

## A Successfully Treated Case of Severe Necrotizing Fasciitis Caused by Acute Appendicitis : A Case Report

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We successfully saved a patient with appendicitis followed by necrotizing fasciitis. A 77-year-old man with a history of ambulatory treatment for depression underwent an emergency operation because of severe abdominal pain. Laparotomy demonstrated that necrotizing appendicitis was massively extending over the abdominal cavity, involving the right paracolic sulcus and Douglas pouch and posterior surface of the right kidney. Irrespective of the emergency surgery, redness and swelling in the right chest and abdomen, which was noted at the time of admission, was not decreased. Successively, a retension incision was performed under the diagnosis of necrotizing fasciitis. Necrotizing fasciitis is an extremely rare complication of appendicitis, and there were only 10 cases documented. Once necrotizing fasciitis occurs, the mortality rate is high, so that correct diagnosis and prompt debridement are mandatory. Particularly for elderly patients with appendicitis, rapid and accurate diagnosis and treatment are required.

**Key words :** necrotizing fasciitis, appendicitis, septic shock, severe bacterial infection

### INTRODUCTION

Appendicitis is a routinely encountered entity in the field of clinical surgery, and complications such as perforation, abscess formation, and pan-peritonitis are not rare. However, necrotizing fasciitis developing as a fatal complication of acute appendicitis is extremely rare. Necrotizing fasciitis is characterized by a necrotic infection that rapidly spreads along the fascia and progresses to systemic sepsis. The disease is most commonly induced by injury, with the mortality rate of 13.6 % [1]. Since delay in diagnosis or treatment may result in a fatal outcome, surgical debridement with an extensive retension incision, combined with chemotherapy, should be performed immediately after the accurate diagnosis. Recently, we encountered

a rare case of severe necrotizing fasciitis which was preceded by appendicitis. The patient recovered from the serious condition by intensive careful management and prompt surgical treatment, including an extensive retention incision of the thoraco-abdominal region.

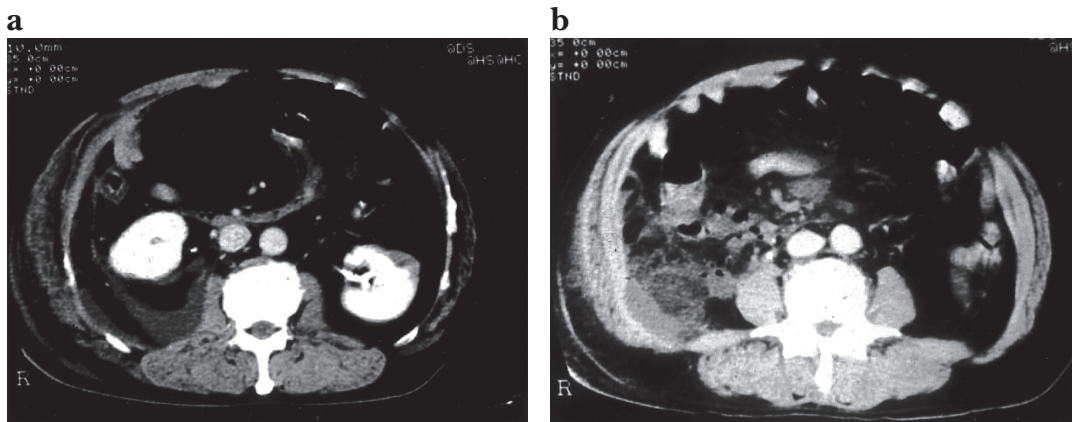
### CASE REPORT

#### History:

The patient was a 77-year-old man. He has been treated with medication consisting of benzodiazepines and antiparkinsonian drugs for depression since 1995. His family history was unremarkable. On March 5 2000, the patient presented with anorexia and suddenly developed right lower abdominal pain. Two days later, he was admitted to the psychiatric hospital that he had been



**Fig. 1** Abdominal and body surface findings. Marked distension of the abdomen accompanied by redness and swelling with an ill-defined border extending from the right lateral thorax to the lateral aspect of the right ilium.



**Fig. 2a, b** Abdominal CT findings. Evidence of marked inflammation and fluid accumulation was observed around the ileocecal area. The inflammatory change extended to the peritoneum and the muscular tunica.

visiting regularly, where he had received conservative treatment. However, there was no improvement in his condition. On the contrary, the abdominal pain considerably became worse, accompanied by high fever. On March 8 2000, he was transported to emergency department of our hospital.

