Laparoscopy and Robotics

Management Protocol for Chylous Ascites After Laparoscopic Nephrectomy

Ankush Jairath, Abhishek Singh, Arvind Ganpule, Shashikant Mishra, Ravindra Sabnis, and Mahesh Desai

OBJECTIVE To devise a management protocol for chylous ascites after laparoscopic nephrectomy.

PATIENTS AND METHODS We retrospectively reviewed the data of the patients that underwent laparoscopic nephrectomy between January 2010 and January 2014 in our institution for different indications and were diagnosed with chylous ascites. We also analyzed a different management protocol that was used.

RESULTS The overall incident rate of chylous ascites was 0.77%. It was more commonly seen on left side and with simple nephrectomy rather than radical. Three out of 9 patients were managed by surgical intervention, rest were successfully managed on conservative treatment in the form of dietary modification, total parenteral nutrition, or octreotide.

CONCLUSION Chylous ascites is a rare but morbid condition following laparoscopic nephrectomy. To manage this complication, we propose preventive and treatment strategies based on symptoms and amount of chylous ascites using our experience and review of the literature.

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Chylous ascites is the accumulation of chyle in the peritoneal cavity1,2 and represents one of the uncommon complications after retroperitoneal surgery. It has been reported after laparoscopic nephrectomy with a variable incidence ranging from 0.6% to 5.9%,3-5 incidence being higher in radical as well as in donor nephrectomies.

Although most of the cases can be managed conservatively,6 some of them need invasive and aggressive approach in order to correct the chylous leakage and prevent the devastating complications related to malnutrition and infection.1

Chylous ascites is a rare occurrence after laparoscopic nephrectomy and has diverse management option with lack of uniformity in treatment patterns. We propose a management protocol for this challenging complication based on our institutional experience.

PATIENTS AND METHODS

We retrospectively reviewed the data of the patients that underwent laparoscopic nephrectomy in our institution for different indications, ranging from donor to simple and radical nephrectomies.

In the patients that presented with chylous ascites following the procedure, clinical parameters as well as management protocol were retrospectively reviewed and outcomes were evaluated.

We used the following management options in our patients:

1. Dietary management:
   Patients were put on total restriction of long-chain fatty acids. Medium-chain triglycerides (MCT) powder or MCT oil of 5 g or 5 mL, respectively, thrice a day (TDS) was started and increased to 15 mL or 15 g TDS if needed. MCT was mixed with lime water/Gatorade/Enerzal to make it palatable. This provided 350-400 kcal energy. The target protein intake was 2 g/kg. Rest of energy requirements were met with carbohydrate intake.

   We started the following dietary regimen for 2 weeks: 2 egg white with 200 mL Amul toned fat-free milk (100 calories and 15 g protein) TDS (300 calories), half-cup boiled potatoes with added salt in the morning and evening (150 calories), 1 bowl boiled vegetables, such as cauliflower, french beans, carrot, peas, twice a day (100 calories per serving) plus one-and-a-half bowl rice (150 calories) with 1 bowl green grams (350 calories, 63 g carbohydrates, 24 g protein) twice a day. With this diet we supplemented multivitamins, essential fatty acids, and micronutrients.

2. Injection octreotide 100 mcg subcutaneous TDS
3. Total parenteral nutrition (TPN)
4. Laparoscopic surgical ligation of lymphatics

RESULTS

Between January 2010 and January 2015, we performed 1156 laparoscopic nephrectomies, including 649 live donor, 330 simple, and 177 radical procedures. Nine cases of postoperative chylous ascites were diagnosed, with a total incidence of 0.77%. Average time of presentation was 17 days post surgery. Majority of this complication was seen after simple and donor nephrectomy, while 1 case of radical nephrectomy also presented with chylous ascites (Table 1).

