

# Chylous Ascites: Complication of Laparoscopic Donor Nephrectomy. Case Report and Review of Literature

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**Background.** Chylous ascites (CA) is an extremely rare complication after laparoscopic donor nephrectomy (LDN). It can increase the hospital stay, morbidity in postoperative period and thus negating the benefits of laparoscopic surgery. Most of the cases were managed conservatively, but surgical intervention may be occasionally required. This report describes the importance of accurate localization of the leaking chyle duct and its repair by endosuturing in a renal donor not responding to conservative treatment. **Methods.** A comprehensive review of literature regarding this rare complication after LDN was performed with Pubmed/Medline and Google Scholar using “chyle,” “complications,” and “laparoscopic donor nephrectomy” as keywords. The demographic profile and management of patients is discussed in detail. The various surgical modalities used to manage these patients are described. **Results.** Fifty-four cases of chyle leak/ascites have been reported after LDN in literature to date. Around 77% donors with CA could be successfully managed conservatively with dietary measures and total parenteral nutrition. Surgical intervention was required in nearly 23% donors ranging from clip application, use of argon coagulation, endosuturing with application of glue after  $36.1 \pm 19.07$  days of failed conservative treatment. Donors with massive ascites or requiring frequent large-volume paracentesis on conservative treatment are likely to require surgical therapy. The present case was successfully managed with laparoscopic endosuturing and has no recurrence at 6 month follow-up. **Conclusions.** Chylous ascites is a rare complication after donor nephrectomy in experienced centers. Although conservative management remains the first line of treatment, early surgical treatment shall be undertaken in cases of massive ascites.

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The first laparoscopic donor nephrectomy (LDN) was reported by Ratner et al<sup>1</sup> in 1995 and has become a standard of care because of its advantages like short hospital stay, lesser analgesic requirement, and better cosmetic results. The overall incidence of serious complications of LDN like hemorrhage and visceral injury is low, but some of these, like chylous ascites (CA), can produce disabling symptoms. The cause of chylous leakage is iatrogenic injury of cisterna chyle and its main tributaries.<sup>2</sup> It can be a source of major morbidity in postoperative period and can lead to

donor dissatisfaction. Chylous ascites after LDN was first reported by Shafizadeh et al<sup>3</sup> and is a rare complication with an incidence varying between 0% and 1.83%.<sup>4</sup> Only 54 cases of chylous leak have been reported in literature post-LDN. Most of these cases have been managed conservatively but there has been a need for surgical intervention like clipping, coagulation and application of glue in rare cases.

This report describes surgical management based on accurate identification of the leaking chyle duct and its repair by endosuturing in a donor with CA post LDN leading to complete resolution. Electronic databases were searched, including medline via PubMed, EMBASE, Cochrane Database, and Google Scholar for published studies in English language mapping to MeSH terms “kidney” or “renal,” “chyle,” “complications,” and “laparoscopic-donor nephrectomy.” The data from the published articles regarding this complication were compiled (Table 1) and analyzed. The study followed the Declaration of Helsinki guidelines and was approved by the Institutional Ethics Committee.

## CASE REPORT

A 54-year-old woman underwent uneventful left LDN and was discharged on postoperative day 3. On

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**TABLE 1.**  
The demographic profile and management of reported patients, presenting with chyle leak after LDN

