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Post Kidney Transplant Lymphoceles: Meticulous Ligation of Lymphatics Reduces Incidence

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ABSTRACT

Objective: To determine the impact of our surgical techinique on the incidence of lymphoceles in all patients who underwent renal transplantation, and identify other risk factors responsible for the development of lymphoceles.

Materials and Methods: The records of all patients who underwent kidney transplantation at the Riyadh Military Hospital from March 2007 to March 2011 were retrospectively reviewed to determine the incidence of lymphocele. Demographic characteristics, risk factors, and surgical technique were outlined. All transplants were performed by a single surgeon and his team.

Results: A total of 273 patients underwent kidney transplantation; only 1 recipient was diagnosed with a lymphocele on ultrasound 6 weeks after transplantation. This patient underwent ultrasound-guided aspiration with complete resolution without recurrence at a 1-year follow-up. Our surgical technique is based on (1) ligation of all paravascular hilar tissue in the allograft, (2) ligation and division of all lymphatic vessels when dissecting the recipient iliac artery and vein, (3) ligation and division of all lymphatics if iliac lymph nodes require removal, and (4) routine use of suction drains. The known risk factors are comparable with other studies and include acute rejection (AR) rates of 6.6%, a body mass index (BMI) >30(24%), diabetes at 22%, retransplants at 15%, zero de novo sirolimus therapy, and 14.6% of recipients on a steroid-free regimen.

Discussion: Post-renal transplant lymphoceles are not uncommon and can result in unnecessary morbidity. These patients can present with a palpable mass, renal impairment from obstruction of the ureter, lower limb edema from iliac vein thrombosis, and sepsis in case of infection. Diagnosis and follow-up with an ultrasound (US) is simple and efficient. The prevention of lymphoceles may be possible with meticulous surgical techniques where all lymphatics are carefully ligated. The reduction of known risk factors can also help reduce its incidence and morbidity. Treatment options include aspiration, sclerosant instillation, and surgery, but lymphoceles can recur and every effort must be made to reduce its incidence.

Conclusion: We feel that a meticulous surgical technique with ligation of all lymphatics, both during dissection of the recipient vessels and the donor allograft, along with appropriate suction drainage, was significant in reducing the incidence of lymphoceles following kidney transplantation in our recipients.

KEYWORDS: Post-renal transplant lymphocele; Meticulous surgical technique; Ligation of lymphatics; Risk factors; Incidence

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Figure 1. Tissue overlying the artery is lifted and stretched (a), 2 silk ties are passed , tied (b), and tissue divided. This is repeated several times till adequate length of artery is mobilized. The arrow shows a large lymphatic.
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(a) (b)

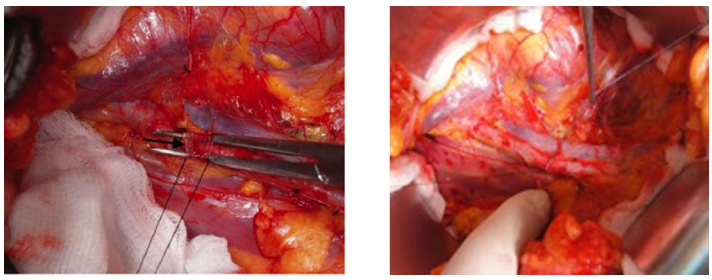

Figure 2. Thick tissue is lifted off the vein (a); this tissue is then tied (b) and divided to expose the vein. This step is repeated till adequate length of vein is mobilized.
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(a) (b)

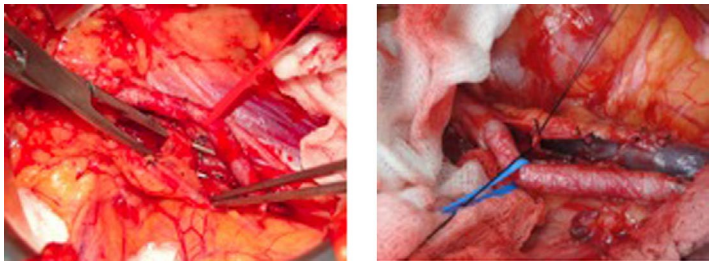

Figure 3. Large lymph nodes obscure the distal half of the external iliac vessels (see arrows in 3a) and visible vessels following lymphadenectomy (b). A large lymphatic is visible (see arrowhead) and several silk ligatures are visible and represent tied lymphatics.
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(a) (b)