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<table>
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<th>Case</th>
<th>Age (years)/sex</th>
<th>Primary Procedure</th>
<th>Presentation</th>
<th>Initial Management</th>
<th>Final Management</th>
<th>Outcome</th>
</tr>
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<td>1</td>
<td>41/M</td>
<td>B/L laparoscopic pre transplant native kidney nephrectomy</td>
<td>Chylous fluid on 4th POD from drain</td>
<td>Octreotide with dietary restriction</td>
<td>Continued the same conservative treatment</td>
<td>Drain output gradually decreased. Patient was discharged on 14th POD</td>
</tr>
<tr>
<td>2</td>
<td>45/M</td>
<td>Renal allograft transplant recipient status post B/L laparoscopic pretransplant native kidney nephrectomy for ADPKD</td>
<td>Chylous fluid on 1st POD from drain</td>
<td>NBM with TPN and octreotide</td>
<td>Continued the same conservative treatment</td>
<td>Drain output gradually decreased. Patient was discharged on 22nd POD</td>
</tr>
<tr>
<td>3</td>
<td>59/M</td>
<td>Laparoscopic left donor nephrectomy</td>
<td>Abdominal distention and gross ascites on 21st POD</td>
<td>Drain placement with stat output of 4500 mL and subsequent daily output was &lt;500 mL/day. In addition, patient was kept NBM and TPN was given for 1 week</td>
<td>Octreotide with dietary restriction</td>
<td>Drain output gradually decreased. Patient was discharged on 14th post drain placement</td>
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<td>4</td>
<td>45/F</td>
<td>Laparoscopic left donor nephrectomy</td>
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<td>Surgical intervention with octreotide and dietary modification</td>
<td>Drain was removed on 3rd day after ligations of lymphatics and patient was discharged on 4th POD</td>
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<td>5</td>
<td>42/M</td>
<td>Renal allograft transplant recipient status post B/L laparoscopic native kidney nephrectomy for recurrent pyelonephritis</td>
<td>Accidental peritoneal rent during transplant 1 month after B/L pretransplant nephrectomy</td>
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<td>Octreotide with dietary restriction</td>
<td>Drain output gradually decreased. Drain was removed on 14th day post placement</td>
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<td>6</td>
<td>44/F</td>
<td>Laparoscopic left simple nephrectomy done for nonfunctioning kidney secondary to stone disease</td>
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<td>Octreotide with dietary restriction</td>
<td>Octreotide with dietary restriction</td>
<td>Ascites resolved over 6 weeks</td>
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<td>7</td>
<td>24/M</td>
<td>Laparoscopic left donor nephrectomy</td>
<td>Abdominal discomfort and moderate ascites on 14th POD</td>
<td>Octreotide with dietary restriction for 3 weeks but discomfort and ascites increased</td>
<td>Surgical intervention with octreotide and dietary modification</td>
<td>Drain was removed on 4th day after ligations of lymphatics and patient was discharged on 5th day.</td>
</tr>
<tr>
<td>8</td>
<td>72/F</td>
<td>Laparoscopic left radical nephrectomy</td>
<td>Mild abdominal discomfort and mild ascites on 30th POD</td>
<td>Octreotide with dietary restriction</td>
<td>Octreotide with dietary restriction</td>
<td>Ascites resolved over 4 weeks</td>
</tr>
<tr>
<td>9</td>
<td>52/F</td>
<td>Laparoscopic left donor nephrectomy</td>
<td>Abdominal distention with port site milky discharge</td>
<td>Patient was kept NBM, TPN was started in addition to subcutaneous somatostatin but</td>
<td>Required surgical intervention in view of difficult wound management and persistent discharge</td>
<td>Patient was discharged on 4th POD after surgical ligation of lymphatics</td>
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ADPKD, autosomal dominant polycystic disease; B/L, bilateral; F, female; M, male; MCT, medium-chain triglycerides; NBM, nil by mouth; POD, postoperative day; TPN, total parenteral nutrition.
Several strategies were used (Table 1) and the choice was made by the clinical judgment of the urology team in charge. Among the 9 patients diagnosed to have chylous ascites (Table 1), 2 were diagnosed on the evaluation of fluid from a preplaced drain. One of the patients was a transplant recipient who had undergone bilateral pretransplant nephrectomy, and on first postoperative day after right iliac fossa transplant started draining chylous fluid from drain (Fig. 1A), with a daily output of around 500 mL/day. The patient was managed with TPN with octreotide injection followed by dietary management. The other patient responded well to octreotide and dietary modification.

Another patient who was also a prospective transplant recipient (had undergone a bilateral pretransplant nephrectomy, asymptomatic in postnephrectomy and pretransplant period), was diagnosed with chylous ascites during renal transplant intraoperatively when accidentally peritoneum got opened. In this patient a drain was kept intraoperatively, dietary modification and octreotide were started postoperatively and the patient settled with this management.

