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The incidence of chylous ascites after liver transplantation and the proposal of a diagnostic and management protocol☆,☆☆,★

Toshiharu Matsuura *, Yusuke Yanagi, Makoto Hayashida, Yoshiaki Takahashi, Koichiro Yoshimaru, Tomoaki Taguchi

Department of Pediatric Surgery, Graduate School of Medical Sciences, Kyushu University, Fukuoka, Japan

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ABSTRACT

Background: No protocol has been established for the diagnosis and management of chylous ascites after liver transplantation (LT). In this study, we retrospectively reviewed our cases of posttransplant chylous ascites (PTCA) and aimed to propose a diagnostic and management protocol.
Patients and methods: We retrospectively reviewed the clinical records of 96 LT recipients who underwent LT at our department. The incidence of PTCA and the associated risk factors were analyzed and our protocol for chylous ascites was evaluated.
Results: PTCA occurred in 6 (6.3%) patients (mean age: 10.7 ± 11.0 years) at a mean of 10.8 ± 3.6 days after LT. The primary disease in all of PTCA cases was biliary atresia (BA). The periportal lymphadnopathy was an independent risk factor for PTCA. In all cases PTCA successfully resolved according to our protocol. Octreotide was administered in 4 of our 6 PTCA cases. The mean postoperative hospital stay was 40.2 ± 8.4 days, which was similar to that of cases without PTCA.
Conclusions: The incidence of PTCA in LT patients, especially in those with BA, is relatively high. Our diagnostic criteria and our management protocol were helpful for patients with refractory ascites after LT.
Type of study: Diagnostic test: Level II. Treatment study: Level III.

Chylous ascites is defined as the extravasation of milky or creamy, triglyceride-rich lymph fluid into the peritoneal cavity [1,2]. Chylous ascites is a rare but well-known complication after liver transplantation (LT). In general, the pathogenesis of chylous ascites is related to a failure of the lymphatic system because of an obstruction caused by some congenital or acquired factors [2]. Two mechanisms may affect the formation of posttransplant chylous ascites (PTCA). The first is an increase in the lymph production in the hepatic and splanchnic areas secondary to cirrhosis. The second involves an injury to the lymphatic system in the periportal and retrohepatic areas during the removal of the native liver and the inadequate ligation of the injured lymphatic vessels. Consequently, PTCA is reported in 0.6–4.7% of patients after LT [3–7]. This may also be caused by the fact that more than 50% of the total body lymph originates in the gut and liver [8]. In addition, the increase in the caval, hepatic, and intestinal venous pressure caused by cirrhosis with portal hypertension also results in a large increase in the production of hepatic lymph.

Chylous ascites can lead to serious consequences because of the loss of essential proteins, lipids, immunoglobulins, vitamins, electrolytes, and water [1]. It is therefore very important to provide adequate nutritional and immunological support while patients receive the optimal therapy for cyhylous ascites—this is especially important for children and immunosuppressed posttransplant patients. However, the criteria for the definition of chylous ascites differ between publications and the optimal treatment remains controversial. In the present study, we retrospectively reviewed our cases of PTCA and propose a management protocol based on our institutional experience.

Abbreviations: ASR, ascites/serum ratio; BA, biliary atresia; CMV, cytomegalovirus; CT, computed tomography; GRWR, graft to recipient weight ratio; GV/SLV, graft volume to standard liver volume ratio; LDLT, living donor liver transplantation; LLS, left lateral segment; LT, liver transplantation; MCT, medium chain triglycerides; MELD, model for end-stage liver disease; NPO, nothing per oral; PELD, pediatric end-stage liver disease; PN, parenteral nutrition; PTCA, posttransplant chylous ascites; PV, portal vein; PVT, portal vein thrombosis; TG, triglyceride; TNC, total nucleated cell; TPN, total parenteral nutrition.

☆ This retrospective study was performed according to the Ethical Guidelines for Clinical Research published by the Ministry of Health, Labor and Welfare of Japan on July 30, 2003 (revised 2008) and complies with the Helsinki Declaration of 1964 (revised 2008). The parents or guardians of all of the infants in this study provided their informed consent prior to their inclusion in this study.

☆☆ Conflict of interest: The authors declare no conflicts of interest in association with the present study.

★ Authorship: Toshiharu Matsuura: designed the study, performed the study, collected data, analyzed data, and wrote the paper: Yusuke Yanagi: collected data and analyzed data: Makoto Hayashida: designed the study and collected data: Yoshiaki Takahashi: analyzed data: Koichiro Yoshimaru: analyzed data: Tomoaki Taguchi: reviewed and revised the paper.

* Corresponding author at: Department of Pediatric Surgery, Graduate School of Medical Sciences, Kyushu University, 3-1-1 Maidashi, Higashi-ku, Fukuoka 812-8582, Japan. Tel.: +81 92 642 5573; fax: +81 92 642 5580.
E-mail address: matsuura@pedsurg.med.kyushu-u.ac.jp (T. Matsuura).

