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LAPAROSCOPIC MARSUPIALIZATION OF LYMPHOCELES FOLLOWING RENAL TRANSPLANTATION

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Objective Clinically significant lymphoceles following renal transplantation are not uncommon. Surgical marsupialization with internal peritoneal drainage is the treatment of choice. We describe the successful laparoscopic formation of a peritoneal window for post- transplantation lymphocele drainage as an effective and minimally invasive procedure.

Patients and Methods Between August 1995 and September 2001, 135 consecutive renal transplantation operations were performed. Nine patients developed clinically significant lymphocele. Four of the nine patients were treated by laparoscopic drainage via a peritoneal window. An analysis of predisposing risk factors commonly associated with lymphoceles was performed. The surgical outcome was assessed.

Results Laparoscopic drainage was successful in all patients. The average operative time was 40 min. The mean hospital stay was 1.5 days for patients with laparoscopic drainage versus 5 days for open surgical drainage. An accidental division of the right native ureter which was identified intraoperatively occurred in one patient. None of the patients developed recurrence of lymphocele after a mean follow up of 10.7 (range 6- 22) months.

Conclusion In patients with clinically significant post-transplantation lymphoceles of appropriate size and location, laparoscopic drainage is easy, safe and effective. It decreases hospitalization and convalescence.

Key Words renal transplantation, lymphocele, laparoscopy

INTRODUCTION

Lymphoceles following kidney transplantation are not uncommon with a reported incidence of 0.6 to 18% of cases[1,2]. Their sources are interrupted lymphatic ducts which may be in the renal hilum[3], the renal surface[4,5] or around the recipient's iliac vessels. The diagnosis is based on clinical signs, ultrasonographic and computed tomography findings. Using such diagnostic tools alone, postoperative urinoma or resolving haematoma may easily be misdiagnosed as lymphocele. Needle aspiration of clear lymph fluid and chemical and microbiologic analysis confirm the diagnosis in equivocal cases. Lymphoceles may be asymptomatic not requiring therapeutic intervention or may grow to a large size and become symptomatic when they compress the adjacent structures or infection is superimposed. Compression of the ureter, iliac vein, lower extremity lymphatic vessels or displacement of the bladder may result in consequent hydronephrosis and elevated serum creatinine, deep vein thrombosis and ipsilateral leg oedema and urinary frequency [6]. Drainage of the lymphocele is indicated when these complications arise or when the patient is symptomatic due to the size and pressure of the lymphocele. Internal drainage (marsupialization) is the treatment of choice either via the transperitoneal approach through a mid-line incision or through the retroperitoneal transplant incision[1]. Less invasive methods including simple needle aspiration[7], external drainage[8] or aspiration and sclerotherapy[9,10], are associated with an unacceptable incidence of complications and recurrence.

Laparoscopic marsupialization as a minimally invasive approach has been advocated recently[11]. In our series of 135 consecutive cases of live-donor kidney recipients, nine patients (6.6%) developed symptomatic lympho-

cele requiring surgical intervention. We report four cases of these nine patients who were successfully managed by laparoscopic peritoneal drainage, and discuss the advantages of this new minimally invasive procedure.

PATIENTS AND METHODS

Between August 1995 and September 2001, 135 consecutive renal transplantations were performed in patients with end-stage renal disease. All were recipients of live-donor kidneys. One hundred and twelve patients (83%) had a primary transplantation, and 23 patients (17%) a second transplantation. They were 78 males and 57 females aged between 11 and 63 years (mean age 38.4 years). All kidneys were transplanted retroperitoneally into the iliac fossa. Careful vascular mobilization was performed, and attempts at clipping or ligating all native perivascular lymphatics were made to decrease the risk of lymphocele formation. End-to-end anastomosis of the renal artery to the hypogastric artery was done in 103 transplants, while end-to-side anastomosis of the renal artery to the external iliac or common iliac artery was performed in 32 transplants. In recipients of a donor kidney with multiple vessels (34 patients), the anastomosis of the main artery is the one mentioned. When the arteries were nearly equal in diameter, a spatulated side-to-side anastomosis was done followed by either an end-to-end anastomosis to the hypogastric or an end-to-side anastomosis to the external or common iliac artery. In other cases, the accessory branch was anastomosed end-to-end to one of the branches of the hypogastric artery or to the inferior epigastric artery after declamping.

