JOURNAL OF LAPAROENDOSCOPIC & ADVANCED SURGICAL TECHNIQUES
Volume 00, Number 00, 2021
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DOI: 10.1089/lap.2021.0047

Intraperitoneal Ultrasound-Guided Safe Laparoscopic Fenestration of Lymphocele After Kidney Transplantation

Huseyin Bakkaloglu, MD,[1] Adem Bayraktar, MD,[1] Mesut Bulakci, MD,[2] and Ali Emin Aydin, MD[1]

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Abstract

Background: Lymphocele is a common complication after kidney transplantation, which does not require treatment unless it is symptomatic. In this study, we aimed to evaluate the incidence, clinical symptoms, treatment choices, and success of different treatment methods of symptomatic lymphocele.
Materials and Methods: We evaluated 168 patients who had kidney transplantation between January 2012 and January 2020. Patients with decreased kidney functions due to lymphocele formation during the clinical follow-up were included in the study. External drainage catheter was placed in all patients, except one. In case of treatment failure with external drainage, laparoscopic fenestration guided by intraperitoneal ultrasonography was performed. Clinical symptoms and success rates of treatments were evaluated.
Results: Symptomatic lymphocele requiring interventional treatment was detected in 15 (8.9%) of 168 renal transplant patients. All of the symptomatic lymphocele cases had increased serum creatinine levels, whereas 10 had decreased urine volume, 4 had abdominal discomfort, and 2 had ipsilateral lower extremity edema. External drainage catheter was placed as the first-line treatment in 13 patients. In 6 cases, due to treatment failure with external drainage and in 2 patients as a first-choice treatment, laparoscopic fenestration was performed. No lymphocele recurrence was observed during follow-up.
Conclusion: Among various methods defined in the treatment of lymphocele, use of laparoscopic fenestration is increasing because of its high success rate and advantages over other methods. Intraperitoneal ultrasound-guided laparoscopic fenestration is a useful and safe method that can be performed as a first-choice treatment since it eliminates the risk of organ injury or bleeding.

Keywords: laparoscopic fenestration, lymphocele, intraperitoneal ultrasound

Introduction

Kidney transplantation is the most physiological and most efficient treatment for end-stage renal failure. Lymphocele is the accumulation of lymphatic fluid around the kidney after kidney transplantation and is one of the most common complications. Although the etiology of lymphocele is not clear, it is emphasized that it occurs due to altered lymphatic flow in the graft and the host after surgical intervention.[1–3] Lymphocele formation occurs frequently in the first 12 weeks after transplantation.[4,5] The prevalence of lymphocele varies between 7% and 51% in the literature.[6–9] The variability in the prevalence is due to the differences in the definition and diagnostic criteria of lymphocele. The frequency of clinically significant lymphocele was reported to be 20%.[7,8]

High doses of corticosteroids, acute cellular rejection, surgical dissection, immunosuppression, and diuretics are risk factors for lymphocele formation.[1,10] Lymphocele is usually clinically asymptomatic and no surgical intervention is needed.[11,12] If it compresses urinary collecting system or blood vessels and causes a decrease in urine volume and an increase in serum creatinine level, a surgical intervention is applied for lymphocele.[12] In this study, we aimed to evaluate the frequency, clinical symptoms, treatment choices, and success of different treatment methods of symptomatic lymphocele in our patients.

Materials and Methods

We evaluated 168 patients who had kidney transplantation between January 2012 and January 2020. One hundred nine of 168 kidney transplantions were from cadaver donors and 59 were from living donors. Female/male ration was 70/98. In our center, induction therapy was performed with

Departments of [1]General Surgery and [2]Radiology, Istanbul Faculty of Medicine, Istanbul University, Istanbul, Turkey.

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corticosteroids and antithymocytic globulin ± basilimab in cadaver donor kidney transplants. As the maintenance therapy was tacrolimus, mycophenolate mofetil (MMF) and corticosteroids were administered. In living donors, no induction treatment was done and immunosuppressive treatment consisted of triple therapy with tacrolimus, MMF, and corticosteroids.

The kidney was transplanted extraperitoneally to the left or right iliac fossa. In the surgical technique, the artery and vein were anastomosed to the external iliac artery and vein with end to side anastomosis technique, and the ureter was anastomosed to the bladder with the Gregoir-Lich technique with antireflux mechanism. During the transplantation, a single drain was placed around the anastomosis of the ureter extending close to the iliac artery and vein. The drainage catheter was withdrawn when the amount of drainage fell below 30 mL/day.

