Case series of gas gangrene in a tertiary care hospital

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INTRODUCTION: Clostridial gas gangrene (GG) or clostridial myonecrosis is a life-threatening soft tissue infection caused by anaerobic, spore-forming clostridium subspecies, associated with a high mortality, often necessitating amputation to control the infection. Clinical suspicion along with prompt and early microbiological differential diagnosis is essential for presumptive diagnosis of gas gangrene.

MATERIALS AND METHOD: Five patients diagnosed with gas gangrene were included in present study. The clinical presentation, results of investigation and treatment outcome of the cases were analysed retrospectively.

RESULTS: Age of patients ranged from 40 to 50 years. Two patients presented with H/O RTA, two with trauma and fifth with thrombosis. Direct smear of the specimen was positive for Clostridial group of organisms. Two patients were managed with extensive local debridement and antibiotics whereas three underwent amputation of affected limb.

CONCLUSIONS: This study emphasizes the importance of suspicion of the possibility of occurrence of gas gangrene in wounds contaminated with soil, because the pathognomonic sign appears at an advanced stage of infection. Surgical and medical treatment together with the resuscitation measures may be life-saving when applied in a timely manner.

Keywords - Gas gangrene, Amputation, Crepitus, Clostridium

INTRODUCTION:
Gas gangrene or clostridia myonecrosis is a necrotic infection of the skin and soft tissue by Clostridium species and is characterized by the presence of gas under the skin. It is potentially lethal disease which spreads quickly in soft tissue of the body [1]. Tissue necrosis is due to production of exotoxins by spore forming bacteria in an environment of low oxygen [2]. Gas gangrene are sub classified in two categories. Traumatic or postoperative is the most common form accounting for 70% of the cases followed by spontaneous or no traumatic gangrene [3]. C. perfringens is isolated in approximately 80% of patients presenting with traumatic gas gangrene followed by C. septicum, C. novyi, C. histolyticum, C. bifermentans, C. tertium and C. fallax [4]. Spontaneous gas gangrene is mostly caused by C. septicum and occurs frequently in patient with gastrointestinal portals of entry. Further factors that increase mortality are advanced age, infection of the trunk, underlying diseases such as diabetes mellitus, and shock [4,5]. An anaerobic environment is necessary for progression of clostridial infections. Thus, deeply penetrating injuries are more likely to develop an infection than more superficial wounds [5]. Blood supply is severely impaired by occlusion of vessels caused by toxin-stimulated platelets, leukocytes, and endothelial cells, which form intravascular aggregates causing thrombosis [6].

PATIENTS AND METHOD:
Five patients diagnosed with gas gangrene were included in present study during the month of January to March 2021 in Department of Microbiology in Tertiary care hospital in Central India. The cases were diagnosed based on their clinical presentations, results of investigations. A general physical and local examination was performed in all the cases to detect the presence of gas gangrene infection. Swab collected from the local wound area was inoculated on Robertsons cooked meat media for anaerobic culture and Blood agar and MacConkey agar plates for isolation of aerobic organisms, routine gram stain was performed for the identification of the causative organism.

Biochemical and antimicrobial susceptibility pattern of isolates were performed by standard bacteriological methods [7,8]. Other routine laboratory investigations include total blood count, C reactive protein, total platelet counts etc. A computerised tomography scan of the affected part was carried out for the confirmation of diagnosis along with Doppler scan to rule out thrombosis.

RESULTS:
We identified 5 cases of gas gangrene. There demographic characteristics, symptoms and other comorbidities are presented in Table 1. All patients were male. Diabetes mellitus was present in three cases. Lower limb, particularly left leg was the most commonly affected anatomical site of the infection. In most of the cases the duration of symptoms before admission did not exceed two days. Clinical presentation involved pain localized in the affected limb, fever and crepitus. Other presenting symptoms included swelling, discoloration, induration of the affected limb, tenderness, stiffness of involved joints.
Table 1: Demographic data, comorbidities, admission, and symptoms

<table>
<thead>
<tr>
<th>Patient</th>
<th>Age</th>
<th>Gender</th>
<th>Previous history</th>
<th>Comorbidity history</th>
<th>Localisation</th>
<th>Clinical presentation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>43yr</td>
<td>M</td>
<td>Left lower limb PVD</td>
<td>Above knee amputation</td>
<td>Left lower limb</td>
<td>Pain and swelling in left lower leg</td>
</tr>
<tr>
<td>2</td>
<td>50yr</td>
<td>M</td>
<td>Road traffic accident</td>
<td>Type 2 DM and HTN</td>
<td>Right lower limb and head injury</td>
<td>Multiple wounds on right lower leg along with swelling, pain and heaviness Fever and headache</td>
</tr>
<tr>
<td>3</td>
<td>45yr</td>
<td>M</td>
<td>Road traffic accident</td>
<td>Type 2 DM</td>
<td>Right thigh</td>
<td>Fever, swelling over right thigh with discharging pus, pain in Right lower limb</td>
</tr>
<tr>
<td>4</td>
<td>45yr</td>
<td>M</td>
<td>Agricultural trauma</td>
<td>HTN and Chronic Bidi Smoker COPD</td>
<td>Left leg</td>
<td>Blackish discoloration of left leg with purulent foul-smelling discharge</td>
</tr>
<tr>
<td>5</td>
<td>40yr</td>
<td>M</td>
<td>Agricultural trauma</td>
<td>Type 2 DM and HTN</td>
<td>Left great toe and one digit</td>
<td>Blackish discoloration of left great toe and one digit with swelling and pain</td>
</tr>
</tbody>
</table>

A detailed list of laboratory investigations, antimicrobial regimens, length of hospital stay, treatment given in these patients is presented in Table 2. Two patients underwent wide surgical debridement of the affected area and were administered antimicrobial treatment. Three out of five patients underwent amputation of the affected part. Skin grafting to cover affected areas was required in 1 patient. Hospitalization ranged variably between 16 and 40 days and was relatively longer in patients with serious systemic complications of the disease.

