Monomicrobial Necrotizing Fasciitis and Sepsis Caused by

*Pseudomonas aeruginosa* and *Pseudomonas fluorescens:

A Series of Ten Cases

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No Conflict of interest
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ABSTRACT

Monomicrobial necrotizing fasciitis caused by *Pseudomonas* species is a rare infection. The purpose of this study was to elucidate the specific characteristics and clinical outcomes of necrotizing fasciitis caused by *Pseudomonas aeruginosa* and *Pseudomonas fluorescens*. Ten patients with monomicrobial necrotizing fasciitis caused by *Pseudomonas* species were retrospectively reviewed over an 8-year period. Differences in mortality, patient characteristics, clinical presentations, laboratory data, and clinical outcomes were compared between the death and the survival groups. Two patients died with the mortality rate of 20%. *Pseudomonas aeruginosa* accounted for 9 patients and *Pseudomonas fluorescens* for one patient. The most common comorbidity is type 2 diabetes mellitus in 5 patients. We found the death patients had lower albumin level and higher counts of band forms of leukocytes than those of the survival patients. Monomicrobial necrotizing fasciitis caused by *Pseudomonas* species needs emergent surgical intervention and aggressive intensive care due to high mortality rate. We reported the first case of monomicrobial necrotizing fasciitis with *Pseudomonas fluorescens*. Severe hypoalbuminemia and increased counts of banded leukocytes in initial laboratory presentations can be considered as poor prognostic factors.
Introduction

Necrotizing fasciitis is a highly lethal soft tissue infection and a true surgical emergency. It can be defined as infections of any of the layers within the soft tissue compartment (dermis, subcutaneous tissue, superficial fascia, deep fascia, or muscle) that are associated with necrotizing changes and result in sepsis and multi-organ failure (1-4). Early diagnosis of necrotizing fasciitis, emergent surgical fasciotomy and broad-spectrum antibiotic therapy are the effective management strategies to reduce the mortality rate of necrotizing fasciitis (1-5).

The prevalence of monomicrobial necrotizing fasciitis has recently been increasingly reported (1,4-7). Park et al. and our previous studies have reported the monomicrobial gram-negative organisms, such as *Escherichia coli*, *Vibrio vulnificus*, *Klebsiella pneumoniae*, and *Aeromonas hydrophila*, should be considered as major pathogens of necrotizing fasciitis that have poorer outcomes than gram-positive necrotizing fasciitis (4,5,7).

*Pseudomonas aeruginosa*, a gram-negative environmental species and an opportunistic microorganism, has become a major cause of nosocomial infections worldwide and is very rarely found in necrotizing fasciitis (8). In Goldstein et al studies, *Pseudomonas aeruginosa* was common found in polymicrobial infections which consist 10 of 162 organisms in 73 patient (3). However, monomicrobial
necrotizing fasciitis caused by *Pseudomonas aeruginosa* is exceptionally uncommon, and only few cases have been reported in the literature search (9-16). Our previous study has reported three cases of monomicrobial necrotizing fasciitis caused by *Pseudomonas aeruginosa*, and one of them died (5). Rampal et al. had demonstrated *Pseudomonas aeruginosa* was the most predominant Gram-negative pathogen in Centra Malaysia, and 25.4% of necrotizing fasciitis patients caused by *Pseudomonas aeruginosa* (16/63) were either amputated or dead (15,16).

The purpose of this study was to elucidate the specific characteristics and clinical outcomes of necrotizing fasciitis caused by *Pseudomonas aeruginosa* and *Pseudomonas fluorescens*. 
Materials and Methods

Participants and Study design

After obtaining approval from the Institutional Review Board (IRB), we retrospectively reviewed the medical records of patients with surgically confirmed necrotizing fasciitis of the extremities who were admitted from January 2009 to December 2017 at Chia-Yi Chang Gung Memorial Hospital. The diagnosis of necrotizing fasciitis was based on intra-operative and histopathologic findings. The wound and blood cultures that revealed monomicrobial infection caused by *Pseudomonas species* were included. Patients who did not undergo surgery and revealed polymicrobial infection were excluded.

The enrolled patients were categorized into two groups: the death group and the survival group. Age, gender, co-morbidities, signs and symptoms, affected sites, microbiological findings, laboratory findings at the time of admission, the duration between contact and admission, the interval between diagnosis and first surgery, length of stay, quick Sequential (Sepsis-related) Organ Failure Assessment score at the time of admission, surgical procedures and clinical outcomes were reviewed for each patient.

