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Improvement of post-transplant lymphocele treatment in the laparoscopic era

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Abstract Post-transplant lymphoceles are a common problem after renal transplantation, often inflicting the graft or adjacent iliac veins. Since 1991, there have been many reports on laparoscopic fenestration as the treatment of choice, but no larger series has been presented. At our department, 63 laparoscopic procedures were performed between 1993 and 2001 among 1502 renal graft recipients. The laparoscopic operation time, conversion rate, hospital stay, and complications have all decreased progessively. Duration of hospital stay and convalescence was markedly longer in patients treated with conventional open surgery (27 patients). Rejections, CMV disease, and post-transplant reoperations seem to have an increased incidence in the lymphocele population. According to our experience, laparoscopic fenestration is the superior treatment for symptomatic lymphoceles, allowing minimal trauma and fast recovery. Our series suggests that the rate of complications/graft injury decreases progressively with experience. Laparoscopic ultrasound seems useful in difficult cases. Prophylactic measures should be emphasised at the time of transplantation and reoperations.

Keywords Lymphocele · Kidney transplantation

Introduction

Peritransplant lymphoceles are a common finding after renal transplantation, often requiring intervention because of the complications they cause: Urinary obstruction with allograft dysfunction, leg oedema, deep vein thrombosis, pelvic discomfort, herniation, and lymph leakage through the wound. In many centres; lymphoceles are the most frequent surgical complication of kidney allograft recipients [16], the reported incidence ranging from 0,6–18% [3, 9]. Careful preparation of the iliac vessels and meticulous ligation of lymphatic tissue is considered to decrease the incidence [9]. Rejection episodes and high-dose steroid medication seem to be associated with an increased risk of lymphocele development [2, 12].

Conservative treatment includes ultrasound-guided drainage with an indwelling catheter and sclerotheraphy using povidone-iodine or alcohol. However, most authors consider these options non-optimal because of high recurrence rates and the unacceptably high risk of infection associated with external drainage lasting for weeks [7, 14]. The treatment of choice has therefore been surgical deroofing (fenestration, marsupialization) of the lymphocele wall, creating an internal drainage route for the lymph.

Since the first laparoscopic fenestration, described in 1991 [15], this minimally invasive technique has taken over as the optimal treatment option in most transplant centres, replacing traditional laparotomy. In recent years, there have been many reports on the laparoscopic method [1, 5, 8, 10, 13, 19, 21], but no series comprising more than 20 patients has been presented. This paper summarises our experience with 63 patients treated with the minimally invasive technique in the laparoscopic era. We emphasize the results from a surgical point of view and look into possible etiological factors.

Patients and methods

Laparoscopic fenestration was attempted in 63 post-transplant lymphocele patients from June 1993 to January 2001 among 1502 renal graft recipients. In the same time period, 27 lymphoceles were treated with conventional open surgery. Table 1 shows the baseline data for both treatment groups.

For the laparoscopic procedure, preoperative assessment included a CT scan with urographic phase, showing the exact relations between lymphocele, transplant ureter/renal pelvis and vessels. Pneumoperitoneum was established through a small transumbilical incision. This allowed introduction of the first trochar under direct vision, omitting "blind steps" (particularly suitable in cases of previous abdominal surgery). A steady state intra-abdominal pressure of 10–12mm Hg was attempted, and we used a laparoscope with 30° optics. Two additional instrument ports (11 mm + 5mm) were introduced contralaterally to the lymphocele. A peritoneal window of at least 5×5 cm was created in the lymphocele wall by means of scissors/diathermy, and in some cases the edges of the lymphocele wall were everted by suture or clips. Lately, we have introduced laparoscopic ultrasound probes (10mm), to help localize the lymphocele in difficult cases. The conventional, open operation was performed through a midline incision.

In order to explore the learning effect, the laparoscopic procedures were divided into early- (1993–1996), and late (1996–2001) time periods. We could not find statistical inferences useful in judging this retrospective, unstratified material.

Results

In our series (Table 1), the overall incidence of symptomatic lymphoceles was 6,0% (90/1502). Living donor transplantations (in which we mostly use the internal iliac artery) account for a lower number of lymphoceles (30%) than should be expected (36% living donor transplantations in this period), but the difference is not significant. The proportion of patients with retransplants among the lymphocele population (13%) was not significantly different from the expected. A rather high proportion of patients had been subjected to previous abdominal surgery (30–40%), but this included catheters for peritoneal dialysis.

The indications for lymphocele intervention are listed in Table 2. Compression of the iliac veins with leg edema or thrombosis was the main indication in about 10% of the cases. The reasons for choosing the open operation technique are shown in Table 3. A decreasing number of conventional operations have been performed, most of them because of the combined occurrence of lymphoceles and wound dehiscence, leakage, or herniation.

