folia medica

Folia Medica 68(1)
DOI: 10.3897/folmed.68.e146721

Case Report

Clinical case of a patient with fatal development of gas gangrene while using totally implantable venous access devices

Buryan Kirov[1,2], Plamen Murdzhanov[1], Angel Petkov[1]

1 *Clinic of Vascular Surgery, St George University Hospital, Plovdiv, Bulgaria*
2 *Department of Cardiac and Vascular Surgery, Faculty of Medicine, Medical University of Plovdiv, Plovdiv, Bulgaria*

Corresponding author: Buryan Kirov, Department of Cardiac and Vascular Surgery, Faculty of Medicine, Medical University of Plovdiv, 15A Vassil Aprilov Blvd., 4002 Plovdiv, Bulgaria; Email: buryank@gmail.com

Received: 14 January 2025 ♦ **Accepted:** 1 April 2025 ♦ **Published:** 26 February 2026

Citation: Kirov B, Murdzhanov P, Petkov A. Clinical case of a patient with fatal development of gas gangrene while using totally implantable venous access devices. Folia Med (Plovdiv) 2026;68(1):e146721. doi: 10.3897/folmed.68.e146721.

Abstract

Gas gangrene, or clostridial myonecrosis, is a rare and life-threatening infection caused primarily by *Clostridium perfringens*. Despite its reduced incidence due to advancements in wound care and antibiotics, the disease remains associated with significant morbidity and mortality, particularly in immunocompromised individuals. This report presents a clinical case of a 37-year-old male with esophageal carcinoma and a totally implantable venous access device (Port-a-Cath), who developed fatal gas gangrene following chemotherapy.

The patient presented with rapidly progressing symptoms, including fever, extensive edema, crepitus, and necrotic bullous lesions of the right upper limb and thoracic region. Despite prompt multidisciplinary evaluations and surgical intervention, the patient succumbed to infectious shock and cardiac arrest shortly after the initial incision. This case underscores the critical need for early clinical recognition of gas gangrene, especially by surgeons and emergency physicians, to initiate life-saving surgical debridement and adjunctive therapies.

This report also highlights the interplay of modern medical devices with rare but catastrophic infections, emphasizing the necessity of vigilant monitoring and robust infection control protocols in high-risk patients. Through this unique presentation, we aim to enhance awareness and diagnostic acumen among healthcare professionals, advocating for interdisciplinary approaches and evidence-based guidelines to mitigate the devastating impact of gas gangrene in similar clinical contexts.

Keywords

complication, infection, gas gangrene, totally implantable venous access devices, port-a-caths

Introduction

Gas gangrene, also known as clostridial myonecrosis[1], is a rare bacterial infection that produces gas in tissue affected as a part of the infection process with local and systematic events. This deadly infection is caused by *Clostridium* species, with *Clostridium perfringens* being the most common.

With mortality rates of 62% and 28% in the American Civil War and World War I, respectively, gas gangrene was considered one of the deadliest wartime diseases. With the best treatment, including early detection, surgical intervention, antibiotic therapy, and hyperbaric oxygen therapy, the overall mortality rate ranges from 20% to 30%, and in some cases[2], as low as 5% to 10%. However, without treatment, the disease is 100% fatal. Certain factors, such as a weakened immune system, diabetes, and spontaneous infections, can increase the mortality rate to 67% or more. If the infection affects the abdominal soft tissue or chest wall, the mortality rate can reach as high as 60%, while infections in the extremities generally have a more favorable mortality rate

Copyright by authors. This is an open access article distributed under the terms of the Creative Commons Attribution License (CC-BY 4.0), which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

PENSOFT.

of 5% to 30%.[3,4] Nowadays, in the United States, the incidence of gas gangrene is only about 1,000 cases per year.[5] The rare occurrence of this serious disease and its diversity and rapid course could pose serious diagnostic and clinical problems in the modern practice of the medical profession.

