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Clostridium Septicum Encephalitis: A Case Report

Bernadette Calabek, Georg Hinterholzer, Gabriele Neuwirth-Senautka, Harald Kirschner, Barbara Horvath-Mechtler and Wolfgang Grisold
Kaiser Franz Josef-Spital, SMZSüd, Department of Neurology, Ludwig Boltzmann-Institute of Neurooncology, Vienna Austria

1. Introduction

Clostridium septicum is one of the agents causing gas gangrene, and was notorious in injuries in battlefield. Infections of the CNS are very rare. Here, we present a 69year-old patient who died from a cerebral clostridium septicum infection.
Clostridium septicum is an anaerobic, spore-forming, gram-positive bacillus. Its virulence depends on toxin building. Spontaneous clostridium septicum infections are rare and are associated with a high mortality (Khan AA et al., 2006, Marangou et al., 1992). Associations with this bacterium and colorectal malignancies have been reported (Khan et al., 2006, Kolbeinsson et al., 1991, Mirza et al., 2009). C. septicum causes disease in mammals and birds, and it was recognized historically as one of the causes of gas gangrene arising from battlefield injuries (Smith, 1984). In the 1960s and 1970s, it became apparent that those patients with hematologic malignancies were susceptible for this kind of infection (Alexander et al., 2010). The number of cases attributable to other malignancies, particularly colonic neoplasms, has increased.

2. Case presentation

A 69-year-old man suffering from myelodysplastic syndrome developed chills, fever and altered state of consciousness within a few hours. The patient was admitted at the intensive care unit in a comatose state with hypotension and tachycardia, intubation was necessary. The neurological examination did not show focal signs. The patient´s past medical history revealed in addition to the myelodysplastic syndrome diabetes mellitus and chronic renal insufficiency. Laboratory data showed leukocytosis and high-elevated CRP. The CT-scan of the brain showed two atypical intracerebral hemorrhages located right parietally and left occipitally, and two gas-filled lesions right frontal and left occipital. There were no traumatic injuries or cranial fractures. The patient received antibiotic therapy with metronidazol, ceftriaxon, fosfomycin and ampicillin. A cerebral abscess or bleeding metastasis had been considered as differential diagnosis.
The next day the cranial MRI showed enormous gas-filled inclusions on both parietal sides, right frontal and of the periventricular white matter on each side. Both anterior horns of the lateral ventricles showed levels of a fluid gas border. Gas lesions were also found in the

venous sinus. The size of all lesions showed progression compared to the previous scan. Twelve hours after admission the blood culture revealed clostridium septicum. The echocardiography was normal. Ultrasound of the upper abdomen revealed a cholecystolithiasis and the kidneys were unremarkable.

Developing a septic shock the patient died of multiple organ failure three days after admission.

The autopsy showed a hyperemic brain. The brainstem and cerebellum were unremarkable. In the frontal sections there was a diffluent area near the left central sulcus, the anterior horns of the lateral ventricles were filled with blood. There was a remarkable crepitation by palpation of the unfixed brain tissue, particularly in the left parietal and occipital region. We

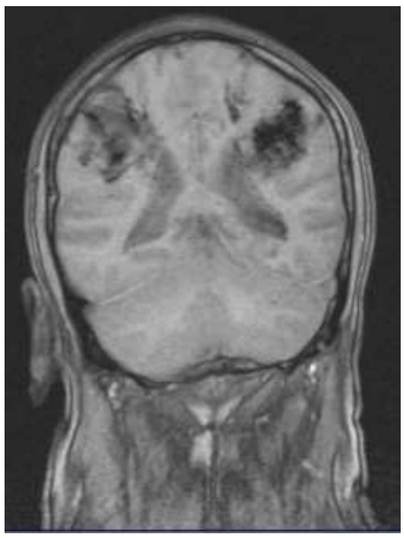


Fig. 1. Levels of fluid-gas in both anterior horns of the lateral ventricles.

