Assessment of risk factors of a lymphocele following kidney transplantation

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### ABSTRACT

Introduction: Kidney transplantation is the best method to treat patients with end-stage renal disease. A lymphocele is one of the most common surgical complications of kidney transplantation. It may have a negative effect on the graft functions.

Methods: Risk factors in the study group and effects of a lymphocele on the functions and survival rate of a transplanted kidney were evaluated during a one-year follow-up. A group of 220 patients who received kidney transplantation in the period between 01 January 2010 and 31 December 2011 was assessed. 19 patients with asymptomatic lymphocele belonged to the study group, and the control group included 201 patients. Results: A lymphocele developed in 19 (8.4%) patients. The body mass index (BMI) was statistically significantly different between both groups (25.9 ± 3.3 in the study group vs. 24.1 ± 7.4 in the control group; p<0.05). Kidney functions after one year were statistically poorer in patients with lymphocele near the graft (38.9 mL/min/1.73m² ±10.0 vs. 48.8 mL/min/1.73m² ± 17.8; p<0.05), but the graft survival rate
was comparable (88% in the study group vs. 93% in the control group). Hospitalization duration of patients with a lymphocele was statistically significantly longer than in the control group (28 ± 18 vs. 17.4 ± 15.2 days; p<0.05). There were not any statistically significant differences with regard to such factors as age, sex, delayed graft function, acute rejection episodes, extended criteria donor kidney. Conclusions: High BMI of a kidney recipient is a significant risk factor of a lymphocele. Graft functions are poorer at one year after transplantation in patients with a lymphocele, but the graft survival rate are comparable to the group of patients without this surgical complication.

INTRODUCTION

Kidney transplantation is the best method to treat patients with end-stage renal disease. It doubles the expected survival time, and improves life quality (1). Unfortunately, it is also associated with post-operative complications. A lymphocele, namely a collection of lymphatic fluid near the transplanted kidney, is one of the most common surgical complications. It may have a negative effect on the functions of a transplanted kidney as it compresses the ureter, urinary bladder, vessels or a kidney itself. Its incidence ranges between 0.6% and even 49% depending on literature, and its peak incidence is at 6 weeks since transplantation (1,2). Such a large discrepancy in the incidence depending on different reports may indicate that there are no unanimous criteria to diagnose a lymphocele, and there are differences with regard to surgical techniques between centers and individual surgeons.

The reason why lymphatic fluid collects around a transplanted kidney is still not fully understood. It is thought that lymphatic fluid is secreted by the kidney itself, lymphatic vessels near the renal hilum and renal capsule, or, what is more probable, it originates in damaged lymphatic vessels located near the iliac vessels that the renal vessels are anastomosed to (2,3). Literature presents many reports regarding risk factors of lymphocele formation after kidney transplantation. The ones that are listed the most frequently include: obesity, diabetes, kidney failure due to polycystic kidney disease, as well as immunosuppressive treatment including high-dose adrenal steroids (2,3), mTOR inhibitors (4) and mycophenolic acid derivatives (3,5). Additionally, delayed graft function or acute rejection episodes (4,7,8) may increase the incidence of a lymphocele. A type of a kidney donor may also be significant. According to many reports, transplantation of kidneys from extended criteria donors (ECD) is associated with a higher risk of lymphocele formation (6). The paper is aimed to assess the incidence of a lymphocele in patients after kidney transplantation and to analyze factors affecting its development.

PATIENTS AND METHODS

A In the period between 01 January 2010 and 31 December 2011 at the Department of General Surgery and Transplantology, Medical University of Warsaw, 262 patients received kidney transplantation. In 22 (8.4%) cases kidneys were transplanted from a related donor, and in 240 cases from a deceased donor (91.6%). 220 patients who received kidneys stored by continuous hypothermic perfusion were analyzed. 20 patients who received kidneys stored by simple hypothermia were excluded from an analysis. The study group included 19 (9.4%) patients with a symptomatic lymphocele, and 201 patients were in the control group. Extended criteria donors accounted for 32.4% of the analyzed group. The following parameters of kidney recipients were analyzed retrospectively: sex, age, BMI, reason for failure of patient’s own kidneys, type of renal replacement therapy, GFR one year after transplantation based on the Cockcroft-Gault formula and the graft survival rate. Additionally, the incidence of graft delayed functions and acute rejection episodes were assessed in a one-year follow-up. Delayed graft function defined as the need to perform at least one hemodialysis session in an early period after kidney transplantation. Kidney perfusion parameters and such parameters associated with donors as age (according to UNOS), creatinine levels, and compliance with the ECD criteria were analyzed. Additionally, parameters regarding kidney transplantation itself were analyzed: cold ischemia time and procedure duration.

