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Case report

Fusobacterium necrophorum pelvic peritonitis and bacteremia mimicking intestinal necrosis

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ABSTRACT

Fusobacterium necrophorum infection is known to cause Lemierre's syndrome, not pelvic peritonitis. Herein, we report a case of *Fusobacterium necrophorum* pelvic peritonitis and bacteremia, without Lemierre's syndrome, mimicking intestinal necrosis. A 28-year-old woman with peritoneal irritation and shock was suspected of having intestinal necrosis due to the presence of hepatoportal venous gas and pneumatosis intestinalis. Intestinal necrosis was ruled out by emergency laparotomy. However, massive opaque ascites and inflammatory changes in the uterus and fallopian tubes were observed. *Fusobacterium necrophorum* and *Gardnerella vaginalis* were found in ascetic fluid cultures. Moreover, *Fusobacterium necrophorum* was also found in blood culture. Systemic management of septic shock and antibiotic treatment improved the patient's general condition and abnormal gas on imaging. The patient had untreated bacterial vaginosis prior to admission. Pelvic peritonitis caused by *Fusobacterium necrophorum* is extremely rare. However, it must be recognized to avoid its rapid development into severe onset mimicking intestinal necrosis.

Introduction

Fusobacterium necrophorum (*F. necrophorum*) infection is a commonly known cause of head and neck infections, including Lemierre's syndrome [1,2]. On the other hand, severe abdominal pain with hepatoportal venous gas (HPVG) and pneumatosis intestinalis (PI) is mostly associated with fatal intestinal necrosis [3]. Herein, we describe a rare case of *F. necrophorum* infection without Lemierre's syndrome. In this case, *F. necrophorum* pelvic peritonitis and bacteremia were accompanied by HPVG and PI mimicking fatal intestinal necrosis.

Case

A 28-year-old Japanese woman was transported emergently to our hospital with fever and abdominal pain. Physical examination findings at the time of emergency transportation included the following: confusion; blood pressure of 80/50 mm Hg; heart rate of 120 beats/min; respiratory rate of 32 breaths/min; and body temperature of 38.3 °C. Abdominal examination showed abdominal tenderness, rebound tenderness, and abdominal rigidity. On gynecological examination, cervical motion tenderness was vague due to the patient's confusion. However, small amounts of cervical bleeding, as well as grayish-white and foul-smelling cervical fluids were revealed. Laboratory test results indicated an arterial blood gas pH of 7.35, HCO_3 level of 15.5 mmol/L, lactate level of 6.9 mmol/L, white blood cell count of 0.9×10^9/L, and C-reactive protein level of 33.98 mg/dL. Contrast-enhanced computed tomography (CT) revealed HPVG, PI, mesenteric emphysema, free air, ascites, and small intestinal wall thickening (Fig. 1A, B). Emergency laparotomy was performed for concerns of intestinal ischemia and gastrointestinal perforation. Although opaque ascites was found, there was no perforation or necrosis of the gastrointestinal tract (Fig. 1C). The uterus and fallopian tubes had inflammatory redness and edema, and the right fallopian tube was found to be adhered. The abdominal cavity was washed with physiological saline and the abdomen was closed. Gram staining of the opaque ascites showed a large number of neutrophils, gram-negative cocci, and short rods (Fig. 1D). The patient was diagnosed with septic shock due to pelvic peritonitis, and was treated in the intensive care unit (ICU). He was administered initial antibiotics therapy: minocycline at a dose of 200 mg per day, ceftriaxone at a dose of 2 g per day, and metronidazole at a dose of 1500 mg per day. Nucleic acid amplification test results for *Neisseria gonorrhoeae* and *Chlamydia trachomatis* in ascites, vaginal fluid, urine, and the pharynx were negative. Nucleic acid amplification test result for HIV was negative (HIV-RNA PCR). Culture tests detected *F. necrophorum* in the blood and ascites, *Gardnerella vaginalis* in the ascites and

