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Laparoscopic deroofing of post-renal transplant lymphoceles – A single-center observational study

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ABSTRACT

Background: Lymphocele formation is the most common identifiable surgical complication of renal transplant recipients, which often requires surgical deroofing. In this retrospective study, we are determining the efficacy of laparoscopic deroofing surgery in the management of post-renal transplant lymphocele. **Aims and Objectives:** This study aims to determine the efficacy of laparoscopic deroofing surgery in the management of post-renal transplant lymphocele. **Materials and Methods:** All patients who underwent surgical deroofing for post-renal transplant lymphocele at the Institute of Kidney DISEASE and Research Center, Ahmedabad, India, between January 2016 and October 2019 were included in the study and retrospectively reviewed. Information about symptomatology, clinical features, radiological findings, preoperative drainage, ultrasound-guided percutaneous nephrostomy (PCN) diversion, intraoperative, post-operative findings, and complications were retrieved and analyzed. **Results:** Among the 1138 open renal transplant recipients, 28 patients developed symptomatic lymphocele (incidence 2.5%). The mean interval to develop these lymphoceles was 8 weeks (3 weeks–4 months). All 28 patients underwent laparoscopic lymphatic deroofing surgery. There were no conversions to open surgery. Overrunning of cut edges was performed in six and omentopexy in two patients, rest of the 20 patients only deroofing of lymphocele was performed. Graft PCN was placed before surgery in four patients and in two patients, percutaneous drain was placed into the lymphocele. The mean operative time was 80 min. The mean hospital stay was 3.5 days. In one case, there was an injury to the ureter intraoperatively which was repaired over a DJ stent laparoscopically. There was one case with recurrence who had a prior history of continuous ambulatory peritoneal dialysis. He was explored and perivascular lymphatics were tied and omental packing was performed. **Conclusion:** Laparoscopic deroofing of symptomatic lymphoceles following renal transplantation appears to be safe and effective, because it has minimal post-operative morbidity, rapid convalescence, and low recurrence rate. Laparoscopy should be considered the first-line treatment for symptomatic lymphoceles.

Keywords: Laparoscopy; Lymphocele; Transplant complication

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INTRODUCTION

Lymphocele is a collection of lymphatic fluid around the transplanted kidney and ureter that are contained by a non-epithelized pseudo-membrane in the extra-peritoneal plane. The incidence of post-transplant lymphocele is reported to be ranging from 0.6 to 18.[1,2] Nakstad et al., reported that lymphocele is the most identified surgical complication in kidney allograft recipients.[3]

Small post-transplant lymphocele is usually managed by conservative methods, while symptomatic lymphocele is

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managed in a step ladder fashion starting from percutaneous drainage to surgical deroofing of the lymphocele cavity in the peritoneal cavity. Aspiration alone has a nearly 100% chance of recurrence while percutaneous drainage has only a 50% success rate.[4] Still, these percutaneous procedures are first-line therapy for infected lymphocele. Previously open surgical laparotomy was the only method to manage large symptomatic lymphoceles. These open surgical deroofing laparotomies had prolonged morbidity, high wound-related complications, more blood loss, long operation duration, and hospitalization, apart from a high risk of graft loss and permanent scar. To overcome these complications, laparoscopic deroofing was first described by McCullough et al., in 1991.[5] Since then, laparoscopic deroofing has become the treatment of choice for symptomatic lymphocele, over the traditional laparotomy and conservative measures at many centers. Now, urologists with good laparoscopic training and experience can easily manage symptomatic lymphocele with laparoscopic marsupialization and deroofing. Lucevicz et al., reported a higher success rate and lower complications in the laparoscopic approach compared with open laparotomy.[6] Similarly, Choudhrie et al., and Singh et al., from India, had successfully cured 80% (4 out of 5) and 85.7 % (18 out of 21) lymphocele patients by laparoscopic marsupialization in their respective series.[7,8] IKDRC, Ahmedabad, is the leading renal transplant center in West India, where laparoscopic urological surgeries are performed on daily basis.

In this study, we are retrospectively reviewing our operated cases of lymphocele deroofing, to determine the efficacy of the laparoscopy approach in the management of post-transplant lymphocele.

Aims and objectives

This study aims to determine the efficacy of laparoscopic deroofing surgery in the management of post-renal transplant lymphocele.

MATERIALS AND METHODS

All patients who underwent surgical deroofing at the Institute of Kidney Disease and Research Center, Ahmedabad, between January 2016 and October 2019 were taken as study subjects and retrospectively reviewed. Ethical committee approval was obtained for this study.

