

**Case Report**

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**A case of Fournier's gangrene after liver transplantation: Treated by hyperbaric oxygen therapy**

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Fournier's gangrene (FG) is known as a rapidly progressing necrotizing fasciitis arising from genitourinary and colorectal infections. Misdiagnoses have occurred often because the initial presentation varies and is unclear. We report a case of FG in a 59-year-old man who had undergone a living donor liver transplant. He was in the maintenance phase of immunosuppressant treatment. FG occurred rapidly without symptoms and required prompt and aggressive debridement. Computed tomography demonstrated a small air density in his left testis. Treatment with hyperbaric oxygen therapy followed by intra-operative Gram's staining navigated debridement was additionally performed with general systematic anti-biological therapy and successfully cured the patient. Extra caution should be paid to patients who are maintained on immunosuppressants. Earlier detection and intervention will reduce the rate of mortality to a minimum.

**Keywords:** Fournier's gangrene, hyperbaric oxygen therapy, living-donor liver transplantation

**1. Introduction**

A combination regimen comprising steroids and FK506 was the standard protocol to improve graft survival in the context of this infectious disease (1). Fournier's gangrene (FG) is known to be a sudden-onset and rapidly progressing necrotizing fasciitis arising from genitourinary and colorectal infections. Misdiagnoses have occurred often because the initial presentation varies and is unclear (2-4).

**2. Case report**

A 59-year-old man underwent living donor liver transplantation (LDLT) because of HBV cirrhosis. He had a history of left epididymitis that had first been identified one year before LDLT and was treated with oral antibiotics. The postoperative course was uneventful without acute rejection or infection. Two

months after the LDLT, the patient was re-admitted because of a continuing low-grade fever. He was in the maintenance phase of immunosuppressant treatment and was maintained with FK506 (8 mg/day) and prednisone (10 mg/day) without exceeding the recommended trough level. At admission, laboratory data revealed a slightly elevated white blood cell count of 12,000/mm<sup>3</sup>, a C-reactive protein level of 5.2 mg/dL (normal < 0.3) and a temporary increase in his blood sugar level to 288 mg/dL.