Niederhuber introduced totally implantable venous access devices (also known as port-a-caths or "ports") in 1982[6], and they are now widely used for long-term access to central venous circulation, especially for cancer chemotherapy and many other conditions[7]. Statistics show that 5,000,000 PCS are implanted in patients in the United States every year.[8] Infection is the leading reason for early or late unplanned port removal, affecting 5.6% to 8% of devices[9], with an incidence rate of 0.2 per 1,000 catheter days. Bacteriologically, the most common causative agents are coagulase-negative staphylococci (CoNS), gram-negative bacilli (*Enterobacteriaceae*), *Staphylococcus aureus*, *Pseudomonas aeruginosa*, and *Candida* species.[10,11] It is estimated that 1.68 million new cases of cancer will be diagnosed in 2016 in the United States[12], many of whom will require intravenous chemotherapy administration and long-term vascular access. Therefore, physicians should be able to recognize and manage their complications.

More than 4400 publications about gas gangrene and more than 1600 about infections associated with Port-a-Cath use can be found using PubMed. In recent years, there are numerous reviews published on the problem of infections during use of port-a-caths[10,11,13,14], but none of them are showing cases of gas gangrene infection as a complication of the use of a port-a-cath device. One case recently has been presented[15] - a case of a central venous catheter related to cultures positive for *Clostridium perfringens*.

In this clinical case, we present a patient with cancer who had undergone implantation of a port-a-cath and subsequently developed gas gangrene, ultimately leading to a fatal outcome.

Case report

A 37-year-old male was admitted to the emergency department of a leading hospital without medical documentation, accompanied by relatives who reported a history of an oncological condition of an unspecified nature. Subsequent investigation revealed that the patient was suffering from carcinoma of the esophagus with metastases to the liver and surrounding gastric lymph nodes. He had been undergoing chemotherapy at a remote facility, with his most recent session occurring three days prior.

According to his relatives, the patient's condition had deteriorated over the previous 16 hours, with an increase in symptoms including fever, unclear pain, and progressively severe discomfort in the right shoulder and arm. Upon presentation, the patient was in a critically poor general state: somnolent, febrile (with a temperature of 37.8°C), and in a passive position. His blood pressure was severely low (60/40 mmHg), and his pulse was elevated (120 beats per minute) but regular.

Particularly concerning was the local examination, which revealed extensive edema in the entire right arm, shoulder, and thoracic region, accompanied by painful palpation. There was pronounced crepitus in the pectoral, shoulder, and axillary areas, along with hyperemia of the skin, punctate necrosis, and the presence of bullous lesions.

Due to the extent of the edema, the patient was referred to a vascular surgical clinic, where he was diagnosed with infectious shock and gas gangrene of the right hand. He was subsequently returned to the emergency department with recommendations for immediate admission and treatment. Within two hours of his return, the patient was assessed by an orthopedic surgeon (who suspected septic arthritis of the right shoulder joint), and an X-ray of the shoulder joint and clavicle was performed. Additionally, consultations were held with a general surgeon and a thoracic surgeon. The latter ruled out pneumothorax and referred the patient for urgent surgery.

Two hours after the patient presented to the emergency department, he was admitted to the hospital and ultimately found himself on the operating table, facing an extremely high risk, as indicated by the anesthesiologist. However, upon the first skin incision, the patient suffered complete asystole and subsequently died.

***Figs 1** and **2** provide images of the arm during the examination. **Fig. 3** depicts a native X-ray of the right arm. The Port-a-Cath is clearly visible, along with pronounced edema of the right upper limb and the subcutaneous region of the right thoracic side, without evidence of pneumothorax. The most important results available from different microbiological and other tests are shown in **Tables 1** and **2**."*

Discussion

Traumatic gas gangrene has become an uncommon condition in both civilian and military settings. However, there are several publications – some 40 patients[2] – for "spontaneous" or "atraumatic" gas gangrene, which refers to cases of gas gangrene that develop without external trauma. The primary cause of this form of disease is *Clostridium septicum*, which is strongly linked to underlying malignancies and states of immunosuppression.[16] The tissue defect may result from factors such as tumors, radiation therapy, chemotherapy, neutropenic enterocolitis, ischemia, pseudomembrane formation, bowel perforation, diverticulitis, gastrointestinal surgery, or medical procedures like colonoscopy or use of venous catheters.[17]

This clinical case starkly highlights the catastrophic potential of gas gangrene in the context of modern medical care, particularly in patients with totally implantable venous access devices. While this condition is rare, its rapid and often fatal progression underscores the critical importance of early recognition and prompt intervention, especially in immunocompromised individuals undergoing chemotherapy.