In our center, if an abnormality in the kidney function tests were detected during the early postoperative follow-up or outpatient follow-up, first imaging modality of choice was Doppler ultrasonography to evaluate renal vascular structures and fluid collection around the kidney. In the presence of a fluid collection that negatively affected the kidney functions, cross-sectional imaging with computed tomography (CT) or magnetic resonance imaging was performed and then the fluid collection was drained by ultrasound-guided placement of external drainage catheter under local anesthesia. Measurement of creatinine levels to differentiate lymphocele from urinoma and fluid culture antibiogram of the drained fluid were routinely performed. After confirming that the collection was lymphatic fluid, daily fluid flow rate was monitored and the catheter was withdrawn when the flow rate decreases below 50 mL.

Until 2012, in the absence of a decrease in the flow rate during the first 15–20 days of follow-up, the instillation of a sclerosing agent was used as a second-choice treatment option for lymphocele. However, with sclerotherapy, we could not achieve the same success rates mentioned in the literature[13]; therefore, since 2012, we quitted performing sclerotherapy and began to perform laparoscopic fenestration.

Laparoscopic fenestration surgery was performed under general anesthesia. A 1.5 cm incision was made below the umbilicus and followed by a pneumoperitoneum formed with a Veress needle and then a 10 mm camera port was placed in the abdomen and a 12 mm port was placed lateral to the umblicus, ipsilateral to the transplant, and a 5 mm port was placed to the contralateral side. If adhesions were present, they were dissected. After the dissection of adhesions, the intraperitoneal evaluation of the extraperitoneally transplanted kidney site was performed by a radiologist with an ultrasound probe (Aloka Prospund 5Sx; 7.5 MHz Linear Laparoscopic Probe, Hitachi, Japan) inserted into the 12 mm port.

During the evaluation, first, the renal parenchyma, ureter, renal artery, and vein were identified ultrasonographically and then the boundaries of the lymphocele were determined, and with Doppler investigation, peritoneal small arterial, and venous structures were evaluated. Then, the most suitable and safe region for fenestration was selected and a 3×3 cm window was opened in the extraperitoneal space and lymphatic drainage into the peritoneal cavity was provided (Fig. 1). Out of 168 kidney transplant patients, 15 patients with symptomatic lymphocele were included in the study and the clinical symptoms, treatment modalities, and the success rate of treatment were investigated. The study was approved by the local ethics committee.

Results

The lymphocele is usually detected incidentally during routine imaging procedures and patients are often asymptomatic. Most cases disappear spontaneously and no intervention is required for treatment. In the presence of lymphocele, which negatively affects kidney functions, interventional treatment is inevitable. Symptomatic lymphocele requiring interventional treatment was detected in 15 (8.9%) of 168 renal transplant patients. All of these patients had cadaveric donor kidney transplantations.

Clinical symptoms of symptomatic lymphocele include urinary retention, abdominal discomfort, venous thrombosis, ipsilateral lower extremity edema, wound opening, and lymphorrhagia.[14,15] In our study, all of the 15 symptomatic lymphocele cases (100%) had increased serum creatinine levels, whereas 10 (67%) cases had decreased urine volume, 4 (27%) cases had abdominal discomfort, and 2 (13%) cases had ipsilateral lower extremity edema. Ultrasonographic imaging in patients revealed lymphocele causing urinary retention.

In our study, external drainage catheter was placed as the first-choice treatment in 13 out of 15 patients with symptomatic lymphocele. In 7 out of 13 patients (54%), the catheter was withdrawn when a sufficient decrease in the flow rate was achieved after a mean of $10.1^{7–13}$ days. In only 1 patient, the drainage catheter was placed again due to recurrence of lymphocele. In our study, in 5 cases, external drainage catheter was withdrawn since there was no decrease in the daily lymphorrhagia amount $17.6^{16–19}$ days after catheter placement and laparoscopic fenestration was performed. In addition, laparoscopic fenestration was performed as the first-choice treatment in 2 patients who had abdominal discomfort and elevated serum creatinine level 3 months after the transplantation and were diagnosed with lymphocele.