Treatment protocol and postoperative care

We established a standard treatment strategy for patients with suspecting necrotizing fasciitis, including emergency fasciotomy, antibiotic therapy with a third-
generation cephalosporin plus tetracycline, and admission to the intensive care unit (ICU) for hemodynamic unstable patients. After operation, wounds were left open and cared by regular wet dressing every 4 or 8 hours a day. Laboratory data and inflammatory maker of erythrocyte sedimentation rate (ESR) and C reactive protein (CRP) were regularly checked at emergency room. Further wound debridement surgery depended on wound conditions, laboratory data and surgeon experiences. If the vital signs of these patients revealed stable and the infections were under control after leaving intensive care unit, hyperbaric oxygen therapy with five times a week would be arranged for enhancing the proliferation of granulation tissues and wound healing. While the wounds became stable without progressive infective signs, plastic surgeons were consulted for soft tissue reconstruction.

**Microbiology laboratory procedures**

Isolates of *Pseudomonas aeruginosa* and *Pseudomonas fluorescens* from primary culture are identified by colonial appearance, Gram stain, agglutination with specific antisera, and conventional biochemical tests with Vitek-2 (bioMérieux, Marcy l’Étoile, France) compact system used in clinical microbiology laboratories. Antimicrobial susceptibility of *Pseudomonas species* was performed by the hospital microbiology laboratory via the standard disk diffusion technique. The minimum inhibitory concentration (MICs) of amikacin, aztreonam, ceftazidime, cefepime,
Ciprofloxacin, gentamicin, colistin, meropenem, imipenem, and piperacillin were measured for each isolate using the agar dilution method according to the Clinical and Laboratory Standards Institute (CLSI) guidelines (17). The results of antimicrobial susceptibility tests were interpreted according to the Clinical and Laboratory Standards Institute criteria for these microorganisms (18).

**Statistical analysis**

Statistical analyses were performed using SPSS version 18.0 statistical software (SPSS, Chicago, Ill., USA). For data samples from normally distributed populations, Student’s t test was used for continuous variables to examine significant relationships between laboratory risk factors and clinical outcomes of the two groups, and $p < 0.05$ was considered statistically significant.
Results

Ten patients with monomicrobial *Pseudomonas* necrotizing fasciitis, *Pseudomonas aeruginosa* in 9 patients and *Pseudomonas fluorescens* in one patient, were identified. The clinical and laboratory characteristics were summarized in Table 1. These patients included 7 men and 3 women, with a mean age of 67.1 years (range, 45-88 years). Two patients acquired trauma, one had bamboo sting while farming, one patient had contact with seawater, and six did not recall any injuries. All patients underwent fasciotomy initially. The most common complaints of patients were pain and swelling of the involved limbs with edematous, patchy, erythematous, and hemorrhagic bullous skin lesions at the time of admission to the emergency room (Figure 1).

Two patients died, resulting in a mortality rate of 20%. Among these patients, most common comorbidities is type 2 diabetes mellitus (5 patients), two of whom had co-existing diseases of chronic renal insufficiency, one had hepatitis and gout, and one had old stroke. Four patients with other comorbidities, two patients had chronic liver disease, one had heart disease, and one of whom had end-stage renal disease and cancer. There was only one patient without comorbidities.
Two patients had upper-limb skin lesions and eight patients had lower-limb skin lesions. Two patients underwent above-the-knee amputation after a few days due to progressive skin involvement following fasciotomy, and one of whom died later.

Four patients received skin grafts, one patient underwent flap reconstruction, and one patient underwent debridement after first surgery. The mean time from contact to presentation in the emergency room is 3.9 days (range, 2-10 days). The mean time from first consultation to first operation is 5.9 hours (range, 3-22 hours). The mean duration of hospitalization is 28.1 days (range, 20-41 days). Two patients (20.0%) were febrile (body temperature >38.5°C) and only one patients (10%) had a systolic blood pressure of <90 mmHg at presentation in the emergency room. Six (60%) patients were admitted to the ICU.