In all cases the external iliac artery was mobilized within its sheath and surrounding lymphatics and fibrolipomatous tissue, so that the end-to-side anastomosis of the renal vein to the external iliac or common iliac vein could be done either from behind or in front of the artery. Careful ligation or clipping of the perivascular lymphatics was attempted. When an end-to-side anastomosis of the renal artery to the external iliac or common iliac artery was performed, the hypogastric artery was usually left undisturbed.

The immunosuppressive protocol consisted of a triple-drug induction therapy with cyclosporin A, azathioprine and steroids. In the maintenance therapy, azathioprine was replaced by mycofenolate moftile in the last 70 patients. Acute allograft rejection occurred in 46 transplants (34%) and was treated with intravenous methyl prednisolone pulses of 3 to 4 gm during a 6-to-8-day interval. Steroid resistant rejection was treated with antilymphoblast globulin or orthoclone OKT-3 monoclonal antibody.

The recipients routinely underwent ultrasonography during the initial hospitalization, at follow-up visits and whenever complications, such as renal dysfunction episodes occurred. Perirenal fluid collections were diagnosed sonographically and verified as lymphoceles by needle aspiration and when the diagnosis was made beyond one week postoperatively. A creatinine concentration in the aspirate comparable to that in the serum was considered diagnostic of lymphocele. A concentration in the range of urine creatinine values would have been considered diagnostic of urinoma. Computerized tomography was performed in some patients to confirm the diagnosis and for better localization of the lymphocele. Symptomatic lymphoceles were defined as those associated with swelling and pain over the allograft, morbid lower extremity lymphoedema, graft obstruction or dysfunction.

An analysis of predisposing risk factors commonly associated with lymphoceles was performed. Factors examined included patient age, sex, number of transplants, arterial anastomosis (end-to-end to hypogastric versus end-to-side to external or common iliac artery), occurrence of acute tubular necrosis-delayed graft function or rejection and use of high-dose corticosteroids (3 gm methyl prednisolone or more intravenously).

Technique of Laparoscopic Drainage

Under general anaesthesia, a nasogastric tube and a Foley catheter were placed to decompress the stomach and the bladder. A Veress needle (14 gauge with an attached 10 cc syringe) was inserted into the peritoneal cavity at the umbilicus. A carbon-dioxide pneumoperitoneum was established to a pressure of 15 mmHg. The needle was removed and a 10 mm trocar sheath was inserted through the same site into the peritoneal cavity. The camera was placed through the previous port and two additional 5 mm and 10 mm trocars were inserted under direct vision away from the transplant, one in the ipsilateral and the other in the contralateral flank. The

patients were placed in the Trendelenburg position to allow the small bowel to fall cephalad, accentuating the visibility of the lymphocele and keeping the caecum under direct vision in the posterior aspect of the field. The abdomen was carefully inspected; the renal transplant and associated lymphocele were visualized as two extrinsic bulges in the retroperitoneum. The lymphoceles were identified by their bluish-shining dome that bulged into the abdominal cavity and their soft consistency on blunt probing. The lymphoceles readily transmitted light when the light of the lens was placed at its wall.

Laparoscopic needle aspiration was done at the proposed site of the peritoneal window. Aspiration of clear lymph fluid confirmed the location. The aspirated fluid was sent for chemical and microbiological analysis. With an endoscissors or hook connected with the cautery and grasping forceps, the lymphocele wall was gently stripped and dissected of its capsule formed of peritoneum and fibrolipomatous tissue. A 4 to 6 cm round or ellipsoid excision of the lymphocele wall was made, creating the window. Bleeding edges of the lymphocele wall were carefully coagulated. The laparoscope was advanced into the lymphocele cavity; all internal loculations and fibrinous exudates were lysed and excised to create a single cavity. The cavity was irrigated and inspected to adequate haemostasis. Omental packing was used to avoid closure of the lymphocele cavity. The omental flap was secured with clips at its position at the edges of the peritoneal window. For marsupialization of the lymphocele cavity, few clips were used to attach the cut edges of the window to the surrounding intact peritoneum. The 10 mm port was used to introduce the medium-large clip applicator. After completion of the procedure, the abdomen was then deflated and the trocars were removed. The puncture sites were closed with absorbable sutures.