Four patients presented with abdominal distension. Ultrasonography was suggestive of ascites in all these cases. Out of these, 2 patients underwent a percutaneous drain placement under local anesthesia as they had moderate-to-severe ascites and drain fluid was further evaluated to confirm chyle. One of them was managed initially by TPN but finally required surgical intervention. The other one was successfully managed on TPN. The third patient underwent paracentesis as he had mild-to-moderate ascites. Fluid evaluation confirmed the diagnosis, and he was successfully managed with octreotide and dietary restrictions. Fourth patient presented with milky discharge from one of the port site 2 weeks following laparoscopic live donor nephrectomy. He was initially managed conservatively on TPN and octreotide (given for a week), but in view of persistent discharge, nonimprovement of symptoms, and difficult local wound management finally required laparoscopic exploration and ligation of lymphatics.

Two patients presented with vague abdominal discomfort, feeling of fullness in abdomen, and early satiety. On ultrasonography both were found to have ascites and underwent paracentesis and fluid evaluation to confirm the diagnosis. They were started on dietary management and octreotide. One responded favorably; however, the other patient had progressive increase in ascites that necessitated lymphatic ligation (Fig. 1A-D).

**COMMENT**

Although the principal cause of postoperative chylous ascites is abdominal aortic surgery, transabdominal spinal approaches as well as gynecologic and urologic procedures have also been described as case series and single case reports.
The incidence of chylous ascites following laparoscopic nephrectomies varies from 0.6% to 5.9% and is usually related to radical procedures that include wide dissection and sometimes lymphadenectomy or with living donor nephrectomies in which extensive dissection is made over the aorta and/or inferior vena cava in order to obtain the maximal length of the renal vessels. In the series published by Kim et al in 2010, the incidence stratified by the type of procedure showed a clear higher risk in these two procedures that reached more than 6%; while simple and partial nephrectomies had incidence of 1.1% and 2.6%, respectively.\(^2\)

The proposed cause for the increased incidence in laparoscopic nephrectomy is attributed to the inability to tie all the tissue and use of hook with cautery to clear the fibro-fatty tissue around the renal vessels. While dissecting the fibro-fatty tissue the plan should be to split the tissue with sequential clipping. When large lymphatics are encountered they are split into smaller chunks, then clipped and further divided.

When the patients from endemic areas (where tropical diseases affecting the lymphatic system are common) undergo these procedures, the rate of lymphatic leak may be significantly higher. In our series, 2 out of 9 patients belonged to endemic areas where filariasis was common. Obvious lymphatic leak on table while doing a laparoscopic surgery may also indicate propensity of development of chylous ascites.

In our series 4 patients underwent simple nephrectomy (3 being bilateral procedures), 4 underwent donor nephrectomy, and 1 radical procedure. This discrepancy with previous reports may be as a result of the small number of cases evaluated or the fact that many simple nephrectomies performed in our center are due to kidneys severely damaged because of stone disease and repeated infections, often requiring wide dissections, including lymph nodes and lymphatic vessels. This is in contrast to open surgery where we can go subcapsular or serially clamp, cut, and ligate in difficult cases.

Majority of our patients presented with abdominal symptoms or with high characteristic output through the preplaced abdominal drain. One patient presented with chylous discharge through the surgical wound. In some centers the abdominal drain is placed routinely after every laparoscopic nephrectomy,\(^2\) allowing the prompt diagnosis and treatment of this condition. We routinely do not place a drain but believe that drain should be placed in high-risk individual, that is, patients having prominent lymphatic, milky discharge on transection of lymphatics, paracentesis is both diagnostic and therapeutic. However, it should be used judiciously as it carries the risk of infectious complications, which can further deteriorate nutritional and immunological status of the patient. The placement of a percutaneous drain is often necessary but should always be coupled with other conservative measures, otherwise the permanent drain can prolong the leakage.

Dietary modification is the simplest and first treatment usually adopted. It includes high-protein, MCT diet, low-fat intake, and salt restriction. As an only treatment, it can solve up to 50% of the mild cases of chylous ascites. This dietary intervention should be continued for several months after resolution in order to prevent recurrences.\(^1\)

Some authors recommend the use of TPN from the time of diagnosis.\(^2\) Our tendency is to avoid it as long as the patient is tolerating an adequate calorie intake as the parenteral nutrition itself carries some risk. Nevertheless, in cases not responding to dietary modification or in those patients with poor nutritional status, TPN is highly advised.

The use of somatostatin and its analogs is gaining popularity, although its mechanism of action is yet unclear. The analogs, octreotide and lanreotide, effectively reduce the lymphatic drainage and lead to early resolution.\(^9\) The dose of octreotide can be started at 100 μg TDS and can be progressively increased up to 200 mcg according to the response.\(^9\) In our series, all the patients were treated with somatostatin analog as one of the primary measures.

