

Clostridium Perfringens Gas Gangrene Complicating an Open Fracture of the Forearms: A Case Report

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Abstract

Case Report

Introduction and importance: Gas gangrene is a rare and severe complication that can be life-critical for the patient or functional for the limb. We report a case of gas gangrene complicating an open fracture of both forearm bones treated traditionally. The aim of our case report is to highlight the bad prognosis of gas gangrene in the soft tissue of the limbs.

Case presentation: This was a 19-year-old patient with an open fracture of both forearm bones that occurred during a football match. The fracture had been treated traditionally with clay, and had progressed to gas gangrene with myonecrosis of the anterior and posterior compartment muscles. An X-ray of the left forearm showed a fracture of both bones of the left forearm, with gas bubbles trailing down the soft tissue of the forearm. The diagnosis of gas gangrene complicating an open fracture of both bones of the left forearm was confirmed. Emergency amputation was necessary to save the patient from severe sepsis. **Clinical Discussion:** open fractures of the limbs, which appear benign but can develop into a serious problem such as gas gangrene. Early diagnosis and appropriate surgical treatment will improve vital prognosis and reduce functional sequelae. Amputation may be a life-saving alternative in extreme cases where it is impossible to save the limb. **Conclusion:** gas gangrene is a rare injury, but a serious one because of the risk of mutilation it can cause. It is very tragic to see an open fracture of the forearm progress to amputation of the limb.

Keywords: Gas gangrene; clostridium; open fractures; amputation; case report.

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INTRODUCTION

Fractures of the two bones of the forearm account for 1 to 2% of all limb fractures. Open fractures of the forearm are injuries that may appear benign but must be treated in a healthcare center to avoid serious complications that could be life-threatening or affect the victim's functional prognosis [1–3].

Gas gangrene is a very serious and rapidly progressing infection. It is a relatively rare complication, and it is important to recognize its symptoms and warning signs [2,3]. It can compromise the prognosis due to septic shock. Only prompt diagnosis followed by extensive surgical debridement can improve the critical prognosis of this fatal disease [4,5].

We report the clinical case of a 26-year-old patient who presented with an open fracture of the

forearm bones complicated by gas gangrene with extensive necrosis of all muscle compartments.

The aim of this presentation is to highlight the critical prognosis of gas gangrene in the soft tissues of the limbs and the risks of traditional treatment for forearm fractures.

CASE PRESENTATION

A 26-year-old patient with no particular medical history, left-handed, who reported falling during a sports accident, leading to an open wound on his left forearm with severe pain and complete functional impairment of the limb, associated with a punctiform wound. He had not consulted any health center. Initial treatment was provided by traditional therapists using clay to cover completely the forearm.

On the third day of traditional treatment, the patient experienced intense, sharp pain that was resistant to analgesics, associated with pyrexia. This led to a consultation at a medical center. After removal of the traditional plaster cast, there was a smell of rotten fish, with significant oedema of the forearm and hand, areas of necrosis, and loss of sensation in the forearm and hand. An X-ray of the forearm revealed a complex fracture of the bones of the left forearm. In light of these findings, he was referred to us for further treatment.

The clinical examination upon arrival at the university hospital, seven days after the trauma, noted that the patient was conscious but in general bad condition. The physical examination noted significant oedema of the hand and forearm with a rounded appearance of the fingers, and the presence of multiple necrotic patches scattered across the anterior and posterior aspects of the forearm and hand. There was total anesthesia in the hand and forearm. A snowy crepitus spreading from the hand to the elbow (fig. 1).



Figure 1: clinical aspect on admission showing severe oedema of the forearm and hand, with patches of skin necrosis

An X-ray of the left forearm revealed a fracture of the bones of the left forearm with the presence of gas bubbles in the soft tissues of the forearm (fig. 2). The diagnosis of gas gangrene complicating an open fracture

of the bones of the left forearm was retained. An emergency fasciotomy and necrosectomy were recommended.



Figure 2: a and b. X-ray image, showing a fracture of the two bones of the forearm with gas bubbles trailing from the soft tissue

During surgery, extensive necrosis of the anterior and posterior compartment muscles was noted, with fetid fluid draining from the elbow compartments, extensive necrosis of the anterior and posterior compartment muscles of the forearm, and bleeding of the palmar and antebrachial skin. Economical excision of

necrotic tissue was performed, along with a wide fasciotomy starting at the elbow and extending to the wrist, and a fasciotomy of the palmar and dorsal faces of the hand (fig.3). A brachio-forearm-palmar brace was applied.