INTRODUCTION

Lymphoceles are the commonest fluid collections observed after kidney transplantation with an incidence that ranges from 0.6 to 61% [1-3]. The majority of lymphoceles, which occur within 1 year of transplantation, are small and asymptomatic, and require no treatment [4]. Larger and symptomatic lymphoceles can cause (1) allograft dysfunction by obstructing the ureter, (2) deep vein thrombosis and lower-limb edema by compressing the iliac veins, (3) paraincisional mass, and (4) abdominal pain. These large lymphoceles are associated with increased morbidity and frequently require urgent intervention. Infective complications can result in mortality [3]. The reported risk factors associated with the formation of lymphoceles are diverse and include acute rejection (AR) [6-8], delayed graft function (DGF) [6], obesity with a body mass index (BMI) over 30 kg/m^2 [2, 7, 9], sirolimus [3, 7, 10], and steroids [6, 11]. A potent yet preventable risk factor is inadequate ligation of lymphatics during back table preparation of the donor allograft vessels [12] and hilum, and during dissection of recipient iliac vessels [1, 6, 13]. Ultrasound (US) is very useful for diagnosis, therapeutic percutaneous aspiration, placement of catheters for sclerosis, and follow-up [14]. However, recurrent lymphoceles require operative drainage into the peritoneal cavity [2]. The objective of this study is to (1) determine the incidence of lymphocele in all patients who underwent kidney transplantation, (2) present our results and identify contributory risk factors, and (3) describe our surgical technique and discuss its impact on the incidence of lymphoceles in our kidney transplant recipients.

MATERIALS AND METHODS

All patients who underwent live or deceased donor kidney transplantation at the Riyadh Military Hospital from March 2007 to December 2010 were included in this analysis. Excluded were the recipients operated on by locum staff. Data was collected from consecutive patients operated on by the senior author. The data was collected retrospectively and the minimum follow-up was 3 months. Exclusion criteria consisted of death, nephrectomy, graft loss within 30 days, or lack of follow-up. The incidence of lymphocele in this group of patients was calculated along with the type of treatment performed.

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Figure 4. A bunch of silk ligatures are visible (see arrows) where the lymph vessels were divided during lymph node removal.
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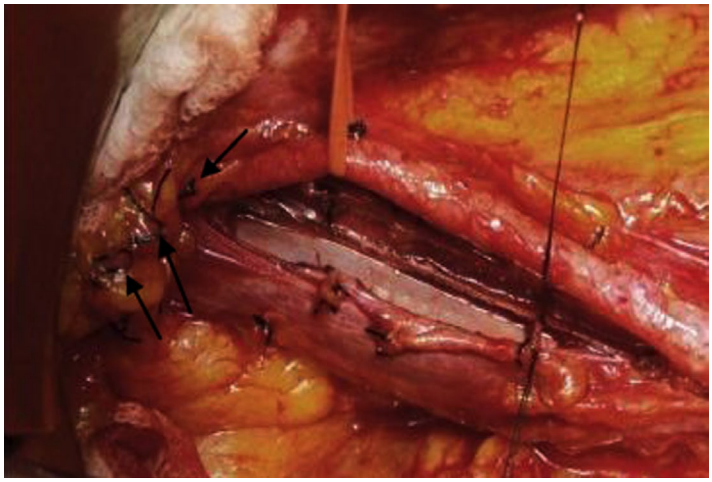

Figure 5. (a) Lymph node medial to external iliac vein (see arrow). (b) This node is being removed after ligating its lymphatics to expose the vein.
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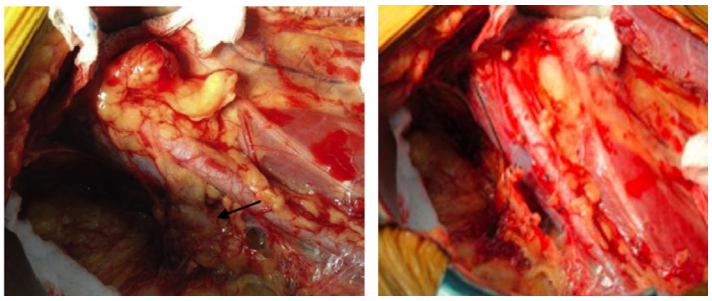
(a) (b)



PATIENT CHARACTERISTICS

Patient demographics along with known risk factors associated with lymphoceles are given in Table 1.

SURGICAL TECHNIQUE

Recipient surgery is performed through an extraperitoneal hockey stick incision. The peritoneum is swept medially to develop the retroperitoneal space and retractors are placed appropriately. All vascular anastomoses are end-to-side to the external iliac vessels or, if these vessels are not usable, to the common iliacs and the extravesical ureteroneocystostomy is stented. The important features of our technique are as follows:

Dissection of iliac vessels. The external iliac vessels are identified and the artery is dissected first. The artery is strapped to the posterior abdominal wall by a layer of fibro fatty tissue that also contains lymphatics and lymph nodes. Mobilization of the artery requires that this tissue layer be divided. This tissue is lifted off the artery (Figure 1a) and two 4/0 silk ligatures are passed and tied on both sides of the artery and divided (Figure 1b). We proceed in this manner by securing sections of tissue until the desired length of artery required for anastomosis has been mobilized. The artery is lifted up using a vessel loop. This exposes the tissue that lies posterior and needs to be divided to fully mobilize the artery. If this tissue appears to be thick, we divide it between ligatures. If flimsy, we use electrocautery.

