears to be essential for eradication of MRSA by Gv.

Skin irritation or systemic complications caused by Gv treatment were not observed in any of the 18 patients, including the one patient with iodine hypersensitivity. A concentration of 0.1% Gv in a polyethyleneglycol (PEG) base is enough to eradicate MRSA in decubitus ulcers, and Gv in a PEG base is less staining to skin than Gv aqueous solution.

We believe that Gv is a useful agent for the elimination of MRSA in decubitus ulcers. In some cases (patient nos 1, 2 and 18), after the Gv treatment was discontinued, reinfection occurred within a week, forcing a

resumption of Gv therapy. We must be vigilant in treating possible re-infections from other sites or other patients.

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