RESEARCH ARTICLE

The lymphocele conundrum: incidence and management in early renal transplants

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Abstract

Objective: To assess the incidence of post-transplant lymphocele, identify risk factors, and analyse the effectiveness and outcomes of different management approaches.

Method: The prospective, descriptive study was conducted at the Department of Renal Transplant, Sindh Institute of Urology and Transplantation, Karachi, from February 25, 2021, to December 25, 2022, and comprised of 300 transplant. Ultrasound was performed in all patients presenting with symptomatology attributed to lymphocele. Any peri-graft collection was labelled as lymphocele if creatinine level of aspirated fluid was similar to that of serum creatinine level of the patients. Data was analysed using SPSS 23.

Results: Of the 300 patients, 230(76.7%) were males and 70(23.3%) were females. The overall mean age was 37.33±8.70 year. There were 18(6%) patients with diabetes, 248(82.7%) with hypertension and 38(12.7%) were obese. The frequency distribution of lymphocele was observed in 22(7.3%) patients, and the mean diameter of lymphocele was 12.50±1.68 cm.

Conclusion: Lymphatic complications, particularly lymphocele, continue to pose a surgical challenge in kidney transplant recipients, primarily resulting from the extensive dissection of the lymphatics during the transplantation procedure.

Keywords: Lymphocele, Renal transplantation, Chronic kidney disease. (JPMA 75: 9; 2025)

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Introduction

The term 'chronic kidney disease' (CKD) refers to abnormalities in kidney structure and function that have been present for >3 months and have a negative impact on health. CKD is classified based on causes, glomerular filtration rate (GFR) category, and albuminuria. A major consequence of CKD is end-stage renal disease (ESRD), defined as irreversible loss of kidney function to the extent that it is no longer able to sustain the body's metabolic needs and maintain homeostasis. It is typically characterised by a GFR <15ml per minute per 1.73 square meters, which indicates a severe decline in kidney function and warrants renal replacement therapy (RRT).[1] Considering patient survival, quality of life and cost-effectiveness, renal transplantation stands out as the best RRT option.[2]

Although there is a relatively minimal risk of complications during or after a kidney transplant, it is crucial to identify, diagnose and treat any complications as soon as possible in order to save the graft and the patient's life.[3] A lymphocele is a lymphatic collection around the renal graft and urinary bladder without any epithelial lining. It can develop from either the lymph that oozes out from the lymphatic vessels in the graft's sinus, or from the lymphatic vessels around the iliac vessel, which are de-skeletonised for the vascular anastomosis of the graft.[4,5]

From 1% to up to 20%, lymphocele incidence has been documented in a wide variety of literature.[5] Other factors associated with it are renal capsular tear, acute rejection, use of diuretics and anticoagulants, extent of dissection, and length of surgery. Use of anticoagulants prevent lymph clotting, whereas steroids and diuretics use increases lymph flow and promotes lymphocele formation. Increased lymph flow in transplant rejection is also associated with lymphocele.[4,5]

Massive lymphocele can compress the pelvicalyceal system, aggravating hydronephrosis and impairing renal function. Small lymphoceles may not be symptomatic. The most common symptoms of lymphocele are abdominal pain, swelling in graft region, lower limb oedema, and obstruction with hydronephrosis in the transplanted kidney, resulting in impaired graft function. Ultrasonography is the most common diagnostic tool used in the visualisation of lymphocele.[6] In case of a leak from the surgical drain of a renal transplant patient, fluid is collected from the drain, and in case of patients with perinephric collection, ultrasound-guided fine-needle percutaneous aspiration is performed.[7]

To distinguish lymphatic complications from urine (urinoma) or serum (seroma) biochemical analysis of aspirated fluid for electrolytes, such as sodium and potassium, total protein, and albumin are required.[8] Sim et

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al. showed the incidence of lymphocele as 5.8%.[9] Ranghino et al also reported lymphocele in 18.6% post-renal transplantation.[8] Choudrie et al. noted it in 4.3% post-renal transplantation patients.[10]

The current study was planned to assess the incidence of post-transplant lymphocele, identify the risk factors, and analyse the effectiveness and outcomes of different management approaches.

Patients and Methods

The prospective, descriptive study was conducted at the Department of Renal Transplant, Sindh Institute of Urology and Transplantation, Karachi, from February 25, 2021, to December 25, 2022. After approval from the institutional ethics review committee, the sample size was calculated using the formula:

$$(n = [Np(1-p)]/ [(d2/Z21-á/2*(N-1) +p*(1-p)])$$

on OpenEpi calculator,[11] with lymphocele post-renal transplantation being 4.3%[10], margin of error 3.3% and confidence level 95%. The sample was raised using non-probability consecutive sampling technique. Those included were patients of either gender aged 18-60 years undergoing live-related renal transplants. Patients with recurrent lymphocele and those who were re-explored due to haematoma and urinoma were excluded. Informed written consent was obtained from all the participants.

