



Laparoscopic Necrosectomy for walled-off necrosis following necrotizing pancreatitis

Kameoka, Yasuyuki ; Okata, Yuichi ; Toyama, Hirochika ; Yoshimura, Shohei ; Uemura, Suguru ; Hatakeyama, Tadashi ; Bitoh, Yuko

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Title: Laparoscopic Transperitoneal Necrosectomy for a Massive Walled-Off Necrosis
Following L-Asparaginase-Induced Acute Necrotizing Pancreatitis in a Child

Running title: LTN for Walled-Off Necrosis

Name of Author(s), Academic Degree of Author(s):

Yasuyuki Kameoka MD¹, Yuichi Okata MD, PhD¹, Hirochika Toyama MD, PhD², Shohei
Yoshimura MD¹, Suguru Uemura MD, PhD³, Tadashi Hatakeyama MD, PhD⁴, Yuko
Bitoh MD, PhD¹

Address of Affiliated Institution(s):

1. Division of Pediatric Surgery, Department of Surgery, Kobe University Graduate
School of Medicine, Kobe, Japan

2. Division of Hepato-Biliary-Pancreatic Surgery, Department of Surgery, Kobe
University Graduate School of Medicine, Kobe, Japan

3. Department of Pediatrics, Hyogo Prefectural Kobe Children's Hospital, Kobe, Japan

4. Department of Pediatric Surgery, Hyogo Prefectural Kobe Children's Hospital, Kobe,

Japan

Corresponding Author:

Name: Yuichi Okata MD,PhD

Postal Address: 7-5-2, Kusunoki-cho, Chuo-ku, Kobe, Hyogo, Japan, 650-0017

Telephone Number: +81-78-382-5942

Email: yuichi.okata@gmail.com

Present address: 7-5-2, Kusunoki-cho, Chuo-ku, Kobe, Hyogo, Japan, 650-0017

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Walled-off necrosis (WON) comprises necrotic tissue, usually transforms four weeks after the onset of necrotizing pancreatitis, and presents a high rate of complications and death¹. The “Step-up approach” is the standard treatment for WON, which starts with percutaneous and transgastric drainage, followed by additional drainage and necrosectomy in stages if initial treatment is ineffective². However, the optimal treatment strategy for pediatric patients remains debatable. Herein, we described a successful case of laparoscopic transperitoneal necrosectomy in a pediatric patient who developed WON during chemotherapy for B-cell precursor acute lymphoblastic leukemia (BCP-ALL) and required radical cure and early resumption of chemotherapy.

A 9-year-old boy with trisomy 21 developed L-asparaginase-induced acute necrotizing pancreatitis during chemotherapy for BCP-ALL (Fig. 1a). Subsequently, an acute necrotic collection was formed; 4 weeks later, it transformed into a massive WON, with a maximum diameter of 21 cm. He presented with vomiting and abdominal pain due to WON compression (Fig. 1b). The patient was then transferred to our hospital for treatment of symptomatic WON. Laboratory findings upon admission showed no evidence of WON infection (white blood cell count: 3,100/ μ L; C-reactive protein: 0.16 mg/L; direct bilirubin: 0.1 mg/dL; pancreatic amylases: 25 U/L; and lipase: 71 U/L). A laparoscopic transperitoneal necrosectomy was performed 45 days after acute pancreatitis

was diagnosed (Fig. 1c). A massive WON was identified laparoscopically; on puncturing, most of the internal liquefied necrotic tissue of the WON was aspirated (approximately 1000 mL; Fig. 1d). Consequently, the WON was reduced in size. Necrosectomy was performed with an additional 2 cm incision (Fig. 1e and 1f); two drains were placed into the cavity. Subsequently, he started food intake on postoperative day (POD) 5 and chemotherapy with 6-mercaptopurine at 10 mg/m² on POD 12. Both drains were removed as the total drain volumes were confirmed to be below 20 mL/day on POD 14; the patient was transferred to the previous hospital on POD 22, and showed no signs of complications six months postoperatively.

In this case, laparoscopy-assisted necrosectomy was successfully performed for a massive WON following L-asparaginase-induced pancreatitis in a pediatric patient. Chemotherapy for the primary disease was resumed promptly.

L-asparaginase-induced pancreatitis is an infrequent but potentially lethal complication of chemotherapy for leukemia. Only one pediatric patient has been reported to be successfully treated with percutaneous drainage to flush out the infected necrotic areas of L-asparaginase-induced acute necrotizing pancreatitis³. However, there have been no reports on the laparoscopic treatment of WON following L-asparaginase-induced pancreatitis.

There are different approaches to treating WON, including percutaneous, endoscopic, laparoscopic, and open surgery; therefore, the optimal management strategy remains controversial, particularly in pediatric patients². Recently, the safety and efficacy of endoscopic approaches for pediatric WON have been widely reported⁴. The success rate of endoscopic intervention for pediatric WON is estimated to be >88%⁴. Moreover, this procedure usually needs to be performed at intervals of 3–7 days and requires multiple sessions to achieve complete debridement when a significant amount of solid or semi-solid necrosis is expected. In addition, the incidence of post-procedural complications is approximately 14%, the most serious of which are vascular injuries and gastric perforations⁵.

In this case, according to the “Step-up approach,” endoscopic transgastric necrosectomy was considered a minimally invasive approach for pediatric WON; however, this approach posed problems, such as the device size mismatch of the large tip diameter of therapeutic echoendoscopes, frequent procedural requirements under general anesthesia, risk of infection, and a potentially longer treatment period for WON, resulting in later resumption of chemotherapy. Furthermore, it was necessary to perform an extensive necrosectomy while maintaining a good operative field to avoid vascular injury owing to the massive WON and the splenic vein running inside the cavity, which suggests

laparoscopic transgastric necrosectomy was expected to be similarly challenging; therefore, laparoscopic transperitoneal necrosectomy was selected as a definitive approach.

Laparoscopic transperitoneal necrosectomy is a valuable treatment option for pediatric patients with WON following L-asparaginase-induced acute necrotizing pancreatitis.

Complete debridement was achieved in a single session, allowing the early resumption of chemotherapy. However, the optimal management strategy for pediatric patients with WON requires further investigation.

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Informed Consent: The patient provided informed consent.

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Figure Legends

Figure 1. (a) Abdominal contrast-enhanced CT showing acute necrotizing pancreatitis: lack of pancreatic parenchymal enhancement (white arrow) and inflammation associated with peripancreatic necrosis (blue arrows). **(b)** Abdominal contrast-enhanced CT showing walled-off necrosis abutting the posterior wall of the stomach (four weeks after onset of acute pancreatitis). **(c)** Intraoperative position. **(d)** Drainage: S.A.N.D balloon catheter (white arrow) is inserted into the cavity. **(e)** Necrosectomy: solid or semi-solid necrotic materials attached to the cavity wall. **(f)** Solid necrotic material.

CT: computed tomography; W: walled-off necrosis; S: stomach; L: liver; V: splenic vein; N: necrotic materials