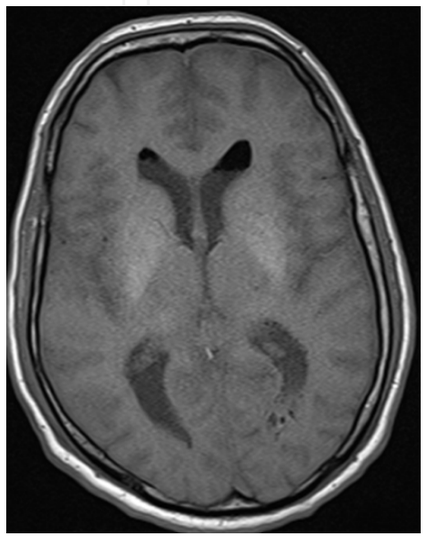
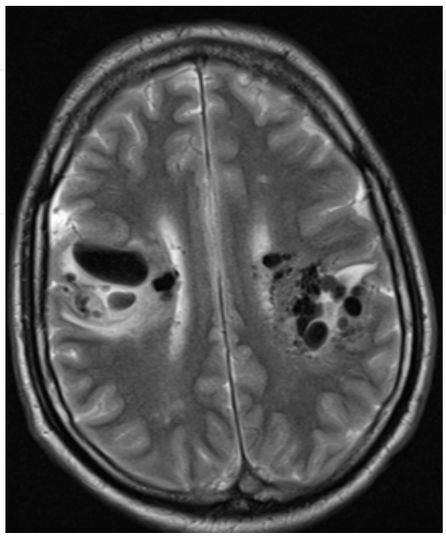


Fig. 2. Gas-filled lesions on both parietal sides.



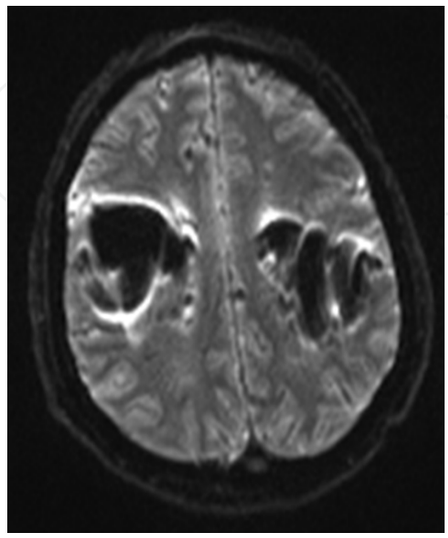


Fig. 3 and 4. Gas-filled lesions in the periventricular white matter and on both parietal sides

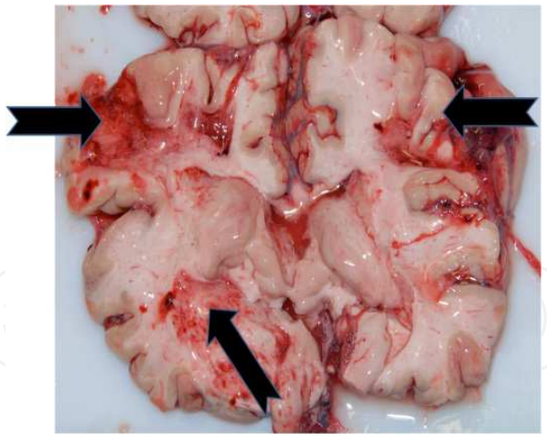


Fig. 5. Hemorrhagic areas on both parietal sides and left temporal

assume this crepitation was caused by escaping of gas bubbles due to the infection. The dissection of the brain revealed hemorrhagic lesions on both parietal sides, left temporal and left occipital. The left parietal lesions also showed suppurative components. These lesions corresponded with the lesions described in the cranial MRI. The swabs we obtained from the parietal lesions verified a clostridium septicum infection. Considering the clinical course and results of the MRI multiple cerebral abscesses must have been assumed.
The autopsy of the body revealed a rectal ulcerated adenoma with low-grade dysplasia associated with an extensive colitis. This colitis is considered a possible source of infection. Interestingly, no further organs had been affected by clostridium septicum.