Figure 4: a and b: Clinical presentation of extensive myonecrosis of the anterior and posterior compartments with suppuration of the elbow

Several bacteriological samples were carried out. Bacteriological examination identified *Clostridium perfringens* as germs.

The evolution of the disease led to severe sepsis and, locally, persistent suppuration and muscle necrosis in all compartments with significant purulent drainage(fig.4). Amputation was recommended, and consent was obtained from the parents and the patient. A

consultation with a psychologist was scheduled before surgery. A transhumeral amputation was performed, combined with antibiotic therapy consisting of vancomycin and ceftriaxone. The patient's condition improved, with regression of the signs of sepsis and good healing of the skin wound on the arm(fig.5). The patient was discharged from the hospital on the 10th postoperative day.



At the 12-month follow-up, the arm stump had healed well, and the patient was happy and awaiting a prosthetic upper limb.

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DISCUSSION

Gas gangrene has long been considered a war infection. It was known in time of war, but is also seen in everyday practice. Debue-Barazer *et al.*, investigating this pathology at the start of the First World War, concluded that this complication was the most dreaded of all war wounds, with a mortality rate of over fifty per cent [3].

Gas gangrene is an acute infectious disease of the soft tissues of the skin, subcutaneous tissues and muscles, resulting from the proliferation of micro-organisms which produce gas and induce extensive tissue necrosis with the formation of oedema and emphysema, associated with secondary general toxic signs [7,8].

Two aetiologies predominate: post-traumatic gas gangrene and post-operative gas gangrene. Other aetiologies are rare, such as the insertion of an intravenous catheter, after an intramuscular or intra-articular injection and after burns [5,9,10].

Among post-traumatic gas gangrene, those arising in the lower limbs are the most common, following open or closed fractures or dislocations. Localisation in the upper limbs is rare, mainly following soft tissue trauma [7].

The causal pathogen is most often *Clostridium*, which is found in large amounts in the ground, in dust and in the digestive tubes of many animals and humans, where it is saprophytic. Other germs have been isolated, such as *Bacteroides* and *Coli*, which may also be responsible for the infection [8,11].

Gas gangrene is a form of humid gangrene resulting from a *Clostridium* infection, in particular *Clostridium perfringens*. Other *Clostridia* can lead to gas gangrene, often observed in the intestinal system, such as *Clostridium novyi* and *Clostridium septicum* [9,10].

Clostridia are anaerobic organisms that can only survive and proliferate in tissues with low oxygen levels. The usual site of infection is an infected wound that has been closed without adequate debridement in the operating room [12,13].

The occurrence of the fracture on a football pitch and the use of clay to traditionally treat the fracture may explain the colonisation by *clostridium* of the open forearm fracture site in our observation. The main risk factor in our case would be the skin opening with telluric contamination, and the use of clay as a means of fracture containment by planers may be at the origin of germ inoculation in the skin opening.

Open fractures of the limbs, which appear benign but can develop into a serious complication such as gas gangrene. If they are not treated optimally, they may develop into serious local complications, such as diffuse myonecrosis of the muscles, or general complications such as severe sepsis, which may be life-threatening in the short term. Early diagnosis and appropriate surgical treatment will improve vital prognosis and reduce functional sequelae [1,12].

The prognosis of gas gangrene depends on early diagnosis and treatment. Treatment includes extensive surgical debridement, discharge incisions and excision of devitalized tissue, as well as parenteral antibiotic therapy depending on the type of bacteria, such as the clostridium found in our case[12]. Amputation is still the exception, but may be necessary in cases of extensive myonecrosis associated with severe sepsis involving a short-term risk of death. Hyperbaric oxygen therapy has been shown to be effective in cases where management was carried out in the early stages[14].

CONCLUSION

Gas gangrene is an anaerobic bacterial infection characterized by gas infiltration of soft tissues with rapid and severe deterioration of the patient's general condition. The treatment of open limb fractures requires optimal care in a hospital setting in order to perform extensive debridement of the contaminated wound. Gas gangrene, although a rare complication, remains serious due to its local complications, which can lead to amputation, and general complications that are life-threatening to the patient.

Consent

Written informed consent was obtained from the patient for publication and any accompanying images.

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