The bacteria species and laboratory data were summarized in Table 2. *Pseudomonas aeruginosa* and *Pseudomonas fluorescens* were susceptible to amikacin, aztreonam, ceftazidime, cefepime, ciprofloxacin, gentamicin, colistin, meropenem, imipenem, and piperacillin, and we did not detect any resistant strains. Broad-spectrum antibiotics, such as ceftriaxone, cefazolin plus gentamicin or oxacillin, were administered initially in the emergency room to patients. Nine patients were administered ceftazidime and one was given ciprofloxacin after the results of culture. The mean white blood cell count is 14830 cells/mm³ (range, 900-31000) with
3.1% (range, 0-10%) banded form and 82.93% (range, 76-88%) segmented form. The mean platelet counts were 185100 mm$^3$. The mean albumin level is 3.02 g/dL (range, 1.7-3.8). The levels of inflammatory marker of ESR and CRP were extremely high in all patients. The bacteremia rate was 40%. The two dead patients had hypoalbuminemia, and case 2 presented severe neutropenia and thrombocytopenia when they admitted to ER. Case 1 died on the 41th day after admission because he had left lung pneumonia with respiratory failure and renal failure, and case 2 died on the 31th day due to pneumonia and fungemia with _Candida tropicalis_, even though the wound of involved legs revealed well healing.

Comparison between the non-survival and survival groups, the patients who died had lower albumin level and higher counts of band forms of leukocytes (Table 3).
Discussion

*Pseudomonas aeruginosa* is a Gram-negative bacterium that is identified in moist environments, and it produces mild cutaneous infections associated with hot rubs, showers and baths (10,12,13). *Pseudomonas aeruginosa* infections of healthy skin are uncommon (14). *Pseudomonas aeruginosa* may cause localized epidermal infections (the green nail syndrome and webbed space infections), moderately serious infections (cutaneous folliculitis and otitis externa), and soft-tissue infections with peri-vasculitis secondary due to bacteremia (4-14). *Pseudomonas aeruginosa* is reported common causes of nosocomial infections, and exhibits resistance to a wide range of antibiotics. However, we did not find any resistant strains in our cases, and we used ceftazidime (9 cases) and ciprofloxacin (1 case) after the results of *Pseudomonas* culture confirmation. There were 33.3% amputation/death rate in the nine cases with ceftazidime use. Rampal et al. had reported *Pseudomonas aeruginosa* was the most frequently encountered Gram-negative pathogen of necrotizing fasciitis in Malaysia (15,16). Unasyn (ampicillin and sulbactam), ceftazidime and clinamycin were proved to be effective to lower the amputation rate and death in *Pseudomonas* cases, in which the use of ceftazidime accounted for 28% amputation/death rate and demonstrated a reliable result against necrotizing fasciitis caused by *Pseudomonas aeruginosa* (15).
*Pseudomonas aeruginosa* possesses many virulence factors such as pili, lipopolysaccharide (LPS), extracellular enzymes, exotoxins, and *Pseudomonas aeruginosa* elastase (PAE) (19,20,21). The toxicity of exotoxin A and digestive capabilities of elastase in tissue were reported may digest the extracellular matrix of subcutaneous tissue and kill fibroblasts by digesting human interstitial and basement membrane collagens and causing cell death following dermal injury, which may provide *Pseudomonas aeruginosa* with the opportunity to penetrate deeper tissue and cause bacteraemia (19). The flagellin of *Pseudomonas aeruginosa* contained five types of secretion systems (TSSs) was confirmed to cause acute epidermis infection, inducing a huge panel of inflammatory mediators in a TLR5 - dependent manner and contributing the invasiveness potential of the bacterium and skin bacterial persistence in vivo (20,21).

*Pseudomonas aeruginosa* can cause rapidly progressive and fatal necrosis of fascia in the immunocompromised host (10-13). Diabetes mellitus is an important predisposing illness, and affects the progression and severity of necrotizing fasciitis based on peripheral vaso-occlusion and sugar-coated capillaries limiting the blood supply to superficial and deep structures (6,7,24). Expression of virulence factors by *Pseudomonas aeruginosa* can easily impair leukocyte chemotaxis, adherence, intracellular bacterial killing, antigen-specific cell-mediated immunity, and
proliferative responses, then cause severe skin and soft tissue damage (19-24). Colak et al found the most frequent co-morbid disease was diabetes mellitus in 13/25 patients (52%) and *Pseudomonas aeruginosa* infection was higher in the non-surviving group (24). In our studies, most common comorbidities is diabetes mellitus (5 patients) and 1 of them died.

In addition, patients with malignancy, acute or chronic leukemia, renal transplantation recipient and childhood had been proposed as case report and most of them died (9-11,26-29). Reisman et al. reviewed 17 of 37 cases with monomicrobial *Pseudomonas* necrotizing fasciitis had a hematological malignancy, in which 15 being treated with chemotherapy at the time of their infection (10). In our study, only one patient had the history of ovarian cancer and died.