Surgical technique

Kidneys were transplanted retroperitoneally. In three cases kidneys were transplanted intraperitoneally, with urine diversion into an intestinal loop created with the Bricker’s method. These cases were excluded from the analysis. The renal vessels were anastomosed to the external iliac vessels of a recipient. The vesicoureteral anastomosis was performed with the McKinonn or Lish-Gregoir technique. The JJ catheter was used depending on surgeon’s preference.

Immunosuppression

A triple-drug regimen was used routinely and included: calcineurin inhibitors, mycophenolate mofetil or mycophenolic acid and prednisolone. Immunosuppression induction was used in the following cases: when the panelreactive antibody (PRA) was above 20%, when at least second kidney transplantation was performed or when there were at least four antigen mismatches.

Lymphocele analysis

A lymphocele was defined as a symptomatic collection of lymphatic fluid detected in an ultrasound
scan, and requiring an intervention. Indications for an intervention included delayed functions of a transplanted kidney, dilation of the pyelo-calycal system, lower extremity swelling or compression of the renal vessels. Treatment of choice included percutaneous drainage of a collection of lymphatic fluid. If a lymphocele returned after two subsequent percutaneous drainages a patient was considered eligible for fenestration using an open or laparoscopic method.

**Statistical analysis**

The t-Test was used to evaluate differences between means. The value of 0.05 was set as a critical level to test hypotheses.

**RESULTS**

The cold ischemia time for all transplanted kidneys was 29.5h ± 8.1h. Delayed graft function was observed in 92 patients (41%) who received kidneys from deceased donors. Primary graft non-function was observed in three patients (1.3%). 62% of kidney recipients were men, and the mean age of all recipients was 47 years. A lymphocele was observed in 19 patients (the study group), what accounts for 8.4%. In 11 patients percutaneous drainage was performed, and fenestration was performed in 8 patients. The remaining 201 patients were included in the control group.

**Analysis of kidney donors**

Kidneys were collected from 125 deceased donors. In 115 cases both kidneys were transplanted. In two cases kidneys were found not eligible for transplantation due to poor perfusion parameters and findings of a screening biopsy. Other two kidneys were transplanted with the pancreas, therefore were excluded from a further analysis. In one case merely one kidney was available for transplantation, and in the next five cases kidneys were transferred to another center for transplantation. Kidneys from extended criteria donors accounted for 47.4% (n=9) in the study group and 31.2% (n=64) in the control group, and the difference was not statistically significant.

**Analysis of a medical procedure and perfusion parameters**

In the study group the flow in the zero hour of perfusion was higher (84 mL/min ± 45.3) compared to the control group (58.6 mL/min ± 39.8), but it was not statistically significant (p=0.058). Flows and resistance rates in the fourth hour did not statistically between the study and control groups. Surgery duration did not differ statistically in both groups (171.2 min ± 61 in the study group and 177.8 min ± 55 in the control group). There were no differences with regard to cold ischemia time between both groups (30.6h ± 7.74 in the study group vs. 29.2h ± 8.25 in the control group).

**Analysis of kidney recipients**

Both groups did not differ statistically with regard to the sex. Polycystic kidney disease accounted for failure of patient’s own kidneys in 12.9%, and the rates did not differ statistically between groups. Also, the rate of diabetes as a cause of renal failure did not differ statistically between groups, and in the whole group its rate was 8.4%. The body mass of patients in the study group was statistically significantly higher (77.3 ± 9.1 kg) compared to the control group (69.2 ± 13 kg ; p<0.05). Moreover, the BMI was statistically significantly higher in the study group vs. the control group (25.9 ± 3.3 vs. 24.2 ± 7.6; p<0.05). Additionally, there was not statistically significant difference between both groups with regard to a type of renal replacement therapy prior to transplantation: 94.7% (n=18) had hemodialysis (HD) in the study group, and 92.5% (n=173) had HD in the control group. There were statistically significant differences between groups with regard to hospitalization duration. In the study group the patients were hospitalized for 28 days on average, whereas in the control group the value was 17.4 days (p<0.05).