The renal transplant patients who underwent robotic recipient surgery were excluded from the study, due to the intraperitoneal approach. All selected patients prospectively maintained databases were retrieved from hospital records. Ultrasound (USG) was the primary mode of diagnosis although there also had non-contrast-enhanced computed tomography (CT) and analysis of creatinine of aspirated fluid. All clinical pieces of information about diagnosis, symptoms, USG findings, CT findings, ureteric compression, aspiration, percutaneous drain placement, image-guided percutaneous nephrostomy (PCN) insertion, surgical findings, total hospital stay, graft functional improvement, and intraoperative and post-operative complications were noted. Descriptive analysis of all retrieved data was performed and presented in table forms.

Surgical technique of laparoscopic deroofing of lymphocele: All the patients were given general anesthesia and were placed in the Trendelenburg position. Pneumoperitoneum was established by the open Hasson technique and a 10 mm laparoscopic trocar was inserted at the umbilical site. Two accessory trocars (5 mm) were placed as required. Lymphocele was identified as bulging (grayish-blue wall) (Figures 1-3). The lymphoceles were opened at the most translucent part over its convex border and deroofed under vision. All the adhesions were bluntly opened. Once an adequate opening was made, the wall was excised and

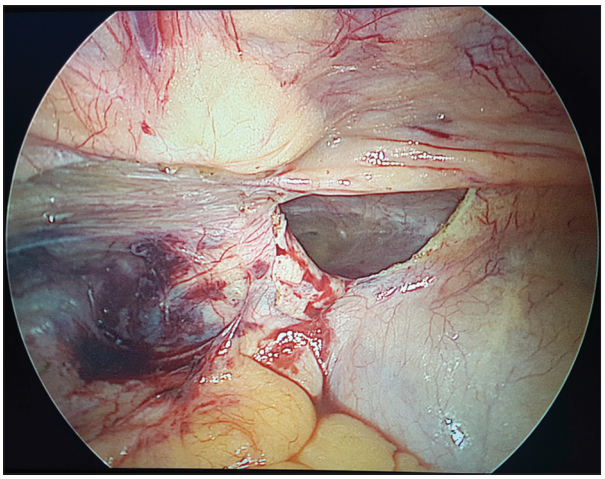

Figure 1: Intraoperative picture showing opening made in lymphocele

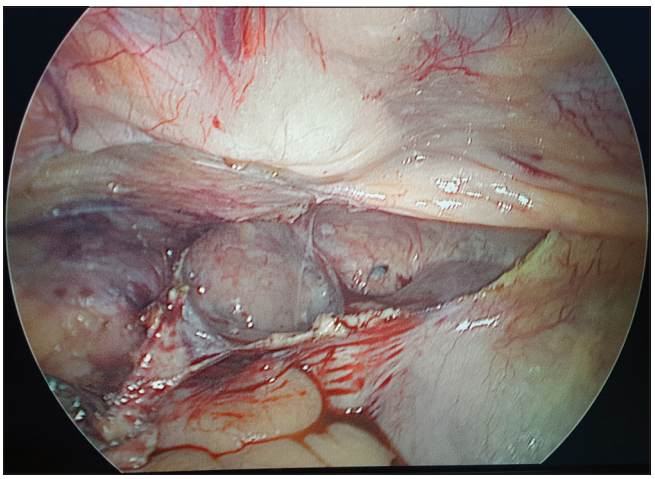

Figure 2: Graft kidney is seen after lymphocele deroofing

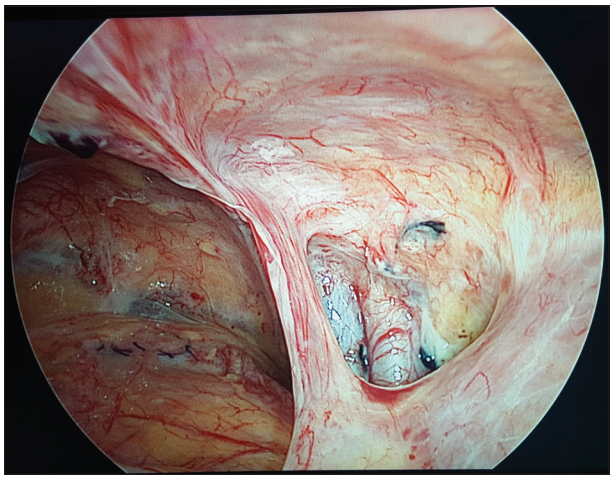

Figure 3: External iliac vessels after lymphocele deroofing

removed. Over running of edges or omental packing was not done routinely if adequate hemostasis and a wide opening were ensured. No drain was placed in any of the cases. In cases where a drain was placed into a lymphocele preoperatively, saline was infused through the drain to identify the lymphocele.

