Comparing the Effect of Electrocutery versus Suture-Ligation of Iliac Lymphatic Vessels on the Appearance of Lymphocele around the Transplant Kidney

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ABSTRACT

Objective: The End-Stages of Renal Disease or ESRD require kidney replacement therapy. The amount of ESRD prevalence is ever increasing and is growing at 11 to 15 percent in Iran. The best therapy is the replacement of kidney transplantation. The appearance of urologic complications is an important cause of morbidity in patients with kidney transplantation. To prevent the formation of postoperative lymphocele, researchers have suggested that the ligation of lymphatic vessels is effective.

Materials and Methods: the primary aim of this study is to study the effect of performing ligation of lymphatic vessels in patients receiving kidney. The patients were divided into two ligation and electrocutery groups and the rate of urological complications in both related groups were evaluated through frequent visits and examination of patients and performing urine, biochemistry and ultrasonography tests during the hospital stay and then, as outpatients for six months after transplant and obtained results were compared with each other.

Results: In our study, there was not observed any significant difference between groups in terms of sex, BMI and also the mean age of patients. The amount of hydrourephrosis had almost no difference in both groups in the second week, the second and sixth months. In every three times of weekly and monthly control of collection, there was not observed any significant differences between groups again. In this study, 6.9% patients in the electrocutery group and 10.7% patients in Ligation group required draining the fluid around the kidney and this difference does not show statistically significant differences. In terms of wound infection, no case of wound infection was observed in the electrocutery patients but in Ligation group, there was 1 patient suffering from wound infection (1.8%), however, there were no significant differences between groups in terms of infection.

Conclusions: the electrocoagulation of iliac lymphatic vessels can be expressed as an alternative method in the ligation of lymphatic vessels. It seems that this method is accompanied with the reduction of surgical time but it was not related to postoperative complications, increasing in incidence of lymphocele and needing for drainage.

KEY WORDS: electrocutery, Ligation, lymphocele, kidney transplantation

INTRODUCTION

Organ transplant specifically of the kidney has had technically and immunologically a significant progressin the past three decades in the way that kidney transplantation is today the preferred treatment for ESRD. Despite a lot of problems involved in organ transplantation, there is a bright future for it (1). In 1902, the surgical techniques for vascular anastomoses (the new way of stitching vessels together) which were used later in human transplant were experimentally conducted at first on animals by Carrel in 1906. He moved from France to America and pursued his research on kidney transplantation there and for this reason, he accomplished the Nobel Prize in 1912 (1).

Surgical problems following kidney transplantation is mainly related to vascular and urologic complications. Improvement in surgical techniques and accuracy of the way of operating the donor and recipient lead to reduction in these complications. Considering the complications of the procedure, quick action plays an effective role in reducing themorbidity of the complications. Surgical complications have been evaluated as about 10% in the kidney recipients; however, it hardly leads to the loss of the transplant.

Lymphoceles are created due to the leaking accumulation of damaged lymphaticson the iliac vessels. There is a high controversy about the rate of its occurrence after transplantation in the literature. Some

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lymphoceles are small and asymptomatic and some are large and with symptoms. Usually, whatever they are
greater, their chance of being symptomatic or requiring to treatment will be more. Deep vein thrombosis and
leg swelling can appear with ureteral obstruction symptom, pressure on the iliac and secondary vein. Or even it
is appeared as an abdominal mass. Sometimes it leads to urinary incontinence due to pressure on the bladder or
drainage sclerotomy or obstruction and its Nakav, it shows itself as scrotal mass (36).

With the closure of iliac lymphatics, its amount can be minimized and the amount of its incidence brings
about 18-38% by use of sirolimuson the onset of transplantation. Lymphoceles are usually diagnosed
by ultrasonography. The feature of its ultrasonography is a round and wall Sonoloscent mass. Hydronephrosis
may be seen with it. Internal complex echo can represent infectious lymphocele. Given the clinical symptoms
and ultrasonography characteristics, it can usually be differentiated from hematoma or urinary lake. Needle
aspiration determines diagnosis under sterile conditions. The obtained liquid is crystal and with high protein
content and its creatinine concentration is equal to serum.

