



MELENEY'S GANGRENE: IMPROVING MORBIDITY AND MORTALITY – AN INSTITUTIONAL EXPERIENCE

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ABSTRACT

Meleney's gangrene, also known as necrotizing fasciitis or synergistic gangrene of the abdominal wall, is a rare but often fatal condition that requires prompt diagnosis and aggressive treatment. Its mortality rate ranges from 34% overall to over 90% in diabetic patients due to its rapidly progressive nature and resultant systemic sepsis. Efforts have been made to reduce morbidity and mortality, ensuring better quality of life. We performed a retrospective analysis of patients presenting to our institute over a 6-month period with Meleney's gangrene, who experienced improved outcomes and lower mortality through a proactive, multidisciplinary approach to management. Elements of this approach included early recognition and evaluation of the condition, timely surgical debridement, a low threshold for re-debridement, targeted antibiotic therapy, the utilization of advanced wound care techniques, and supportive care. The mortality rate observed at our hospital (27%) were lower than the reported average. We also analysed the demographic characteristics, onset, microbiological profile, comorbid illnesses and wound management techniques employed. Our findings suggest that a comprehensive strategy can lead to better patient outcomes and reduced morbidity in this challenging clinical scenario.

KEYWORDS : Meleney's gangrene, Necrotising fasciitis, Synergistic bacterial gangrene**INTRODUCTION**

Meleney's gangrene, or necrotizing fasciitis of the abdominal wall, is a rare and rapidly progressive soft tissue infection that can quickly become life-threatening if not recognized and treated promptly. The condition is characterized by the rapid spread of infection through the fascia, often leading to extensive tissue necrosis and systemic toxicity.

Meleney's gangrene can occur both spontaneously and secondary to trauma or surgery. While it often arises in the setting of a surgical wound or a minor injury, it can also develop in the absence of any identifiable preceding event. The disease process typically begins with a breach in the skin barrier, allowing bacterial entry into the subcutaneous tissue. These bacteria then proliferate rapidly and release toxins, leading to widespread inflammation, tissue necrosis, and the formation of gas within the tissues. The infection spreads rapidly along fascial planes, outpacing the body's immune response and leading to extensive tissue destruction. Patients with underlying medical conditions, particularly diabetes mellitus, are at increased risk of developing Meleney's gangrene due to impaired wound healing and immune responses.

Meleney's gangrene typically arises from a polymicrobial infection, with both aerobic and anaerobic bacteria contributing to its pathogenesis. Common organisms isolated from these wounds include haemolytic, aerobic *Staphylococcus aureus*, and microaerophilic *Streptococcus*, and various gram-negative bacteria. The synergistic action of these microorganisms leads to the rapid tissue destruction characteristic of this condition.

Empirical antibiotic therapy for Meleney's gangrene should be broad-spectrum, targeting both aerobic and anaerobic organisms. Commonly used regimens include a combination of a carbapenem (e.g., meropenem or imipenem) or piperacillin-tazobactam with an agent effective against methicillin-resistant *Staphylococcus aureus*, such as vancomycin or linezolid. Antibiotic therapy should be tailored based on culture and sensitivity results once available.

While Meleney's gangrene is fundamentally a clinical diagnosis, laboratory investigations are essential to assess

the severity of infection and guide treatment decisions. Elevated white blood cell count with a left shift, elevated C-reactive protein, and erythrocyte sedimentation rate are common findings reflecting the inflammatory response. Blood cultures, though not always positive, can help identify the causative organisms and guide targeted antibiotic therapy. Wound cultures are crucial for identifying the specific microorganisms involved and assessing antibiotic sensitivities.

Additionally, computed tomography imaging is a valuable tool in assessing Meleney's gangrene. CT findings suggestive of this condition include fascial thickening, gas within the soft tissues, and the presence of fluid collections. CT can help delineate the extent of tissue involvement, guide surgical planning, and differentiate Meleney's gangrene from other conditions that may present similarly.

Surgical debridement forms the cornerstone of management in Meleney's gangrene. Often, the extent of soft tissue destruction is found to be far greater than what is appreciated on the skin. The postoperative wound should be assessed regularly, with a low threshold for re-debridement to provide ample clearance.

This aggressive approach – while invaluable in resolving infection and improving outcomes – often leaves large, complex wounds that pose significant challenges for closure. Delayed primary closure, where the wound is left open for a period of time to allow for further observation and dressing changes before being sutured closed, is a common approach. In cases with extensive tissue loss, reconstructive procedures such as skin grafting or flap surgery may be necessary to achieve wound closure.

Negative pressure wound therapy has emerged as a valuable adjunct in the management of Meleney's gangrene wounds. By applying controlled negative pressure to the wound bed, NPWT promotes drainage, reduces bacterial burden, and encourages granulation tissue formation, ultimately facilitating wound healing.

