Case Report

Invasive Group A Streptococcal Infections in Sacral Pressure Ulcer of an Elderly Person Supported by a Health Care Worker: A Case Report

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Case: A 74-year-old male who was bedridden and lived alone and was supported by remote medical service was brought to our emergency department.

Outcome: The patient exhibited necrotizing soft tissue infection in a sacral pressure ulcer, which required early debridement, antibiotic administration, vasopressor, mechanical ventilation and blood purification therapy. Group A *Streptococcus* (GAS) was detected from the sacral ulcer and blood culture. He was diagnosed as having streptococcal toxic shock syndrome (STSS).

Conclusion: Pressure ulcers infected with GAS quickly lead to STSS. In the aging society, many medical personnel including health care workers have the opportunity to contact patients with contagious bacterium, and infectious precautions are required.

Key words: Group A *Streptococcus*, healthcare worker, pressure ulcer infection, remote medical service, streptococcal toxic shock syndrome

(J. Nihon Univ. Med. Ass., 2017; 76 (4-5): 225–227)

Introduction

There are many opportunities to treat infectious pressure ulcers following the increase in elderly bedridden patients. An infected pressure ulcer is a common disease, but it can be a severe soft tissue infection causing serious sepsis. It is a mixed infection with various bacteria detected, but reports of pressure ulcers infected with Group A *Streptococcus* are rare. Pressure ulcers infected with GAS can quickly lead to streptococcal toxic shock syndrome and multiple organ failure¹⁾. Subcutaneous wound infections caused by pressure ulcer are difficult to notice until they are widespread. GAS is usually caused by pharyngitis and cellulitis²⁾, as the route of droplets from the upper respiratory tract brings the infection in contact with the wound²⁾. There is a report of nosocomial GAS infections occurring with health care workers acting as the intermediary³⁾. Even if elderly people living alone require full care and have almost no opportunity to go out, they are still vulnerable to the spread of GAS infection through the intervention of health care workers. It is necessary to take appropriate precautions in order to prevent STSS occurring in a short period of time.

Case Report

Our patient was a 74-year-old man who had been bedridden due to leg paralysis caused by spinal caries and lived alone. The patient was receiving remote medical

service by a healthcare worker for intractable sacral pressure ulcer. The healthcare worker providing remote medical service had many opportunities to contact various patients in a cluster area. On the other hand, the patient had few opportunities to contact other people, and the healthcare worker had frequent contact with the patient.

The patient had been repeatedly hospitalized to undergo debridement of recurrent pressure ulcer infection until several months ago and to be the carrier of Methicillin-resistant *Staphylococcus aureus* (MRSA). GAS had not been detected in his body as an indigenous bacterium in the past.

The patient developed a chill four days before hospitalization. He was found unconscious when health care worker visited. His vital signs on admission were E1V1M4 on the Glasgow Coma Scale, blood pressure of 70/- mmHg, heart rate of 132 beats per minute, respiratory rate of 24 breaths per minute, and an axillary temperature of 38 degrees centigrade. Physical findings on the hip were an infectious pressure ulcer with skin redness, a cavity and subcutaneous emphysema.

The result of blood test and chemical examination were shown in Table 1. The results of arterial blood gas (FIO₂ 1.0) analysis were pH 7.502, PaCO₂ 14.5 mmHg, PaO₂ 194 mmHg, HCO₃⁻ 11.5 mmol/l, BE -11.8 mmol/l, lactate 8.8 mmol/l, and P/F ratio 194, indicating metabolic acidosis and acute respiratory distress syndrome (ARDS). A pelvic CT indicated widespread gas in the gluteus

Table 1 Sequential change of laboratory data from day 1 to day 7

Parameter		Day 1	Day 3	Day 5	Day 7
White blood cell count	/mm ³	28600	35600	30100	24400
Hemoglobin	g/dl	12.1	10.4	8.9	9
Platelet	$\times 10^3/\text{mm}^3$	483	135	23	30
Fibrinogen	mg/dl	968	296	278	—
D-dimer	$\mu\text{g/ml}$	4.9	22.6	16.7	—
Total bilirubin	mg/dl	0.68	1.79	2.84	3.68
Asparate aminotransferase	IU/l	38	355	169	65
Alanine aminotransferase	IU/l	22	96	126	64
Blood urea nitrogen	mg/dl	52.6	42	49.6	56.8
Creatinine	mg/dl	1.82	1.85	2.25	2.77
C-reactive protein	mg/dl	30.1	24.3	18.5	—

Serum white blood cell count and CRP level continued to elevate.

Serum platelet and fibrinogen level decreased.

Serum total bilirubin and Creatinine level increased.

