

# Gas Gangrene at Tertiary Care Centre

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## Abstract

**Objectives :** To study gas gangrene isolates at tertiary care centre.

**Methods :** Analysis of a series of 206 cases of gas gangrene was done over a period of 2 yr (Dec. 2004 – Dec. 2006).

**Results :** *Clostridium perfringens* was cultured in 58 (90.6%) of the cases, *Clostridium tertium* were isolated in 5 (7.8%) and *clostridium tetani* in 1 (1.56%) case. Clinical classifications of *clostridial* infection and anaerobic streptococcal myositis emphasize differential diagnostic points. Prevention of gas gangrene is accomplished by early, adequate debridement of wounds. 47 cases were diagnosed as anaerobic streptococcal myositis. In 10 (4.85%) cases only *Peptostreptococcus anaerobius* was isolated. No organism (either aerobe or anaerobe) was isolated in 35 (16.99%) cases. In the remaining 142 culture positive cases which did not yield growth of any anaerobe, the common isolates were *E. coli* (37) followed by *pseudomonas spp.* (31) and *Klebsiella spp.* in various combinations.

**Conclusion :** Hence it is important to know the aetiological agents to institute specific therapy, to reduce morbidity and mortality.

## Introduction

Gas gangrene is rapidly progressive infection of the muscles and the connective tissue may be affected to a lesser degree at first. The difficulties in diagnosis are related not only to familiarity with signs and symptoms of gas gangrene, but also to the confusion between gas gangrene and various bacterial and nonbacterial lesions simulating gas gangrene.<sup>1-3</sup> Traumatic injuries account for half of the cases of gas gangrene, the remaining being divided into postoperative complications (30%) and spontaneous (non-traumatic) gas gangrene(20%).<sup>3</sup> The incriminated pathogen is isolated in about half of the cases. In the remainder an assortment of aerobic and anaerobic organisms coexist in the contaminated wound.<sup>3</sup>

Anaerobic streptococcal myositis is known to mimic gas gangrene clinically.<sup>4</sup> Identification of organisms may obviate the need for amputation thus changes line of treatment. The incidence of culture positive gas gangrene may vary from 0.03% to 5.2%.<sup>5</sup>

Though gas gangrene is a relatively infrequent incidence in clinical practice, our L.T.M.M.C. and L.T.M.G. hospital is located in the centre of Mumbai and have specially developed trauma centre. Considering all these facts the study was carried out to find out incidence of gas gangrene and differentiate between other conditions which may mimic clinically.

## Material and Methods

A total of 206 clinically suspected cases of gas gangrene admitted in L.T.M.M.C. and L.T.M.G.H., Sion, Mumbai, during period of two years from December 2004 to December 2006 were studied. All were road traffic

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accidents. Swabs were collected from most active part of wound, deeper tissue and exudates were collected and transported in Robertsen's cooked meat medium. Gram staining was done from swabs and muscle pieces. Morphology of all the bacteria, pus cells were studied. All specimens were studied aerobically and anaerobically. For aerobic organisms subculture was done on blood agar and MacConkey agar. For anaerobic culture Neomycin blood agar (NBA), Egg yolk agar (EYA) and Phenyl ethyl alcohol agar (PEA) were used. Anaerobiosis was done by using McIntosh fildes jar with H<sub>2</sub> and CO<sub>2</sub> gas mixture. Anaerobic organisms were identified by Gram staining, aerotolerance, sensitivity to Metronidazole and Gentamicin, colony morphology. Species identification was done by gelatin liquefaction, indole production, urease activity, esculin hydrolysis, lecithinase and lipase activity on EYA, production and fermentation of glucose, lactose, sucrose, mannitol, maltose, mannose and xylose and sensitivity to sodium polyanethol sulphonate (SPS) for *peptostreptococcus spp.*<sup>6</sup>

Aerobic organisms were identified by morphology, colony characters and standard biochemical tests.

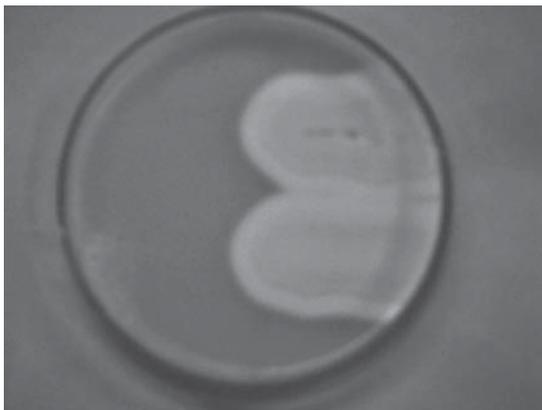


Fig. 1 : Colonies of *clostridium perfringens* on Egg yolk agar (EYA) showing opalescence

## Results

Out of 206 clinically suspected cases of gas gangrene 64 (31.06%) yielded growth of clostridial species. Peptostreptococcus and other aerobes grew in various combinations indicating mixed flora. Smear positive cases were 87, thus correlation between microscopy and culture was 73.56%. Of total 47 isolates of Peptostreptococcus 37 were isolated along with clostridial species and in 10 (4.85%) cases only anaerobe grown was peptostreptococcus. Only aerobic growth was observed in 97 (47%) cases. No growth was seen in 35 (16.99%) cases. Table 1 shows frequency of organisms isolated from cases of gas gangrene. Table 2 shows total aerobes isolated.

