

# Early diagnosis and Antibiotic Treatment for Fulminant Clostridium difficile Infection

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## Abstract

The guidelines recommend surgical treatment for fulminant Clostridium difficile infection (CDI). However, mortality remains high, and patients with severe condition are not considered for surgical treatment because of poor post-surgical outcomes. Moreover, delayed diagnosis of fulminant CDI may induce intestinal necrosis. Thus, early diagnosis is crucial.

## INTRODUCTION

Fulminant CDI has a low incidence rate of about 3% of the total CDI cases. [1] However, fulminant CDI is associated with high morbidity and mortality. The optimal time for surgery is within 48 h after initiating conservative treatment without seeing a response and developing multiple organ failure or bowel perforation. [2] When toxic megacolon, or perforation is present, subtotal colectomy with ileostomy remains the standard of care.

However, this treatment can lead to mortality rates approaching ~50%. [3] Furthermore, patients with acute respiratory failure with intubation, shock requiring vasopressors, age greater than 80 years, and dialysis-dependent renal failure are not considered surgical candidates as they have conditions that predict poor post-surgical outcomes. [4] In this manuscript, we described that early diagnosis and conservative antibiotic treatment saved a dialysis-dependent patient with fulminant CDI, intubation, and septic shock.

## CASE REPORT

A 74-year-old Japanese man with type 2 diabetes mellitus was transferred to our hospital from another hospital because of persistent watery diarrhea, disturbed consciousness, and shock. 15 days before the visit, he underwent pyloric gastrectomy for advanced gastric cancer. After the operation, he suffered from pneumonia and was treated with antibiotics. Two days before the visit, he experienced large amounts of watery stool, followed by fever and shock. However, the enzyme immunoassays for toxin A/B were negative.

Upon admission to our hospital, his vital signs were as follows: blood pressure (88/54 mmHg); pulse (115 beats per minute); body temperature (39.2); respiratory rate (40 breaths per minute); Glasgow coma scale eye opening (2); verbal response (2); and motor response (1). Blood tests demonstrated high inflammatory response, acute kidney injury, hypokalemia, and elevated serum creatine kinase. Abdominal computed tomography (CT) scans showed accordion sign (figure 1).

After the patient was admitted to the intensive care unit, tracheal intubation, administration of meropenem for septic shock of unknown cause and noradrenaline (0.6 µg/kg/minute) to maintain blood pressure, continuous renal replacement therapy for anuria, and severe metabolic acidosis were performed. In addition, we

submitted the patient's stool sample for enzyme immunoassay (EIA) for toxin A/B and glutamate dehydrogenase (GDH) test. On day 2, his white blood cell count was elevated to 76,400 / $\mu$ L and his lactic acid level reached 5.7 mmol/L. Moreover, the results for enzyme immunoassay for toxin A/B and the GDH test were positive. Thus, we diagnosed fulminant *Clostridium difficile* infection.

Surgical treatment was not considered because the patient has the following conditions: intubation, shock requiring vasopressors, and dialysis-dependent renal failure. The antibiotics were changed from meropenem to metronidazole and added to an oral administration of vancomycin.

Thereafter, the patient's general condition gradually improved. On day 5, watery diarrhea disappeared and intestinal peristalsis improved. In addition, administration of noradrenaline and continuous renal replacement therapy were removed, and he was successfully extubated. After discontinuing the administration of antimicrobial agents, we confirmed that the patient did not have CDI relapse. On day 49, he returned to his former hospital without any complications.

## DISCUSSION

We showed that the patient with fulminant CDI was saved by early diagnosis and conservative antibiotic treatment. Late diagnosis could cause megacolon and intestinal perforation. [5] Thus, early diagnosis is crucial before the disease progresses. However, early diagnosis for CDI is difficult, because there is no single stool test, and the best standard laboratory test for CDI diagnosis has not been clearly established. [6] In general hospitals, the EIA for toxin A/B test has been adopted because it is fast, convenient, and inexpensive. [7] However, the EIA for toxin A/B has a sensitivity of 32–98% and a specificity of 84–100%, and thus, we repeated toxin A/B EIA combined with GDH test. [8] GDH screening for *C. difficile* used in association with EIA for toxin A/B quickly gives an accurate test result. [7,8] In addition, abdominal CT has been studied as an imaging modality for diagnosing CDI. [9] Typical CT findings of colonic wall thickening (most common), dilation, peri-colonic stranding, accordion sign, double-halo sign, and target sign are non-specific and can be found in other forms of colitis. However, these may be more pronounced with CDI. [10]

## CONCLUSION

In cases with high clinical suspicion for fulminant CDI, physicians should combine the examinations for early diagnosis and conservative therapy to reduce mortality in patients with fulminant CDI.

## CONFLICT OF INTEREST STATEMENT

The authors declare no conflicts of interest.

## AUTHOR CONTRIBUTIONS

KF, IH, TH, and KD contributed to management of the patient. KF drafted an initial manuscript. IH, RI, and KD critically reviewed the manuscript. All the authors contributed to writing the manuscript and have provided written consent for publication.

## ETHICAL APPROVAL

Need for ethical approval waived. Consent from the patient deemed to be enough.

## CONSENT FOR PUBLICATION

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

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## FIGURE LEGEND

Figure 1.

Abdominal computed tomography image showed accordion sign; high-attenuation oral contrast in the colonic lumen (arrows) alternating with low-attenuation inflamed mucosa (arrowheads).

## KEY CLINICAL MESSAGE

In fulminant *Clostridium difficile* infection (CDI), early diagnosis is important, and early diagnosis could save fulminant CDI patients that do not qualify for surgery due to severe complicating conditions by conservative antibiotic therapy.