Typical cases of lymphocele being small and asymptomatic do not require any treatment. Aspiration is
performed through skin in the case of urinary lake, obstruction and infection. The most common indication is
the treatment of ureteral obstruction. If the cause of obstruction is only due to the simple lymphocele pressure,
only drainage will solve the problem. Ureter is often narrow and sometimes due to its involvement, the
inflammatory process of lymphatic wall may require to be re-implanted (37). Repeated percutaneous drainage
is not recommended because it rarely makes the problem disappear and it often leads to infection. Infectious or
obstructive lymphocele can be drained out through open or close system. Closesystem is preferred to the open
one because it controls the fluid and is less prone to infection (38). Researchers have suggested that lymphatic
vessel ligation is effective to prevent the formation of postoperative lymphocele. Our aim of this study is to
study the effect of performing lymphatic vessel ligation in patients receiving kidney.

MATERIALS AND METHODS

The studied population is the patients referred to the transplant ward of Imam Khomeini Hospital in
Urmia, Iran whom all have been ESRD and required kidney transplantation. All people who were candidates for
kidney transplantation after hospitalization place under routine paraclinic investigation before transplantation
including general tests of blood and urine, urinary tract ultrasonography, VCUG, heart and lungs examination.

Exclusion criteria from study include those who had a history of kidney transplantation. Patients are randomly
divided into two groups of ligation and electrocutery lymphatic vessels during surgery. Thus, when a patient underwent the Ligation of lymphatic vessels, electrocutery lymphatic vessels was performed for the
next patient in the next transplant.

The time of surgery to the preparation of vascular beds was separately calculated for both groups conducted by
one surgical team.

After surgery, patients were monitored in transplant ward and the necessary tests such as urine analysis
and culture were performed on the seventh day after surgery and ultrasonography from urinary system and
transplanted kidney in the second and fourteenth day after surgery. All ultrasonographies were performed by a
radiologist and in ultrasonography, cases such as hydronephrosis of transplanted kidney and fluid around the
kidney were considered. Also, the wound infection was checked through examining the wound in terms of pain,
erythema and secretion around the wound on two to seven days after surgery.

The amount of fluid was controlled by ward personnel. Routine and if there was no problem in the
fourteenth postoperative day (if having the stent after removing stent), the patients would be discharged. If there
was lake, the infection of surgical area, resistance urinary tract infection (UTI) or fluid around kidney,
hospitalization of patients would continue. If the patient is discharged, the calculated cost is noted by the unit of
revenue and then, the patient is monitored as an outpatient with ultrasonography and tests until 6 months.
Finally, the obtained results are compared with each other in the groups.

Data analysis

The SPSS 16.0 software was used to analyze data. P<0.05 was considered statistically significant. After
entering the data, information was expressed as mean and standard deviation (SD). To analyze the data, chi
square test was used for the univariate analysis of qualitative variables and Student test in continuous
variables.

RESULTS

In the current study, patients with kidney failure undergoing kidney transplantation were studied in two
groups of 30 electrocutery and 60 ligation patients from 2010 to 2011. Meanwhile, one patient of electrocutery
group was undergone nephrectomy and obligation patients, 3 patients underwent the nephrectomy of
transplanted kidney and one person died due to cardiac arrest and the study continued with 29 patients in the electrocutery group and 56 patients in Ligation group. The mean age of patients in the iliac lymphatic vessels electrocutery group was 38.9 ± 14.51 years old and in the lymphatic vessels ligation group 40.46 ± 17.08 years old. There was no significant difference between both groups in terms of age of patients.

The BMI mean in the electrocutery group was 23.88 ± 4.88 and in the Ligation group 23.13 ± 5.60. According to P = 0.5, there is no significant difference between both groups in terms of BMI. Of 29 patients in the electrocutery group, 15 patients (51.7%) were men and 14 patients (48.3%) women. Of 56 patients in the ligation group 32 patients (57.1%) were men and 24 patients (42.9%) women. Given Chi-square test with P = 0.63, there is no significant difference between both studied groups in terms of sex. The mean surgical time for 29 patients in the electrocutery group was 36.44 ± 2.5 minutes and in the ligation group 37.80 ± 2.77 minutes. With P = 0.03, there are significant differences between the mean surgical time of both groups.

The meantime of hospitalization in hospital for the electrocutery group was 22.96 ± 6.47 days and in the Ligation group, it was 27.35 ± 10.9 days. Given that P = 0.05, there is no significant difference between both groups in terms of the duration of hospitalization in the hospital.