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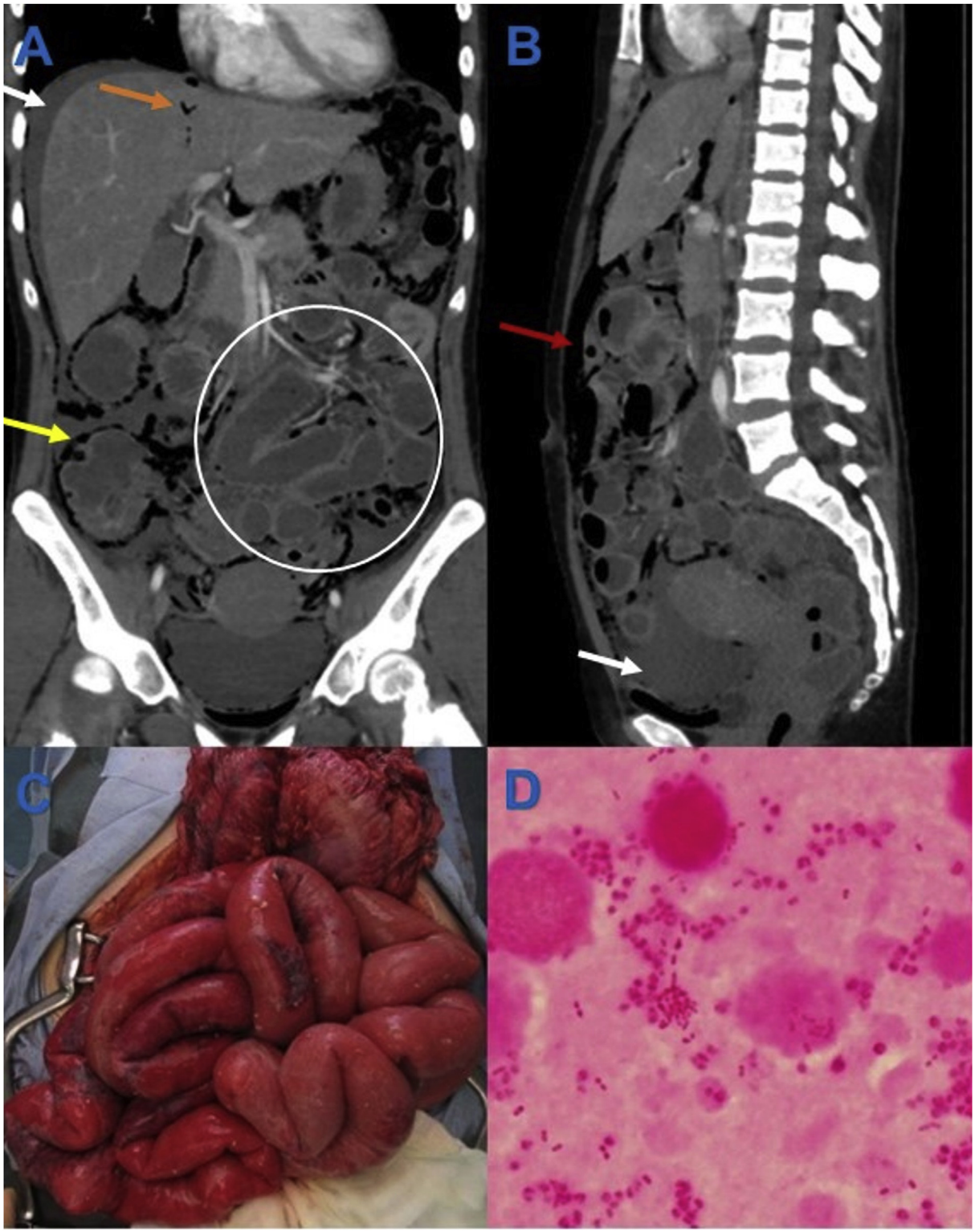

Fig. 1. *Fusobacterium necrophorum* peritonitis and bacteremia mimicking intestinal necrosis, with hepatoportal venous gas and pneumatosis intestinalis.
A: Contrast-enhanced computed tomography images in the coronal plane revealing small intestinal wall thickening (circle), hepatoportal venous gas (orange arrow), pneumatosis intestinalis (yellow arrow), and ascites (white arrow).
B: Contrast-enhanced computed tomography images in the sagittal plane revealing free air (red arrow) and ascites (white arrow).
C: Laparotomy revealing no necrosis or perforation in the entire colon, small intestine, and gastroduodenum. A blood clot easily peeling off the intestinal wall was observed.
D: Gram staining of the opaque ascites showing a large number of neutrophils, gram-negative cocci, and short rods.

vaginal fluid, and *Mobiluncus species* in the vaginal fluid on day 7. No bacteria were detected in the urine, pharynx, and stool culture tests. CT revealed resolution of the HPVG and PI on day 8. The patient gradually improved and left the ICU on day 12.