The tissue layer overlying the veins can also be thick and contain lymphatics (Figure 2a), and it is generally divided with electrocautery. We, however, proceed to expose and mobilize the external iliac vein in exactly the same manner as the artery by ligating and dividing this tissue (Figure 2b) until the required length of vein for anastomosis is exposed. These 4/0 silk ligatures are placed to prevent leaks from divided lymphatic vessels. In cases where the common iliac artery is used for anastomosis, mobilization is achieved similarly by ligating and dividing all overlying tissue.

Lymph nodes obscuring the external iliac artery (Figure 3a) are also removed by ligating all tissue before dividing (Figure 3b). A bunch of silk ties are proof of having secured the lymphatics entering the lymph nodes (Figure 4) from the lower limb. At times, lymph nodes are also found along the medial wall of the vein with lymphatics coursing over the vein within this thick tissue layer. These nodes are also removed after ligating its lymphatics (Figures 5a and 5b).

Allograft. In the same manner, all divided lymphatics present in the allograft hilum and along its vessels are carefully ligated to prevent leakage (Figure 6a). Some donor kidney lymphatics become obvious after perfusion and are similarly ligated (Figure 6b).

Suction drain. At the end of the procedure, a closed suction Jackson-Pratt drain is placed in all patients and only removed when drainage is less than 40 mL for 2 consecutive days.

Figure 6. (a) Live donor allograft dissection. Lymphatics around the artery being secured with 4/0 silk ligatures. (b) Lymphatics that become obvious after perfusion; also secured with silk ligatures (see arrow).
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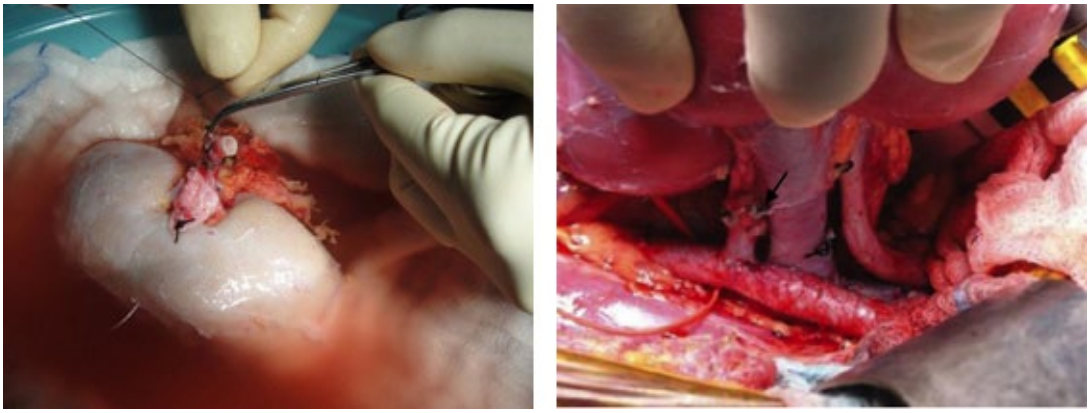
(a) (b)



Ultrasound (US) is performed on the first postoperative day, the day before discharge, and as needed. Following discharge, a baseline ultrasound is carried out in the clinic and is repeated at 4 weeks, 3 months, and then annually. It is also performed when indicated.

Immunosuppression. Recipients were given anti T-cell antibody (Thymoglobulin, Genzyme) induction when receiving deceased donor kidneys, live donor kidneys with more than 2 mismatches, retransplantation, and if highly sensitized. Basiliximab (Simulect, Novartis) was given to recipients with 2 or less mismatches. All recipients received methylprednisolone induction and zero mismatch recipients were induced with methylprednisolone only. Maintenance immunosuppression comprised tacrolimus, mycophenolate mofetil, and steroids. Sirolimus was only given to recipients of extended criteria kidneys 4 to 6 weeks after transplantation.

RESULTS

Out of 273 transplants carried out, only 1 (0.3%) recipient was diagnosed with a lymphocele. This patient presented with paraincisional fullness and pain 6 weeks after transplantation. US confirmed a lymphocele that was aspirated under with complete resolution and did not recur at the 1-year follow-up. This was her first kidney transplant and the live donor kidney was placed in the right iliac fossa, and except for steroids, she had no known risk factors. The allograft preparation and recipient vascular dissection was performed in the usual meticulous manner by the same team that performed all the transplants. She received our standard depleting antibody (Thymoglobulin) induction with a triple drug maintenance regimen and was discharged home on day 6 after removal of the drain when the drainage was less than 40ml/day for 2 consecutive days. The presence of other risk factors in our cohort of patients is shown in Table 1. The incidence of lymphoceles in some recent studies is shown in Table 2.