Hung et al. investigated the necrotizing fasciitis in 55 patients with cirrhosis (27). Most patients had infections by monomicrobial gram-negative bacilli, which *Pseudomonas aeruginosa* accounted 9%. The hypoalbuminemia (serum albumin <2.5 g/dL) was the only independent predictor of mortality in cirrhotic patients. Both non-survival cases had significantly lower albumin level compared to the survival group in this study. Several well established studies revealed that albumin has important physiologic roles as volume expansion effects, transporter of biologically active molecules, and as a free-radical scavenging antioxidant (30-32). We thought that the
uncorrected lower albumin levels and higher counts of band forms may be attributed to immunocompromised status, additional infections (pneumonia and secondary bacteremia), and death. Routine monitoring for albumin levels and banded forms of WBC counts should be emphasized.

*Pseudomonas fluorescens* is widespread in nature and is found in water, moist soil, vegetation, and surfaces of plants (33). *Pseudomonas fluorescens* is characterized as a pyoverdin-positive group with producing a soluble greenish fluorescent pigment, and is often colonized from a contaminated water dispenser and moist environments with low iron concentration (34). *Pseudomonas fluorescens* contains GacS-GacA two-component system and type of type III secretion system (T3SS) to produce biofilms and hemolytic activity against human immunity that is similar to that found in *Pseudomonas aeruginosa* (33). Although *Pseudomonas fluorescens* is usually regarded much lower virulent than *Pseudomonas aeruginosa*, it was reported to cause bloodstream infections in patients with cancer and immunocompromise, such as blood transfusion-related septicemia, catheter-related bacteremia, and peritonitis in peritoneal dialysis patients (35,36). *Pseudomonas fluorescens* has been reported to cause cutaneous abscess of left thumb after a dog bite; however, it never been reported to associate with necrotizing soft tissue infection (37). In case 5, she was a farmer and denied any underlying chronic illness. She visited ER due to left low leg
pain, erythema and hemorrhage bullae for 3 days, but she did not recall any injury of leg. *Pseudomonas fluorescens* was confirmed by wound culture 3 days after emergent fasciotomy. The contact with soil, plant or insect in farm might be the possible cause of *Pseudomonas fluorescens* infection. As far as we are aware, the case 5 was the first reported case of monomicrobial necrotizing fasciitis with *Pseudomonas fluorescens*.

There are several limitations that should be acknowledged. First, the number of study cases is small because of its rarity, but this is the first case series of single hospital to investigate the specific characteristics and clinical outcomes of monomicrobial *Pseudomonas* necrotizing fasciitis in extremities. Second, we did not do molecular identification, such as 16S rDNA sequencing or polymerase chain reaction, was carried out to confirm identity of cultures.

In conclusion, to our best knowledge, this is the first cases series of monomicrobial necrotizing fasciitis caused by *Pseudomonas species*, and we reported the first case of monomicrobial necrotizing fasciitis with *Pseudomonas fluorescens*. Because the mortality rate was up to 20%, it needs early diagnosis, and emergent surgical intervention with application of the effective antimicrobial agents against *Pseudomonas species*. Severe hypoalbuminemia and increased counts of banded leukocytes in initial laboratory presentations can be considered as poor prognostic factors in *Pseudomonas* necrotizing fasciitis.
Acknowledgements

The study protocol was approved by Institutional Review Board of Chang Gung Medical Foundation (103-2081B).