Thereafter, we confirmed the patient's detailed sexual history and the patient was suspected of having untreated bacterial vaginosis (BV) prior to admission. Three weeks prior to admission, the patient experienced postcoital bleeding and dyspareunia, and

noted cloudy and odorous vaginal fluid. The patient had multiple sexual partners and had receptive oral sex. No intrauterine device or condom was used.

In addition, the patient had no upper respiratory symptoms suggestive of Lemierre's syndrome prior to admission, and no antibiotics were used.

Discussion and conclusions

The findings of this present case have important clinical implications, suggesting that *F. necrophorum* pelvic peritonitis and bacteremia without Lemierre's syndrome mimicked intestinal necrosis.

Among *Fusobacterium species*, the main causative bacteria of invasive human infections are *F. necrophorum* and *F. nucleatum* [2]. *F. necrophorum* infection is associated with head and neck infections including Lemierre's syndrome. Moreover *F. nucleatum* infection is associated with oral infections such as periodontal disease and obstetric infections that are harmful to pregnancy [2,4].

Since there were no signs of pharyngeal tonsillitis, the pharyngeal swab culture test was negative, and there was no thrombophlebitis or pulmonary nodules in this patient, Lemierre's syndrome was ruled out. Furthermore, there were no abnormalities in the gingiva or urinary tract. This patient was a serious case with circulatory failure and was suspected of having fatal intestinal necrosis due to coexistence of HPVG and PI on imaging. This coexistence of HPVG and PI is most concerning for intestinal necrosis due to ischemia, and emergency laparotomy should be performed in severe cases [3]. In our case, although emergency laparotomy was performed, intestinal necrosis and perforation were not found. Inflammation of the uterus and fallopian tubes, adhesion of the fallopian tubes, and opaque ascites were observed. Therefore, this patient was diagnosed with pelvic peritonitis. The gas-producing bacterium, *F. necrophorum*, was detected in both ascites and blood cultures and was the causative agent of that ominous gas image. HPVG and PI then disappeared promptly on treatment with antibiotics that had coverage for anaerobic bacteria, and peritoneal lavage drainage.

F. necrophorum pelvic peritonitis is extremely rare and seen only in patients with intrauterine devices [5]. However, this patient had never used intrauterine devices. The method of transfer of *F. necrophorum* may have been from a partner's oral cavity to the patient's vagina through receptive oral sex [6]. Consequently, these vaginal bacteria may have possibly migrated from the lower to the upper genital organs. There was insufficient evidence that *F. necrophorum* did not grow in culture of vaginal fluids. However, *F. necrophorum* was difficult to culture. Therefore, this result may have been a false negative. The growth of *Gardnerella vaginalis* in cultures of both vaginal and ascites fluids justifies this limitation. Further case accumulation is needed to confirm this hypothesis. Furthermore, this patient had signs of BV 3 weeks prior to peritonitis. BV is common in patients with pelvic inflammation disease (PID), and both diseases are interrelated. However, whether BV is a causative agent or an independent risk factor for PID is unclear and controversial [7,8].

Gram-staining findings of *F. necrophorum* show that it is polymorphic, including gram-negative cocci and short rods. This is different from the characteristics of other *Fusobacterium species* such as *F. nucleatum* [9]. Recognizing distinctive Gram stain findings can be a diagnostic clue and aid in antibiotic selection, as it is classical but practical in all medical institutions.

In recent years, there have been many reports of Lemierre's syndrome due to *F. necrophorum*, and it is changing from a "forgotten disease" to a "well-known disease". This case presents what should be considered for managing pelvic peritonitis in young women as a "rare and alarming disease" of *F. necrophorum* infection.

Authorship contributions

Category 1

Conception and design of study: Toru Ishihara, Hidetaka Yanagi, Masayuki Oki, Hideki Ozawa.

Acquisition of data: Toru Ishihara.

Analysis and/or interpretation of data: Toru Ishihara.

Category 2

Drafting the manuscript: Toru Ishihara.

Revising the manuscript critically for important intellectual content: Hidetaka Yanagi, Masayuki Oki, Hideki Ozawa.

Category 3

Approval of the version of the manuscript to be published: Toru Ishihara, Hidetaka Yanagi, Masayuki Oki, Hideki Ozawa.

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Ethical approval

This case report complies with ethical standards.

Consent

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

Declaration of Competing Interest

The authors report no declarations of interest.

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