Demography data was noted along with body mass index (BMI), history of previous abdominal surgery, history of ipsilateral femoral angio access, side of graft placement, vascular anatomy of graft, number of arteries in graft kidney, duration of bench dissection for graft preparation, total ischaemia time, and ligation of lymphatic in the recipient bed.

After the transplant, each patient remained admitted for 11 days. After discharge, the patient's postoperative course was observed with clinical history, physical examination and ultrasound abdomen and graft colour doppler index for 1 month. Data regarding symptomatology, like abdominal distension, pain, wound discharge, graft dysfunction, fever and oedema of the ipsilateral leg or of the genitalia, was recorded. Lymphocele in the perigraft region on ultrasound appeared anechoic and contained septation. Fluid from the perigraft region was aspirated and sent for creatinine levels. The collection was labelled as lymphocele if the creatinine level of the fluid was similar to that of the serum creatinine level of the patients. Characteristics of lymphocele, its diameter, location in relation to graft, and details of management (non-invasive, minimally invasive or invasive laparoscopic/open surgical approach) were recorded using a predesigned proforma.

Data was analysed using SPSS 23. Frequencies and percentages were used to express qualitative variables, while quantitative variables were expressed as mean ± standard deviation. Binary logistic regression analysis was performed to assess the relative risk of each variable. P=0.05 was taken as significant.

Results

Of the 300 patients, 230(76.7%) were males and 70(23.3%) were females. The overall mean age was 37.33±8.70 years. Mean BMI was 21.20±2.57kg/m^2. The mean total ischaemia time was 110.54±15.98 minutes, while mean fluid creatinine level was 2.59±1.20 and serum creatinine level was 2.06±0.79 mg/dl. There were 18(6%) patients with diabetes mellitus (DM), 248(82.7%) with hypertension (HTN) and 26(8.7%) had a previous history of abdominal surgery (Table 1).

Overall, 25(8.3%) patients had a history of ipsilateral femoral line insertion in the past. The donor artery findings revealed that 248(82.7%) patients had a single artery, 34(11.3%) had a double artery, and 18(6.0%) had a triple artery. Operative findings revealed ligation of lymphatics during recipient bed making was performed in 268(89.3%) patients. Regarding immunosuppressive therapy, 86(28.6%) patients received tacrolimus, 214(72.4%) received cyclosporine, 58(19.33%) received mycophenolic acid, 242(80.67%) received azathioprine, and 300(100%) received prednisolone.

Lymphocele was observed in 22(7.3%) patients, and the mean diameter of the lymphocele was 12.50±1.68 cm (Table 2). Of these 22(7.3%) patients, 6(27.3%) were managed conservatively, 2(9%) underwent ultrasound-guided aspiration once, percutaneous drain insertion along with instillation of sclerosing agents was performed in 6(27.3%), and 8(36.4%) patients underwent surgical intervention in the form of peritoneal window formation.

BMI, ligation of lymphatics in graft bed and history of femoral line insertion in ipsilateral limb were significant predictors of lymphocele formation after renal transplant, while gender, age, HTN, DM, history of previous surgery, total ischaemia time, number of arteries in the graft, and the site of graft placement showed no significant association with lymphocele formation (Table 3).

Table-1: Patient demographics and clinical variables.

	Minimum	Maximum	Mean±SD
Age (Years)	18	60	37.33±8.694
Body mass index (BMI) (Kg/m2)	18	32	21.20±2.578
Total ischaemia time (minutes)	71	140	110.54±15.980
Fluid creatinine level (mg/dl)	1	4	2.59±1.197
Serum creatinine level (mg/dl)	1	3	2.06±0.786
Diameter/Volume of lymphocele (cm)	10	15	12.50±1.679

Table-2: Graft characteristics, lymphocele sites, symptoms, and management approaches

Number graft arteries		n (%)
Number graft arteries	Single	248 (82.7)
	Double	34 (11.3)
	Triple	18 (6)
Side of Graft Placement	Right	292 (97.3)
	Left	08 (2.7)
Site of Lymphocele in relation to graft	Upper pole of graft	10 (45.5)
	Middle of graft	02 (9.1)
	Lower pole of graft	04 (18.2)
	Anterior to graft	04 (18.2)
	Posterior to graft	02 (9.1)
Symptomatology	Pain	04 (18.2)
	Graft Obstruction on USG	08 (36.4)
	Wound discharge	08 (36.4)
	Fever	02 (9.1)
Management of Lymphocele	Conservative	06 (27.3)
	Single aspiration	02 (9.1)
	Drain placement and sclerosing agents	06 (27.3)
	Surgical Drainage	08 (36.4)

Table-3: Logistic regression analysis of predictors for lymphocele formation

				95% C.I. for EXP(B)	
	B	*p*-value	Exp(B)	Lower	Upper
Previous abdominal surgery	0.044	0.12	1.04	0.988	1.110
Gender	0.133	0.80	1.14	.403	3.240
Diabetes Mellitus	0.862	0.65	1.17	0.300	2.123
Hypertension	-0.661	0.32	0.51	0.139	1.915
Age (years)	-0.059	0.08	0.94	0.882	1.008
Site of transplant	-1.520	0.99	0.00	1.315	1.010
DJ stent	-0.083	0.87	0.92	.327	2.591
Body mass index (BMI) (Kg/m^2)	1.199	0.00	3.31	2.212	4.972
Total ischemia time (minutes)	0.011	0.42	1.01	0.984	1.039
Ligation of Lymphatics in Graft bed	-5.58	0.001	0.004	0.000	0.010
History of Femoral Angio-access	1.38	0.001	4.00	0.000	0.010

CI: Confidence interval.