In all 8 patients who underwent laparoscopic fenestration treatment, oral intake was allowed at the eighth hour and patients were discharged on the second day, except 1 patient. Only 1 patient had abdominal pain without any gastrointestinal dysfunction and with normal serum leukocyte and C-reactive protein levels, and was discharged with full recovery after 4 days.

Control ultrasonography was performed in all patients who underwent an intervention due to symptomatic lymphocele at 3 months after the procedure and no recurrence of lymphocele was observed. There was no recurrence during the follow-up period varying between 5 months and 3 years with a mean of 25.8 months.

Discussion

Lymphocele, which is one of the most common complications after kidney transplantation, often does not require treatment, but a delay in the treatment of symptomatic lymphocele, which negatively affects kidney functions, may result in graft loss. In our study, the frequency of symptomatic lymphocele after kidney transplantation was 8.9%. Several treatment modalities with different success rates are used to treat symptomatic lymphocele.[16] Factors such as the severity of symptoms, size of the lesion, potential complications after treatment, clinical status of the patient and department-defined standards are important when choosing a treatment method.[9]

The most common treatment modalities are aspiration, external drainage, sclerotherapy, and open/laparoscopic fenestration.[1,2,16,17] Studies have shown that the efficacy

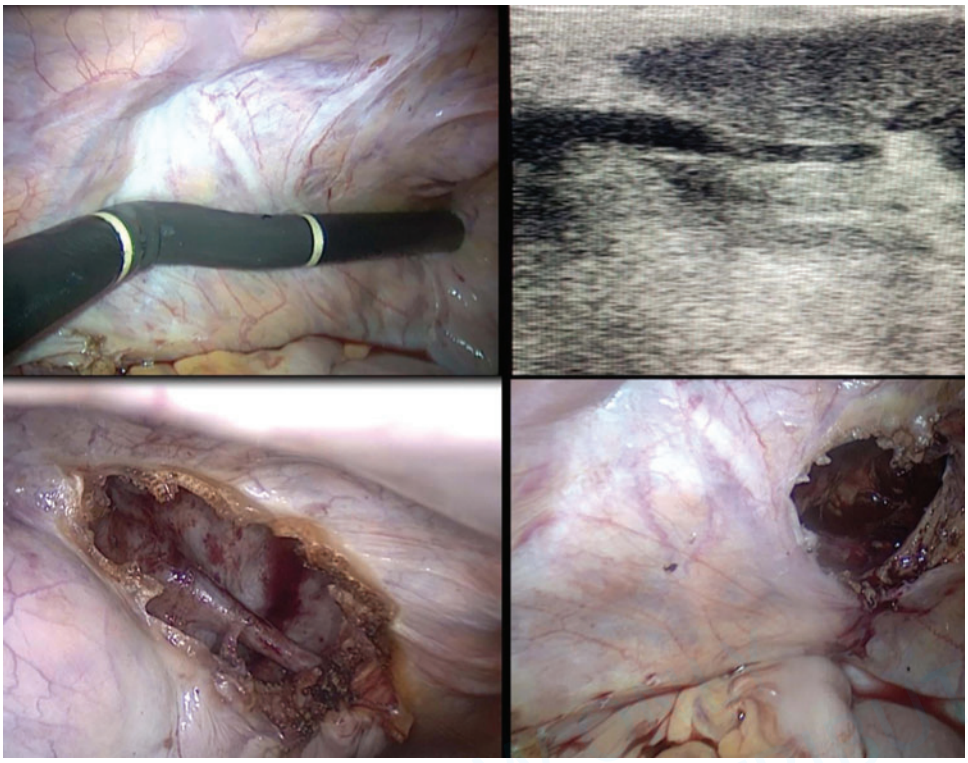


FIG. 1. Detection of lymphocele localization by intraperitoneal ultrasonography and safe fenestration. Color images are available online.

of aspiration treatment is 25% and recurrence rate is 50%–100%.[14,18–20] Aspiration method in the treatment of lymphocele is not used in our transplantation center. External drainage is another treatment modality for lymphocele. In our clinic, it is commonly used as a first-choice treatment. The disadvantages of this treatment are the long duration of treatment due to prolonged stay of drainage catheter and the high risk of secondary infections.[11] Studies have shown that the efficacy of external drainage treatment is 50% and the recurrence rate varies between 20% and 60%.[14,18–21] In our study, treatment success was 54% with external drainage.