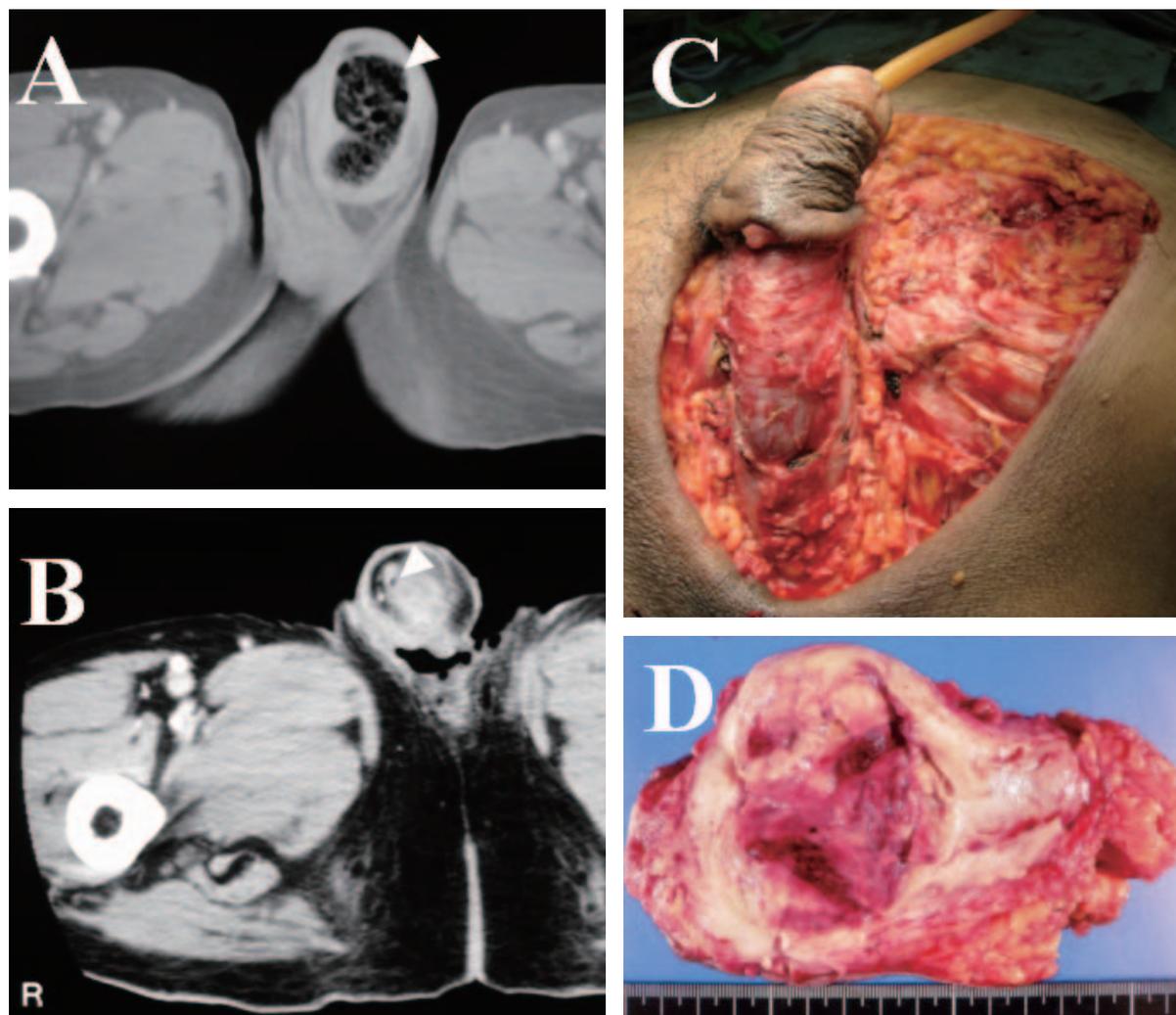
On the 5th hospital day, the patient complained of continuous dull pain in the left lower abdomen with rebound tenderness. Thereafter, a sudden-onset systemic reaction due to sepsis occurred. The patient's blood pressure dropped to 68/46 mmHg while his body temperature rose to 39.8°C. The laboratory data demonstrated severe infection with a white blood cell count of 800/mm<sup>3</sup>, a C-reactive protein level of 12.27 mg/dL and a blood sugar level of 116 mg/dL. Computed tomography showed a small air density in his left testis (Figure 1A). A balloon-like induration with retract-pain was found in the left scrotum without redness of the skin. He was diagnosed with FG and was immediately subjected to wide debridement with broad-band antibiotics.

Two days after the operation, his laboratory data and complaints showed improvement, but micro air

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**Figure 1. The left testis swelled like a balloon because of the gas-producing bacterial infection. (A)** A pelvic CT scan was used to visualize the inner air in the left testis. **(B)** Micro air was found in the right testis during follow-up CT, which was performed 2 days after the operation. **(C)** The second debridement was navigated using intra-operative Gram's staining, which showed no bacterium or neutrophilic infiltration in the excised tissue. **(D)** Marked necrotizing tissue with gas-infiltration was found in the extracted testis.

was found in the remnant testis on follow-up CT (Figure 1B). We immediately performed re-debridement and excised the right testis along with perineum tissue. At first, the debridement was performed until the healthy tissue margin was macroscopically identified. Next, the margin of the resected tissue was stumped to the glass and checked for bacterial phagocytosis by neutrophilic leukocytes using Gram's staining. This process was continued until all of the bacterium and neutrophilic infiltration assays in the excised tissues yielded negative results (Figure 1C).

