

# Ligation and Fibrin Glue Spraying for Intractable Chylous Ascites after Radical Gastrectomy for Gastric Cancer: Case Report and Literature Review

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Chylous ascites associated with radical resection of gastric cancer is a serious clinical condition. Lymph node dissection is indispensable during gastrectomy for gastric cancer. However, postoperative chylous ascites prolongs the hospital stay and re-operation. There are few reports on this subject. Most cases of chylous ascites resolve without treatment, but the condition can result in substantial morbidity. The definition of chylous ascites is ambiguous and varies in the English literature. In this report, we discuss a case of chylous ascites in a 68-year-old man who underwent distal gastrectomy for early gastric cancer at our hospital. He was admitted 8 months after surgery with a main complaint of abdominal swelling. Abdominal puncture helped to diagnose chylous ascites with marked elevation of triglyceride level. The patient received a hypercaloric infusion through a central line, and octreotide acetate, but did not improve. After assessment of lymph outflow by lymph scintigraphy, surgical ligation of the lymph vessels was performed through laparotomy. The volume of milky-white ascites in the abdominal cavity was 3,000 mL. Macroscopically, the fluid was confirmed as flowing from behind the common hepatic artery. Thus, ligation was performed. Chylous ascites has not recurred at 12 months after the re-operation. In summary, a case of chylous ascites after radical gastrectomy for gastric cancer was successfully treated by surgery. We review and discuss the relevant literature. (*J Nippon Med Sch* 2021; 88: 242–247)

**Key words:** intractable chylous ascites, gastric cancer, gastrectomy, ligation of lymphatic vessel, lymphatic scintigraphy

## Background

Chylous ascites after gastrectomy for gastric cancer is rare. Most cases improve with conservative therapy and require no further management. However, prolonged production of chylous ascites worsens the general condition of a patient when ascites does not resolve without intervention. In this report we discuss a case of intractable chylous ascites after distal gastrectomy for early gastric cancer performed 9 months before presentation. The patient was successfully treated with surgical ligation of the lymphatic vessel.

## Case Presentation

A 68-year-old man had received a diagnosis of gastric carcinoma. Comorbidities included type 2 diabetes, diabetic nephropathy requiring dialysis, and impaired cardiac function due to previous myocardial infarction. Our preoperative diagnosis was cT1b endoscopically, and surgical resection was thus recommended. He declined laparoscopic surgery, so distal gastrectomy by laparotomy, D1 plus lymph node dissection, and Billroth II reconstruction were performed because of his underlying medical conditions. The pathological findings were M, Less, type 0-IIc, 28 × 19 mm, tub1, ly0, v0, pT1aN0M0, pStage IA, according to the Japanese Classification of

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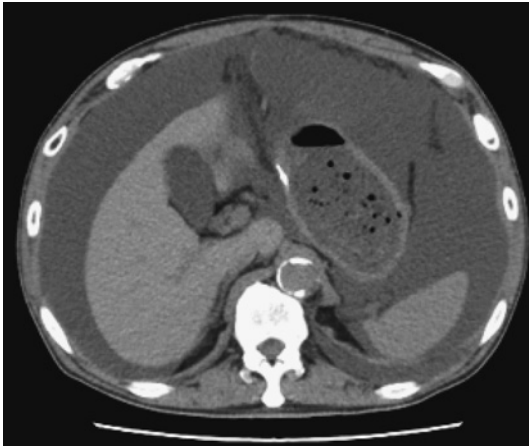


Fig. 1 Abdominal CT findings on admission  
Abdominal CT showing a large volume of ascites and no sign of cancer recurrence.

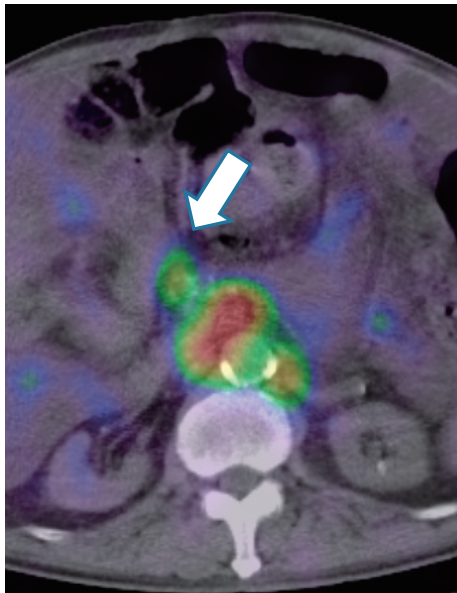


Fig. 2 Lymphatic scintigraphy findings  
Lymphatic scintigraphy showing outflow of lymphatic fluid around the common hepatic artery (indicated by the white arrow).