Author	Case	Time of presentation after L, d	Age	Sex	Laterality	Type of laparoscopy	Management: conservative	Lymphangiogram	Management: surgery	Surgery, d	Recurrence (follow-up)
Shafiqzadeh et al, 2002 <sup>3</sup>	1	14	36	F	L	PL	LFD/MCT/D/DPD	No	No	—	—
Molina et al, 2003 <sup>5</sup>	1	10	45	F	L	PL	LFD/MCT	Yes	LC, G, C	35	No (4 mo)
Geary et al, 2004 <sup>6</sup>	1	12	44	F	L	HL	LFD/MCT/PD—TPN/SA	No	HLS, G, C	26	No (1 mo)
Leventhal et al, 2004 <sup>7</sup>	2	—	—	—	—	PL	LFD/MCT/PD—TPN	No	No	—	—
Wu et al, 2004 <sup>8</sup>	1	3	—	—	—	HL	LFD/MCT/PD	No	No	—	—
Bachmann et al, 2005 <sup>9</sup>	1	8	59	F	L	PR	LFD/MCT/PD/SA—TPN, Chylothorax: ICD, RDR	No	No	—	No
Ramani et al, 2005 <sup>10</sup>	1	—	—	—	—	PL	LFD/MCT/PD	No	LC	45	No
Caumartin et al, 2005 <sup>11</sup>	1	13	48	F	L	PL	TPN/SA/LFD/MCT	Yes	LE, LC, G	70	Yes, managed on MCT
Sharma et al, 2005 <sup>12</sup>	1	12	60	F	—	PL	LFD/MCT/PD	No	No	—	—
Wadström, 2005 <sup>13</sup>	1	16	—	F	—	HR	LFD/MCT/PD	No	No	—	—
Seo et al, 2005 <sup>14</sup>	2	—	—	—	—	HL	Yes (—)	—	No	—	—
Breda et al, 2006 <sup>15</sup>	2	—	—	—	—	PL	LFD/MCT/D/DPD	No	No	—	No
Kocak et al, 2006 <sup>16</sup>	3	—	—	—	—	PL	LFD/MCT/PD	No	No	—	No
Bachmann et al, 2008 <sup>17</sup>	3	6–28	—	—	—	PR	LFD/MCT/D/DPD	No	No	—	—
Aerts et al, 2009 <sup>4</sup>	3	12	50(1) NA (2)	F (2), M (1)	L (3)	HL (1)	LFD/MCT/D/DPD (3)—TPN (1)	No	2; surgery details (—) LE (1) after failed TPN	57	No
Kim et al, 2010 <sup>18</sup>	9	—	—	—	L(8), R (1)	PL	LFD/MCT/TPN	—	—	—	No
Sinha et al, 2010 <sup>19</sup>	1	—	38	F	L	HL	LFD/MCT/D/DPD—TPN/S	No	LE, LC	28	No (1 y)
Gagliano et al, 2011 <sup>20</sup>	1	16	44	F	L	PL	MCT/D/S/DPD	No	No	—	No (3 mo)
Capocasale et al, 2012 <sup>21</sup>	8	2	42–64	M (6), F (2)	L	PL	TPN/S (7), LFD/MCT/S (1)	No	No	—	No
Meulen et al, 2013 <sup>22</sup>	1	12	34	F	L	HL	LFD/MCT/PD/S	—	No	—	No (6 wk)
Sharma et al, 2014 <sup>23</sup>	1	14	48	M	L	PR	LFD/MCT/SA	No	No	—	No (2 y)
Rodríguez et al, 2015 <sup>24</sup>	1	7	55	F	L	PL	TPN/Octreotide/D—LFD/MCT	—	No	—	No (1 mo)
Jairath et al, 2015 <sup>25</sup>	1	21	59	M	L	PL	LFD/MCT/TPN/SA	No	No	—	No
	3	14–28	24–52	F (2), M (1)	L (3)	PL (3)	LFD/MCT/SA (3), TPN (1)	No	LE, LC (3) floseal, surgical (2)	7–21	No
Guglielmo et al, 2016 <sup>2</sup>	1	3	18	F	L	HL	TPN × 1 wk/somatostatin—HP/LFD	—	No	—	No (1 mo)
Ng et al, 2018 <sup>26</sup>	3	1	26–59	F (2), M (1)	—	PR	LFD/MCT(3), S(2)	—	No	—	No (2 wk)
	1	2	31	M	L	PL	LFD/MCT/S—TPN/D	Yes	LE	36	Recurrence: day 38 (day 79 LA)
Present case report	1	13	54	F	L	PL	LFD/MCT/D/DPD	No	LE	64	No (6 mo)

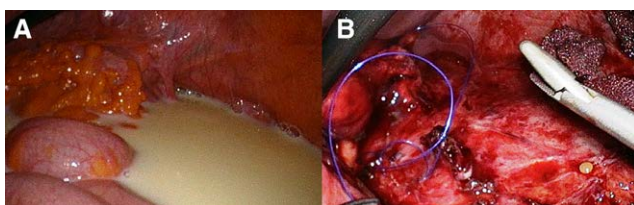
C, argon beam coagulators; D, diuretics; F, female; G, fibrin glue; HL, hand-assisted laparoscopy; HLS, hand-assisted and retroperitoneoscopic; ICD, implantable cardioverter-defibrillator; L, left; LA, laparotomy; LC, laparoscopic clips; LDN, laparoscopic donor nephrectomy; LE, laparoscopic endosuturing; LFD/MCT, low-fat diet with medium-chain triglycerides; M, male; NA, not applicable; PD, percutaneous drainage; PL, pure laparoscopy; PR, pure retroperitoneoscopic; r, right; RDR, retroperitoneoscopic drain repositioning; SA, somatostatin analog; TPN, total parenteral nutrition.

postoperative day 13, she presented with complaints of generalized abdominal pain, and difficulty in breathing and marked abdominal distension. Ultrasonography of abdomen showed a large amount of free fluid in the abdomen which on aspiration was milky white in color. Biochemical analysis revealed pH of 7.22, triglycerides of 986 mg/dL (reference range, <60 mg/dL), protein of 23 g/dL (reference range, <3 g/dL), and presence of chylomicrons was confirmed by Sudan III staining. She was started on low-fat diet and diuretics and underwent paracentesis thrice, 15 days apart starting at postoperative day 14 for symptomatic relief during which 3 to 4 L of chyle was aspirated per session.