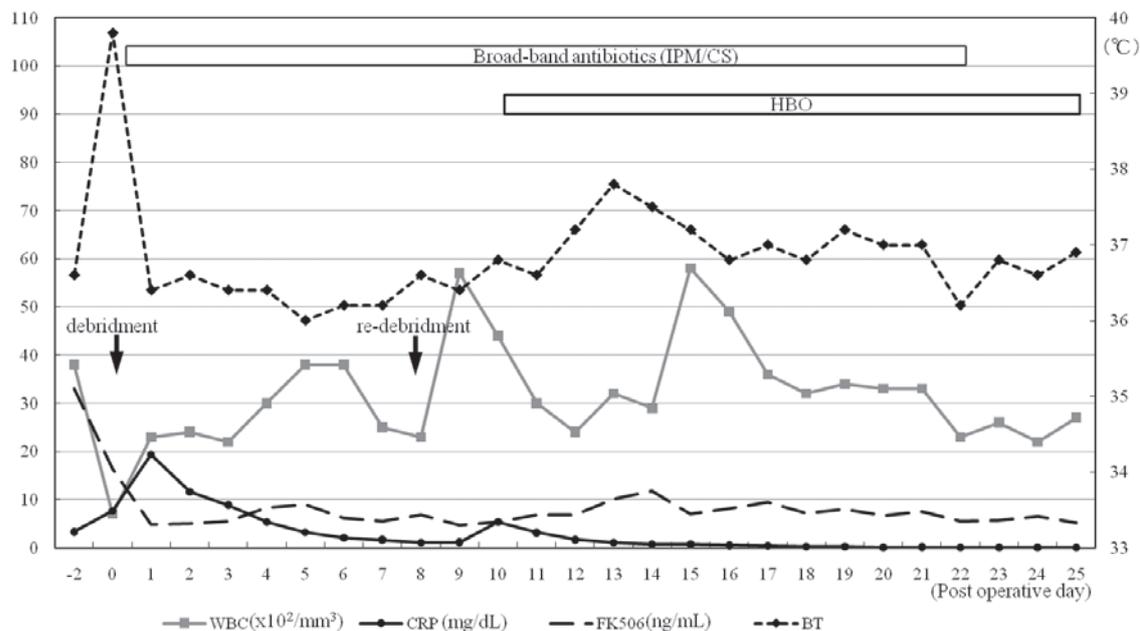
After the operation, marked necrotizing tissue containing gas was found in the extracted testis (Figure 1D). The bacterial organisms cultured from blood were *E. coli* and *Streptococcus* species. Additionally, hyperbaric oxygen therapy (HBO) was performed daily starting 2 days after the operation for two weeks. No recrudescence occurred during this treatment, and split-thickness skin-grafting was performed followed by HBO after one month. The patient successfully

recovered within two months after the initial operation (Figure 2).

### 3. Discussion

Extra caution should be used for patients who are maintained by an immunosuppressant. Earlier detection and intervention for FG will reduce the rate of mortality to a minimum. In the present case, the patient's epididymitis was treated with oral antibiotics one year before LDLT. The occult infection in his left epididymis may have been one of the causes of FG. However, no sign of infection was found during the preoperative screenings of LDLT.

FG is no longer a rare disease in urologic-related transplantation patients, but it is rarely reported in liver transplantation patients. Patients who are treated with immunosuppressants should be recognized as most noteworthy (2,3). A delay in the treatment of FG has a significant impact on the prognosis. The initial



**Figure 2. The treatment course after admission.** The trends of laboratory data and treatments were expressed.

symptoms are little and non-specific, but local infection spreads rapidly at the rate of 1 inch per hour (3). The mortality rate is approximately 15-20% in non-diabetic patients, whereas it increases to twice that in diabetic patients (2-4).

A prompt and aggressive surgical approach with optimal antibiotic therapy is the only way to cure this disease. Computed tomography is the best modality for diagnosing FG and for monitoring the progress of infection (1). We did not hesitate to perform early and repeated debridement. However, the borderline of debridement was uncertain because the demarcation between the healthy tissue and the necrotizing tissue was invisible. In the present case, the debridement was guided by intra-operative Gram's staining, which continued until all of the bacterium and neutrophilic infiltration in the excised tissue was negative. This method may help determine the borderlines for debridement in future cases.

HBO in FG has a positive effect on infection control and wound healing. HBO may help decrease the number of debridements required (4,5) HBO increases tissue oxygen tension to a high level that in turn inhibits and kills anaerobic bacteria while suppressing aerobic bacteria proliferation (5). Thus, HBO may be suitable for post-LDLT patients as a supplemental protocol.

FG occurs commonly in urologic-related transplantation, whereas to our knowledge, there has been no report of a case in post-liver transplantation patients. The radiological findings and episode of this case were so unusual that we were immediately able to make the diagnosis and recommend a suitable

treatment. Earlier recognition and intervention will provide opportunities to improve outcomes.

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