**Physical and laboratory findings on admission:**

The patient was 158 cm tall and weighed 63 kg. His body temperature was 38.0°C, blood pressure 121/96 mmHg, and pulse rate regular

at 113 beats/min. No signs of anemia or jaundice were noted. Abdominal examination revealed distension and board-like rigidity with rebound tenderness especially marked around the umbilicus. Redness associated with tenderness and mild swelling were noted over an area extending from the right thorax to the right lower abdomen and lateral aspect of the right ilium (Fig. 1). Signs of severe inflammation were observed, with a white blood cell count of 18,100/ $\mu$ l and serum CRP level of 5.6  $\mu$ g/dl. The serum levels of CPK (639 IU/dl), GOT (73 IU/dl)

and GPT (53 IU/dl) were all high, but arterial blood gas analysis did not show low PaO<sub>2</sub> or acidosis.

#### Abdominal CT findings:

Irregular thickening fat tissue and accumulation of fluid were noted around the ileocecal area, with the fluid accumulation extending to the postrenal area. The density of the peritoneum and the posterior sheath of the rectus abdominis was not uniform, suggesting that these areas were also probably affected by severe inflammation. However, no free air was observed under the diaphragm (Fig. 2a, b). Based on these findings, we suspected severe appendicitis or large intestinal diverticulitis associated with abscess formation, or pan-peritonitis resulting from perforation of colon cancer.

#### Surgical findings:

On the hospitalization day (after 3 days from an initial symptom) emergency surgery was performed under general anesthesia. Laparotomy by means of a lower abdominal median incision showed the suppurative appendicitis complicated with perforation at the lower edge of the right iliac fossa behind the ileocecal area. Abscess was observed to be extending from the right paracolic gutter to the pouch of Douglas and the posterior renal area. Appendectomy, abdominal irrigation and drainage were performed. The drainage tube were placed right and left sub-phrenic space, Douglas space, right para-colic gutter. We did not make a retention incision because we did not keep mind the possibility of necrotizing fasciitis from appendicitis. On the 3<sup>rd</sup> postoperative day, the bacterial culture of the abscess fluid obtained during surgery revealed the growth of *E. coli*.

#### Pathological findings:

The appendix was found to be atrophied (3.0 × 0.8 cm) and was severely infiltrated by neutrophils, resulting in extensive necrosis across all the layers. There was no evidence of malignancy.

#### Postoperative course:

The patient had high fever (38°C) and suffered respiratory failure at the time of surgery, and the patient required mechanical ventilatory support. The discharge from the drain inserted during the operation was serous. The area of



**Fig. 3** Body surface findings at discharge: The retention incision wound had cicatrized and healed well within about 80 days after the operation.

redness with edema and swelling, which was found to be extending from the right chest to the lateral aspect of the right ilium on admission, grew bigger. On the basis of necrotizing fasciitis, a retention incision and Debridement were performed on the 5th post-operative day. The incision, about 40 cm long, extended from the right lateral thorax to the right iliac crest to a depth just above the muscle. Bacterial culture of the material obtained from the incision site revealed growth of *E. coli* and *Streptococcus acidominimus*, while the blood culture was negative. The incision wound was treated with open gauge drainage and flomoxef sodium and clindamycin were administered systemically. On the 25th postoperative day, the patient could be disconnected from the ventilator. The signs of inflammation diminished. The infected wounds in the right lateral thorax and right abdomen became cicatrized and healed well. On the 79th postoperative day, the patient was discharged in good general condition (Fig. 3).

## DISCUSSION

Acute appendicitis is a disease that is relatively commonly encountered in the field of surgery. In some cases, however, where the typical symptoms, such as right lower abdominal pain, high fever, and increased white blood cell count are absent, diagnosis and treatment may be delayed. As a result, the incidences of various complications, such as perforation, appendicular abscess, intrapelvic abscess, peritonitis, and wound infection increase. This situation is encountered more frequently in elderly people. The percentage of patients developing perforation has been reported to be 6 % among patients younger than 60 years old, and 32 % among those aged 60 years or older [2]. Moreover, while the mortality rate associated with acute appendicitis only is 0 to 1.3 %, the rate increases by six times when perforation develops as a complication [3]. In our case, it took long for the symptoms to appear, perhaps because the patient was old.

