Methicillin-Resistant *Staphylococcus Aureus* Following Leech Application at a Congested Flap after a Mastectomy

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This study was supported by a grant from the
National Research Foundation of Korea (NRF-
2017R1A2B4005787).

No potential conflict of interest relevant to
this article was reported.

Medical leech therapy is a treatment for the venous congestion of tissue flaps, grafts, and replants. We report a case of methicillin-resistant *Staphylococcus aureus* (MRSA) following leech application at a congested flap after mastectomy. A 45-year-old woman had an invasive ductal carcinoma. Modified radical mastectomy was performed. The chest wall defect was reconstructed with a local rotation flap. On postoperative day (POD) 1, congestion and color change were observed, and 10 medical leeches were applied to the congested area. On POD 4, another 10 medical leeches were applied. On POD 12, wound necrosis progressed and a pus-like discharge appeared. A wound swab culture revealed MRSA. Debridement was carried out on POD 15. From POD 16, vancomycin and piperacillin/tazobactam were injected for 18 days. The wound culture on POD 18 also revealed MRSA. A split-thickness skin graft was performed on POD 28. MRSA has not been clearly identified in the literature as a leech enteric bacterium. Although MRSA may have come from another source, the present case raises the possibility of MRSA infections following leech application at congested flaps. When medical leeches are applied at the congestion site of a flap, an aseptic cradle will be helpful. Vancomycin irrigation may be needed if infection occurs.

Keywords Leeching, Methicillin-resistant *staphylococcus aureus*, Surgical wound infection

INTRODUCTION

Methicillin-resistant *Staphylococcus aureus* (MRSA) is especially troublesome in hospitals, prisons, and nursing homes, where patients with open wounds, invasive devices, and weakened immune systems are at a greater risk of nosocomial infection than the general public [1]. MRSA comprises a very small fraction of surgical site infections following breast surgery. Only 1 case of MRSA was

found among 53 patients with culture-positive breast surgical site infections [2].

Medical leech therapy (MLT) is well established as a treatment for the venous congestion of tissue flaps, grafts, and replants. The aim of MLT is to salvage compromised microvascular free-tissue transfers by improving the venous drainage, thereby matching the venous outflow with the arterial inflow [3]. We use MLT for the treatment of partial necrosis in pedicled transverse rectus abdominis myocutaneous flaps, as well as to salvage soft tissue avulsion in patients with trauma. Recently, a prospective study was performed of patients with venous congestion after a free flap. Patients who required leeches were more likely to experience total flap loss than patients who did not require leeches (75.0% vs. 42.1%). However, no significant difference was found in total flap loss ($P=0.32$) [4].

This treatment is associated with surgical site infections of bacterial species, most commonly *Aeromonas hydrophila* (*A. hydrophila*), which is an obligate symbiote of *Hirudo medicinalis* [5].

Received: Jun 1, 2017 Revised: Jun 19, 2017 Accepted: Jun 20, 2017

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Since *A. hydrophila* produces an enzyme that lyses *Staphylococcus aureus* (*S. aureus*) cells [6,7], *S. aureus* infections have not yet been reported following MLT. We report a case of MRSA following leech application at a congested flap after a mastectomy.

CASE REPORT

A 45-year-old woman felt a fingertip-sized nodule on the upper medial quadrant of her right breast. A core biopsy revealed it to be an invasive ductal carcinoma. A modified radical mastectomy including the nipple-areolar complex was performed, and the chest wall defect was reconstructed with a local rotation flap (Fig. 1A). Postoperatively, cefazedone was injected.

On postoperative day (POD) 1, congestion and color change were observed (Fig. 1B), and 10 medical leeches (Leeches USA, Ltd., Westbury, NY, USA; distributed by Insung Meditech, Bucheon, Korea)

Fig. 1. The case of a 45-year-old woman. (A) The chest wall defect was reconstructed with a local rotation flap. (B) Congestion and color change on postoperative day (POD) 1. (C) Medical leeches applied on the congested area. (D) Wound necrosis progressed on POD 12. (E) Pus-like discharge appeared on POD 12. (F) Right breast after debridement on POD 15. (G) Skin defect before skin graft on POD 28. (H) The skin graft taken on POD 35.

were applied to the congested area (Fig. 1C). Amikacin was administered intravenously to prevent *Aeromonas* species before leech therapy. On POD 4, another 10 medical leeches were applied, which did not lead to improvement. Areas measuring 1 cm in diameter around the leeches became pinkish for 2 days after application; however, necrotic changes followed. Alporin was given intravenously. On POD 12, wound necrosis progressed (Fig. 1D) and a pus-like discharge appeared (Fig. 1E). Debridement was carried out on POD 15 (Fig. 1F). On POD 16, vancomycin and piperacillin/tazobactam were injected for 18 days. Wound cultures on POD 18 and POD 20 also revealed MRSA.

A split-thickness skin graft was performed on POD 28 (Fig. 1G), and a skin graft was taken on POD 35 (Fig. 1H).

DISCUSSION

MRSA has been reported in an iliopsoas hematoma consequent to a prosthetic graft infection and in an autologous bone graft at a cranioplasty site [8,9].

The incidence of MRSA is 0.76 per 1,000 surgical site infections [10]. MRSA comprises 22% of monomicrobial surgical site infections following breast cancer surgery [11].

Because infections of clean surgical wounds have not been reported for a year in our department, the origin of the microorganism was thought to be the medical leeches.

Although *A. hydrophila* in medical leeches produces an enzyme that lyses *S. aureus*, in this case, we isolated MRSA producing exfoliative toxin B from blood and bile cultures simultaneously with *A. hydrophila* from bile culture [12].

MRSA has not been clearly identified in the literature as a leech enteric bacteria. Although MRSA may have come from another source, the present case raises the possibility of MRSA infections following leech application at a congested flap.

When medical leeches are applied at the congestion site of a flap, an aseptic cradle should be used.

If infection occurs, vancomycin irrigation will be needed before the culture results are received in order to prevent nosocomial infections such as MRSA.

PATIENT CONSENT

Patients provided written consent for the use of their images.

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