RESULTS

The overall incidence of clinically significant lymphocele was 6.6% (9 out of 135 patients). In four patients open surgical internal peritoneal drainage was performed transperitoneally through a mid-line incision. Four patients underwent internal peritoneal drainage via the laparoscope. One patient underwent sonographically-guided percutaneous needle aspiration twice with injection of tetracycline as a sclerosing agent.

Among the 9 patients with clinically significant lymphocele, 8 had undergone primary transplantation and one patient had undergone a previous kidney transplantation. Seven patients underwent an end-to-end anastomosis of the graft artery to the hypogastric artery, while two underwent an end-to-side anastomosis of the graft artery to the external or common iliac artery.

Symptomatic lymphoceles with volumes ranging from 180 to 2200 ml occurred between 4 and 27 weeks after transplantation. A clinically significant compression of the urinary tract structures occurred in all patients. The predominant site of compression was the ureter. The symptoms of compression were independent of the lymphocele volume. The clinical manifestations of lymphocele included a rising creatinine level and hydronephrosis in 8 patients, pain and abdominal swelling over the graft in 4 patients, significant ipsilateral leg oedema in 5 patients, deep venous thrombosis of the common femoral vein in one patient and a change in the micturition pattern in one patient.

Five of the 9 patients with lymphoceles (55.5%) had rejection episodes and received high-dose corticosteroids. Two of these 5 patients received antilymphoblast globulin following a short course of steroids. Two patients (22.2%) experienced acute tubular necrosis-delayed graft function. Among the remaining 124 transplant patients 41 (33%) had rejection episodes; four of them were steroid-resistant.

In the four patients who performed laparoscopic drainage, the procedure was successful, and in none of the patients the laparoscopic procedure had to be converted to open laparotomy. The lymphoceles were located medial and either anterior or inferior to the kidney. The average operative time was 40 minutes. Accidental division of the right native ureter during creation of the peritoneal window occurred in one case. Since the patient had originally been anuric before transplantation, no attempt for repair or ipsilateral nephrectomy was done, and the proximal and distal ends were doubly clipped. Follow-up sonography for 6 months did not reveal any new pathologic changes in the ipsilateral kidney and no other complications occurred.

The mean hospital stay for patients with laparoscopic drainage (without concurrent problems such as rejection) was 1.5 days (range 1 to 3). For patients with primary open surgical drainage, it was 5 days (range 4 to 8). After a mean follow up of 10.7 (range 6 to 22) months, none of the patients had developed recurrence of the lymphocele, as verified by ultrasonography, and all had well-functioning grafts with normalization of the preoperative back pressure changes.

DISCUSSION

Lymphoceles are lymphatic fluid collections without epithelial lining[12]. There are two possible sources of lymphatic leakage after renal transplantation: the transected and unligated lymphatic channels around the recipient iliac vessels and the lymphatics of the transplanted graft (for example kidney surface, capsular tears, transected hilar lymphatics and site of graft biopsies), which are more difficult to control[13,14]. This study reports an incidence of significant lymphocele of 6.6% percent which is nearly similar to other large series[15-18]. Urinary tract compression in the present series was independent of lymphocele size and was more obviously determined by the location of the lesion. The type of recipient artery (hypogastric versus external iliac artery), recipient gender or previous transplantation did not affect the incidence.

Data from our and other studies[16,19-21] document that acute tubular necrosis–delayed graft function and some drugs (e.g. diuretics and anticoagulants) have been implicated in the formation of lymphoceles. Their incidence can be minimized by meticulous ligation of the perivascular lymphatic channels and avoidance of an improper surgical technique, e.g. an exorbitant use of diathermy. The pathophysiology of that association is unclear, but Pederson and associates[22] demonstrated an increase in allograft lymph flow during rejection in an experimental allograft model. In the present series, 5 of the 9 patients with clinically significant lymphocele had a moderate to severe allograft rejection requiring high doses of steroids.