Other drugs such as etilefrine and iodinated dye have been described in isolated cases but still there is no enough evidence to recommend them. Their use is currently restricted to clinical trials only.\(^10,11\)

Surgical intervention is reserved for those patients who do not respond to conservative measures, but its timing remains controversial. Many authors agree that a nonoperative approach for at least 4 weeks is warranted, while some advice to wait even for 12 weeks.\(^2\)

In cases with chylous ascites after bilateral nephrectomy, intraoperative findings, such as oozing lymphatics, dense fibro-fatty tissue, site of more extensive lymphatic dissection, or removal, during the primary surgery can give a clue about the site of leakage whether left or right. Moreover, if a drain is kept it can give a fair idea of side of leak. In the absence of the above, a lymphoscintigraphy and lymphangiogram should be done.
<table>
<thead>
<tr>
<th>Author</th>
<th>No. of Cases</th>
<th>Age (Years)/Sex</th>
<th>Primary Intervention</th>
<th>Presentation</th>
<th>Management</th>
<th>Outcome</th>
</tr>
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<tbody>
<tr>
<td>Sharma et al&lt;sup&gt;15&lt;/sup&gt;</td>
<td>1</td>
<td>60/F</td>
<td>Left laparoscopic donor nephrectomy</td>
<td>7th POD with abdominal symptoms</td>
<td>MCT with elementary diet</td>
<td>Resolved over 4 weeks</td>
</tr>
<tr>
<td>Gagliano et al&lt;sup&gt;16&lt;/sup&gt;</td>
<td>1</td>
<td>44/F</td>
<td>Left laparoscopic donor nephrectomy</td>
<td>Abdominal distention, pain, and dyspnea on 16th POD diagnosed with gross ascites</td>
<td>Percutaneous drain placement with MCT, diet modification, and spironolactone</td>
<td>Resolved over 4 weeks</td>
</tr>
<tr>
<td>Bachmann et al&lt;sup&gt;17&lt;/sup&gt;</td>
<td>1</td>
<td>59/F</td>
<td>Left laparoscopic Retroperitoneoscopy donor nephrectomy</td>
<td>Abdominal pain, diarrhea, and gross ascites on 8th POD</td>
<td>Initial percutaneous drain placement but requires laparoscopic drainage with diet modification and somatostatin</td>
<td>Success</td>
</tr>
<tr>
<td>Geary et al&lt;sup&gt;13&lt;/sup&gt;</td>
<td>1</td>
<td>44/F</td>
<td>Hand-assisted donor nephrectomy</td>
<td>Abdominal distention and loss of appetite with gross ascites on 14th POD</td>
<td>Initially MCT, TPN, and somatostatin, but in view of nonimprovement after 1 week of conservative management, hand-assisted ligation of lymphatics was done</td>
<td>Patient was discharged on 4th POD</td>
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<tr>
<td>Molina et al&lt;sup&gt;12&lt;/sup&gt;</td>
<td>1</td>
<td>45/F</td>
<td>Left laparoscopic donor nephrectomy</td>
<td>Abdominal distention, dyspnea, and gross ascites on 13th POD</td>
<td>Initially managed by TPN with somatostatin then percutaneous drain placement followed by laparoscopic lymphatic ligation in view of nonimprovement even after 10 weeks</td>
<td>Success after surgical intervention</td>
</tr>
<tr>
<td>Caumartin et al&lt;sup&gt;18&lt;/sup&gt;</td>
<td>1</td>
<td>48/F</td>
<td>Left laparoscopic donor nephrectomy</td>
<td>Abdominal distention and dyspnea on 10th POD diagnosed with gross ascites</td>
<td>Initially managed by TPN and somatostatin. Patient responded and was discharged on MCT with diet modification. But patient readmitted due to reaccumulation of ascites fluid and finally required laparoscopic lymphatics ligation. Postoperative recurrence of ascites was managed by paracentesis, MCT, and dietary modification</td>
<td>Success after surgical intervention and paracentesis thereafter</td>
</tr>
<tr>
<td>Aerts et al&lt;sup&gt;19&lt;/sup&gt;</td>
<td>1</td>
<td>50/M</td>
<td>Left laparoscopic hand-assisted donor nephrectomy</td>
<td>Abdominal distention, pain with gross ascites on 26th POD</td>
<td>Initially managed by percutaneous drain placement (12.275 L output over first 24 hours), MCT, and diet for 1 week followed by TPN after failure for 3 weeks. But required laparoscopic lymphatics ligation</td>
<td>Success after surgical intervention</td>
</tr>
<tr>
<td>Sharma et al&lt;sup&gt;20&lt;/sup&gt;</td>
<td>1</td>
<td>48/M</td>
<td>Left retroperitoneoscopic donor nephrectomy</td>
<td>Left flank pain, swelling, fever, nausea, and vomiting on 14th POD</td>
<td>Initially drain placement with immediate output of 1.6 L and subsequent 500 mL/day. This was followed by octreotide and dietary management</td>
<td>Resolves over a week</td>
</tr>
<tr>
<td>Meulen et al&lt;sup&gt;21&lt;/sup&gt;</td>
<td>1</td>
<td>34/F</td>
<td>Laparoscopic hand-assisted left donor nephrectomy</td>
<td>Abdominal bloating and constipation on 12th POD</td>
<td>Initially paracentesis followed by octreotide, MCT, and dietary modification</td>
<td>Resolves over a week</td>
</tr>
</tbody>
</table>