RESULTS

In the study period from January 2016 to October 2019, a total of 1406 renal transplants were done in IKDRC, Ahmedabad. Out of the 1406 transplants, 1022 grafts were from live donors and 384 grafts were from cadavers. Robotic surgery was done for 268 cases.

Among the 1138 open transplant recipients, 28 patients developed symptomatic lymphocele (incidence 2.5%). The mean age of recipients who developed lymphocele was 45 years and males were more commonly involved than females (13:1). The 28 patients with lymphocele presented with either of the four clinical manifestations as briefed in Table 1.

The lymphoceles developed in a mean interval of 8 weeks (3 weeks–4 months) from transplantation and the mean volume collected was 410 ml (195–1150). Before laparoscopic deroofing, out of 28 patients, four patients underwent USG-guided graft PCN and two patients had USG-guided drain placed in the lymphocele. All 28 patients underwent laparoscopic lymphatic deroofing surgery by either of the following methods as illustrated in Table 2. The mean operative time of laparoscopic deroofing surgery was 80 min (65–100). The mean hospital stay was 3.5 days. The mean follow-up was 30 months post-lymphocele deroofing.

Post-laparoscopic deroofing two out of 28 patients developed complications. One of the patients presented

Table 1: Clinical Presentation

Presenting Symptoms	No. (n=28)	%
Asymptomatic graft dysfunction or raised S. creatinine	18	64.2
Abdominal fullness/swelling	6	21.5
Abdominal swelling+lower limb edema (compression of iliac veins)	2	64.3
Persistent wound serous discharge	2	7.1

Table 2: Laparoscopic Procedures for Lymphocele management

Surgical management	No. of lymphocele patients
Laparoscopic deroofing	20/28
Laparoscopic deroofing+Overrunning of cut edges	6/28
Laparoscopic deroofing+Omental packing	2/28
Graft PCN before laparoscopic deroofing	4/28
Drain into lymphocele before laparoscopic deroofing	2/28

PCN: Percutaneous nephrostomy

with refractory ascites post-laparoscopic deroofing. It might have been due to the sclerosing peritonitis that would have resulted from a long-term continuous ambulatory peritoneal dialysis in the past. He underwent open exploration with ligation of perivascular lymphatics followed by omental packing; thereafter, no recurrence was reported. In the second patient, the ureteric injury was noticed intraoperatively and managed laparoscopically by placing a DJ stent and repairing the ureter with an absorbable suture. No ureteric stricture, hydronephrosis, or narrowing were reported in follow-up visits and scans after DJ stent removal (Table 3). The overall success of laparoscopic deroofing was 96.4% with only one recurrence. No harm in graft function was reported in any operated patient.

DISCUSSION

Lymphocele is a common delayed complication among renal transplant recipients, due to the injuries to lymphatic channels while creating a renal bed. By meticulous ligation of the lymphatic vessels during renal graft benching and preparing the iliac vessels carefully, different studies found a reduction in the incidence of lymphocele.[2,9] The use of high-dose steroids,[10] diuretics, mTOR (Sirolimus) inhibitors,[11] obesity, and acute graft rejection,[12] delayed graft function,[10] cadaveric donor,[10] retransplantation,[10] and adult polycystic kidney disease[13,14] appears to accentuate the risk of lymphocele formation.[15,16] Lymphoceles are usually small, asymptomatic, and found incidentally on routine ultrasonography after kidney transplantation 2 weeks–6 months after transplantation with a peak incidence at 6 weeks.[17]

Table 3: Patients characteristics

Factors	Results
Mean interval from transplantation	8 weeks (3 weeks–4 months)
Mean volume of lymphocele	410 ml (195 ml–1150 ml)
Mean operative time	80 min (65 min–100 min)
Conversion to open surgery	Nil
Mean hospital stay	3.6 days
Mean follow-up time	30 months
Time for nadir creatinine	5–7 day
No. of recurrence	1 patient
No. of complication	2 patients

Lymphoceles can cause symptoms when there is compression of the transplant ureter, bladder, and pelvic veins. The symptomatic lymphocele patients were evaluated by graft Doppler, and NCCT KUB (non-contrast CT scan of kidney and urinary bladder) to read the relation of lymphocele with kidney, renal pelvis, ureter, and urinary bladder (Figures 4 and 5).