Gastric Cancer, 15th edition<sup>1</sup>. His postoperative course was uneventful, and no adjuvant therapy was provided. We could not perform follow-up CT at 6 months after gastrectomy because of the patient's circumstances. Upon emergency admission, 9 months after gastrectomy, his abdomen was markedly distended, and peripheral edema was observed. There was no tenderness or palpable masses in the abdomen. Abdominal CT on admission showed a high volume of ascites and no sign of cancer recurrence (Fig. 1). Upon puncture, the ascitic fluid was milky and odorless. Ascites testing revealed a high triglyceride level (1,535 mg/dL) and a cytologic classifica-

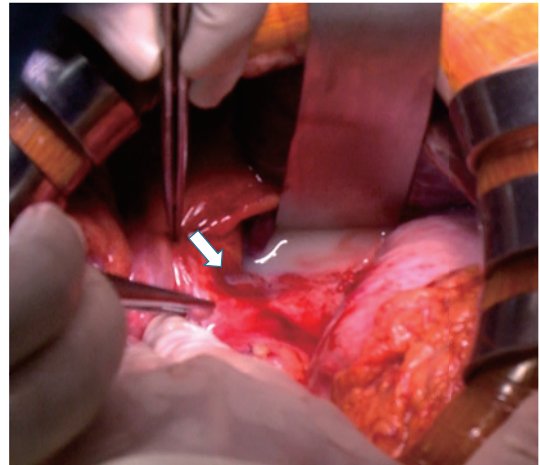


Fig. 3 Intraoperative findings  
Milky-white ascites (approximately 3,000 mL) in the abdominal cavity.  
The outflow site of lymphatic vessels was near the common hepatic artery (indicated by white arrow).

tion of class II. Chylous ascites after gastrectomy with lymph node dissection was thus diagnosed, and treatment with total parenteral nutrition and octreotide (300 µg/day) was started immediately and continued for 4 weeks. More than 2,000 mL of milky ascites was drained daily, and the volume remained almost unchanged after octreotide administration. Abdominal distension and nutrition status did not improve.

Lymphoscintigraphy was used to observe lymph outflow around the common hepatic artery (Fig. 2). On the basis of the results, we opted to treat the ascites by ligating the lymphatic vessel, 10 months after gastrectomy. Three hours before surgery, the patient was given butter and 100 mL of milk orally, so that chylous ascites outflow could be located during laparotomy. During the operation, milky ascites accumulated (approximately 3,000 mL) intraperitoneally (Fig. 3). The presence of the lymph node stump and outflow of milky-white lymph behind the common hepatic artery were confirmed macroscopically. The outflow site was ligated several times and sprayed with fibrin glue. Subsequently, milky-white ascites was not visible macroscopically, and the lymphatic vessel was thus considered successfully ligated and sealed. The operation time was 215 minutes and blood loss was 94 mL.

After surgery, the ascites in the drain tube was serous and limited in volume. On postoperative day 7, the patient was started on a low-fat diet, and the drain tube was removed on day 14. An abdominal CT scan taken 12 months after the re-operation confirmed the absence of ascites and gastric cancer.

Table Reported cases of chylous ascites after gastrectomy for gastric cancer

Author	Year of publication	Number of CA cases	Number of Radical GR	Diagnosis	Treatment
Wu CW, et al. 7)	1996	13	258		
Rajasekar A, et al. 5)	2000	1		MA	Fasting + TPN
Wu CW, et al. 8)	2000	16	362		
Kaas R, et al. 21)	2001	2		HTG	Intestinal feeding with MCT drip
Hong JH, et al. 9)	2002	13	1,552	MA	Fasting + TPN + repeated paracentesis
Lee JH, et al. 10)	2002	4	119		
Halkic N, et al. 6)	2003	1		MA	TPN + fat-free food
Huang Q, et al. 11)	2004	1		HTG	TPN
Yol S, et al. 12)	2005	4	34	MA	Fasting + TPN
Gong DJ, et al. 13)	2008	2	125		
Zhang LS, et al. 14)	2009	53	1,596	HTG	TPN ± octreotide
Griniatsos J, et al. 15)	2010	1		MA	lymphangiography
Yamada T, et al. 16)	2013	1		MA+HTG	Low fat food
Ahn SH, et al. 17)	2014	1	43		
Lu J, et al. 18)	2015	57	1,366	MA+HTG	Drain, MCT, low fat food ± octreotide
Nakata K, et al. 19)	2015	1	18		
Kim SW, et al. 20)	2017	1		MA	Low dose RT
Present case		1		MA+HTG	Surgical ligation + spraying fibrin glue

