Non-clostridial gas gangrene in diabetic lower limbs with peripheral vascular disease

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Abstract

Introduction
Infections in diabetics are common. Some infections like necrotizing fasciitis are known to affect the diabetic lower limb and rapidly spread to affect the entire limb. Gas gangrene, whether clostridial or non-clostridial, 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. This article describes a rare case of non-clostridial gas gangrene of the diabetic lower limb with peripheral vascular disease.

Case report
A 43-year-old male presented to our emergency department with a history of pain in his left lower limb for the past 10 days. The patient was fortunate to survive but ended up in bilateral major lower-limb amputation. According to us, this is the first rare case reported from India.

Conclusion
Non-clostridial gas gangrene is rare in literature and its occurrence in diabetic lower limbs with peripheral vascular disease is extremely rare.

Introduction
Skin and soft tissue infections over the lower limbs in diabetics are quite common. Insignificant infections over the lower limbs can rapidly progress to become both limb- and life-threatening infections. Gas gangrene is one such limb-threatening infection.

Gas gangrene is defined as a necrotic infection of skin, soft tissue and muscle and is characterized by the presence of gas under the skin. The gas-forming infection can be clostridial or non-clostridial. Clostridia are the main cause of the gas gangrene. Non-clostridial gas gangrene is a rare condition and is known to be associated with a high mortality. Bacteria causing gas gangrene are many and include aerobic and anaerobic Streptococci, E. Coli, Klebsiella pneumoniae, Aeromonas hydrophila, Morganella morganii and so on.

We hereby report a rare case of gas gangrene in diabetic lower limb caused by Proteus species.

Case report
A 43-year-old male presented to our emergency department with a history of pain in his left lower limb for the past 10 days. Pain was dull, aching and non-radiating. Three days later he noticed a blackish discolouration of the foot and the leg, which progressed to involve the entire thigh. The patient also complained about a foul smell from the limb. He was unable to walk for the past week and used to have low-grade fever on and off. He subsequently noticed pain even in the right lower limb for 3 days. The patient did not give any history of preceding trauma. He was not aware of his diabetes status.

On general physical examination, patient was found to have a pulse of 110/min, blood pressure of 110/60 mmHg. He was afebrile. He had dyspnoea and tachypnoea.

On local examination, we found that the patient had gangrene of the entire left lower limb (Figure 1). The entire limb was tender, with areas of fluctuation, and was having crepitations. There were no pulses in the entire left lower limb. On the right lower limb, there was a decrease in

Figure 1: The extensive gangrene of the left lower limb (amputated).
Case report

Laboratory investigation of the patient showed haemoglobin of 10.4 g%; total count, 10,400; platelets, 2.8 lakh/cmm; blood urea, 35 mg%; s. creatinine, 0.7 mg%; prothrombin time, 12.5%; international normalized ratio (INR), 1.1; HIV and HbsAg, non-reactive; and random blood sugar (RBS), 657 mg%.

Liver function test (LF5; total protein), 4.1 g%; albumin, 1.1 g%; total bilirubin, 1.15 mg%; conjugated bilirubin, 0.16 mg%; aspartate-aminotransferase (AST), 216 IU; alanine aminotransferase (ALT), 91 IU; and alkaline phosphatase, 136 IU.

X-ray of the hip showed presence of gas extending beyond the left hip (Figure 2). The lower-limb duplex ultrasound showed external iliac artery thrombosis with no distal flow on the left side and popliteal artery thrombosis with no flow distally on the right side.

With a diagnosis of gas gangrene on the left side, the patient underwent hip disarticulation in view of extensive infection and muscle necrosis and subsequently an above-knee amputation on the right side in view of the presence of extensive foul-smelling pus and muscle necrosis of the leg muscles. Patient was on a broad spectrum antibiotics consisting of piperacillin-tazobactam and metrogyl. The pus culture report showed a heavy growth of *Proteus vulgaris* sensitive to cefoperazone, amikacin, piperacillin and cefotaxime. The histopathological examination showed coagulative necrosis involving entire thickness with extensive myonecrosis and involvement of adjacent soft tissue and blood vessels and the overlying skin showing invasive gram-positive bacilli. The features are compatible with gas gangrene.

Patient showed improved recovery postoperatively. He however required repeated debridement of the left-hip open wound in view of slough and infection.

When the wound showed good granulation tissue (Figure 3), the patient underwent stump closure (Figure 4). His sutures were removed 2 weeks later after the discharge and his stump was healthy on both the sides.

**Discussion**

Gas gangrene caused by clostridial or non-clostridial organism is quite rare in clinical practice and the diagnosis
Case report

Conclusion
Non-clostridial gas gangrene is rarely mentioned in literature and its occurrence in diabetic lower limbs with peripheral vascular disease is extremely rare. Timely intervention is crucial for survival.

Consent
Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the editor-in-chief of this journal.

References

Figure 4: The healthy stump postoperatively after secondary closure.

of this condition is either delayed or missed4.
Gas gangrene has often been related to injuries, especially in the war wounds. The incidence of gas gangrene in World War I was 5%, whereas in World War II it was 0.7%3. The annual incidence of gas gangrene in the US ranges from 1,000 to 30,003.
Non-traumatic infection may occur, which is a common feature in diabetes, congestive heart failure and renal failure6.
Gas gangrene is broadly classified into traumatic, non-traumatic/spontaneous, postoperative and uterine types5.
Bird et al. reported three cases of non-clostridial gas gangrene in diabetic lower limbs7, whereas Van et al. reported seven cases of non-clostridial gas-forming infection8.
Most of the non-clostridial gas-forming infection is known to occur in diabetics. Symptoms like local pain and swelling are less marked compared to clostridial gas gangrene4.
Signs of systemic toxicity develop rapidly, and many patients present with septic shock at the time of initial presentation2. Gas is a prominent feature detected clinically or radiologically.
There are very few case reports of gas gangrene occurring in patients with peripheral vascular disease4.
The treatment of non-clostridial gas gangrene differs from clostridial gas gangrene4. Surgical debridement of all the gangrenous tissues, along with broad-spectrum antibiotics, is crucial in preventing the extension of the infection5. Many times, major amputation of the lower limb may be required to save patient’s life. Even in our case, an immediate major amputation was done at an appropriate time, followed by good postoperative care, which was the reason for the patient’s survival. The rate of mortality caused by gas gangrene ranges from 4% to 100% in patients with extreme disease3,8.

Figure 4: The healthy stump postoperatively after secondary closure.

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