Another treatment modality is sclerotherapy with sclerosing agents such as ethanol, povidone–iodine, and tetracycline.[3] There are studies showing that sclerotherapy is a safe and cost-effective treatment.[13,22] Although the success rate of sclerotherapy is as high as 94%,[13] there is a 20% risk of recurrence.[16,23,24] After 2012, we do not perform sclerotherapy anymore since our success rate is lower than the ones mentioned in the literature.

In recent years, an increasing number of surgical treatments are performed for lymphocele where other treatment modalities fail. Although both open and laparoscopic surgery can be performed, open surgery has been replaced by minimally invasive laparoscopic method in recent years. The peritoneal drainage of the lymphatic fluid is provided with an opening in the intraperitoneal lymphocele wall. Open and laparoscopic surgeries have recurrence rates of 15% and 0%–10%, respectively, and the length of hospital stay is shorter than other treatment methods.[16] In many studies, they have become the first treatment option in recent years due to low recurrence rate.[3,18,20,25,26] The other advantage is lower risk of secondary infections compared to external drainage and sclerotherapy.

In our study, 8 patients underwent laparoscopic fenestration guided by intraperitoneal ultrasonography. No lymphocele recurrence was observed in early and long-term follow-up. Treatment success was 100% with ultrasound-guided laparoscopic fenestration; however, the number of patients was few. During the laparoscopic fenestration process, it is very important to determine the right fenestration site in the peritoneum to drain the lymphocele into the peritoneal cavity. When an opening is made in the peritoneum, it may result in organ damage or herniation in the early or late postoperative period. Kidney, renal artery, renal vein, or transplanted ureter may be injured when an opening is made in the peritoneum.

In addition, the peritoneal bulging caused by *extraperitoneal kidney is* sometime*s* mistaken by lymphocele.[3] Lucewicz et al. reported a complication rate of 8% during laparoscopic fenestration and stated that these complications probably occurred when localizing the lymphocele.[16] There are also publications reporting an injury rate of 5%–7% during fenestration and a decrease in these rates as the experience increases.[27,28]

Several methods are used in the literature to select the right place in the peritoneum. Tie et al. used ultrasound or CT guidance for transperitoneal guide wire or drainage catheter placement to select the right place.[29] Schips et al. described a technique in which diaphanoscope guidance was used to make an opening in the peritoneum during laparoscopic fenestration.[30] Gill et al. used intraoperative percutaneous ultrasonography to minimize the incidence of injuries during laparoscopic fenestration. In another study, methylene blue instillation into the lymphocele cavity was suggested.[8]

Risaliti et al. used intraperitoneal ultrasonography for the first time to select the fenestration site, and in their study, which consisted of 19 cases, they defined a complication in only 1

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patient who had an ipsilateral hydrocele formation and they reported that intraperitoneal ultrasound was a useful tool that reduced the risk of iatrogenic lesions.[31] Øyen et al. reported that laparoscopic ultrasound could be used in difficult cases.[32]

In our study, we routinely used laparoscopic ultrasound probes in all cases to determine the fenestration site. The localization of kidney, renal artery, renal vein, ureter, and lymphocele was determined with intraperitoneal ultrasound and the safest region for fenestration was selected under ultrasonography guidance. There was no complication or lymphocele recurrence in the early and late follow-up of patients. We think that intraperitoneal ultrasound-guided laparoscopic fenestration provides a very important advantage over other methods since the use of intraperitoneal ultrasound does not prolong the operation time, is easy to use, and eliminates the risk of organ injury.

In conclusion, lymphocele is one of the most common complications after kidney transplantation, but it does not require treatment unless it is symptomatic and adversely affects kidney function. Laparoscopic fenestration can be performed in case of treatment failure with other methods or can be applied as a first-choice treatment for lymphocele because of its advantages over other methods. Laparoscopic fenestration procedure performed under intraperitoneal ultrasound guidance is a useful and safe method that can be used in all lymphocele cases since it eliminates the risk of organ injury or bleeding.

Authors' Contributions

H.B.: data collection and article creation; A.B.: data collection; M.B.: radiological evaluation of patients; A.E.A.: contribution to the evaluation of the article.

Disclosure Statement

No competing financial interests exist.

Funding Information

No funding was received for this study.

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Address correspondence to:
Huseyin Bakkaloglu, MD
Department of General Surgery
Istanbul Faculty of Medicine
Istanbul University
Istanbul, 34093
Turkey

E-mail: huseyin.bakkaloglu@gmail.com

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