Non-traumatic, non-clostridial gas gangrene of the lower limb requiring hip disarticulation: A case report

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ABSTRACT

Introduction: Non-traumatic (spontaneous) gas gangrene is very rare and usually caused by clostridial organism in immune compromised patients. This case report presents a rare occurrence of this condition by non-clostridial organism in a patient with no known immune compromising status.

Case Report: A 45-year-old male plumber presented with a three months history progressively worsening atraumatic right leg gas gangrene. Within 48 hours of admission, the infection ascended from the knee to the hip joint necessitating a hip disarticulation. Tissue culture yielded *Klebsiella pneumoniae* as the offending organism.

Conclusion: Non-traumatic, non-clostridial gas gangrene may occur in previously healthy individuals. Systemic manifestation of sepsis is delayed hence improving the chances of survival if identified early and prompt and appropriate antibiotic and surgical intervention is instituted.

Keywords: Gas gangrene, *Klebsiella pneumoniae*, Non-clostridial gangrene, Non-traumatic gangrene

INTRODUCTION

Gas producing infection, whether clostridial or non-clostridial, is a serious, and often limb and life-threatening infection with high mortality rate [1]. Gas gangrene is a rare clinical entity mostly associated with trauma. Non-traumatic (spontaneous) gas gangrene is very rare and occurs usually in patients with immune depression [2] and is most commonly caused by clostridial organisms.

We present a case of non-traumatic, non-clostridial gas gangrene in a previously healthy patient who survived following a hip disarticulation.

CASE REPORT

A 45-year-old male plumber presented with a three months history of progressively worsening right leg swelling. The swelling was insidious in onset; there was development of multiple leg ulcers discharging foul smelling pus and progressive darkish discoloration of the right foot and leg. He also had fever. He had no history of trauma and he is not a known diabetic.

Examination revealed a toxic looking middle-aged man who was febrile and dehydrated. His vital signs on admission were: temperature of 38°C, respiratory rate of 28/min, pulse rate of 120/min, and blood pressure of 100/60 mmHg.
Examination of the right lower limb revealed a swollen right leg with darkish discoloration, there were multiple ulcers discharging foul smelling pus with intervening areas of necrotic skin and bullae (Figure 1A). There was crepitus up to the knee.

A diagnosis of gas gangrene of the right leg with sepsis was made and empirical broad-spectrum antibiotics consisting of ciprofloxacin, ceftriaxone, and metronidazole was commenced. He also had tetanus prophylaxis and intravenous fluids.

He had a white cell count of $38.97 \times 10^3/UL$ with 95.5% neutrophilia. Packed cell volume was 42% and platelet count was $206 \times 10^3/UL$. He had hyponatremia of 124 mg/dL (normal 130–145 mg/dL), azotemia with urea of 55 mg/dL (normal 15–45 mg/dL). His random plasma glucose was 117 mg/dL, retroviral screening was negative, X-ray of the right lower limb revealed air in the muscle planes and subcutaneous tissues up to the distal third of the thigh (Figure 1B and C), Doppler ultrasonography showed no evidence of blood flow in the external iliac arteries and distal vessels and also revealed gas bubbles in the femoral and popliteal vessels and in the soft tissues of the right leg.

The patient was counseled for an urgent right above knee amputation to which he did not give consent. The crepitus ascended to the right hip and he was thereafter counseled for a right hip disarticulation which he had 48 hours after admission; intraoperative findings were a gangrenous right leg, necrotic muscles up to the proximal third of the thigh, subcutaneous emphysema up to the hip, gas in tissue planes up to the hip and foul smelling pus in the hip joint. Tissue samples were sent for microscopy culture and sensitivity; he had myoplasty of the stump done while the skin was left open.