AIM

The aim of this study is to assess the clinical presentation,

comorbid illnesses, surgical approach, microbiological profile, alternative wound care techniques, and in-hospital mortality rate of patients presenting with Meleney's gangrene.

OBJECTIVES

1. To describe the demographic characteristics of patients with Meleney's gangrene.
2. To identify comorbid illnesses in patients with Meleney's gangrene.
3. To identify the mechanism of onset and clinical manifestations of Meleney's gangrene.
4. To understand the microbiological profile of patients presenting with Meleney's gangrene.
5. To account for advanced wound care techniques, namely negative pressure wound therapy (NPWT)
6. To describe the mortality of such patients while admitted in hospital.

MATERIALS AND METHODS

STUDY DESIGN

Retrospective single-centre clinical case study.

This retrospective study includes 11 patients diagnosed with Meleney's gangrene at our institute in a 6-month long time frame between December 2023 and June 2024. Medical records including inpatient and follow up data were examined.

SAMPLING METHOD

Consecutive sampling

Inclusion Criteria

1. Patients with a clinical and imaging diagnosis of Meleney's gangrene
2. Patients who underwent surgical treatment at our institute

Exclusion Criteria

1. Patients who did not consent to or died before surgical treatment
2. Patients who presented to our institute after primary debridement performed at another centre

DATA COLLECTION

Medical records were examined for the following:

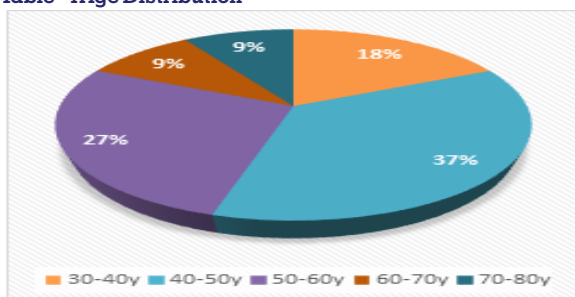
1. Demographic data (age, sex)
2. Mechanism of injury (spontaneous, traumatic, postoperative)
3. Comorbid illnesses (diabetes mellitus, hypertension, coronary artery disease, chronic kidney disease, etc.)
4. Clinical manifestations (local crepitus, fever, signs of shock, respiratory distress)
5. Microbiological profile of initial wound culture
6. Use of adjunct wound management techniques (negative pressure wound therapy, delayed primary closure, split thickness skin grafting)
7. In-hospital mortality rate

STATISTICAL ANALYSIS

Descriptive statistics were used to summarise the above data.

RESULTS

Table - 1 Age Distribution



Total no.	30-40 years	40-50 years	50-60 years	60-70 years	70-80 years
11	2	4	3	1	1

Table - 2 Sex Distribution

Total no.	Male	Female
11	9	2

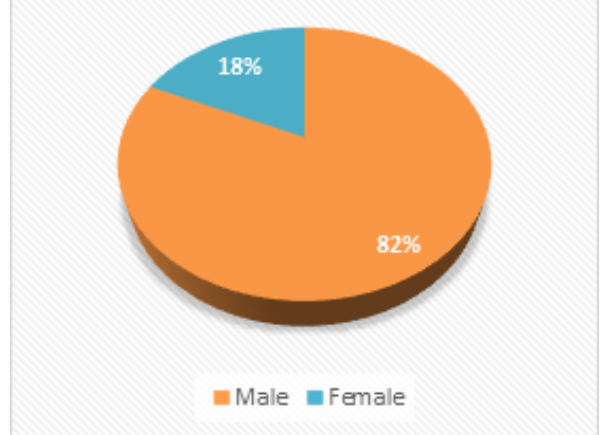


Table - 3 Mechanism Of Injury

Total no.	Spontaneous	Traumatic	Postoperative
11	3	7	1

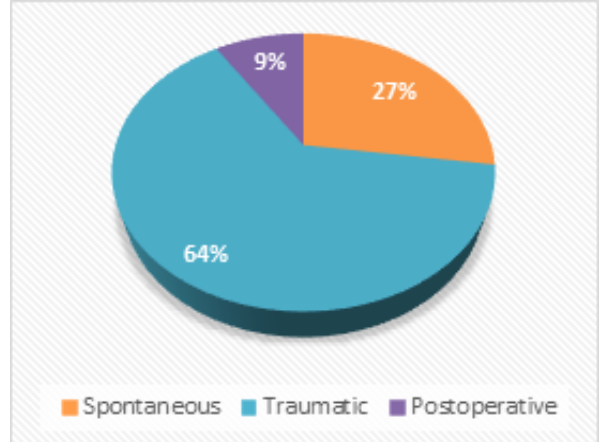


Table - 4 Comorbid Illnesses

Nature of Illness	No. of patients	%age of patients
Diabetes mellitus	9	81%
Hypertension	5	45%
Coronary artery disease	2	18%
Chronic kidney disease	1	9%