Table 4 shows the possible etiologic factors occurring after transplantation. The number of reoperations (prior to the appearance of lymphocele) was above the usual level of 5–10% for the whole transplant population. Our basic immunosuppressive regimen changed several times during the laparoscopic era (Cyclosporin A (CyA)/steroids/azathioprin → CyA/steroids/basiliximab → CyA/steroids/mycophenolate mofetil), with a consequent reduction in rejection rate. On the whole, the incidence of rejections among patients with lymphoceles (particularly of steroid-resistant rejections) seems to be higher than among patients without lymphoceles. Also, the occurrence of CMV disease (treated cases) was clearly higher than expected (20–25% at our institution) in the lymphocele group.

The results of the different groups are compared in Table 5. Among the 63 laparoscopic procedures, 7 (11%) were converted to open surgery and 4 (6%) suffered from major complications. These are listed in Table 6. It is not clear whether the colon perforation was caused by injury during the lymphocele operation or due to concurrent CMV disease. The other serious complications (lesion of renal pelvis/bladder) occurred during the early phase (1993–1994) of the laparoscopic era. In the first patient, a renal pelvis with anterior localization was perforated. This caused immediate conversion to

Table 1. Baseline data for the whole period (June 1993 to January 2001); altogether $n = 90$ patients treated for lymphocele among 1,502 kidney recipients

Op. method Time period	Lap. sc. + open 1993–2001	Lap. sc. 1993–2001	Open 1993–2001
Number (n)	90/1502 Tx	63	27
Incidence (%)	6.0		
Age (years; mean, range)	49 (12–78)	50 (12–78)	48 (24–72)
Gender M:F (n:n)	63:27	42:21	21:6
(%)	70:30	67:33	78:22
Living:cadav. donor	27:63		
(%)	30:70		
Re-Tx (n; %)	12/90 (13)		
Previous abd. Surgery (n)	34	25	9
(%)	38	40	33

laparotomy with suturing of the renal pelvis. In the second patient, the bladder was "fenestrated" instead of the lymphocele (which was collapsed due to external drainage). The thin-walled bladder was then mistaken for a lymphocele; perforated and "marsupialized". Later acknowledgement of the condition led to "open" reoperation after 3 days, with suture of the perforated bladder and proper fenestration of the lymphocele. In both patients, the further course was uneventful, with complete recovery of the patient and graft function.

In the laparoscopic group, we experienced 4 (7%) recurrences, requiring reoperation. The laparoscopic operating time has clearly decreased progressively, and is now comparable to that of the open procedure. Likewise, the conversion rate and the duration of hospital stay have decreased significantly. In the open group, the results in terms of duration of hospital stay/convalescence were markedly worse, while the complications (hernia/wound infection/ureter lesion) and recurrences were at about the same level.

Table 2. The indications for fenestration ($n=90$; 1993–2001)

Indication	*n* (%)
Urinary obstruction	38 (42)
Graft dysfunction	20 (22)
Pelvic discomfort	12 (13)
Leg edema	8 (9)
Deep vein thrombosis	2 (2)
Wound dehiscence/hernia/leakage	10 (11)

Table 3. The indications for *open* fenestration/reasons for not doing the laparoscopic procedure ($n=27$)

Indication/reason	*n*
Co-existent wound dehiscence/hernia	11
Location of lymphocele/ureter/vessels	6
Previous abdominal surgery	3
Practical reasons (lack of lap. sc. competence)	7

Table 4. Events occurring between transplantation and lymphocele development fenestration (whole material; $n=90$)

Event	
Interval Tx-fenestration (days; median, range)	52 (13–1398)
Hematomas Tx-Fen. (*n*; %)	8 (9)
Reoperations Tx–Fen. (*n*; %)	14 (16)
Rejection therapy (*n*; %)	47 (52)
– Steroid resistant (*n*; %)	21 (23)
CMV disease (*n*; %)	29 (32)

Discussion

The formation of post-transplant lymphoceles obviously originates in the surgical transsection of lymphatic ducts. In the recipient, there are major lymphatic ducts crossing the iliac vessels. However, it has also been shown that transsected lymphatics from the kidney graft may contribute [6]. In Table 7 the etiological factors, hereby discussed, are summarized. Meticulous preparation of the graft and of the recipient vessels has been found to reduce the incidence of lymphoceles [9]. Recently, a prospective, randomised study [18] demonstrated a markedly reduced incidence by using the common iliac artery instead of the external iliac artery. This is in agreement with anatomical observations, and may indicate that the major lymph contribution is from the recipient side. Furthermore, our material suggests a slightly reduced lymphocele incidence in living donor transplantations, where we predominantly use the internal iliac artery, leaving the external iliac artery undissected. Careful ligation of the lymphatic ducts is considered to reduce the incidence, but there is no hard evidence. It is rather obvious that limited and careful perivascular dissection may be beneficial.