Most lymphoceles in this series developed within the first weeks and months after transplantation, but late lymphoceles occurring several months and years later have also been described[13,19,23]. Boedker and co-workers[21] have attributed the early detection of lymphocele in recent years to the frequent use of ultrasonography. Most lymphoceles are small and without clinical significance. Yet, some may cause clinical symptoms if the localization causes compression of the iliac vein or the transplant ureter. In a recent study of 118 transplantations, lymphoceles 5 cm or larger in diameter were noted in 26 (22%) patients after operation by ultrasonography; in only 8 (31%) of them, the lymphoceles became symptomatic and required therapy[20].

In this series clinical manifestations of lymphocele included a decrease of renal function (rising creatinine levels) as a result of urinary tract obstruction, abdominal or perirenal discomfort or pain, ipsilateral leg swelling because of venous obstruction, oedema of the external genitalia and change in the micturition pattern. Other authors reported cutaneous lymph fistulae, unexplained weight gain, obstruction of the inferior vena cava and portal vein, arterial obstruction and pulmonary embolism caused by iliac vein thrombosis[12,24-27].

The diagnosis of lymphocele is usually established with ultrasonography. Computed tomography is more helpful in the localization of the collection and determination of its relation to surrounding important structures. To distinguish a lymphocele from other forms of fluid collection (e.g. urinoma, haematoma, abscess, seroma), a needle aspiration under sonographic guidance should be done for chemical and bacteriologic analysis, especially when the collection is noted early in the clinical course after transplantation. Because the lymphatic fluid presents an ultrafiltrate of plasma, the concentrations of constituents are equal to or less than the serum values[28].

Various alternatives have been advocated for the management of symptomatic post-transplantation lymphoceles. Percutaneous needle aspiration is the simplest approach, but this has been associated with unacceptable recurrence rates as high as 50- 80%; it should therefore be performed only for diagnostic, not for therapeutic purpose[7,8,28]. Aspiration of the lymphocele and injection of a tissue sclerosing agent (e.g. povidone–iodine, ^{198}Au colloid, ampicillin, tetracycline) have also been advocated[7-9,29,30] with a higher success rate. Sclerosants could potentially damage the kidney or the delicate blood supply of the ureter because of the marked inflammatory response that is

induced. It has also been postulated that sclerosis and the resulting scar tissue might make any future graft exploration difficult and hazardous[31]. External catheter drainage, either with percutaneously placed catheters or surgically placed drains, likewise carries the risk of bleeding and infection via the drain in immunocompromised patients and may be complicated by a prolonged drainage from the drainage catheter or catheter site[7,16].

Internal transperitoneal drainage (marsupialization) is generally believed to be the gold standard of post-transplantation lymphocele treatment[16,17,21]. This procedure does not correct the source of the lymphatic leak, but it allows free drainage of the lymphatic fluid collection from the retroperitoneal space into the peritoneal cavity where it is reabsorbed, preserving the sterility of the lymphocele cavity. A lymphocele may be approached through either the previous transplant incision or through a lower midline laparotomy. The former incision allows for visualization and protection of the kidney, ureter and vessels, and is most appropriate for anterior and lateral lymphoceles. However, a safe entry into the abdominal cavity may be complicated by bowel adherent to the peritoneum overlying the lymphocele. The midline approach reduces the risk of bowl injury and is especially useful for medial and posterior lymphocele; a generous portion of the peritoneum forming the lymphocele wall must be excised. In addition, an omental flap (omentoplasty) can be put into the lymphocele cavity and kept in place with few non-absorbable stitches (omentopexy)[31] to reduce the chances of the opening in the peritoneum being sealed with bowel. The recurrence rate after primary internal marsupialization is between 10% and 25%[12,28]. Fortunately, in our series, there was no recurrence in the 4 patients who underwent open surgical marsupialization and omentopexy after a minimum follow up of 8 months.

