

## Gas gangrene spreading to the bone marrow

### INTRODUCTION

Gas gangrene is a term reserved for fulminant soft tissue infections caused by *Clostridium* species. The post-traumatic form of gas gangrene is caused by *Clostridium perfringens*.<sup>1</sup> Nontraumatic, or spontaneous, gas gangrene is even more rare and is usually caused by *Clostridium septicum*; underlying malignancy is often present.<sup>1</sup> Gas gangrene progresses rapidly and is often lethal.

### CASE REPORT

A 76-year-old man was sent to our emergency department with loss of sensibility and paresis of his left arm, which started two hours before arrival. In the ambulance, ten minutes before arrival, small bullae appeared and his skin turned a coppery colour. Upon arrival in the emergency department, he had clinical signs of class III haemorrhage. On physical examination a pupillary asymmetry, decreased corneal reflex, and loss of sensibility and paresis of the left arm were found. Several haemorrhagic bullae and severe subcutaneous emphysema of the whole left arm and left chest wall were seen (figure 1). On conventional radiographs of the thorax and shoulder, massive subcutaneous emphysema was diagnosed. Laboratory studies revealed a raised white cell count ( $10.4 \times 10^9/l$ ) and C-reactive protein (180 mg/l), with a haemoglobin of 6.7 mmol/l and a creatine kinase of 11,500 U/l. Computed tomography scan revealed extensive myonecrosis and subcutaneous emphysema in the left chest wall, shoulder, and arm, as well as further gas embolisms, even in the bone marrow (figures 2 and 3).

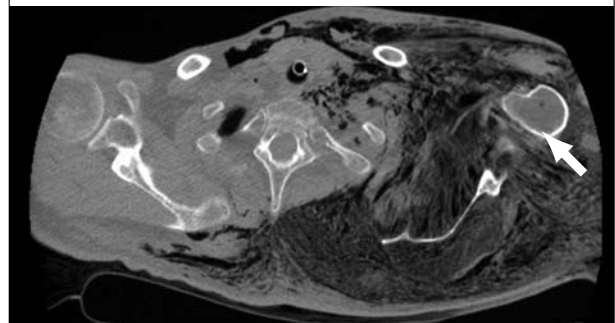
**Figure 1.** Diffuse swelling of the left upper arm, with a purplish skin and several haemorrhagic bullae



**Figure 2.** A computed tomography scan shows massive myonecrosis and subcutaneous emphysema of the left chest wall, with gas in the arcus aortae



**Figure 3.** A computed tomography scan shows gas diffusion into the bone marrow of the left humeral head



The patient became asystolic 45 minutes after arrival. During cardiopulmonary resuscitation skin changes and subcutaneous emphysema were rapidly progressive. The patient died 1.5 hours after presentation. On the post-mortem examination, a tumour of the caecum was found with covered perforation. Mediastinal emphysema, pneumatosis coli, and extensive gas embolisms were found in the systemic circulation and in multiple organs. The blood cultures later grew *C. septicum*.

## DISCUSSION

*Clostridia* are anaerobic, gram-positive, toxin- and spore-forming bacteria, normally found among gut flora and in the soil. The most common responsible pathogen for spontaneous gas gangrene is *C. septicum*, which is aerotolerant.<sup>1,2</sup>

Described predisposing factors for spontaneous gas gangrene are colon carcinoma, diverticulitis, and haematological diseases that cause immunosuppression.<sup>2-4</sup> The nontraumatic form of gangrene has three patterns of spread of spontaneous infection, from local visceral cellulitis to metastatic infection.<sup>5</sup> The last form, which affected this patient, is extremely rare and often fatal.<sup>6,7</sup>

The onset of nontraumatic gas gangrene is abrupt, with rapid progression. Excruciating pain is the most prominent first symptom.<sup>1,3</sup> The treatment requires prompt antibiotic therapy with penicillin and aminoglycoside or piperacillin-tazobactam, and radical surgical débridement.<sup>4,8</sup> The benefits of hyperbaric oxygen therapy remain unproven.<sup>2,4</sup> The mortality rate is about 70%.<sup>3</sup> To our knowledge, this is the first documented case of gas in the bone marrow.

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