## Abbreviations

CA: chylous ascites; GR: gastrectomy; MA: milky appearance; HTG: high triglycerides level in ascites; TPN: total parenteral nutrition; MCT: medium chain triglycerides; RT: radiation therapy

## Discussion

The abdominal lymphatic system is classified as the intestinal lymphatic system and hepatic lymphatic system. In patients with cirrhosis, lymphatic flow of the hepatic lymphatic system increases<sup>2</sup>. Intractable ascites after abdominal surgery with lymph node dissection often occurs in patients with cirrhosis. Jun et al. reported that in patients with Child A cirrhosis, radical gastrectomy with D2 dissection is not contraindicated<sup>3</sup>. Fenghua et al. reported that D1 lymph node dissection is recommended for Child B patients and that radical gastrectomy is dangerous for Child C patients<sup>4</sup>. In patients with Child B/C cirrhosis, lymph node dissection, such as manipulation of the hepatoduodenal ligament, should be avoided when possible, and frequent lymph vessel ligation should be considered. Liquid in the hepatic lymphatic system is not milky, because it does not contain fat absorbed in the small intestine. Our patient did not have cirrhosis, and the ascites was chyle. Thus, the intestinal lymphatic system, not the hepatic lymphatic system, was abnormal in our patient.

Chylous ascites is a rare complication after radical resection for gastric cancer. However, there are no unified standards for managing chylous ascites after gastrectomy<sup>5,6</sup>. Here, we describe our case and performed a PubMed search of relevant English studies indexed during

1991-2017.

In our review of 173 reported cases<sup>5-21</sup> chylous ascites was defined as extravasation of milky and/or triglyceride-rich fluids in the abdominal cavity, and was almost always treated with fasting and total parenteral nutrition (Table). The incidence of chylous ascites after gastrectomy with D2 lymph node dissection in Japan ranges from 0.3% to 0.4%<sup>22</sup>. After D3 lymph node dissection, the incidence rate of lymph fistula increases from 1.6% to 3.8%<sup>23</sup>. The cause of this complication is usually direct lymphatic damage during surgery. Retroperitoneal lymph tissue is present near the aorta, and lymphatic fluid from intraperitoneal organs flows into this region. Intraoperative damage near the aorta causes such complications. In addition, lymphoid tissues are often anomalous, which can result in unexpected damage to lymphatic vessels<sup>24</sup>. A persistent lymph fistula can cause nutritional disturbances, dehydration, dystonia of the electrolytic balance, and a decrease in immune function<sup>25</sup>. Chylous ascites often occurs approximately 7 days after surgery, because lymphatic flow increases after a diet without fat restriction is begun<sup>21</sup>.

Diagnosis of chylous ascites is relatively easy clinically. Appearance of milky-white, non-purulent fluid in drainage tubes after the start of enteral feeding is characteristic of postoperative chylous ascites<sup>26,27</sup>. In addition, most

patients exhibit abdominal distension. The daily volume of chylous ascites produced is greater than 200 mL/day, according to some reports<sup>21,26-28</sup>. Typical laboratory findings for chylous ascites are presence of chylomicron-rich drainage fluid with a triglyceride concentration greater than 110 mg/dL<sup>26-30</sup>. In an analysis of drainage ascites, Lu et al. reported that low-volume chylous ascites was present in 57 of 1,366 patients (4.1%) who underwent laparoscopic gastrectomy for gastric cancer. Furthermore, patients with metastasis to lymph node No. 8 (lymph nodes along the common hepatic artery<sup>31</sup>) or No. 9 (celiac artery lymph nodes<sup>31</sup>), and patients who had undergone dissection of more than 32 lymph nodes, were significantly more likely to have chylous ascites<sup>18</sup>. Methods of identifying the site of chylous ascites leakage include lymphangiography and lymphatic scintigraphy. Lymphangiography is a method of performing CT after injecting ethyl ester of iodinated poppy-seed oil fatty acid into the inguinal region. The frequency of accurate identification of the leakage site by lymphangiography was reported to be 58% to 78%. Furthermore, lymphangiography itself may have a therapeutic effect because of the embolic characteristics of the drug<sup>32,33</sup>. However, we used lymphatic scintigraphy to identify the leakage site because no doctor was experienced with lymphangiography in our department.