Table 2: Clinical course, treatment, and outcome

<table>
<thead>
<tr>
<th>CASE</th>
<th>TIME OF ADMISSION TO SURGERY</th>
<th>LENGTH OF STAY IN HOSPITAL</th>
<th>BACTERIA</th>
<th>LAB FINDINGS</th>
<th>TREATMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Day 2</td>
<td>35 days</td>
<td>C. perfringens K. pneumoniae P. mirabilis</td>
<td>WBC-12700 HB-10.9 PLT-393000 CRP-48 NA/K-135/4.0 Urea/Crea-26/0.9</td>
<td>Intravenous Ampicillin-Sulbactam and Metronidazole. Below knee amputation for the same with STSG donor right thigh.</td>
</tr>
<tr>
<td>2</td>
<td>Day 1</td>
<td>16 days</td>
<td>C. perfringens K. pneumoniae</td>
<td>WBC-25600 HB-10.1 PLT-156000 CRP-50 NA/K-134/3.4 Urea/creat-25/1.0</td>
<td>Metronidazole and Gentamicin. Uncompromised excision of all damaged parts</td>
</tr>
<tr>
<td>3</td>
<td>Day 1</td>
<td>26 days</td>
<td>C. perfringens P. aeruginosa</td>
<td>WBC-18000 HB-9.5 PLT-210000 CRP-51 NA/K-136/3.8 Urea/creat-30/1.4</td>
<td>Intravenous penicillin, clindamycin, metronidazole and fluid resuscitation An above knee amputation was performed followed by extensive debridement of the remaining necrotic tissue</td>
</tr>
</tbody>
</table>
Gas gangrene is rare but serious infections with acute onset, rapid progression, systemic toxemia and a high mortality rate. Amputation is usually necessary to control infection and save life whereas functional limb preservation is rare [9]. It is well known that usual causative organisms in gas gangrene are clostridial species. However, a variety of other organisms: coliforms, anaerobic streptococci, and Bacteroides may also produce infection in which gas is demonstrable [10]. Fermentation of glucose in tissues is thought to be the source of the gas in gangrenous infections. Anaerobic environment results from crash type injury, contaminated open fractures and retained foreign material which is associated with C. perfringens gas gangrene [11].

Similarly present study has two patients of road traffic accident, 2 patients met with trauma during agricultural work and 1 patient develop gas gangrene in stump of above knee amputation operated for Peripheral vascular disease (PVD). The triad of pain, infection and is associated with significant morbidity and mortality. All of our patients survived, but three of them underwent amputation as against 16% mortality reported in the Meta analysis of Eke [10]. Amputation is usually necessary to control infection and save life whereas functional limb preservation is rare. Co morbid medical conditions such as Diabetes mellitus must also be considered before heading down a long road of multiple operations to save a limb. In a study conducted by Ghosh et al type 2 Diabetes mellitus and alcohol abuse was the most common predisposing factor [13].

The diagnosis of gas gangrene is made by presence of capsulate bacilli in Gram-stained smears in cases is classic findings present in 2 patients, oedema and crepitus was present in all of our patients at the time of local examination. Co morbid medical conditions such as Diabetes mellitus must also be considered before heading down a long road of multiple operations to save a limb. In a study conducted by Ghosh et al type 2 Diabetes mellitus and alcohol abuse was the most common predisposing factor [13].

Radiographic evidence of soft tissue gas may be present prior to the detection of clinical Creptus [12]. All our patients presented with pain as one of the chief signs at the time of admission. Bullae and the bluish skin discoloration are classic findings present in 2 patients, edema and crepitus was present in all of our patients at the time of local examination.

The management of gas gangrene includes surgical debridement of the necrotic tissue with incision and drainage of the involved areas, antibiotic therapy and intensive care [19,20]. Early diagnosis and aggressive management are essential as overwhelming sepsis may quickly develop and is associated with a significant morbidity and mortality. All of our patients survived, but three of them underwent amputation as against 16% mortality reported in the Meta analysis of Eke [21]. Prompt initiation of antimicrobial treatment covering aerobic and anaerobic organism is critical.

In present study, antibiotic treatment was most often started with Ampicillin-sulbactam, clindamycin, and metronidazole and then adapted to the results of the anti bio grams. Low sample size and the design as a retrospective analysis must be identified as limitations of this study.

**CONCLUSION**

Gas gangrene is characterized by sudden onset with rapid progression, gloomy prognosis and increased mortality. Therefore, it is necessary to keep high suspicion of each wound contaminated with soil and vegetative matter. Early diagnosis, extensive surgical debridement, prompt antibiotic therapy with intensive care monitoring can reduce the mortality and morbidity associated with gas gangrene.
REFERENCES


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