Of 29 patients in the electrocutery group, in 12 patients (41.4%) the type of anastomosis were internal, 15 patients (51.7%) external and 2 patients (6.9%) common.

Of 56 patients in the ligation group, 22 patients (39.3%) were internal, 31 patients (55%) external and 3 patients (5.4%) common. According to the chi-square test with P = 0.9, there is no significant difference between anastomosis in both groups.

### Table 1: relative and absolute frequency distribution and needing for collection drainage in both studied groups

<table>
<thead>
<tr>
<th>Group</th>
<th>Need to Collection Drainage</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Electrocutery</td>
<td>(%6.9)2</td>
<td>(%93.1)27</td>
</tr>
<tr>
<td>Ligation</td>
<td>(%10.76)</td>
<td>(%89.3)50</td>
</tr>
<tr>
<td>Total</td>
<td>(%9.4)8</td>
<td>(%90.6)77</td>
</tr>
</tbody>
</table>

### Table 2: relative and absolute frequency distribution of anastomosis between both studied groups

<table>
<thead>
<tr>
<th>Group</th>
<th>Anastomosis Type</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Internal</td>
<td>External</td>
</tr>
<tr>
<td>Electrocutery</td>
<td>(%41.4)12</td>
<td>(%51.7)15</td>
</tr>
<tr>
<td>Ligation</td>
<td>(%39.3)22</td>
<td>(%55.4)31</td>
</tr>
<tr>
<td>Total</td>
<td>(%40.34)</td>
<td>(%54.1)46</td>
</tr>
</tbody>
</table>

In examining wound infection in patients in the electrocutery group, no case of wound infection was reported, however, in the ligation group, 1 patient (1.8%) with wound infection of 56 cases was reported. But, there was no significant difference between both groups in terms of wound infection P = 0.4.

### Table 3: relative and absolute frequency distribution of wound infection in both studied groups

<table>
<thead>
<tr>
<th>Group</th>
<th>Wound Infection</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Electrocutery</td>
<td>0</td>
<td>29</td>
</tr>
<tr>
<td>Ligation</td>
<td>1</td>
<td>55</td>
</tr>
<tr>
<td>Total</td>
<td>1</td>
<td>84</td>
</tr>
</tbody>
</table>

Of 29 patients in the electrocutery group in the second week, 4 patients (13.8%) suffered from hydronephrosis and of 56 patients in the ligation group, 9 patients (16.1%) suffered from hydronephrosis. Of 29 patients in the electrocutery group, 28 patients referred to control in the second month which of these, 2 patients (7.1%) had suffered from hydronephrosis and in the ligation group, two patients did not refer which of 54 patients, 5 patients (9.3%) had suffered from hydronephrosis (p = 0.28).

Of 29 patients in the electrocutery group, 28 patients came for control in the sixth month that no case of hydronephrosis had been reported and in the ligation group in the sixth months of 51 patients, 2 patients (3.9%) suffered from hydronephrosis and according to the statistical Chi-square test; there was no significant difference between both groups in terms of hydronephrosis in the sixth month.
Of 29 patients in the electrocutery group in the second week, 7 patients (24.1%) and of 56 patients in the Ligation group, 12 patients (21.4%) had suffered from collection. There is no significant difference between both groups and collection \( P = 0.7 \).

Of 29 patients in the electrocoagulation group, 29 patients came for control in the second month, of which, 3 patients (10.3%) suffered from collection and in the Ligation group, 2 patients had not referred and of 54 patients, 7 patients (13%) had suffered from collection \( P = 0.76 \).

Of 29 patients in the electrocoagulation group, 26 patients came for control in the sixth month, in this group, 2 patients (7.7%) had suffered from collection and of the ligation group in the sixth months, 51 patients came and 4 patients (7.8%) suffered from collection.

Given the statistical Chi-square test, there is no significant difference between both groups in terms of collection in the sixth month \( P = 0.9 \).

**DISCUSSION**

Chronic kidney failure is said to be the reduction of progressive function of the kidney which is stretched over three months. The end stages of chronic kidney failure are called ESRD requiring kidney replacement therapy. The amount of ESRD prevalence is ever increasing and has been growing about 11 to 15 percent in Iran (2).

