

# Non Clostridial Gas Gangrene Leading to Stroke in Postoperative Period- A Case Report

SUKHVIR SINGH<sup>1</sup>, GAZALA SHABEEN<sup>2</sup>

## ABSTRACT

Gas gangrene is a life threatening infection of muscles and soft tissues which is associated with very high mortality rate. Non clostridial gas gangrene is a rare phenomenon that mostly occurs in diabetic patients. Gas gangrene leads to various systemic manifestations. A 66-year-old female patient, diabetic with chronic kidney disease, on haemodialysis was presented as a rare case of non clostridial right great toe gas gangrene, which progressed to systemic toxicity and stroke within a period of 72 hours in postoperative period. The source of infection in this case may have been *Acinetobacter* which is a gram-negative bacterium. Despite prompt diagnosis and intensive therapy, the patient died 15 days after the operation. After going through literature, no case was found to be reported of stroke in postoperative period due to non clostridial gas gangrene thus making it a unique case to report. Also, only few cases of life threatening non clostridial gas gangrene are reported in literature.

**Keywords:** Chronic kidney disease, Diabetes, Mortality, Systemic toxicity

## CASE REPORT

A 66-year-old female patient presented in the Emergency Department with severe pain, swelling and blackening of right foot over last three days. The symptoms first appeared one month back when patient had a non healing ulcer of right great toe with second and third toes subsequently. Amputation was done 20 days back after she developed cellulitis. Patient was a diagnosed case of hypertension and uncontrolled diabetes on insulin for 12 years and with chronic kidney disease from six years; since last one year, she was on haemodialysis twice per week, which was done via arteriovenous fistula in right arm.

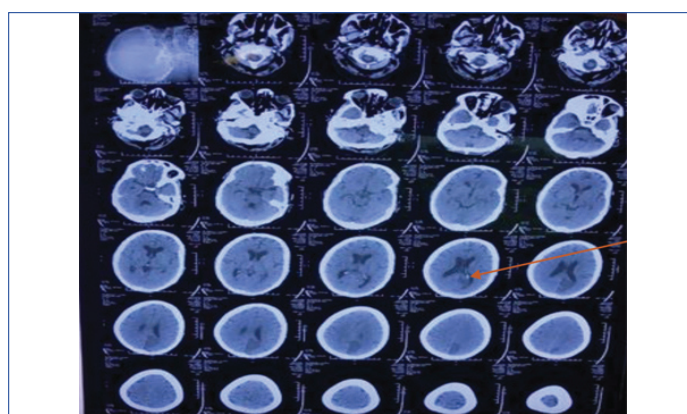
On examination, patient was conscious and oriented, average build with Body Mass Index (BMI) of 21 kg/m<sup>2</sup>, showing signs of respiratory failure (heart rate 110 beats/min, respiratory rate 30 breaths/min, Saturation of Peripheral Oxygen (SpO<sub>2</sub>) 85% on room air). She had blackish necrotic slough and foul discharge with gangrenous changes in right foot [Table/Fig-1]. Blood investigations revealed raised Total Leukocyte Count (TLC) count (37.5/μL) haemoglobin 8 gm/dL, with respiratory acidosis in Arterial Blood Gas (ABG) analysis (potential of hydrogen ([pH] 7.21, partial pressure of carbon dioxide {PCO<sub>2</sub>} 47, partial pressure of oxygen {PO<sub>2</sub>} 77, Bicarbonate {HCO<sub>3</sub>} 23) and she was managed with antibiotics intravenous meropenem one gm twice a day for five days and on non invasive ventilation support. Diagnosis of right foot gas gangrene was made and patient shifted immediately to operating room for right lower limb debridement and midtarsal amputation under general anaesthesia after preoperative evaluation which shows deranged renal function with urea- 98 mg/dL creatinine- 7 mg/dL, deranged sugars with random blood sugar- 220 mg/dL. After standard monitor application (Blood pressure, saturation, electrocardiogram, end tidal carbon dioxide, temperature monitoring was done). She was induced with fentanyl 2 μg/kg, propofol 1.5 mg/kg and atracurium 0.5 mg/kg was given for muscle relaxation.