The male-to-female ratio in our study was 13:1, this low figure of female patients is due to more transplant recipients being male. In our transplant program, during the study period, the incidence of symptomatic lymphocele was 2.46% lower than in world literature (5.2%).[6]

Post-transplant lymphoceles require treatment when they are causing symptoms. There is neither any prospective randomized control trial data nor any protocol available for the treatment of symptomatic lymphocele. The step ladder hierarchical treatment method is commonly used for the management of symptomatic lymphocele. Various modes of treatment used for lymphoceles are (a) conservative management, (b) traditional laparotomy, and (c) laparoscopic deroofing.

Conservative measures such as image-guided aspiration, inserting a percutaneous drain, or instillation of sclerosing agents, such as povidone-iodine, ampicillin, or tetracycline, may be used for the initial management of symptomatic lymphoceles.[18] However, lymphocele recurrence rates associated with simple needle aspiration and sclerosant therapy have been significant (50–100% and 10–15%, respectively).[18,19] The main advantage of percutaneous minimally invasive procedures is that they help in recipient stabilization and optimization for definitive surgical procedures. Percutaneous external drainage is the preferred initial treatment in infected lymphocele as surgical. Internal drainage is contraindicated[7] in such conditions. The disadvantages of the percutaneous approach are apart from high recurrence, it is associated with morbidity of drain for a longer duration, major fluid, and protein loss,

Figure 4: Lymphocele compressing the bladder and ureter with resultant hydronephrosis

Figure 5: Computed tomography cross-section showing lymphocele compressing the bladder

and also a high risk of infection (25%),[20] hence, it should be used only in the infected lymphocele.[21] Theoretically, sclerotherapy is successful in 80–90% of cases,[22] regardless of the agent used, but it is associated with a risk of fibrosis around the transplant ureter,[23] making the future procedure difficult, and additionally, it may require weeks of therapy before resolution.

The surgical principle is to deroof the lymphoceles into the peritoneal cavity from where the lymph gets absorbed. Open marsupialization of lymphocele was the gold standard in the past.[7] However, open laparotomy surgery is associated with a high recurrence rate of 15%, prolonged morbidity, wound-related complications, delayed convalescence, long hospitalization, and a permanent scar.[24] Hence, laparoscopy offers an attractive alternative for internal drainage which shows similar recurrence rates, rapid convalescence, shorter hospital stays, significantly lower intraoperative blood loss, detailed visualization of the anatomy, and favorable cosmesis.

Gill et al., reported that the laparoscopic technique is associated with longer operating time (194.6 vs. 176.9 min) but decreased blood loss (23.1 vs. 74.6 ml), earlier resumption of oral food intake (0.9 vs. 2.5 days), shorter hospital stays (2 vs. 6.1 days), and faster convalescence (2 vs. 6.9 weeks) compared to open surgery.[25] The mean operative time in our study is 80 min and the mean hospital stay is 3.6 days.

In the year 2011, Lucevicz et al., compared various modalities of lymphocele treatment in a meta-analysis, incorporating 52 studies and 1113 patients. The recurrence rate of various therapies is shown in Table 4. They have reported that laparoscopic deroofing has the lowest recurrence rates among all available procedures.[6] Table 5 shows the results of various studies, their incidence, modes of surgical management, complications, recurrence, and in comparison, to our study. Recurrence rates after laparoscopic deroofing range from 0% to 12% in various studies. The recurrence rate in our study is 3.5%. The incidence, complication, and recurrence in our study are similar to other major studies quoted in the literature. Even though several studies have performed omentopexy and suturing of cut edges to prevent recurrences, we performed simple deroofing in 72% of cases and propose that as long as the deroofing is wide and adequate and hemostasis is adequate, there is no need for omentopexy or marsupialization in all cases.