## Discussion

*Clostridium perfringens* is known as leading

Table 1

Frequency of organisms isolated from cases of gas gangrene	
<i>Clostridial species</i> (64) :	
<i>Clostridium perfringens</i>	58 (90.62%)
<i>Clostridium tertium</i>	05 (7.8%)
<i>Clostridium tetani</i>	01 (1.56%)

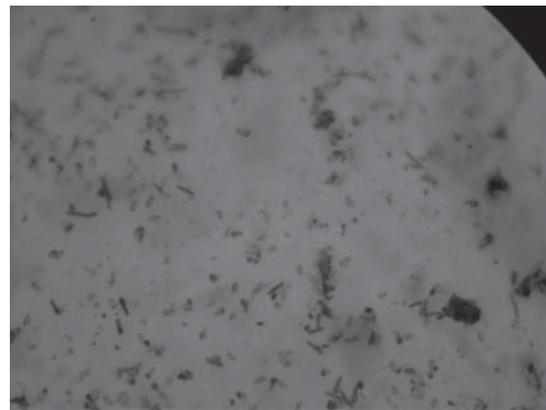


Fig. 2 : Gram stain of muscle tissue showing polymicrobial flora and Gram positive bacilli with box car app

cause of gas gangrene<sup>8</sup> ranges from 50-100%.<sup>8</sup> Some reports have implicated *Cl.sporogenes*, *Cl.histolyticum*, *Cl.bifermentans* and *Cl.fallax* as a pathogen in gas gangrene cases.<sup>10</sup>

In our study *Cl. perfringens* isolates were 58 (90.62%) of *clostridium species*, thus responsible for 90.62% cases. Previous reports from our institute has reported *Cl.perfringens* as a predominant isolate (81.3%), *Cl. histolyticum* from 5 cases and *Cl. Novyi* from 4 cases.<sup>9</sup> Local cleaning and debridement was done in all cases. Anti-gas gangrene serum was given after skin testing. Intravenous Metronidazole was given to prevent multiplication of anaerobes. However, amputation was done in 30 cases, as local lesions were rapidly progressive.

The incidence of culture positive gas gangrene varies between 0.03% to 2%. In this

study it was found to be 31%, which was significantly high. Table 3 shows comparison of aetiological agents with other studies.

In all the cases of gas gangrene, polymicrobial flora was observed including other anaerobes and aerobes. Anaerobic streptococcal myositis usually resembles gas gangrene clinically and has to be differentiated by laboratory findings.<sup>4</sup>In present study 10 isolates were *Streptococcus anaerobius*, which was managed by conservative treatment. Some aerobic bacteria can produce lesions following trauma, which may resemble gas gangrene.<sup>8</sup> In present study only aerobic growth was seen in 97 cases. No growth of either aerobe or anaerobe was observed in 35 cases. Similar findings were noted in previous studies.<sup>8</sup> Mechanical effects might have resulted in trapping of air in culture negative cases.

The present study thus revealed the importance of isolation and identification of organisms from suspected cases of gas gangrene, which is necessary for proper management of patients.

#### References

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**Table 2**

Total aerobes isolated were 166:	
<i>Escherichia coli</i>	37
<i>Pseudomonas species</i>	31
<i>Klebsiella species</i>	28
<i>Enterobacter species</i>	17
<i>Proteus species</i>	12
<i>Acinetobacter species</i>	07
<i>Streptococcus pyogenes</i>	10
Methicillin resistant <i>Staphylococcus aureus</i> (MRSA)	10
Methicillin sensitive <i>Staphylococcus aureus</i> (MSSA)	06
<i>Enterococcus species</i>	08

**Table 3 : Comparison of aetiological agents with other studies**

	<i>Cl.perfringens</i> (%)	<i>Cl.septicum</i> (%)	<i>Cl.sporogenes</i> (%)	<i>Cl.fallax</i> (%)	<i>Cl.tertium</i> (%)
MacLennan <sup>8</sup>	56	37	—	1	—
Altermeier and Fullen <sup>10</sup>	95	8	—	—	—
Baradkar V & Patwardhan <sup>7</sup>	50	25	12	—	—
Present study	90.62	—	—	—	7.8

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#### **ALISKIREN AND VALSARTAN FOR HYPERTENSION**

*'These findings provide a clear rationale for further studies to investigate the potential effects of long-term treatment with the combination of aliskiren and valsartan, and combinations of aliskiren with other [angiotensin receptor blockers], on possible benefits beyond treating hypertension'*

Studies have shown preliminary indications that the combination of aliskiren and the angiotensin receptor blocker valsartan provides greater reductions in blood pressure than monotherapy. To investigate further, Suzanne Oparil and colleagues assessed the blood pressure-lowering effects of the combination of aliskiren and valsartan at their maximum approved therapeutic doses. They found that the combination of aliskiren and valsartan at maximum recommended doses provides significantly greater reductions in blood pressure than monotherapy with either agent in patients with hypertension, with a tolerability profile similar to that with aliskiren and valsartan alone. In a Comment, Willem Birkenhager and Jan Staessen discuss the strengths and weaknesses of Oparil and colleagues' study.

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