Necrotizing fasciitis refers to infection of the soft tissues that follows an acute course. The fascia consists of two parts: the deep fascia which covers muscles, and the superficial fascia which is located between the subcutaneous fat tissue and the deep fascia. Inflammation occurs mainly in the latter, i.e., the superficial fascia, since the superficial fascia consists of extremely

sparse fibrous tissue, it is more susceptible to inflammation and necrosis. The necrosis then leads to thrombosis and obstruction of microvessels, which, in turn, induces further necrosis [4, 5]. As to the causative bacteria, it has been suggested that mixed infection with aerobic and anaerobic bacteria accounts for 68 % of the cases, single infection with anaerobic bacteria for 22 %, and single infection with aerobic bacteria for 10 %. Among aerobic bacteria, *Staphylococcus aureus* has been reported to be the most common causative organism, followed by *E. Coli* and *Alpha-hemolytic Streptococci*. Among anaerobic bacteria, *Peptostreptococcus* is the most common, although *Bacteroides fragilis* and *Clostridium* are also frequently encountered [6]. Since *E. coli* was detected in the fluid from both the intraperitoneal space and the infected subcutaneous tissues of our patient, it was assumed to be the causative bacterium. Necrotizing fasciitis often occurs in the presence of underlying diseases, such as diabetes mellitus, liver cirrhosis, chronic renal failure, leukemia or AIDS. Conditions that depress the immune defense mechanisms against infection; steroid treatment, chemotherapy, radiation, alcoholism, advanced age and peripheral vascular disease, as well as diseases that compromise the blood supply, are quite frequently associated with this complication [7]. Since the inflammation involves mainly the fascia, the redness characteristi-

**Table 1** Summary of the previous reports on necrotizing fasciitis caused by appendicitis

Case No	Year	Author	Age	Sex	Concomitant Disease	Location	Death or Alive
1	1926	Brewer G.M	32	M	-	appendectomy wound	Alive
2	1926	Brewer G.M	64	M	-	appendectomy wound	Alive
3	1987	Mazza J.F	59	F	-	abdominal wall	Death
4	1989	Guirguis E.M	80	F	DM	thigh	Alive
5	1989	Intragumtornchai T	19	M	Acute nonlymphocytic leukemia	appendectomy wound	Alive
6	1993	Jacobs P.P.M	44	F	-	right upper leg, thigh, hip	Alive
7	1994	Gerber G.S	85	M	Alzheimer's Dementia	scrotum (Fournier's Gangrene)	Alive
8	1996	Bobrow B.J	63	M	Hypertension, Depression DM, Congestive heart failure	right flank	Death
9	1999	Fujiwara H	98	F	Hypertension, Arrhythmia	right abdominal wall	Alive
10	1999	Groth D	49	F	Hypertension	abdomen, right flank, right chest	Alive

cally spreads over an extensive area and the border is ill defined. In the advanced stage, symptoms such as high fever, lowered blood pressure and consciousness disturbance occur. In addition, sepsis, shock and multiple organ failure often develop rapidly. The common causative factors for this complication are believed to be injury, surgical wounds or skin infection, peri-anal abscess, intravenous drug abuse, tooth extraction and insect bites [8].

On the other hand, necrotizing fasciitis as a complication of appendical perforation and abscess, like that seen in our patient, is extremely rare. In our search of the literature, we found reports of only 11 cases including our own (Table 1) [8-16] in the treatment of necrotizing fasciitis, administration of antibiotics and surgical debridement are of the utmost importance. Since antibiotics often fail to enter the sites of inflammation because of local necrosis and vascular obstruction, extensive skin incision and debridement must be performed as soon as the condition is suspected. Early surgical treatment is considered to have a beneficial influence on the prognosis of this condition. In fact, the mortality rate is reportedly 12.5 % when surgery is conducted within 24 hours of the diagnosis, and 72.7 % if six days or more elapse before surgery [17]. In our patient, a retention incision was not performed until 5 days after the redness was first detected, resulting in persistent postoperative sepsis and intractable respiratory failure. It is considered that debridement should have been performed more aggressively at an earlier stage. When acute appendicitis becomes severe and complications develop, it is therefore important to keep in mind the possibility of necrotizing fasciitis developing as a serious complication.

In summary, we experienced a successful treatment of a case with severe necrotizing fasciitis as a complication of acute appendicitis by instituting appropriate surgical procedure and systemic control.

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