Discussion

Lymphocele is a collection of lymphatic fluid that forms around a transplanted organ. When a pelvic collection has comparable qualities to plasma, a diagnosis is made. This is corroborated by the biochemical examination of the fluid, which reveals similar electrolyte content to that of plasma with a low protein concentration. On microscopic examination, the presence of lymphocytes might be an important indicator.[12-13]

Lymphoceles are the most common fluid collections, occurring in 0.6% to 18% of patients following renal transplantation.[10] In the current study, which comprised 76.7% males and 23.3% female patients having a mean BMI of 24.21±3.86 kg/m^2, the observed incidence of lymphocele was 7.5%.

In a study of 154 patients who underwent renal transplantations, the reported incidence of lymphocele was in 9(5.8%) patients. The median onset of occurrence was 19 days (range: 6-28 days) after surgery, and the median age of patients diagnosed with lymphocele was 46 years (range: 34-58 years).[9] These findings matched the current results.

The prevalence of lymphocele is known to range from 0.6% to 18%.[10] A study found an incidence of 4.38%, with 1.88% being symptomatic.[14] The study proposed tying up all the significant lymphatic vessels when preparing the bed for the graft in the recipient. Treatment of a symptomatic lymphocele following kidney transplantation should begin with minimally invasive techniques, like aspiration, followed by sclerotisation and pigtail insertion, and then to more invasive options, like laparoscopic or open marsupialisation if less invasive techniques fail.[15] In the current study, the incidence of lymphocele formation was significantly less among patients who underwent ligation of lymphatics while making bed for the graft. Of the total current patients, 27.3% recovered with conservative management, 9.1% had single percutaneous aspiration, 27.3% underwent ultrasound-guided pigtail placement and instillation of sclerosing agent, and 36.4% required surgical drainage.

Sim et al. reported the site of occurrence of lymphocele as the inferior aspect (n=5), lateral aspect (n=2), upper pole (n=1), and medial aspect (n=1) of the transplanted kidneys.[9] In the current study, the distribution of lymphocele sites was found to be different than reported in the literature, with lymphocele around the upper pole being the commonest site (45%), followed by the anterior aspect (18.2%), the lower pole (18.2%), the middle pole (9.1%), and the posterior aspect of the graft (9.1%).

In a study of 991 adult kidney transplants (523 cadaveric and 468 live), the incidence of symptomatic lymphoceles was found to be 2.52%. A total of 25 lymphoceles (14 females and 11 males) received treatment. Percutaneous aspiration and fluid analysis, including creatinine, cytology with differential cells, and bacterial culture, were performed in all instances prior to surgery to determine the aetiology of the fluid collection.[16]

Scheuermann et al. evaluated effect of BMI on graft survival and surgical complications, and reported significant increase in the incidence of lymphocele with raised BMI (p=0.010).[17] Similarly, the current study revealed significant effect of raised BMI over lymphocele incidence (p=0.001). No significant literature is available on the effect of ipsilateral femoral angio-access over the incidence of post-renal transplant lymphocele, but in the current study, a

significant association was observed between the history of ipsilateral femoral line insertion and incidence of lymphocele (p=0.001).

After kidney transplantation, the development of a symptomatic lymphocele is a common postoperative surgical complication. It may cause pain and suffering, as well as transplant failure or subsequent graft loss. Multiple diverse predictors for symptomatic lymphocele were identified in a study, with the common denominator being surgical care of the retroperitoneal region, peritoneum, and the ureter.[18]

Murat et al., in a study of 452 recipients, described the incidence of 6.4%, which was almost similar to the current incidence. Most of the patients were managed by percutaneous drainage and sclerotherapy. There were signifcant differences with respect to age (50-65 years; p=0.016).[19] On the contrary, the current study could not find a significant effect of age over incidence of lymphocele (p=0.12). In a prospective study of 26 patients who underwent robotic-assisted kidney transplant (RAKT), similar incidence of 7.69% was observed.[20]

The current study has limitations as it was unable to recover specific surgical data on back table graft perfusion and preparation. Prospective, multi-centre studies are required to examine the impact of these factors on the onset of symptomatic lymphocele.

Conclusion

Due to the dissection of both the recipient's and the graft's lymphatic systems, lymphatic issues and lymphocele remain common surgical complications in kidney transplant patients. To circumvent this problem, transplant surgeons must keep a focussed concentration throughout organ extraction and 'back table' procedures to avoid extensive dissection of the lymphatics in the kidney, and ligating lymphatic channels surrounding great vessels in recipient while making bed for the graft. Minimally invasive technique is the recommended approach to tackle post-transplant lymphocele.

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