The recent advent of laparoscopic marsupialization as a minimally invasive surgery is considered the treatment of choice of post-transplantation lymphocele[24,29,32]. The advantages of the laparoscopic window are related to its less invasive nature in immunosupressed renal transplant recipients, particularly in those individuals who have recently undergone a therapy of acute rejection with high doses of steroids and are at an increased risk of poor wound healing and bacterial infection. Many investigators have found it to be simple, easy and safe[12,18,24,29,32,33], even in patients with previous abdominal surgery[24]. Our own experience confirms some distinct advantages of laparoscopic drainage including a rapid convalescence, no requirement of changing oral immunosuppression, better cosmetic results, less pain and a fast return to normal activity. Nevertheless, an increased application of this method has allowed associated complications to become apparent. Accidental transection of the graft ureter during laparoscopic deroofing of a lymphocele has been reported[32]. In our series, the ipsilateral native ureter was accidentally transected.

We, therefore, recommend some precautions that may be useful to avoid complications with laparoscopic drainage of post-transplantation lymphoceles. The patient should be placed in the Trendelenburg position to allow the small bowel to fall cephalad. The lymphocele must be identified with certainty by its soft consistency on probing and its transmission of light when the light source is placed at its wall. Laparoscopic needle aspiration at the proposed site of the peritoneal window may reduce the risk of injury to the vessels and the ureter. The transplanted and native ureter must be identified before excision of the peritoneal window. If on preoperative radiological localization the lymphocele is found in close proximity to either ureter, preoperative insertion of a ureteral catheter may facilitate identification of the ureter. Inferior lymphoceles close to the bladder should be distinguished by distending the bladder visually with saline solution. To avoid closure of the peritoneal window and to ensure an adequate drainage of the lymphocele, as in open surgery, a wide enough ellipse must be excised, the lymphocele cavity itself should be inspected, and all internal loculi should be divided. An omental flap may be placed to ensure further patency of the constructed window and prevent recurrence.

Laparoscopic lymphocele drainage may not be feasible in small symptomatic lymphoceles that are difficult to be distinguished from the graft or iliac vessels, in extremely lateral lymphoceles and lymphoceles with massive adhesions or bowel interposition.

In conclusion, for post-transplantation lymphoceles with an appropriate size and location, laparoscopic internal drainage through a peritoneal window offers an effective, safe, technically easy and less expensive

alternative to open surgical drainage. The procedure is particularly recommended in patients who undergo concurrent rejection treatment with increased doses of corticosteroids, because they are at an increased risk of impaired wound healing and infections.

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RESUME

La Marsupialisation par Voie Laparoscopique des Lymphocèles après Transplantation Rénale

Objectif Une lymphocèle cliniquement significative n'est pas rare après transplantation rénale. La marsupialisation chirurgicale avec drainage péritonéale interne est le traitement de choix. Nous décrivons un procédé mini-invasif de création par voie laparoscopique d'une fenêtre péritonéale pour le drainage d'une lymphocèle post-opératoire après transplantation rénale. **Patients and Méthode** Entre Août 1995 et Septembre 2001, 135 transplantations rénales consécutives ont été réalisées. Neuf patients ont développé une lymphocèle cliniquement significative. Quatre d'entre eux ont été traits par laparoscopie créant une fenêtre péritonéale de drainage. L'analyse des facteurs prédisposant à une lymphocèle a été faite. Le devenir chirurgical a été évalué. **Résultats** Le drainage laparoscopique a été réussi chez tous les patients. La durée opératoire moyenne était de 40 minutes. La durée moyenne d'hospitalisation était de 1,5 jours pour les patients traités par laparoscopie et de 5 jours pour ceux traités par chirurgie ouverte. Une section accidentelle de l'uretère droit propre reconnue en cours d'intervention est survenue chez un patient. Aucun patient n'a développé une lymphocèle récidivante après un suivi de 10,7 mois (extrêmes de 6 et 22 mois). **Conclusion** Chez les patients présentant une lymphocèle post-transplantaion rénale de volume et de siège appropriés, le drainage laparoscopique est un procédé simple, sûr et efficace. Il diminue la durée d'hospitalisation et de convalescence.

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