The patient was referred to our institute on postoperative day 62 for surgical management. On general physical examination, her vitals were stable but she appeared severely malnourished. Her abdomen was massively distended. Her complete blood counts and renal function tests were within normal limits. She had hypoalbuminemia (total protein, 5.2 g/dL; albumin, 2.2 g/dL). Ultrasonography of abdomen revealed a large collection in all recesses of peritoneal cavity. She was initiated on a high-fat diet for 2 days to aid in identification of leaking chyle duct and taken up for exploratory laparoscopy on postoperative day 64. Laparoscopy was performed in a right lateral decubitus position using one 10-mm port and two 5-mm ports, which were inserted at the previous port site. Intraoperatively 3 L of chyle was drained. The left colon was adherent to renal fossa and a rent in mesocolon was seen which was allowing free flow of chyle into the peritoneal cavity (Figure 1A). The colon was dissected and the lymph leak could be identified near the aorta, cephalad to the origin of the left renal artery. Endosuturing of leaking chyle duct was done by placing figure of 8 Prolene 3-0 thread around it (Figure 1B) and rent in mesocolon was approximated with silk 3-0. No preoperative lymphoscintigraphy was done, and no abdominal drain was placed. The operative repair took 170 minutes. Repeat ultrasound done on postoperative day 3 showed presence of mild ascites for which was a diagnostic tap was performed. This aspirate was transudative in nature due to hypoalbuminemia and did not have high triglycerides content. The patient was discharged on postoperative day 4. The patient had recovered completely and did not have any free fluid in peritoneal cavity at 6 months follow-up.

## DISCUSSION

Laparoscopic donor nephrectomy is the procedure of choice for living renal donation. The most common



**FIGURE 1.** A, Intraoperative image showing collection of milky white fluid (chyle). B, Repair of leaking chyle duct using laparoscopic endosuturing.

complications of LDN include hemorrhage, visceral injury, paralytic ileus, and lung atelectasis. Chyle leak, which is a rare complication after LDN and may go unnoticed intraoperatively because high intra-abdominal pressure created by pneumoperitoneum, can mask leakage from the low-pressure lymph vessels.<sup>9,22</sup> Most of the large series have reported it to be an extremely rare complication (0%–1.83%), but there are 2 reports where a disturbingly high incidence of 3.8% and 6% has been observed.<sup>18,21</sup> The high incidence in these 2 studies could be attributed to the learning curve in a smaller number of patients (146 and 208, respectively). It has been seen that the learning curve and refinements in surgical technique are associated with decrease in the rate of complications in LDN.<sup>27</sup> In all large series of LDN reporting surgical complications, the incidence of chylous leak remains extremely low.<sup>4,7,16,25</sup> In our center, we have performed 2100 LDN until now, with only 1 patient developing CA who recovered with a high-protein, low-fat, medium-chain triglyceride diet.<sup>12</sup>

The patient described in the case report was a middle age female who developed this complication after left LDN. Most of the studies have shown female predilection for this complication. There is a definite female preponderance, which may partly be because of the increased proportion of females volunteering for live donation.<sup>28</sup> All the cases reported in literature so far except one have been reported in left LDN.<sup>18</sup> The majority of the donor nephrectomies (80%–85%) are left sided which can explain the occurrence of CA mainly after left donor nephrectomy.<sup>29</sup> The anatomical distribution of lymphatics is another reason for the difference in incidence among 2 sides. The ascending vertical lumbar lymphatic trunks lie between the aorta and inferior vena cava and no periaortic lymphatic dissection is done in right laparoscopic nephrectomy. Moreover, cistern chyle, which is the dilatation of lumbar lymphatic trunk, is located near aorta which may get injured during left nephrectomy.<sup>18</sup>