He was admitted into the intensive care unit post-operatively for inotropic support, tissue biopsy microscopy culture, and sensitivity yielded *K. pneumoniae* and he was commenced on culture specific antibiotics. Within 48 hours of surgery there was obvious clinical improvement, vital signs were temperature of 36.6°C, respiratory rate of 24/min, pulse rate of 89/min, and blood pressure of 104/68 mmHg. White cell count was on the downward trend ($16.56 \times 10^3/UL$ with 79.2% neutrophilia) and electrolyte and urea levels were normal. He continued to improve and was discharged to the ward after six days. He commenced ambulation with bilateral axillary crutches on the 13th post-operative day, he had routine wound care with subsequent wound contraction, he was counseled for wound cover with skin graft which he did not consent to till the wound healed by second intention (Figure 2).

**DISCUSSION**

Gas-producing infections may be clostridial or non-clostridial. Gas gangrene is a serious and often a limb and life-threatening infection with a very high mortality rate.

Non-clostridial gas gangrene is a relatively rare entity and most of the reported cases are in diabetic patients with neurologic and vascular complications of their poorly controlled disease [1, 2]. It is commoner than clostridial gas gangrene in diabetics and the diagnosis is often delayed or missed since unlike clostridial gas gangrene, the non-clostridial gas gangrene is of insidious onset, with minimal local signs and without systemic signs in the initial phase. Hence, the patients are not often ill until late [1, 3].

The commonly isolated organisms are aerobic Gram-negative bacilli *Escherichia coli*, *Pseudomonas* species and *Klebsiella* species, and more rarely anaerobic streptococcus and bacteroides [2, 4, 5].

Gas gangrene can also be broadly classified into traumatic, non-traumatic/spontaneous, postoperative, and uterine types [6]. Traumatic types are the commonest irrespective of causative organisms [6–8] as the history of gas gangrene is closely tied to battlefield wounds. However, even in peace times they constitute over 50% of cases of gas gangrene. In Enugu, Nigeria all 15 cases reported in a five-year series were of the traumatic type [7].

Non-traumatic infection occurs usually in patients with diabetes, congestive heart failure, and renal failure or any disease that cause immune suppression [8]. It
is said to be almost exclusively caused by *Clostridium septicum* [9], although there have been some reports of spontaneous gas gangrene involving non clostridial organisms [10, 11].

Early suspicion is essential as treatment of non-clostridial gas gangrene is different from that of clostridial infection in that limb salvage may be possible and surgical intervention may be limited to decompression, drainage, and excision of necrotic material, although if the limb is ischemic amputation may be required. There is neither indication for gas-gangrene antiserum in these infections nor the need for hyperbaric oxygen therapy. Initial broad-spectrum antibiotics before changing to culture sensitive antibiotics is beneficial [1, 2, 8].

We have presented a case of non-traumatic, non-clostridial (*K. pneumoniae*) gas gangrene in a non-diabetic adult male with no identifiable cause of immune suppression. The patient did not present to our facility until he had developed systemic manifestation of sepsis three months after the spontaneous onset of his symptoms. This delayed period onset of systemic illness is longer than that reported in diabetics [1–3] and may be due to his pre-morbid immune competence.

Radiologically, gas is seen only in the extramuscular soft tissues of patients with non-clostridial gas gangrene as seen in our patient unlike in clostridial infections in which gas is also present within the muscles [2]. Also as presented in our patient Doppler ultrasonography may reveal gas bubbles in the major vessels of the limb and even in the great vessels [11, 12]. It had been suggested that this might be due to diffusion of gas into the vessels from the surrounding emphysematous soft tissues as a result of increased capillary permeability caused by toxins elaborated by the infective organisms [12]. This increase in capillary permeability may also be caused by the actions of the chemical mediators of inflammation.

The importance of immediate and appropriate surgical intervention in preventing mortality is shown in the management of our patient as an above knee amputation was considered a sufficient surgery as at the time of his admission, but the patient refused. Within the next 48 hours this was no longer considered appropriate and he had a hip disarticulation done. The presence of copious foul-smelling pus in the hip joint at surgery confirms that an above knee amputation at that later time would not have been a sufficient enough surgery for eradicating the source of infection.

CONCLUSION

Non-traumatic, non-clostridial gas gangrene may occur in previously healthy individuals. Systemic manifestation of sepsis is delayed hence improving the chances of survival if identified early and prompt and appropriate antibiotic and surgical intervention is instituted.

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