**Analysis of graft function after transplantation**

The analysis found that after one year GFR in the study group was statistically lower, 38.9 mL/min/1.73m² ± 10 vs. the control group 48.8 mL/min/1.73m² ± 17.9; p<0.05. Delayed graft function (DGF) was observed in both groups at a similar incidence, namely 42.1% (n=8) in the study group vs. 40.9 (n=84) in the control group. Primary non-function of a transplanted kidney was observed only in three patients in the control group. After one year the survival of a transplanted kidney did not differ significantly between groups, and was 88.2% in the study group, and 93.5% in the control group. In a one-year follow-up the rate of acute rejection episodes also did not differ statistically between groups: 12.5% (n=2) vs 10.5% (n=17).

**DISCUSSION**

The paper has analyzed many factors that might potentially increase the risk of lymphocele formation around a transplanted kidney. In the study material the incidence of a lymphocele is low (8.4%) compared to data reported by other authors where the incidence of a lymphocele ranges between 0.6% up to even 49% (1,2). The amount of lymphatic fluid secreted may be lower when the lymphatic vessels near the iliac vessels are prepared carefully and cautiously, and when a kidney is carefully prepared prior to transplantation. Hamza pays attention to the above in their work (9). It seems it is necessary to design and conduct a clinical study to assess real effects of a surgical technique on the lymphocele incidence after kidney transplantation. The analysis
confirmed that high BMI of a kidney recipient is a significant risk factor of a lymphocele. Similar results were also observed by other authors (10). It may be associated with excessively developed adipose tissue located in a surgical site, therefore it is more difficult to provide for all numerous lymphatic vessels in this area. Similar results were obtained by researchers from London who evaluated a lymphocele in a group of pediatric recipients and found that BMI > the 95th percentile is a significant risk factor (11). High BMI is also a risk factor of other complications in patients after transplantation, for example surgical site infection or cardiovascular complications (12). Hospitalization duration was significantly prolonged in the study group compared to the control group in the analyzed material. Longer hospitalization was associated, among others, with the need to maintain a Redon drain for a longer time, and it indicates that lymph secretion disturbances were observed in the study group as early as at the beginning. Delayed graft function is reported as a risk factor for lymphocele formation around a transplanted kidney. This statistically significant correlation has been indicated by Khauli (13) in a group of 118 patients. This observation was not confirmed in our analysis. In our material we did not observe any effects of acute kidney rejection on lymphocele formation that has been demonstrated by a Brazilian researcher Lipay (6) and an Indian researcher Veeramani M(8). Similarly as in the paper presented by Vermani (8), the survival rate of a transplanted kidney one year after transplantation did not differ statistically between both groups. However, our analysis revealed that GFR was statistically significantly lower in the study group. A collection of lymphatic fluid around a transplanted kidney constitutes a serious therapeutic problem. Many researchers present different methods to prevent it in a group of patients after kidney transplantation. A suggestion presented by Swedish investigators, Trygve Syversveen et al. (14), associated with prophylactic fenestration during kidney transplantation seems to be interesting. They report statistically significant reduction of a risk of a lymphocele in the study group. Italian researchers, L. Berardinelli et al. (15), presented a paper on the use of a polymeric adhesive to prevent the formation of a lymphocele after transplantation. Other researchers suggested to prolong duration of compression therapy of the lower extremity in order to prevent lymphocele formation after transplantation (16). All these methods require further studies and are still among non-conventional therapeutic strategies.

CONCLUSIONS

In our material the incidence of a lymphocele after kidney transplantation was 8.4%. The body mass index is a significant risk factor increasing the incidence of a lymphocele. Kidney function assessed based on the GFR differed significantly and was lower in a group of patients with a lymphocele, with a compared survival rate of a transplanted kidney in both groups.

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TABLES

Table 1. Recipients’ analysis
Table 2. Deceased donor analysis

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BIBLIOGRAPHY