Figure 1. View of the right arm during the examination by a vascular surgeon – areas of bullae, edema, necrosis and fluctuation of the right shoulder joint and to the scapula.

Figure 2. View of the right arm at the time when first seen by a vascular surgeon – areas of bullae, edema, necrosis and fluctuation on the armpit and forearm.

Table 1. Results of the more important blood tests at admission

CRP	38 mg/L	Potassium	5.4 mmol/L
Glucose	2.3 mmol/L	Natrium	140 mmol/L
Urea	3.3 mmol/L	Thrombin time	22.8 sec
Creatinine	68 µmol/L	APTT	78.3 sec
Albumin	9 g/L	Total protein	14 g/L
Creatinine kinase	4215.0 U/L	CK-MB	93 U/L

The fatal course of this case underscores the indispensable role of early clinical recognition, which must begin with a comprehensive assessment by frontline healthcare providers, including emergency physicians and surgeons. The presence of key clinical signs—such as crepitus, bullous lesions, and rapidly spreading soft tissue infection—should immediately raise suspicion for gas gangrene, prompting urgent multidisciplinary evaluation. Time remains the single most crucial factor in mitigating the mortality associated with this devastating condition, as delays in diagnosis or intervention significantly reduce the likelihood of survival.

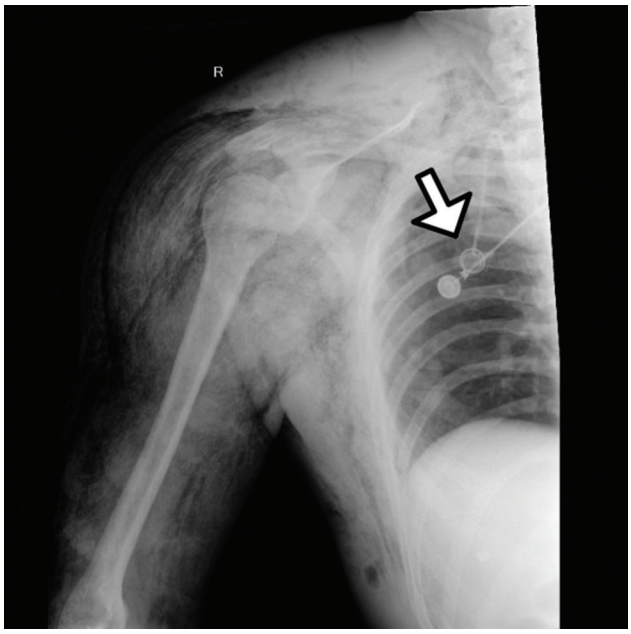

Figure 3. Overview X-ray of the right arm and right thoracic half. The swelling of the foreskin is clearly visible, an arrow shows the Port-a-Cath.

This report also highlights the broader implications for surgical practice. Surgeons, who often serve as the first point of definitive care for such infections, must maintain a high index of suspicion and act decisively when confronted with patients presenting with severe soft tissue infections. Rapid surgical debridement remains the cornerstone of management, emphasizing the importance of precise and timely diagnostic ability to identify candidates for life-saving interventions. In this context, the importance of structured training programs, continuing education, and awareness campaigns cannot be overstated, as they equip surgeons and other healthcare providers with the tools to detect and manage rare complications like gas gangrene effectively.

Table 2. Results of microbiological studies

In vivo punction	In mortem
Clostridium limosum	*Streptococcus parasanginis* from lien
	Bacillus cereus – other body
	Staphylococcus hominis – other body

Conclusion

The interplay of modern medical devices with opportunistic infections further raises questions about the balance between innovation and risk. As the use of totally implantable venous access devices continues to expand, it is essential for clinicians to remain alert to potential complications, however rare they may be. This case highlights the necessity of robust infection control protocols, regular monitoring of high-risk patients, and the establishment of guidelines for the early identification and management of such complications.