Abbreviations as in Table 1.
In general (on the basis of review of literature combined with our own experience), it has been observed that patients with a constant drain output of more than 1000 mL per 24 hours are the candidates that are unlikely to respond to conservative management and eventually needed surgical intervention.

In our series, 3 patients needed surgery: first one that did not respond after 1 week of conservative therapy, the second patient who presented with port site chylous discharge along with difficult local wound management, and the third one who had progressive ascites even after 3 weeks on octreotide and dietary management.

All the 3 patients were successfully managed by laparoscopy, clipping all the perihiliar lymphatic tissue. In these cases we prepared the patient by giving them 50 g butter orally, a night prior to surgery to delineate oozing lymphatics better during surgery. Intraoperatively, after peritoneoscopy all the chyle was sucked out. The colon was reflected medially. In 1 case colon was densely stuck laterally. In this particular case, bowel was Freed and reflected medially by sharp dissection using scissors. Care was taken to dissect away from lateral border of colon. Resultant bleeding was managed using diathermy once colon was away.

Figure 2. Proposed management protocol to manage chylous ascites. (Color version available online.)

In our series, 3 patients needed surgery: first one that did not respond after 1 week of conservative therapy, the second patient who presented with port site chylous discharge along with difficult local wound management, and the third one who had progressive ascites even after 3 weeks on octreotide and dietary management.

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**Proposed Algorithm**

**Category 1:** Diagnosed on the basis of pre-placed drain. 
- A. If drain output < 500 cc/day- Dietary management + octreotide, 
- B. If drain output > 500-1000 cc/day-TPN + octreotide, 
- C. If drain output > 1000 cc/day for > 48 hours (irrespective of the initial output immediately after per cutaneous drain placement) - surgical treatment.

**Category 2:** A. Mild to Moderate ascites: Paracentesis: If it refills in 48 hrs and no relief of symptoms- place a drain, B. Moderate to severe or tense ascites: Place an abdominal drain follow the further management as per daily drain output.

**Establish the diagnosis:** Category 1: Drain fluid by gross appearance and examination for triglycerides (more than 5-8 times diagnostic). **Category 2:** Paracentesis: establish diagnosis by gross appearance and examination for triglycerides (more than 5-8 times diagnostic).

Baseline Investigations other than diagnostic: Hemogram, Total proteins, S. Albumin, S. Globulin, S. Lipids, S. Electrolytes.

**Diet plan:** Near Total restriction of long chain fatty acids. Start MCT powder/MCT oil :: 5gm/5ml TDS, can increase to 15ml/15gm TDS. **Lipids:** MCT should be made palatable by mixing with: lime water / Gatorate / Enerzal. This will provide 350-400 Kcal. **Proteins:** Target daily intake 2 grams/kg. Rest of energy requirements are met by carbohydrate intake.

**Monitor drain output:** Remove once it is less than 50 cc

**Monitor on serial ultrasound:** In case Paracentesis is done

**Dietary restriction to be followed till 6 weeks post improvement**

**Laparoscopic surgical exploration:** Patient to have 50 grams of butter 5 hours prior to surgery for easy identification of lymphatics. The lymphatics are seen leaking and thus can be easily clipped. All the tissue in the renal bed is serially clipped or suture ligated.