Remarkably, however, when performing exactly the same surgical procedure without immunosuppression (Auto-transplantation), lymphoceles are very rare. At our centre, we have experienced only one lymphoceleamong 520 patients that underwent auto-transplantation

Table 5. Results specified according to operation method and time period; early (1993–1996), late (1997–2001) and summarized (1993–2001) laparoscopic group, and open group (1993–2001)

Op. method Time period	Lap. sc. 1993–1996	Lap. sc. 1997–2001	Lap. sc. 1993–2001	Open 1993–2001
Operating time (minimum; median, range)	105 (40–235)	74 (30–165)	85 (30–235)	73 (23–125)
Conversions (n)	6/27	1/36	7/63	
(%)	22	3	11	
Complications (n)	3/27	1/36	4/63	3/27
(%)	11	3	6	11
Hospital stay (days; median)	4	2	3	8
Recurrences (n)	1/21	3/35	4/56	2/27
(%)	5	9	7	7

Table 6. The major laparoscopic complications

Complication	Year
Perforation of renal pelvis	1993
– Converted: sutured	
Lesion of urinary bladder	1994
– "Fenestration" of bladder	
– Reop. day 3: bladder suture + fenestration	
Colon perforation	1996
– Reop. twice 1-2 weeks after fenestration: colostomy	
– Diathermy injury??; could also be due to CMV (concurrent CMV-disease)	
Incisional (port) hernia	1997
– Reop.: hernia repair	

Table 7. Etiological factors for lymphocele formation in renal allograft recipients

Factor
Transsection of lymphatic tissue
– Extensive dissection
– Art. iliaca externa > art. iliaca communis
– Ligation better than diathermy??
Diminished healing/adherence
– Immunosuppression/steroids
— Rejection-treatment
– CMV infection??
– Catabolic patients/malnutrition
Space-creating factors
– Hematom/seroma
– Reoperations
– Extensive dissection

[4, personal observation]. This strongly indicates that the permissive factor in allograft recipients is diminished tissue adherence/slower healing, which allows transsected lymphatic channels to stay open and create fluid loculaments. The steroids are considered to be a major offender. Interestingly, increased incidence of lymphoceles have been observed with rapamycin (Sirolimus) [11], and the rapamycin-derivative Everolimus [unpublished results]. Rapamycin is known to exhibit antiproliferative actions. Based on these considerations, intensified immunosuppression/rejection theraphy should be expected to increase lymphocele frequency. This has indeed been suggested in several studies [1, 2, 12], and our data is also consistent with this view. Furthermore, in our series CMV disease is more frequent in the lymphocele population. However, this may be a correlation explained by the probably higher level of immunosuppression in the lymphocele group.

From these considerations we can conclude that factors helping to create space for fluid expansion will increase the incidence of lymphoceles. Accordingly, the incidence of reoperations and hematomas after transplantation seems to be higher in the lymphocele population. Prophylactic fenestration (peritoneal window) performed in the course of reoperations after transplantation may therefore be recommended, particularly if peritransplant hematomas/fluid collections are found. When renal grafts are placed inside the peritoneal cavity, lymphocele development is rare. It is never the less possible due to formation of adhesions, and indeed, one patient in our series had undergone simultaneous (intraperitoneal) kidney- and pancreas transplantation.

The laparoscopic approach offers the advantages of minimal trauma and fast recovery, as concluded by almost all authors [1, 5, 8, 10, 13, 19, 21]. However, according to several reports [10, 13, 17, 20], and demonstrated by our early experience, there is a significant risk of injury to vital structures (ureter/renal pelvis/bladder/iliac vessels). Our series suggests that this risk decreases with experience and time, in spite of expanding the indications. We now consider that there are no absolute contraindications for the laparoscopic procedure, regarding both previous abdominal surgery, and lymphocele localization. Careful preoperative assessment with CT scan, showing the relationship to the ureter/renal pelvis, has proved to be very helpful. To further reduce the risk, we have found laparoscopic ultrasound useful in difficult cases, as it shows the exact localization and relation to the vital structures. Others [19] report that transcutaneous staining with methylene blue makes the localization of the lymphocele easier, however we cannot verify this.

To reduce the incidence of post-transplant lymphoceles, prophylactic measures should be emphasized, as discussed above. According to our experience, laparoscopic fenestration is the superior treatment for symptomatic lymphoceles. However, the risk of graft injury should always be kept in mind. Many lymphoceles are easy to locate and fenestrate, while the difficult cases may be very challenging. The importance of experience, as suggested by this paper, should be emphasized when introducing the technique.

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