Serum D-dimer level elevated since Day3.

muscle (Fig. 1). This case was diagnosed as having septic shock caused by gas gangrene. Initial therapy required fluid loading via infusion and administration of noradrenaline. The patient was put on mechanical ventilation.

Debridement was carried out urgently and Tazobactam/piperacillin (TAZ/PIPC) 13.5 g per day was administered. The infected pressure ulcer had spread to the left iliac crest. The gluteus muscle was necrotized and debrided. The wound infection had reached the area of the sciatic nerve.

On the second day, the patient's erythematous rash had spread to mid-thigh and debridement was added. *Streptococcus pyogenes* had been detected from blood cultures and muscle. The erythematous rash was spreading more broadly and rapidly, and circulation insufficiency was progressing.

There was enough evidence in this case to justify a diagnosis of STSS. That is, isolation of GAS from a normally sterile site, hypotension of less than 90 mmHg

systolic blood pressure, ARDS, renal insufficiency, coagulopathy, liver involvement, a generalized erythematous rash and soft tissue necrosis. The antibiotics were changed to benzyl penicillin potassium (PCG) 12 million units per day and clindamycin (CLDM) 1600 mg per day. The severity of the illness in progress was demonstrated by Sequential Organ Failure Assessment (SOFA) score⁴⁾ (Fig. 2). Circulation insufficiency was so severe that high dose vasopressor was required. The patient's condition deteriorated to multiple organ failure and death on the 9th hospital day.

Discussion

This report is the fulminant case of pressure sacral ulcer cause by GAS. Early debridement and antibiotics were performed for septic shock cause of necrotizing soft tissue infection on sacral pressure ulcer. GAS was isolated from tissue and blood culture. Tissue necrotizing was progressed after first debridement. By the time STSS was diagnosed, multiple organ failure was progressed⁵⁾. Necrotizing soft tissue infection on pressure ulcers are generally caused by mixed infection and mild progress. One study showed GAS was isolated from necrotizing pressure ulcer (4%) as mixed infection, which was not fulminant progress such as STSS⁶⁾. In our case, GAS was detected for the first time, and the patient was under immune suppression status cause by repeated pressure sacral ulcer, which increased risk of STSS⁷⁾.

Healthcare workers can be carriers of GAS infection and cause an outbreak in a cluster area such as the community, nursing home, or hospital. No reports of outbreak of GAS in the remote medical area was reported. However, it is possible that infection was transmitted by the healthcare worker providing remote medical service to treat patients in a certain area.

These days, as more elderly patients live alone, health-

Fig. 1 Pelvic CT

Pelvis CT identified widespread gas in the gluteus muscle.

White arrows indicate the intra muscle air. Black arrows indicate the left ileum (A), the sacrum (B) and the left gluteus muscle (C)

Fig. 2 Therapeutic process in ICU

A: The clinical course after admission

● The day performed debridement

□ The day detected GAS in muscle tissue

△ The day detected GAS in blood culture

GAS: Group A Streptococcus

TAZ/PIPC: tazobactam/piperacillin

PCG: benzyl penicillin potassium

CLDM: clindamycin

The crossbar under antibiotics represent the interval of administrat- ing antibiotics

B: MAP and catecholamine administration

MAP: mean arterial pressure (mmHg)

The first axis measures volume of noradrenaline (μg/kg/min) and mean arterial pressure (mmHg) and the second axis measures vol- ume of dopamine (μg/kg/min)

C: The severity of the illness in progress demonstrated by SOFA score

SOFA: Sequential Organ Failure Assessment

care workers carry the potential risk of spreading fulmi- nant infection.

Although the exact route of infection of GAS is unknown in this case, the potential risk of infection by droplets and direct contact, as related to insufficient pre- cautions by the healthcare worker is possible.

It is difficult to collect reliable data from remote medi-

cal patients in line with the guidelines of the Centers for Disease Control and Prevention, However, healthcare workers and medical implements can be considered as sources of infection such as GAS. In remote medical ser- vice, droplet and direct contact are regarded as fundamen- tal routes of infection. Healthcare workers have to brush up their knowledge and wear hand grove when they take care of infected patients. They must also manage their practices so as to restrict the carrying of medical equip- ment and generation of medical waste in the homes where they visit⁸⁾.

Conclusions

In general, an infectious pressure ulcer is a mixed in- fection. However, we have reported a fulminant case caused by GAS which led rapidly to STSS and multiple organ failure.

The infection route was unknown in this case. Many medical personnel including health care worker have op- portunity to contact with the patient who have contagious bacterium like GAS. Namely infectious precaution for fulminant infection is required of many medical person- nel.

Conflict of interest

Nothing.

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