DISCUSSION

Lymphoceles cause increased morbidity and can result in mortality [3], and every effort should be made to reduce its incidence. Based on lymphangiography, 2 pathophysiologic mechanisms have been demonstrated that may result in lymphocele formation: drainage from open lymphatics divided at the time of recipient iliac vessel dissection [13] and divided lymphatics in the donor kidney hilum [12]. We are meticulous in ligating all possible lymphatics, not only ones along the artery but also those along the iliac veins and when removing lymph nodes. The same meticulous technique is carried out during back table allograft dissection. The role of risk factors [2, 3, 6-11] in lymphocele pathophysiology may be that of delaying the healing of such divided lymphatics, but if these

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Table 1. Recipient demographics and lymphocele risk factors.
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Age (range)	4–74
Total	273
Male (%)	170 (62%)
Live/deceased donor	183/90
Diabetes	59 (22%)
Acute rejection	18 (6.6%)
BMI>30kg/m^2/range	68 (24%)/18–39
Retransplants	24 (9%)
DGF total/live donor	9 (3.2%)/1 (0.5%)
Steroid-free regimen	40 (14.6%)
De novo Sirolimus	zero

Table 2. Lymphocele incidence in some recent studies.
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Reference	Incidence of lymphocele (%)
Rogers et al. (11)	5.5%
Goel et al. (7)	33%
Langer et al. (10)	17%
Dubeaux et al. (1)	0.6%
Atray et al. (2)	26%
Khuali et al. (6)	22%

lymphatics are adequately ligated, we feel that the role of risk factors can be reduced, if not eliminated. De novo sirolimus therapy has been associated with the highest incidence of lymphoceles [3, 7, 9, 10], and the proposed mechanism being a failure of adhesion formation and lymphangiogenesis [15]. We have used it selectively in DD kidney transplants to replace tacrolimus 6 to 8 weeks after transplantation, and feel that perhaps this delayed introduction of sirolimus may reduce its impact on wound healing and lymphoceles. In analyzing the individual risk factors, our incidence of DGF and AR is lower than most studies and may have played a part in preventing lymphoceles; however, the use of steroids, BMI, retransplants, and diabetes in our recipients is similar to most series. A steroid-free regimen was introduced in mid-2009 to reduce cardiac and bony complications in diabetic recipients, and may have been responsible for improved wound healing and lymphoceles reduction, at least in this group of 40 recipients. Since the overall incidence of lymphoceles was only 0.3% with no wound breakdowns, it is unlikely that this regimen negatively influenced lymphocele development or wound healing. Our only case of lymphocele was a recipient of a first transplant from a live donor with none of the risk factors except steroids (no sirolimus, non-diabetic, BMI: 22, no AR/DGF) and it is likely that perhaps not all the lymphatics were secured. Steroids were the only known risk factor in our case; however, the vast majority of our other recipients were also on steroids but didn't develop lymphoceles. Our incidence of lymphocele is very low compared to several recent series. Another series with a similarly low incidence also stresses surgical technique with the need for careful ligation of lymphatics [1]. Another series, also with a low incidence, suggests reducing lymphatic disruption by using vessels that are more proximal can reduce lymph leakage and lymphoceles, the emphasis being on preventing lymph leaks [13]. Whatever role the risk factors play can be negated by preventing lymph leaks with properly placed ligatures. The presence of suction drains creates negative pressure and brings opposing surfaces together to collapse and seal any open lymphatics. One advantage and a possible reason for the low incidence of lymphoceles was that all the transplants were carried out by the same surgeon with the same meticulous technique every time. Different surgeons use different techniques and may lack uniformity. Some may prefer electrocautry to ligatures during dissection. A limitation of this study was the retrospective data collection and analysis, and it did not involve a comparison of various groups. Additionally, drains were used in all recipients and could not be blinded.

In our study, the non-detection of lymphoceles was not the reason for the reported low incidence; primarily because in the first 3 months, US is carried out at least 3 times and every 3 months thereafter for the first year. US is also carried out whenever there is a suspicion of lymphocele with recipients presenting with pain, renal impairment, lower limb edema, or a palpable mass. Lymphoceles result in morbidity in terms of increased hospital stays, costs, invasive procedures, and surgery. Additionally, a significant recurrence rate has been reported following aspiration (33%), sclerotherapy (25%), and surgery (12%) [2], and justifies the extra time spent in placing ligatures if lymphoceles can be prevented. Based on our experience, we feel that it may be possible to reduce lymph leakage and prevent the formation of lymphoceles by carefully ligating all lymphatics.

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