Because drainage fluid after gastrectomy was almost all serous in our patient, the drainage tube was removed on the third day after gastrectomy, and the patient was discharged on the twelfth day. Chylous ascites was diagnosed 8 months after gastrectomy; however, the patient initially experienced occasional abdominal swelling after discharge. We performed suprapancreatic dissection with an ultrasonic coagulation device in this case. We speculated that, during lymphadenectomy, lymph vessels had been temporarily blocked by an ultrasonic coagulation device but gradually began leaking a few months later. Aggressive dissection around the common hepatic artery and celiac artery during surgery for gastric cancer can increase the risk of chylous ascites. In this case, because the volume of milky-white ascites from the drainage tube was greater than 2,000 mL/day, and the triglyceride level in ascites was very high (1,534 mg/dL), we were able to diagnose chylous ascites definitively. We performed lymphatic scintigraphy, which is a more straightforward method than lymphangiography. Lymphatic scintigraphy clearly showed that the leakage site was around the common hepatic artery.

The primary treatment for chylous ascites is conserva-

tive therapy-usually total parenteral nutrition with or without octreotide. Bhatia et al. speculated that octreotide suppresses secretion of lymphatic fluid via somatostatin receptors in the small intestine<sup>34</sup>. This conservative treatment was successful in about 67% of cases<sup>35,36</sup>. As an alternative conservative treatment, Kim et al. reported that massive chylous ascites production improved after low-dose radiation of the dissected area after gastrectomy for gastric cancer<sup>20</sup>. Despite these alternative treatments, surgery should not be delayed in cases of intractable ascites, because the nutritional and immune status of the patient may worsen. Leibovitch et al. reported that physicians should consider surgical treatment if chylous ascites does not improve after 4 to 8 weeks of conservative therapy<sup>35</sup>.

It is important to identify the site of lymph drainage before surgical treatment. Preoperatively, lymphatic scintigraphy suggested that the outflow site was located near the common hepatic artery in our patient. Additionally, by administering butter and milk orally 3 hours before surgery, we were able to confirm intraoperatively a milky-white lymphatic discharge around the common hepatic artery macroscopically<sup>37</sup>. We performed suture and ligature several times until the milky-white discharge was no longer observed, and then sprayed fibrin glue<sup>38</sup>. We speculated that fibrin glue would be effective for adhering the suprapancreatic area, thereby eliminating space for storage. Chylous ascites was not present on a CT scan at 12 months postoperatively.

In gastric cancer surgery, an ultrasound-activated device is usually used to dissect the area around the common hepatic artery. In our case, we also used an ultrasound-activated device for dissection of the suprapancreatic area. Sealing failure can easily occur because the walls of lymphatic vessels are more fragile than those of blood vessels. Near the common hepatic artery and celiac artery, individual differences in lymphatic flow have been observed<sup>16</sup>. Therefore, lymph vessels must be carefully sealed (sometimes with additional ligatures or clips), and the absence of lymphatic leakage after dissection must be confirmed macroscopically. If prolonged chylous ascites develops, the site of lymphatic fluid leakage should be confirmed lymphangiography or lymphatic scintigraphy as soon as possible. Surgical treatment should be considered in such cases, before development of severe malnutrition or immunological impairment.

### Conclusion

We reported a case of intractable chylous ascites after

gastrectomy with lymph node dissection. Chylous ascites was successfully treated by surgical ligation of the lymphatic vessel after confirming the diagnosis by lymphatic scintigraphy. Prolonged chylous ascites greatly worsens the general condition of the patient. Surgical treatment of intractable chylous ascites is indicated for patients who do not respond to conservative treatment of a few weeks' duration.

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**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 from the Editor-in-Chief of this journal.

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