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Original Research Paper

Microbiology

SERRATIA LIQUIFACIENS:A RARE CAUSE OF AEROBIC INFECTION IN A CASE OF GAS GANGRENE.

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ABSTRACT **BACKGROUND** Gas gangrene is synonymous with myonecrosis and is a highly lethal infection of deep soft tissue, caused by Clostridium species, with Clostridium perfringens being the most common. The infection involves deeper tissue such as a muscle which can lead to a rapidly spreading infection along tissue planes, and patients often present with sepsis. Immunocompromised patients and those with local tissue hypoxia (due to trauma or poor vascular supply) are most at risk. **CASE REPORT** We report a rare case of gas gangrene in a female patient with super added aerobic infection with a rare Carbapenem resistant : S. liquefaciens. S. liquefaciens is a rare organism which belongs to the Serratia group which mainly cause hospital acquired infections but ours was a community acquired case.

KEYWORDS : Gas gangrene, Clostridium species, S. liquefaciens

INTRODUCTION

Gas gangrene is a severe, life-threatening infection caused by different species of Clostridium, which usually develops as a consequence of trauma or surgical intervention.1

Nowadays, it is a rare condition that can occur in some clinical settings, such as posttraumatic origins, postoperative origins, and spontaneous occurrences. The development of gas gangrene requires anaerobic conditions, thus allowing spores to germinate. So, gas gangrene usually develops in ischemic or devitalized tissues, where arterial blood flow has been damaged by extensive trauma or obliterative vessel diseases.2 Toxins produced by the bacterial growth can induce thrombotic and necrotic phenomena, leading to anaerobiosis and gas production, causing emphysema and myonecrosis .3

Along with these anaerobic infections, there is always a mixed type of infection with various Gram positive and Gram negative bacteria. We report a rare case of gas gangrene in a diabetic patient with super added aerobic infection with one of the rare multi drug resistant Gram negative organism, Serratia liquifaciens.

CASE REPORT

A 58 yr old female patient came with the chief complaints of generalized debility with prostration and severe body ache, reduced oral intake and severe pain in left toe with swelling since 4-5 days.She was a known case of hypertension, diabetes mellitus and bronchial asthama with vasculitis since 10 years.

On examination,
General Condition -critical, BP-100/60 mmhg, Pulse 86beats/minute, Respiratory rate 18/minute, Respiratory System-Clear, Cardiac System-Normal,S1, S2 heard.She was admitted in ICU critical care unit and all samples were sent in the diagnostic laboratory for analysis.

CBC findings-TLC-23600/cumm with PMN- 88%, Hb 10.8gm/dl. Arterial Doppler was performed which showed severe atherosclerotic wall changes with luminal compromise and flow and velocity changes. Patient had developed sepsis and was critical.

Pus from left great toe was sent to Diagnostic Microbiology Laboratory for Gram stain and culture sensitivity. Gram stain showed occasional pus cells ,Gram positive, non-sporing , short and stout bacilli suggestive of Clostridial group of organisms, many Gram negative bacilli were also seen. Gram stain report was immediately informed telephonically to the respective consultants in the hospital.

Culture was done on 5% sheep blood agar, Mac Conkey agar (aerobic culture), Robertson's cooked meat media (anaerobic culture). Next day colonies were studied on various culture medias. Colonies on Mac Conkey agar were non-lactose fermenting, opaque, 2-3 mm in diameter, circular, complete, dome shaped.Colonies on 5% sheep blood agar were 2-3 mm in diameter, opaque, non hemolytic, circular.Robertson's cooked meat media was foul smelling, turbid and on Gram stain again Gram positive, short, stout non-sporing Gram positive bacteria suggestive of Clostridial group were seen.

Biochemical tests were performed from Mac Conkey agar. Oxidase test was negative from colonies and catalase test was positive on colonies from 5% sheep Blood agar. Motility was seen from peptone water and the Gram negative organisms were found to be motile.

BD Vitek 2 compact automated machine was used for the identification purpose of Aerobic bacteria. It identified Serratia liquifaciens with 98% probality. It was only sensitive to colistin. All other drugs tested were resistant . Report was reconfirmed with Vitek 2 again and another sample from same site. Same organism was isolated again with same antibiotic sensitivity.

Patient was started on Inj.Cegeva 3gm i.v stat (1.5 gm i.v BD), Inj Meropenem 500mg i.v TDS, Inj Targocid 400mg i.v OD and other supportive medications.Patient underwent amputation of left great toe after being admitted on the same day .The procedure was uneventful.

Patient was kept in intensive care unit in isolation and all infection control measures were followed like barrier nursing, Contact precautions etc.But due to Clostridial gas gangrene, multi drug resistant organism (S.liquifaciens) and other co-morbidities like diabetes and hypertension; patient went in septic shock and was put on ventilator.Due to poor prognosis and wide spread sepsis, patient could not be retrieved and succumbed to the illness.

DISCUSSION

Necrotizing soft tissue infections (NSTI) are characterized by the presence of toxin-producing bacteria, extensive tissue destruction, and fulminant inflammatory progression, leading to sepsis, multi-organ failure, and, finally, if untreated, death.4 Clostridial gas gangrene (GG) or clostridial myonecrosis is a life-threatening soft tissue

infection caused by anaerobic, spore-forming clostridium subspecies.5

Infected patients who do not receive adequate, immediate surgical treatment present mortality rates of up to 100% and death occurs within 2 to 4 days after hospital admission.5,6,7

The fulminant clinical and histological features of an infection with clostridia are mediated by potent bacterial exotoxins6, making clostridial myonecrosis the most rapidly spreading and lethal infection in humans.8

Many Serratia species are also associated with soil, including S. marcescens, S. grimesii, S. liquefaciens, and S. quinivorans.9,10,11

Serratia belongs to the family Enterobacteriaceae; over time, the taxonomy of Serratia has evolved, with 14 currently described species belonging to the genus .12 Serratia species are usually recognized as nosocomial pathogens; however, some recent studies have demonstrated that Serratia infection can be community acquired, with Serratia marcescens being implicated .13,14

Infections with S. liquefaciens in healthcare setting are uncommon compared to infections with S. marcescens. S. liquefaciens colonizes hands and the respiratory, gastrointestinal, and urinary tracts.15,16 It is a highly motile organism and is commonly found in water, soil, plants, and insects. 17

The pathogenicity of S. liquefaciens is well established in humans, insects, and fish ,17,18 and cases of fatal infection have been reported.19 S. liquefaciens causes infections in immunocompromised hosts,19 such as neonates,20 and in those with indwelling/introduced foreign bodies/liquids, e.g., intravenous/intra-arterial (IV/IA) lines, endotracheal tubes, multiple use vials ; 21thus, the entry routes are ingestion, injection, and catheterization.

Lisa et al published an article about serratia liquefaciens bloodstream infections from contamination of epoetin Alfa at a hemodialysis center in 2001.22 There are very few reported cases about S. liquefaciens causing community acquired infections. This is a rare case report in which there is aerobic infection in gas gangrene with Carbapenemase resistant S. liquefaciens.

CONCLUSIONS

In a patient of gas gangrene, there is always associated aerobic infection at the site of gangrene.Proper identification and early antibiotic sensitivity testing by automated systems like Vitek 2 is very necessary. These automated systems help greatly in identification and proper selection of antibiotics at the earliest and thereby preventing any further losses to the patient. Multi drug resistant organisms should be identified at earliest and proper infection control measures like contact precaution, barrier nursing etc. should be followed strictly to prevent any further spread in the hospital.

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Competing Interests

Nil.

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