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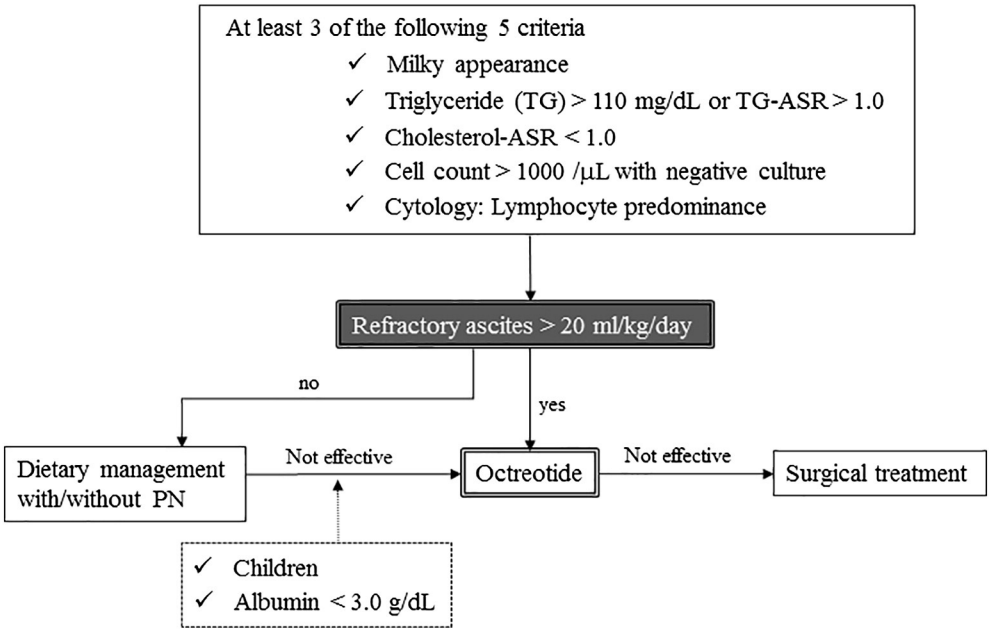

Fig. 1. Proposed diagnostic and management protocol for PTCA.

1. Patients and methods

1.1. The clinical characteristics of the patients

Ninety-six LTs, including 2 retransplantations (male: female, 31:63) were performed at the Department of Pediatric Surgery in Kyushu University under the approval of the Ethics and Indications Committee of Kyushu University. With the exception of 3 grafts from deceased donors, all of the liver grafts were from living donors. The mean age of the recipients was 8.6 ± 9.1 (range: 0.1–33.5) years. Nineteen cases underwent LT in adulthood (≧18 years old) and the remaining 77 cases in childhood. The primary diseases were biliary atresia (BA) ($n = 73$), fulminant hepatitis ($n = 10$), congenital metabolic liver disease ($n = 4$), hepatoblastoma ($n = 3$), Alagille syndrome ($n = 2$), and the congenital absence of the portal vein ($n = 2$). We retrospectively compared the demographic and clinical factors influencing PTCA in 6 patients with PTCA defined our criteria shown in Fig. 1 and 88 patients who did not develop PTCA. The patients were considered to be positive for portal lymphadenopathy when the periportal lymph nodes on pretransplant computed tomography (CT) were more than twice the diameter of the portal vein, which was our own definition in this study.

1.2. The surgical technique of liver transplantation and immunosuppression

All of the transplantation procedures that were included in this study were performed by the same expert transplantation team. In cases involving abdominal adhesion, dissection was performed using an electrical scalpel and some vessel sealing devices to remove the native whole liver. In LT for BA patients, the already constructed Roux-en-Y limb should be dissected and retrieved from the native liver using a stapling device. As we have previously reported [9], when there was a large portal vein (PV)–diameter mismatch between the recipient and the graft or when the PV wall was sclerotic because of periportal inflammation, the PV was dissected to the level of the confluence of the superior mesenteric vein and the splenic vein, and then venoplasty was performed using a patch graft. Huge swelling of the periportal lymph nodes (a representative case is shown in Fig. 2) may cause the compression or kinking of the PV after PV anastomosis. In these cases, the periportal lymph nodes were basically dissected and retrieved using an electrical scalpel and the Ligasure vessel sealing system (Valleylab, Boulder, CO) and the final remnant lymphatic vessels were ligated. The basic immunosuppression protocol was consisted of tacrolimus with steroids, and steroids were basically tapered and discontinued at 6 months after LT.

1.3. The diagnosis of chylous ascites

When all of any other causes of refractory ascites after LT including the graft outflow obstruction were excluded, chylous ascites was suspected based on the drainage of milky and creamy fluid that mostly began after oral intake. The patients were diagnosed based on the triglyceride (TG) levels of the liquid. The laboratory diagnosis is based on the following findings: a gross milky color, a drained ascites/serum TG ratio (TG-ASR) >1.0 and an ascitic TG level of >110 mg/dL. A drained ascites/serum cholesterol ratio (Chol-ASR) of <1.0 is also a typical finding in patients with chylous ascites. The leukocyte cell count of the drained fluid is >1000/μL and cytological examination reveals the predominance of lymphocytes. In the present study, cylous ascites was diagnosed in patients who matched at least 3 of the 5 criteria shown in Fig. 1.

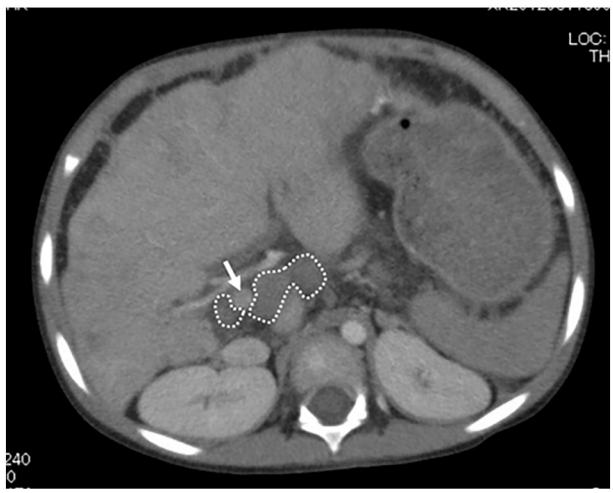

Fig. 2. CT representative image of portal lymphadenopathy. The swollen lymph nodes (white dot circle) existed around the portal vein (white arrow).