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Aeromonas infection in critically ill burn patients

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ABSTRACT

Aeromonas infection in burn patients is extremely uncommon. Here we report on four cases of Aeromonas infection in burn patients admitted to the BICU at the Singapore General Hospital burn unit between June 2001 and May 2006. Two patients had positive blood cultures, and the other two had tissue samples with growth. There was no history of exposure to soil or fresh water in all patients. The average age of patients was 35 years (range 24–41) and the average % TBSA was 48% (range 35–80). Cultures were isolated between days 2 and 4 post burn. There was one mortality in the series. Increasing antibiotic resistance was noted among isolates of Aeromonas. Continued vigilance is essential to detect infection early, even in the absence of a suggestive history, with adequate debridement and appropriate antibiotic therapy.

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1. Introduction

Organisms of the genus *Aeromonas* are a rare cause of invasive and often fatal disease, with unquestionable proof of causation in human illness only demonstrated in the past three decades [1]. They are a group of Gram-negative facultative anaerobes typically causing infection after exposure to fresh water, soil or marine creatures [2]. Only five *Aeromonas* species have been conclusively established as human pathogens, following isolation in pure culture from extraintestinal infections [3]. Three species (*A. hydrophila*, *A. caviae* and *A. veronii* biotype *sobria*) account for $\geq 85\%$ of clinical isolates [4], and have been implicated in a wide gamut of infections.

Infection in burn patients is particularly rare, with nine small case series or reports in the English literature [2,5–12], and only two cases of burn wound infection from Asia [2]. Here we present our experience with four patients found to have *Aeromonas* infection admitted to the burns intensive care unit (BICU) of our burns centre over a 5 year period from 2001 to 2006, all of which were critically ill and required intubation during their stay.

2. Methods

All patients admitted to the Singapore General Hospital (SGH) Burn Center BICU from June 2001 to May 2006 were retrospectively reviewed. The SGH Burn Center is the only dedicated burn facility in Singapore, serving a population of 4.18 million people with an annual admission of 288. It receives all severe burns cases and more than 93% of burns cases in Singapore, as well as cases from Southeast Asia [12]. It comprises 29 beds, divided into a 4 bed BICU, 6 bed high dependency unit and 19 bed general ward. Those patients admitted to the BICU require intubation either due to the severity of their burns or presence of inhalational injury.

Following resuscitation and stabilization, patients in our unit undergo early burns excision and skin grafting, with daily Opsite™ (Smith & Nephew, Singapore) dressing for superficial and mid dermal burns not requiring surgery. Blood cultures were obtained from all patients with pyrexia $>38.5^\circ\text{C}$ on more than one occasion over a 24 h period, and at 5 day intervals thereafter till resolution of pyrexia. Tissue cultures were obtained by sending excised burn tissue for microbiological

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examination. Topical antimicrobials and prophylactic antibiotics are not used.

Aeromonas isolates were identified by observing phenotypic reactions with biochemical tube media. Differentiation to species level was not performed by the laboratory due to cost and manpower constraints. Culture isolates were tested for susceptibility to different antibiotics using the Kirby-Bauer disk diffusion method, following the Clinical and Laboratory Standards Institute (CLSI).

3. Case reports

3.1. Overview

Characteristics of the patients are presented in Table 1. Two patients had bacteraemia consistent with primary blood stream infection, one of which was polymicrobial and the other monomicrobial. The other two patients had positive tissue cultures.

3.2. Case 1

A 37-year-old Indonesian Chinese man was caught in a gas tank explosion in July 2003 at his home in Batam, Indonesia and subsequently trapped in a burning building for 30 min. He sustained 80% total body surface area (TBSA) partial thickness burns to the face, torso, upper and lower limbs and was also found to have inhalation injury. He was transferred to our unit 24 h after injury, having traveled in a speed boat from Batam. Fluid resuscitation was commenced, and he subsequently underwent tangential burns excision and split skin grafting 1 day later. He was kept intubated and ventilated after surgery, and started on intravenous penicillin, cloxacillin and genta-

micin due both to the interval between the initial injury and transfer to our unit, as well as exposure to pathogens during transfer. Post-operatively he was hypotensive and inotrope support was initiated. He spiked a high temperature on day 3 post admission, and blood culture grew *Aeromonas* spp, as well as *Acinetobacter baumannii* and *Klebsiella* spp. Antibiotics were converted to vancomycin, amikacin and cefepime. Unfortunately he continued to deteriorate and subsequently developed acute renal failure with acute respiratory distress syndrome, and subsequently passed away on day 8 after admission from multiple organ failure.

3.3. Case 2

A 36-year-old Indian man was electrocuted by a 66 kW electrical mains cable at a construction site in July 2003, and suffered arc burns to his face, neck, upper and lower limbs. He was assessed as 40% TBSA burns with 3% full thickness involvement of both hands. There was also evidence of inhalational injury. On admission, he was intubated and underwent fluid resuscitation. Early burn excision and split skin grafting of both hands the day after admission was performed. Tissue cultures from this surgery returned as *Bacillus* spp. He became febrile on day 2 after admission, and blood cultures grew *Aeromonas* spp as a monomicrobial isolate. He was administered intravenous vancomycin, ciprofloxacin and amikacin. The fever initially resolved and the patient improved clinically. Unfortunately, he later developed *A. baumannii* wound infection on day 8 after admission, which was treated with netilmicin and ciprofloxacin. Two further operations were performed to excise the remaining burned areas, with split skin grafting. He subsequently recovered well and was discharged on day 20 after admission.

Table 1 – Characteristics of patients

	Patient			
	1	2	3	4
Demographics				
Age	38	36	24	41
Gender	M	M	F	F
Severity of burn injury				
% TBSA	80	40	35	35
% full thickness burns	0	6	30	7
Inhalational injury	Y	Y	N	Y
Circumstances around injury				
Type of burn	Flame	Electrical	Flame	Flame
Admission (>24 h post burn = delayed)	Delayed	Immediate	Delayed	Immediate
Microbiology				
Post burn day positive culture	4	2	3	2
Site of positive culture	Blood	Blood	Tissue	Tissue
Monomicrobial/polymicrobial	P	M	P	P
Progress and outcome				
Length of hospital stay (days)	8	20	42	109
Number of surgeries	1	3	10	7
Outcome	Died	Discharged	Discharged	Discharged

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