Table - 5 Clinical Manifestations

Clinical sign	No. of patients	% of patients
Local crepitus	6	54%
Fever	5	45%
Signs of shock (tachycardia/hypotension/altered mental status)	5	45%
Respiratory distress	2	18%

Table - 6 Microbiological Profile

Nature of infection	% of cases
Monomicrobial	0%
Polymicrobial	100%
Organism isolated	No. of cases
<i>Staphylococcus aureus</i> (methicillin sensitive)	6
<i>Staphylococcus aureus</i> (methicillin resistant)	3
<i>Streptococcus pyogenes</i>	3
<i>Escherichia coli</i>	2

<i>Proteus mirabilis</i>	1
<i>Klebsiella pneumoniae</i>	0
<i>Pseudomonas aeruginosa</i>	1
<i>Acinetobacter spp.</i>	1

Table – 7 Use Of Adjunct Wound Management Techniques

Method	No. of patients
Negative pressure wound therapy (NPWT)	5
Delayed primary closure	3
Split thickness skin graft	6
Nil	2

Table – 8 In-hospital Mortality Rate

Outcome	No. of patients	% of patients
Discharge	8	73%
Death	3	27%

DISCUSSION

Necrotising fasciitis is a destructive soft tissue infection of the skin, subcutaneous tissue and deep fascia, due to a polymicrobial infection, often with concomitant sepsis and septic shock. Though well documented as early as 5th century BC by Hippocrates, it remains a formidable challenge to surgeons even today. Meleney's gangrene (synergistic bacterial gangrene) is a type of necrotising fasciitis occurring on the anterior abdominal wall, and is associated with high mortality rates and poor outcomes. It is a surgical emergency, and outcomes depend on early diagnosis and prompt surgery with extensive debridement and possible periodic re-assessments and re-debridement. Additionally, patients require empirical and later targeted antibiotic therapies to combat the microbial load. Regular postoperative dressings and wound assessments are essential to treatment.

Patients in the study uniformly received early debridement and broad-spectrum antibiotics with MRSA coverage. Glycaemic control and nutritional support were provided by expert physicians, and frequent wound inspections and dressings were performed. Negative pressure wound therapy was deployed early, and patients were counselled about possible wound closure options.

Our study revealed a male predilection, with maximum incidence occurring in a middle-aged population. Diabetes mellitus was by far the most frequent comorbid illness, affecting over 80% of patients. Nearly half of all patients presented with signs of shock, belying the fast course and degree of morbidity of the disease.

All patients had microbiologically proven polymicrobial cultures, with *S. aureus* being the most common organism, followed by *Streptococcus pyogenes* and then coliforms.

Adjunct wound management techniques were performed in all but 2 patients, who experienced mortality in the early postoperative period. The remaining patients received some form of wound closure – either delayed primary or grafting – preceded by NPWT in a little over half of the cases.

The in-hospital mortality rate was lower than the published average (27%), and may be attributed to adoption of an institutional protocol, with the features highlighted above.

CONCLUSION

Meleney's gangrene continues to be a formidable challenge to general surgeons. However, adoption of principles like aggressive and early debridement with a low threshold for re-debridement, empirical broad-spectrum followed by targeted antimicrobial therapy, as well as multidisciplinary efforts to manage comorbidities and offer nutritional support may yield substantial benefits to patients.

REFERENCES

1. Rengan V, Duraisami V, Ravindra C, Muralidharan K. A case of Meleney's abdominal gangrene in Madras Medical College. International Surgery

Journal. 2019 Jul 25;6(8):2963.
2. Sharma A, Katiyar VK, Tiwary SK, Kumar P, Khanna AK. Meleney's Gangrene of the Abdomen Managed With Serial Debridement and Negative Pressure Wound Therapy: A Case Report. Cureus [Internet]. 2024 Sep 2 [cited 2024 Oct 16]; Available from : https://www.ncbi.nlm.nih.gov/pmc/articles/PMC11445978/
3. Ahmed S, Niran Maharjan, Niroj Hirachan. Meleney's gangrene managed with a single extensive debridement and resultant defect closure with abdominoplasty technique – a case report. Annals of Medicine and Surgery [Internet]. 2024 Jan 12 [cited 2024 Oct 16];86(3):1711–5. Available from: https://pmc.ncbi.nlm.nih.gov/articles/PMC10923296/
4. Davson J, Jones DM, Turner L. Diagnosis of Meleney's synergistic gangrene. British Journal of Surgery. 1988 Mar;75(3):267–71.
5. Prabhat Nickkarode, Shriya Haval. Unmasking the Silent Threat: Meleney's Synergistic Gangrene in a Healthy Young Woman Without Predisposing Factors. Cureus. 2024 Jul 4;