Pervasive Pneumatosis in a Patient on Immunosuppressive Agents

(See page 696 for the Photo Quiz.)

Diagnosis: *Clostridium perfringens* Bacteremia

Culture of the serosanguinous fluid sampled from a bulla revealed *C. perfringens*, and blood culture subsequently grew *C. perfringens* and *Klebsiella pneumoniae*. Hemolysis was not confirmed by peripheral blood smear in this case. The patient died within 60 minutes after the initial presentation. Post-mortem computed tomography (CT) revealed air throughout the entire body, including the cranium, chest, abdomen, and subcutaneous tissues (Figures 1 and 2).

*Clostridium perfringens* is an anaerobic, Gram-positive, spore-forming bacillus, and bacteremia due to this organism has re-emerged as an important clinical infection. *C. perfringens* is the most commonly identified among *Clostridium* species involved in bloodstream infections, and although rare, the diagnosis is increasing [1, 2]. This is presumably due to factors including advances in anaerobic blood culture techniques and a growing population of elderly patients and complicated patients with comorbid illness [1, 3].

*Clostridium* bacteremia may develop in immunocompetent hosts after trauma or surgery, but more commonly it occurs in immunocompromised hosts, including those with old age (≥65 years), malignancy, requirement of hemodialysis, Crohn’s disease, cirrhosis, or diabetes mellitus [1, 2, 4, 5]. Another predisposing factor is the use of chemotherapeutic agents, given the damage that they inflict on mucosal barriers [3]. Regarding the portal of *C. perfringens* entry into the bloodstream, preexisting soft-tissue infection and myonecrosis are well-known sites, but multiple portals have been identified, including the lungs and the hepatobiliary, gastrointestinal, genitourinary, and reproductive tracts [1, 5–9]. Concurrent polymicrobial bacteremia, especially with *Enterobacteriaceae*, may be observed, depending on the portal of entry [5, 8, 10].

The mortality rate associated with *C. perfringens* bacteremia is substantial. Overall mortality is approximately 30%–50% on the basis of data from case series of various *Clostridium* bacteremia [1, 2, 4], and rapid deterioration (ie, patients dying within hours after presentation) may occur [7, 11, 12]. Although the molecular basis underlying the fulminant presentation of *C. perfringens* bacteremia remains unclear, it is likely influenced by the severity of illness at the time of presentation (ie, shock), the presence of an underlying illness, and the failure to initiate immediate antimicrobial therapy active against *C. perfringens* [1, 4, 5, 12]. Another notable clinical manifestation associated with *C. perfringens* bacteremia is massive hemolysis [7, 13]. This is likely due to the extracellular toxin, phospholipase C, which damages red blood cell membranes by hydrolyzing sphingomyelin and lecithin [1, 14].

In the case of our patient, traditional autopsy was declined by the patient’s family, but with their permission, a postmortem CT scan was performed within 30 minutes of the patient’s expiration. Although the extreme and pervasive pneumatosis observed on the CT scan likely developed by the time of initial presentation, as suggested by the diffuse swelling observed on physical examination, postmortem bacterial multiplication might have contributed, because the doubling time of *C. perfringens* is approximately 7 minutes [15]. Postmortem CT could not identify the portal of entry for *C. perfringens* in this case, and, as mentioned above, a traditional autopsy could not be obtained to assist with this investigation. The practice of a “virtual autopsy” using radiographic imaging as a surrogate for traditional autopsy is common in Japan, because it is more culturally accepted. In light of this limitation, the portal of bacterial entry in this case remains unclear.

Figure 1. Axial cut of brain computed tomographic (CT) scan. Postmortem CT scan of the brain revealing disseminated air.
Notes

Potential conflicts of interest. All authors: No reported conflicts. All authors have submitted the ICMJE Form for Disclosure of Potential Conflicts of Interest. Conflicts that the editors consider relevant to the content of the manuscript have been disclosed.

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