To survive and reduce the amount of uramic toxins these patients need kidney replacement. The best alternative treatment is kidney transplantation. Another alternative treatment is dialysis. The appearance of urologic complications is an important cause of morbidity in the patients with kidney transplantation. Major urologic complications of kidney transplantation are associated with the adapted technique of transplantation. The risk of urologic complications has been significantly reduced by changing surgical techniques and using new immunosuppressive protocols, in the way that its twenty percent rate, in 1970 have reached less than ten percent in 1990 (1).

The related complications include urinary tract infection, deep vein thrombosis, hematuria, urinary fistula, ureteral obstruction, symptomatic lymphocele, fluid accumulation around the transplant kidney; prolonged wound secretions and increasing the amount of hospital stay. The related patients suffering from complications had hospitalized significantly more than other patients within a year after transplantation. Also, these patients had spent more hospital costs (43).

Pelvic lymphoceles considered as a cystic structure that due to secondary lymphatic damage, it usually leads to pelvic lymphadenectomy and kidney transplantation (15). The formation of lymphocele is a common complication after kidney transplantation (28). Surgical complications are still considered a challenge in increasing morbidity and mortality in the recipients of kidney transplantation (29). Iliac vessels are surrounded by dense lymphatic pathways that these lymphatic vessels are removed before anastomose from the surface of these vessels (14).

The performance of suturing and separation of lymphatic vessels has been commonly conducted, and it has also been suggested by researchers (13). However, the electrocoagulation of lymphatic vessels can be considered as an alternative technique, although some researchers’ beliefs on increasing the prevalence of lymphocele. Given the above contents, we decided to study the effect of electrocoagulation of lymphatic vessels in patients with kidney transplantation in the way that the patients were divided into two groups of ligation and electrocoagulation, and we studied the complication rate in both related groups. In our study, the mean age of patients in ligation and electrocoagulation groups was 38.9 and 40.46 years old, respectively; that its difference was not statistically significant. In terms of sex, the rate of male and female had no statistical differences in both groups. In this study, BMI was 23.88 in the electrocoagulation group and 23.13 in the Ligation group that does not show statistically any significant differences and it states that BMI cannot be considered as a variable. In the previous studies, BMI has been considered as a risk factor of lymphatic formation (42 and 46).

**Examining the accumulation rate of fluid around the kidney after transplantation**

The accumulation rate of the graft in patients was controlled 3 times, the second week, the second and sixth month after kidney transplantation. In all 3 times of controlling the collection, no statistically significant differences were observed. In our study, this rate was 7.8% in the electrocoagulation group compared to 7.7% in the Ligation group at the end of the sixth month. Although this conclusion is consistent with the most of the previous studies, in those studies, an accurate ligation of lymphatic vessels despite the lack of such connection had been recommended (43).

**Examining the need for Collection Drainage within 6 months after transplantation**

In the present study, 6.9% in the electrocoagulation and 10.7% patients in the ligation group required collection drainage that is not statistically significant. This issue has not been examined in the previous studies.
Wound infection was not observed in the electrocoagulation patients and it was reported as 1.8% in the ligation group. In that was not significant and was consistent with most previous studies (42, 43).

The surgical time (the onset was from the beginning to the end of the vascular bed preparation) was 36.44 in the electrocoagulation and 37.8 minutes in the Ligation group. This difference shows statistically significant figure and it was consistent with a study conducted previously (40). In the electrocoagulation group, it was 22.51 days and in the ligation one that was 27 days. In this study, this figure is not statistically significant.

Considering the studied cases in previous studies based on the applied immunological regime intervention and occurrence of allograft rejection as the main factor involved in the occurrence of lymphocele, in our study, both groups underwent the same immunotherapy regimen and the patients who underwent nephrectomy due to rejection were excluded from the study (44, 45). In our study, when results are compared between both groups, it appears that we are not faced with higher lymphocele occurrence and postoperative complications. However, shorter time is spent on the preparation of the vascular beds that can be done for recipients of the kidney transplantation.

Conclusions

ESRD patients are chronically ill, have low hemocrit and suffer from water and electrolyte disorders. Thus, the reduction of surgical time and less exposure to anesthetic drugs can be beneficial for these patients and as an alternative procedure, conducting electrocoagulation of lymphatic vessels in our study was a safe method and it can be expressed in closing lymphatic vessels.

REFERENCES