**Role of Lymphangiogram followed by glue embolization:** In cases where site of leak is difficult to establish (B/L Nephrectomy)
of psoas was followed cranially till oozing lymphatics were seen (Fig. 1A). However, there were dense adhesions encountered in all the cases. After oozing lymphatics were visualized, they were clipped using Weck clips. All the fibro-fatty tissues around the great vessels and the renal hilum were clipped. Larger oozing lymphatics were sutured using Vicryl on CT-1 needle with Weck clip attached at one end (Fig. 1B). Surgicel bolster (Fig. 1C) and Floseal (Fig. 1D) were also used in 2 cases. Postoperative outcome was uneventful and the patients were discharged after the surgery when drain output became vented; hence, the surgeons operating in the retroperitoneal area followed cranially till oozing lymphatics were visualized, they were clipped using Weck clips. All the encountered in all the cases. After oozing lymphatics were sutured with this approach, although more studies are needed to validate this procedure.

Molina et al.12 presented the first report of laparoscopic management of chylous ascites after donor nephrectomy. As no obvious chyle leakage was evident, they applied several clips in the perihiliar area followed by argon beam coagulation and fibrin glue. In 2004, Geary et al.13 also described a case of laparoscopic management of chylous ascites in which they were able to identify the source of the leak and the leak was controlled by intracorporeal suturing and bipolar electrocautery. As the expertise in laparoscopic approach continues to increase, and considering the advantages of the magnified view and the minimal invasion, the indication of laparoscopy in the management of these cases becomes more evident each day.

Peritoneovenous shunts have been performed as an alternative to invasive approach, especially in those patients with high volume losses and poor performance status that are not able to undergo surgery and need a prompt resolution. Nevertheless, serious complications such as fat emboli, disseminated intravascular coagulation, and sepsis have been reported. For the same reason, this procedure is reserved only for those cases not suitable for surgery.7

Cope et al.14 described successful embolization of the major retroperitoneal lymphatic ducts through a transabdominal percutaneous puncture in 4 of 5 patients treated with this approach, although more studies are needed to validate this procedure.

Chylous ascites is a complication that can be prevented; hence, the surgeons operating in the retroperitoneum must recognize the value of ligating and securing all the lymphatics with clips surrounding the major vessels and the renal hilum.

There is a lot of nonuniformity in the management protocols and literature is also scant. Even in large series presented by Kim et al.,2 where they have reported 32 patients with incidence rate of 5.1%, they lack definite management protocol. Therefore, based on our experience (Table 1) and thorough review of the literature (Table 2), we would like to propose the algorithm depicting management plan following chylous ascites (Fig. 2).

Prevention and early detection strategies (Supplementary Fig. 1):

1. Consider preoperative factors like endemicity for lymphatic disease.
2. Split and clip the lymphatic tissue.
3. Use Vicryl on CT-1 needle (rescue stitch-like stitch) to suture the oozing lymphatics; Floseal may be used as an adjuvant.
4. Check high-risk individuals (obese, or patients who underwent extensive lymphadenectomy, or obvious leaking of lymphatics on table while doing a laparoscopic surgery) at the end using laparoscopy carefully.
5. Place drain in high-risk individuals.

Operative strategies (Supplementary Fig. 1):

1. Prepare patient well with 50 g butter 6 hours prior to surgery.
2. Expect dense adhesions.
3. Clip all the hilar and perihilar lymphatic tissues.
4. Use Vicryl on CT-1 needle (rescue stitch-like stitch) to suture the oozing lymphatics. Surgicel and Floseal may be used as adjuvants.

The limitation of this study is that it is a retrospective study, with small number of patients. Moreover, the suggested protocol needs to be validated in multicenter studies.

CONCLUSION

Postoperative chylous ascites, although uncommon, is a highly morbid complication of laparoscopic nephrectomy that demands prompt recognition and early treatment, as it can have severe deleterious consequences for the patient. A systematic protocol should be followed in the management of the same. On the basis of our experience, we would like to suggest that all patients draining more than 1000 mL chyle per day for 48 hours or more should be taken up for surgical repair and other patients should be started on conservative management. It is highly recommended that the careful clipping of all the perihiliar and retroperitoneal fatty tissue during the dissection of the great vessels should be done and drain should be placed in high-risk patients for early identification of the disease.

References


**APPENDIX**

**SUPPLEMENTARY DATA**

Supplementary data associated with this article can be found, in the online version, at http://dx.doi.org/10.1016/j.urology.2015.06.001.