Conflict of interest

None to declare.
References


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**Figure Legends**

**Figure 1.** Case 5 who was a 71 year-old female without chronic illness had left leg pain and erythema for 3 day. (A) (B) Preoperative photographs of left leg revealed skin erosion, erytherma, vesicles and subcutaneous bleeding. (C) After emergency fasciotomy, the wound culture confirmed the presence of *Pseudomonas fluorescens*. Repeated debridement were performed on the 7th day to control infection. (D) She had received skin graft on the 16th day and discharged on the 26th day after fasciotomy.
<table>
<thead>
<tr>
<th>Patient</th>
<th>Age (yr)</th>
<th>Gender</th>
<th>Underlying Disease</th>
<th>Site</th>
<th>Interval A (days)</th>
<th>Interval B (hours)</th>
<th>Interval C (days)</th>
<th>Result</th>
<th>Duration of Hospitalization (days)</th>
<th>Systolic Blood Pressure (mm Hg)</th>
<th>Body Temperature at ER &gt;38.5°C</th>
<th>Intensive Care Unit</th>
<th>Stay</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>88</td>
<td>M</td>
<td>DM, CRI</td>
<td>left leg</td>
<td>7</td>
<td>unknown</td>
<td>4</td>
<td>Fas</td>
<td>0</td>
<td>Death</td>
<td>≤ 90 at ER</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>2</td>
<td>45</td>
<td>F</td>
<td>ESRD, Cancer, HB</td>
<td>right leg</td>
<td>3</td>
<td>unknown</td>
<td>5</td>
<td>Fas, AK</td>
<td>18</td>
<td>Death</td>
<td>N</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>3</td>
<td>75</td>
<td>M</td>
<td>HC</td>
<td>left forearm</td>
<td>2</td>
<td>seawater</td>
<td>22</td>
<td>Fas, STSG</td>
<td>20</td>
<td>Discharge</td>
<td>N</td>
<td>Y</td>
<td>N</td>
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<tr>
<td>4</td>
<td>79</td>
<td>M</td>
<td>DM</td>
<td>left foot</td>
<td>4</td>
<td>bamboo</td>
<td>4</td>
<td>Fas, Flap</td>
<td>8</td>
<td>Discharge</td>
<td>N</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>5</td>
<td>71</td>
<td>F</td>
<td>None</td>
<td>left leg</td>
<td>3</td>
<td>unknown</td>
<td>4</td>
<td>Fas, STSG</td>
<td>16</td>
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<td>Heart Disease</td>
<td>right leg</td>
<td>2</td>
<td>unknown</td>
<td>4</td>
<td>Fas, STSG</td>
<td>23</td>
<td>Discharge</td>
<td>N</td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td>7</td>
<td>69</td>
<td>M</td>
<td>DM, Old Stroke</td>
<td>left leg</td>
<td>2</td>
<td>unknown</td>
<td>3</td>
<td>Fas, AK</td>
<td>14</td>
<td>Discharge</td>
<td>N</td>
<td>N</td>
<td>Y</td>
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<tr>
<td>8</td>
<td>77</td>
<td>M</td>
<td>DM, Gout, HC</td>
<td>left forearm</td>
<td>10</td>
<td>trauma</td>
<td>5</td>
<td>Fas, STSG</td>
<td>21</td>
<td>Discharge</td>
<td>N</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>9</td>
<td>57</td>
<td>M</td>
<td>Old Stroke, CRI</td>
<td>right leg</td>
<td>3</td>
<td>trauma</td>
<td>4</td>
<td>Fas, Debride</td>
<td>7</td>
<td>Discharge</td>
<td>N</td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td>10</td>
<td>52</td>
<td>F</td>
<td>DM, CRI</td>
<td>right foot</td>
<td>3</td>
<td>unknown</td>
<td>4</td>
<td>Fas</td>
<td>0</td>
<td>Discharge</td>
<td>N</td>
<td>Y</td>
<td>N</td>
</tr>
</tbody>
</table>

67.1 3.9 5.9 13.7 28.1

**Note.** 1. HC, hepatitis C; HB, hepatitis B; CRI, chronic renal insufficiency; DM, diabetes mellitus; ESRD, end-stage renal disease.
2. Interval A, time from contact to presentation in the emergency room; Interval B, time from first consultation to first operation; Interval C, time from first operation to final operation.
3. Fas, fasciotomy; AK, above the knee amputation; STSG, split-thickness skin graft.
Table 2  Laboratory Data and Initial Antibiotics Use of Patients with Monomicrobial Necrotizing Fasciitis Caused by *Pseudomonas* spp.