Ureteral injury is by far the most serious and common complication of the laparoscopic approach, and it occurs more frequently with laparoscopy (7%) than with open surgery (1.6%).[16] A variety of techniques has been described to identify ureter intraoperatively and minimize ureteric injuries such as pre-operative stenting and fiber-optic stents.[26] Percutaneous filling of the lymphocele with methylene blue facilitates the identification of the lymph collection, but identifying the transplanted ureter still may be difficult.[27] Extracorporeal USG can distinguish the ureter from the lymphocele, but it is of little help in the presence of a pneumoperitoneum. A second flexible endoscope used to transilluminate the lymphocele wall from the inside was described as a valuable tool for identifying the ureter in a report of a single case after kidney-pancreas transplantation.[27] Even the use of laparoscopic USG failed to identify ureter from lymphocele.[28] Only one ureteric injury (3.5%) was noted in our study, which has been repaired laparoscopically over a DJ stent. Intraoperative complications can be minimized by careful preoperative imaging required to delineate anatomical relations of vessels and graft ureter to lymphocele. This helps the surgeons to create a peritoneal window at the most translucent part of the convex wall of the lymphocele and avoid indiscriminate extensions of the peritoneal window. If necessary, an extension should be made anteriorly, toward, or along the anterior abdominal wall. The position of the lymphocele has been considered a risk factor for conversion, especially if the lymphocele is located inferiorly to the transplanted kidney and posteriorly to the iliac vessels.[29] In our experience, we were always able to locate the lymphocele and create an opening in its wall, although the procedure undoubtedly is

Table 4: Result of different procedures in post-renal transplant lymphocele management – meta-analysis by Lucevicz et al., in the year 2011

Primary treatment modality	Number of total studies	Total number of patients	Recurrence (%)
Aspiration	26	218	141 (59)
Sclerotherapy	14	155	41 (31)
Drainage	18	219	100 (46)
Laparoscopic surgery	20	333	19 (8)
Open surgery	17	188	18 (16)

Table 5: Results of various laparoscopic lymphocele surgeries in renal transplant recipients from the literature search

Author	Year	No. of symptomatic lymphocele/total transplant	%	Laparoscopic surgery	Complications (%)	Recurrence (%)
Lima et al.[30]	2012	25/991	2.52	25	2 (8)	1 (4)
Abou-Elela et al.[31]	2002	9/135	6.9	4	1 (20)	0 (0)
Bailey et al.[32]	2003	34/685	5	25	0	1 (4)
Lucevicz et al.[6]	2011	1113/21403	5.2	333	21 (12)	19 (8)
Fuller et al.[24]	2003	60/1836	3.3	20	0 (0)	2 (10)
Choudhrie et al.[7]	2012	14/744	1.9	5	1 (20)	1 (20)
Singh et al.[8]	2017	36/1720	2.09	21	Not reported	3 (14.3)
IKDRC experience	2022	28/1138	2.5	28	2 (7.18)	1 (3.57)

more difficult when the lymphocele is posteriorly located. An open approach should also be considered in case of severe adhesions or previous laparotomies. The threshold to convert the laparoscopic approach to open laparotomy should be kept low, and immediately change the approach when difficulty is encountered in laparoscopic deroofing to prevent ureteric and bladder injury. Although in our study, none of the cases was converted to open laparotomy and all complications were managed laparoscopically only. Precision and experience of laparoscopic surgeons are very important in managing laparoscopic deroofing of lymphocele and intraoperative problems.

The mean hospital stay in our study was 3.5 days which is comparable to 2.5 days in Lucevicz et al., and 3.55 days in Singh et al.[6] With the above discussion, we are suggesting that the laparoscopic deroofing of lymphocele is a safe and effective approach for the treatment of symptomatic lymphocele in post-renal transplant recipients, and should be used as a first-line modality in non-infective lymphocele. To the best of our knowledge, this is the largest series of laparoscopic lymphocele management from the Indian subcontinent.

Limitations of the study

Our limitation was the retrospective nature of the study and the absence of a pre-defined protocol for lymphocele management at our institute. Hence, there is a need for a multicentric prospective randomized controlled study to formulate a protocol for post-transplant lymphocele management.

CONCLUSION

Laparoscopic deroofing of symptomatic lymphoceles following renal transplantation appears to be safe and effective because it has minimal postoperative morbidity, rapid convalescence, and low recurrence rate. Laparoscopy should be considered the first-line treatment for symptomatic lymphoceles.

Careful pre-operative imaging, experience in laparoscopy, and experience in operating these groups of patients minimize the risks of injury and provide with best results with the lowest recurrence rates compared to all other modes of treatment. We also propose simple adequate deroofing and good hemostasis which are good enough to prevent recurrence and routine omentopexy and suturing of cut edges are not required in all cases.

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RM- Concept and design of the study, surgeries, and data collection, and prepared the first draft of the manuscript; **DK**- Concept and design of the study, reviewed the literature, and prepared the final draft of the manuscript; **JR**- Main operating surgeon and coordination; and **MA**- Reviewed the literature, manuscript preparation, and data analysis.

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