Ethiocal approval

Not applicable

Ethical statements

The authors declared that no clinical trials were used in the present study.

The authors declared that no experiments on humans or human tissues were performed for the present study.

The authors declared that no informed consent was obtained from the humans, donors or donors' representatives participating in the study.

The authors declared that no experiments on animals were performed for the present study.

The authors declared that no commercially available immortalized human and animal cell lines were used in the present study.

Conflict of interest

The authors have declared that no competing interests exist.

Funding

No funding was reported.

Use of AI

No use of AI was reported.

Data availability

All data used are referenced or included in the article.

Author contributions

All authors have contributed equally.

Acknowledgements

The authors have no support to report.

References

1. Present DA, Meislin R, Shaffer B. Gas gangrene. A review. Orthop Rev 1990; 19(4):333–41. PMID: 2185454.
2. Srivastava I, Aldape MJ, Bryant AE, et al. Spontaneous *C. septicum* gas gangrene: A literature review. Anaerobe 2017; 48:165–71.
3. Shindo Y, Dobashi Y, Sakai T, et al. Epidemiological and pathobiological profiles of *Clostridium perfringens* infections: review of consecutive series of 33 cases over a 13-year period. Int J Clin Exp Pathol 2015; 8(1):569–77. PMC 4348875.
4. Lehnhardt M, Homann HH, Daigeler A, et al. Major and lethal complications of liposuction: a review of 72 cases in Germany between 1998 and 2002. Plast Reconstr Surg 2008; 121(6):396e–403e. PubMed: 18520866.
5. Buboltz JB, Murphy-Lavoie HM. Gas Gangrene. [Updated 2023 Jan 30]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2025 Jan-. Available from: https://www.ncbi.nlm.nih.gov/books/NBK537030/.
6. Niederhuber JE, Ensminger W, Gyves JW, et al. Totally implanted venous and arterial access system to replace external catheters in cancer treatment. Surgery 1982; 92:706–12.
7. Biffi R, Toro A, Pozzi S, et al. Totally implantable vascular access devices 30 years after the first procedure. What has changed and what is still unsolved? Support Care Cancer 2014; 22:1705–14.
8. Silberzweig JE, Sacks D, Khorsandi AS, et al. Reporting standards for central venous access. Technology Assessment Committee. J Vasc Intervent Radiol 2000; 11:391–400.
9. Hsieh CC, Weng HH, Huang WS, et al. Analysis of risk factors for central venous port failure in cancer patients. World J Gastroenterol 2009; 15:4709–14.
10. Lebeaux D, Larroque B, Gellen-Dautremer J, et al. Clinical outcome after a totally implantable venous access port-related infection in cancer patients: a prospective study and review of the literature. Medicine (Baltimore) 2012; 91:309–18.
11. Pinelli F, Cecero E, Degl'Innocenti D, et al. Infection of totally implantable venous access devices: a review of the literature. J Vasc Access 2018; 19(3):230–42.
12. Cancer Facts and Figures 2016 American Cancer Society; 2016. Available at: http://cancer.org/research/cancerfactsstatistics/can cerfacts-figures2016/. Accessed May 18, 2016.
13. Di Carlo I, Pulvirenti E, Mannino M, et al. Increased use of percutaneous technique for totally implantable venous access devices. Is it real progress? A 27-year comprehensive review on early complications. Ann Surg Oncol 2010; 17(6):1649–56.
14. Tabatabaie O, Kasumova GG, Eskander MF, et al. Totally implantable venous access devices: a review of complications and management strategies. Am J Clin Oncol 2017; 40(1):94–105.
15. Miyamura Y, Shimazaki T, Okada K. Catheter-related gas-forming suppurative thrombophlebitis. Int J Emerg Med 2024; 17(1):33. doi: 10.1186/s12245-024-00602-8
16. Alpern RJ, Dowell VR. *Clostridium septicum* infections and malignancy. JAMA 1969; 209(3):385–8.
17. Gnerlich JL, Ritter JH, Kirby JP, et al. Simultaneous necrotizing soft tissue infection and colonic necrosis caused by C*lostridium septicum*. Surg Infect 2011; 12:501–6.