Intraoperative period remains uneventful and she was transferred intubated to surgical Intensive Care Unit (ICU) for further management in view of respiratory acidosis. Patient was haemodynamically stable and extubated the next day of surgery. She again developed discoloration of the amputated site and as the disease progressed, was taken for below knee amputation on postoperative day two. Patient was intubated again and weaning off was tried from next day of surgery. Culture reports from blood and tissue both showed *Acinetobacter baumannii*. Antibiotics Polymyxin B five lakh units per day and

Targocid 400 mg intravenous once a day were added on day four of hospitalisation as per sensitivity testing. TLC count tapered down to 14.6/μL. Patient was generating good tidal volume (450 mL) breaths and extubation was planned as per weaning protocol. Just before extubation on postoperative day four, patients had a deterioration of Glasgow Coma Scale (GCS) to 8, and not following commands. Non Contrast Computed Tomography (NCCT) brain was done as per advice of neurologist which revealed acute infarct in right Posterior Cerebral Artery (PCA) territory [Table/Fig-2].



[Table/Fig-1]: Gangrene of right foot.



[Table/Fig-2]: CT scan brain (arrow showing well defined hypodensity with loss of grey white matter differentiation in right parieto-occipital region).

Electroencephalography (EEG) showed diffuse encephalopathy with sharp waves. Tracheostomy was done on postoperative day nine as there was no improvement in respiratory parameters. Heparin was continued injection 5000 IU twice a day with addition of tablet ecosprin 75 mg once a day. Patient continued to deteriorate with increment of leucocyte count to 25.6/ $\mu$ L, haemodynamic instability with blood pressure 78/52 mmHg on inotropic support of norepinephrine and had an episode of sudden cardiac arrest on day 15.

## DISCUSSION

Gas gangrene is a deadly infection mostly caused by *Clostridium perfringens*. In modern clinical practice, trauma associated with road traffic accident is a common cause [1]. Iatrogenic causes such as intramuscular injection and abdominal surgeries are also recognised but rare in nature [2,3]. It is attended by local pain, fever and rapidly evolving systemic toxicity and is often fatal unless promptly recognised and aggressively treated. Diabetes, immunocompromised state, intravenous (i.v.) drug abuse, cancer and peripheral arterial diseases are some of the known risk factors [4]. Gas gangrene is a life-threatening infection of deep soft tissues, most commonly caused by *Clostridium* species, there is very less data available on non clostridial origin of this disease. Other organisms responsible are *Escherichia coli* (46.6%) and *Streptococcus* (36.8%). Less frequently encountered pathogens include *Bacteroides*, *Enterobacter*, *Staphylococcus*, *Enterococcus*, *Pseudomonas*, *Corynebacterium*, *Klebsiella pneumoniae* and *Acinetobacter baumannii* [5]. In this case the organism identified was *Acinetobacter* which is a gram-negative rod shaped organism. It has special affinity for compromised immune system and also multi-drug resistance infection as shown in the present case. Bacteraemia and tracheal cultures also had same organism in the present case making the diagnosis of sepsis with this organism. Amputation surgery was done due to systemic toxicity to save patient life, as previous case reports also did urgent radical amputation of gas gangrene site that saved potential mortality [6,7]. Question in dispute is what led to the infarction of Patient-controlled analgesia (PCA) territory, was it because of the Virchow's triad secondary to co-morbidities or was it because of septic emboli? We could not rule out the possibility of sepsis precipitating the already atherosclerosed vessels. In authors opinion, order of events which followed gas gangrene by sepsis and surgery may have superimposed the already hypercoagulable state completing the Virchow's triad (categories of factors which contribute to thrombosis) which includes hypercoagulability, stasis and endothelial injury [8]. We cannot rule out the possibility of a single factor in this case. There is an array which intermingles here and the factor solely responsible could not be elicited.