3. Conclusion

Due to these atypical gas lesions we primarily assumed a traumatic event, which could not be verified. The intracerebral hemorrhages and gas lesions increased within 2 days, an infection with a gas-forming organism was likely. The results of the swabs and blood cultures confirmed the suspicion and revealed clostridium septicum.
Pneumocephalus is commonly seen after head and facial trauma, tumors of the skull base, after neurosurgery or otorhinolaryngology, and rarely spontaneously.
Clostridium septicum is an anaerobic, gas-forming, gram-positive organism, which is found ubiquitous in the soil but is usually not present in the human intestinal flora (Moore et al., 1974). Its virulence is based on protein toxicity. Clostridium septicum is forming alpha-toxin, a lethal and necrotizing pore-forming cytolysin (Kennedy et al., 2005).
Clostridium septicum is a highly virulent but poorly characterized pathogen that is being increasingly recognized as a major contributor to serious clostridial infections. It is the primary aetiological agent of spontaneous gas gangrene or atraumatic myonecrosis. Often malignancy is identified as a result of an investigation following the diagnosis of a clostridium septicum. It is suggested that under such conditions the bacterium is allowed to entry the bloodstream and to establish an infection at a distant site in the body (Kennedy et al., 2005). The condition is rapidly fulminating and often fatal, with reported mortality rates of approximately 60%. A possible explanation for this association is that the anaerobic glycolysis of the tumor may provide a hypoxic and acidic environment that favors proliferation of clostridium septicum (Alpern and Dowell, 1969).
A review of clostridial bacteremia examined blood cultures of 24 hospitalized patients. The review demonstrated that the source of clostridium species was a gastrointestinal site in 24

patients (52.2%). The most frequently identified clostridium species was Clostridium perfringens (in 10 [21.7%] of patients), followed by Clostridium septicum (in 9 [19.6%]). Thirty-one patients (67.4%) were aged > 65 years, 13 patients (28.3%) had diabetes mellitus, and underlying malignancy was present in 22 patients (47.8%) (Rechner et al., 2001).
Although nontraumatic infections in normal hosts do occur, they would appear to be quite rare, based upon our review of the available literature.
In this case the rectal ulcerated adenoma and extensive abscesses of the rectal wall are considered being the source of infection. It would appear likely that our patient's infection arose from his compromised gastrointestinal tract. The rapid progression of disease associated with these atypical gas lesions possibly depends on the immunosuppression by the myelodysplastic syndrome.
In summary, the coincidence of the immunosuppressed situation and the rectal ulcerated adenoma as source of infection just can be suspected. In the long run we do not know the exact coherences between the infection and its real cause in this case.

Key points:
- Clostridium septicum is a gram-positive, spore-forming organism, which is not usually present in the normal intestinal flora of humans. Infection with this organism is most commonly associated with spontaneous gas gangrene.
- Clostridium septicum infections are often associated with a colorectal malignancy or hematologic disease.
- Clinicians should search for an underlying colonic cancer in cases of clostridium septicum infection.

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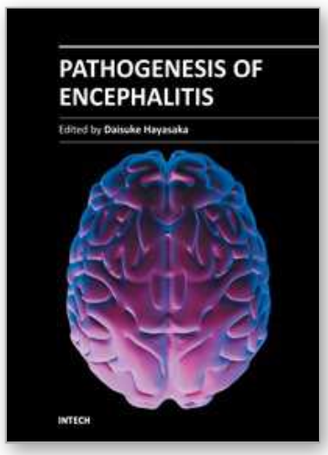
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Pathogenesis of Encephalitis
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Many infectious agents, such as viruses, bacteria, and parasites, can cause inflammation of the central nervous system (CNS). Encephalitis is an inflammation of the brain parenchyma, which may result in a more advanced and serious disease meningoencephalitis. To establish accurate diagnosis and develop effective vaccines and drugs to overcome this disease, it is important to understand and elucidate the mechanism of its pathogenesis. This book, which is divided into four sections, provides comprehensive commentaries on encephalitis. The first section (6 chapters) covers diagnosis and clinical symptoms of encephalitis with some neurological disorders. The second section (5 chapters) reviews some virus infections with the outlines of inflammatory and chemokine responses. The third section (7 chapters) deals with the non-viral causative agents of encephalitis. The last section (4 chapters) discusses the experimental model of encephalitis. The different chapters of this book provide valuable and important information not only to the researchers, but also to the physician and health care workers.

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