<table>
<thead>
<tr>
<th>Patient</th>
<th>Bacteria</th>
<th>White Blood Cell Count (cells/mm³)</th>
<th>Band Forms (%)</th>
<th>Segmented Forms (%)</th>
<th>Lymphocyte Forms (%)</th>
<th>Platelet Count (per mm³)</th>
<th>Albumin (g/dL)</th>
<th>ESR (umol/L)</th>
<th>C-Reactive Protein (mg/L)</th>
<th>Initial Antibiotics Use</th>
<th>Positive Culture</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td><em>P. aeruginosa</em></td>
<td>17000</td>
<td>6</td>
<td>84.5</td>
<td>5</td>
<td>191000</td>
<td>1.7</td>
<td>55</td>
<td>153</td>
<td>Ceftriaxone+oxacillin</td>
<td>W</td>
</tr>
<tr>
<td>2</td>
<td><em>P. aeruginosa</em></td>
<td>900</td>
<td>10</td>
<td>76</td>
<td>6</td>
<td>12000</td>
<td>2.7</td>
<td>44</td>
<td>271</td>
<td>Cefepime</td>
<td>W&amp;B</td>
</tr>
<tr>
<td>3</td>
<td><em>P. aeruginosa</em></td>
<td>31000</td>
<td>5.5</td>
<td>83</td>
<td>5</td>
<td>133000</td>
<td>3.3</td>
<td>129</td>
<td>286</td>
<td>Ceftriaxone+oxacillin</td>
<td>B</td>
</tr>
<tr>
<td>4</td>
<td><em>P. aeruginosa</em></td>
<td>13100</td>
<td>2</td>
<td>80</td>
<td>8.5</td>
<td>159000</td>
<td>3.3</td>
<td>88</td>
<td>109</td>
<td>Ceftriaxone+clindamycin</td>
<td>W</td>
</tr>
<tr>
<td>5</td>
<td><em>P. fluorescens</em></td>
<td>14900</td>
<td>0</td>
<td>88</td>
<td>8</td>
<td>201000</td>
<td>3.8</td>
<td>80</td>
<td>149</td>
<td>Ceftriaxone+clindamycin</td>
<td>W</td>
</tr>
<tr>
<td>6</td>
<td><em>P. aeruginosa</em></td>
<td>16300</td>
<td>0</td>
<td>86.8</td>
<td>9.5</td>
<td>104000</td>
<td>3.3</td>
<td>76</td>
<td>154</td>
<td>Piperacillin</td>
<td>W&amp;B</td>
</tr>
<tr>
<td>7</td>
<td><em>P. aeruginosa</em></td>
<td>7900</td>
<td>6</td>
<td>80</td>
<td>10</td>
<td>173000</td>
<td>3</td>
<td>70</td>
<td>150</td>
<td>Ceftriaxone+clindamycin</td>
<td>W&amp;B</td>
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<tr>
<td>8</td>
<td><em>P. aeruginosa</em></td>
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<td>84</td>
<td>11</td>
<td>406000</td>
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<td>79</td>
<td>379</td>
<td>Ceftriaxone</td>
<td>W</td>
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<td>1.5</td>
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<td>212000</td>
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<td>80</td>
<td>170</td>
<td>Ceftriaxone</td>
<td>W</td>
</tr>
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<td><em>P. aeruginosa</em></td>
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<td>0</td>
<td>80</td>
<td>10</td>
<td>260000</td>
<td>3.8</td>
<td>150</td>
<td>322</td>
<td>Cefepime</td>
<td>W</td>
</tr>
</tbody>
</table>

W= wound, and B= blood.
<table>
<thead>
<tr>
<th></th>
<th>Death (N-2)</th>
<th>Survival (N-8)</th>
<th>p-value</th>
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<tbody>
<tr>
<td>White cell count (cells/mm³)</td>
<td>8950</td>
<td>16300</td>
<td>0.26</td>
</tr>
<tr>
<td>Segmented forms (%)</td>
<td>80.3</td>
<td>83.6</td>
<td>0.30</td>
</tr>
<tr>
<td>Band forms (%)</td>
<td>8.00</td>
<td>1.87</td>
<td>0.016*</td>
</tr>
<tr>
<td>Lymphocyte form (%)</td>
<td>5.50</td>
<td>8.37</td>
<td>0.13</td>
</tr>
<tr>
<td>Platelet counts (per mm³)</td>
<td>101500</td>
<td>206000</td>
<td>0.22</td>
</tr>
<tr>
<td>Albumin (g/dL)</td>
<td>2.20</td>
<td>3.23</td>
<td>0.04*</td>
</tr>
<tr>
<td>C-reactive protein (mg/L)</td>
<td>212.0</td>
<td>214.8</td>
<td>0.97</td>
</tr>
<tr>
<td>Erythrocyte sedimentation rate (umol/L)</td>
<td>49.5</td>
<td>94.0</td>
<td>0.07</td>
</tr>
<tr>
<td>qSOFA score</td>
<td>1.5</td>
<td>0.625</td>
<td>0.77</td>
</tr>
</tbody>
</table>

* mean P<0.05 and the difference was significant

qSOFA: quick Sequential (Sepsis-related) Organ Failure Assessment