Infectious insult, immunocompromised state, atherosclerosed vessels may lead to formation of an infected thrombus which paves pathway for septic emboli, a thrombus secondary to infection, causing an obstruction in the blood vessel. It is an indispensable condition yet

under studied. Septic embolism is more commonly seen in infective endocarditis patients but also reported with septic thrombophlebitis, periodontal, and central venous catheter infections. Consequences reported are septic pulmonary embolism, aneurysms, extremity abscess, myocardial, mesenteries and cerebral infarction. With the aging population, advances in technology, and broader application in patients with multiple established high risk co-morbidities (i.e., obesity, diabetes, chronic immunosuppression, renal failure, malignancies, etc.,) increase the thrombogenic propensity. Hypercoagulable state (secondary to trauma or infection), vascular damage (atherosclerosis, venepuncture) and circulatory stasis (immobility) all lead to formation of Virchow's triad [8].

In this case, patient is an elderly female with hypertension, diabetes mellitus and chronic kidney disease on regular haemodialysis, these all individually act as a risk factor for stroke as per CHA<sub>2</sub>DS<sub>2</sub>-VASc (congestive heart failure, hypertension, age  $\geq$ 75 years, diabetes mellitus, stroke or Transient Ischemic Attack (TIA), vascular disease, age 65-74 years, sex category) score [9], while, she presented with gas gangrene and bacteraemia, which can also lead to septic emboli and perioperative stroke. Postoperative complication is a result of co-morbidities or a consequence of Virchow's triad is still a question to look for. Further evaluation is indeed needed as to firmly diagnose the pathophysiology and further management of such patients.

## CONCLUSION(S)

It can be concluded that the gangrene of a diabetic with chronic kidney disease on haemodialysis is likely to be non clostridial and is a particularly sinister condition. Antibiotic therapy should be started at earliest to control the infection, and there is a very high risk of septicemia and death.

## REFERENCES

- Mathur P. Infections in traumatised patients: A growing medico-surgical concern. *Indian J Med Microbiol*. 2008;26(3):212-16.
- Sathyanaarayana H, Rani L, Rajendran R, Sarmah P. Iatrogenic infection of clostridium welchii following intramuscular injection of sodium diclofenac. *J Lab Physicians*. 2013;5(1):58-59.
- Garg D, Garg N, Gupta M. Gas gangrene in the abdominal wall: A physician's nightmare. *Clin Res Hepatol Gastroenterol*. 2013;37(6):549-50.
- Carbonetti F, Cremona A, Guidi M, Carusi V. A case of postsurgical necrotizing fasciitis invading the rectus abdominis muscle and review of the literature. *Case Rep Med*. 2014;2014:479057.
- Shigemoto R, Anno T, Kawasaki F, Shigemoto, Irie S, Yamamoto M, et al. Non clostridial gas gangrene in a patient with poorly controlled type 2 diabetes mellitus on hemodialysis. *Acta Diabetol*. 2018;55(1):99-101.
- Bird D, Giddings AE, Jones SM. Non clostridial gas gangrene in the diabetic lower limb. *Diabetologia*. 1977;13(4):373-76.
- Aggelidakis J, Lasithiotakis K, Topalidou A, Koutroumpas J, Kouvidis G, Katonis P. Limb salvage after gas gangrene: A case report and review of the literature. *World J Emerg Surg*. 2011;6(1):01-07.
- Bagot CN, Arya R. Virchow and his triad: A question of attribution. *Br J Haematol*. 2008;143(2):180-90.
- Olesen JB, Torp-Pedersen C, Hansen ML, Lip GY. The value of the CHA<sub>2</sub>DS<sub>2</sub>-VASc score for refining stroke risk stratification in patients with atrial fibrillation with a CHADS<sub>2</sub> score 0-1: A nationwide cohort study. *Thrombosis and Haemostasis*. 2012;107(6):1172-79.

### PARTICULARS OF CONTRIBUTORS:

- Consultant, Department of Anaesthesiology, Max Hospital, Mohali, Punjab, India.
- Junior Resident, Department of Anaesthesiology, Max Hospital, Mohali, Punjab, India.

### NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:

Dr. Sukhvir Singh,  
House No. 214, Ward 2, Samrala, Ludhiana-141114, Punjab, India.  
E-mail: drsukhvirsingh@gmail.com

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