Most of the patients presenting with this complication became symptomatic in second postoperative week as was seen in our patient as well<sup>3-6,9,11,13,17,20,22,23</sup> when significant accumulation of fluid occurs. However, in some patients with an abdominal drain, the chyle leak may be detected in the first week.<sup>3,8,17,21,24,26</sup> The present patient was initially managed conservatively on a low-fat diet, diuretics, and paracentesis. Most authors propose the initial management to be conservative consisting of a low-fat diet, medium-chain triglycerides, somatostatin analogs, diuretics, and peritoneal drainage, and total parenteral nutrition (TPN) is often initiated as a second-line therapy.<sup>4,6,7,9,19,26</sup> There are 54 cases of chyle leak reported in literature. The details of all patients except one report of 2 cases were available.<sup>14</sup> Of 52 donors with chyle leak, 40 (76.92%) donors could be successfully treated conservatively.<sup>2-4,7-9,12,13,15-18,20-26</sup> Seven patients required TPN after failed dietary management.<sup>4,6,7,9,19,26</sup> Early use of TPN and octreotide as a first line treatment may lead to improved outcomes of conservative therapy as seen by complete resolution in all the 7 patients managed with this protocol in one series.<sup>21</sup> Lymphangiography +/- sclerotherapy has also been reported to resolve CA an isolated case report. However, it requires special expertise which may not be widely available.<sup>30</sup>

Surgical approach is reserved for refractory cases. The exact duration of conservative therapy is not clear. All patients who required surgery ( $n = 12/52$ , 23.08%) were initially treated with low-fat diet, medium-chain triglycerides, diuretics, and somatostatin analog for a mean duration of  $36.1 \pm 19.07$  days.<sup>4-6,10,11,17,19,25,26</sup> The present case had developed severe hypoalbuminemia during 2 months of conservative therapy when she was taken up for exploratory laparoscopy because of persistent chyle ascites. Patients with CA can develop serious nutritional, mechanical, and immunological consequences because of persistent loss of protein and lymphocytes. Therefore, in patients with a large amount of leak as in the present case, early surgical intervention can minimize the prolonged morbidity and need for frequent therapeutic interventions in postoperative period.<sup>26</sup>

Recurrence of CA after surgical exploration has been described in 2 patients, of which one was managed conservatively with dietary modification, whereas the other required a relaparotomy.<sup>11,26</sup> Different modalities have been suggested to help in intraoperative localization of leak for successful resolution of CA. These include ingestion of high-fat diet or milk before surgery as it stimulates chyle production or injection of intravenous indigo carmine during surgery. The most critical step in surgical repair is to identify the site of chyle leak point. A high-fat diet was instituted for 2 days before surgery in this patient, which resulted in accurate identification of the leaking chyle duct and endosuturing of leaking chyle duct could be successfully performed. The various surgical modalities described in the literature are laparoscopic endosuturing/laparoscopic clips application with adjunctive floseal or fibrin glue application.<sup>4-6,10,11,19,25,26</sup> The use of argon beam coagulation has also been described.<sup>5,6</sup> The present case shows that with accurate localization, suturing alone is sufficient to control CA.

Specific precautions have been advocated to minimize the rate of chyle leak after LDN. The left renal hilum is surrounded by well-developed lymphatic network which often opens into the cisterna chyle. This makes it mandatory to free the renal vessels from the surrounding lymphatic tissue. Remaining close to the renal artery during dissection can prevent injury to the lymphatic vessels. Injury to large lymphatic vessels, which are easy to overlook, may occur, particularly during dissection of tissue medial to the renal vascular pedicle. These lymphatics can be ligated with small clips, bipolar cautery or direct suturing to minimize risk of developing CA.<sup>9</sup> Overcauterization may lead to thermal damage or vasospasm of renal vessels. On the contrary the use of monopolar, bipolar, or ultrasound coagulation has been also reported to increase incidence of chyle leak.<sup>18</sup> Meticulous clipping of all perihilar and retroperitoneal tissue during renal pedicle dissection has also been advocated to minimize incidence CA. However, extensive application of endoclips to ligate lymphatics can interfere with application of stapler during retrieval. The incidence of CA might actually be related to the surgical technique rather than bipolar coagulation or clipping. At our center, the incidence is extremely low even with use of use of monopolar cautery and harmonic stapler rather than clips for dissection around renal hilum. Avoid entering into lymphatic tissue along with the aorta while lifting the ureter/gonadal complex in periaortic region, staying

close to renal artery, and no dissection around the aorta above the renal vein might be reasons for a low rate of CA at our center.

## CONCLUSIONS

Chylous ascites is a rare complication after donor nephrectomy in experienced centers. Although conservative management remains the first line of treatment, early surgical treatment shall be undertaken in cases of massive ascites.

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