ELECTROCOAGULATION VERSUS SUTURE-LIGATION OF LYMPHATICS IN KIDNEY TRANSPLANT RECIPIENT SURGERY

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ABSTRACT

Objective: *To compare electrocoagulation versus suture-ligation of the lymphatics in kidney transplant operation of the recipient in terms of: operating time, cost effectiveness, drainage from renal bed and incidence of lymphocele.*

Material and Methods: *This prospective comparative study was conducted at the department of Urology and Kidney Transplantation, Hearts International Hospital Rawalpindi during a period of two and a half years (January 2003 to July 2005) by a single surgical team.*

All patients who underwent kidney transplant during this period and did not fall into exclusion criteria were included in the study. Ninety Cases of End-stage Renal Disease undergoing kidney transplant were randomly divided into two equal groups. Patients in the group A had their lymphatics electro-coagulated and divided in the preparation of external iliac vessels for allograft anastomoses, while the patients in group-B underwent suture-ligation and division of the lymphatics covering the external iliac vessels.

Results: *The average operating time was reduced in group-A. Also, no suture material was used for this step. Over all anesthesia time was also less. There was no significant difference in the quantities of postoperative drainage from the wound. There was no incidence of lymphocele development in group-A (0%). While one patient (2.2%) in group-B had a moderate lymphocele which was aspirated and there was no recurrence. Cut off point of the study was six months from the day of surgery.*

Conclusion: *Electro-coagulation and division of lymphatics coursing over the external iliac vessels is an attractive procedure. It saves time, is cost-effective, the postoperative wound drainage is not a problem and the procedure is not associated with increased incidence of lymphocele.*

Key Words: *Renal Transplant, iliac vessels, lymphatics, electro-coagulation, suture-ligation, lymphocele.*

INTRODUCTION

Chronic renal failure needs substitutive treatment such as haemodialysis and peritoneal dialysis for the patient to survive. Kidney transplantation (KTx) improves survival of the patient with chronic renal failure. Since the first KTx, performed by Joe Murrey in Boston in 1954, advances in medical therapy, immunosuppressive therapy and refinements in surgical techniques have improved the quality of life of the transplant patients.[1]

Kidney Transplant is the prototype among solid organ transplant operations. A perfectly executed vascular renal allograft anastomosis is crucial to graft perfusion. Most transplant surgeons select external iliac vein and artery for anastomoses with renal vein and renal artery respectively.[2] Iliac vessels are covered with dense lymphatic channels which course over them in a variable pattern. These lymphatics have to be cleared from the surface of these vessels before anastomoses. Traditionally suture-ligation and division of these lymphatic channels used to be practiced.[2,3] However, electro-coagulation and division is an alternative technique.[4]

Lymphorea is a minor complication after KTx but may develop into a lymphocele and prolong hospital stay.[5] A small lymphocele may be

STATISTICS
ANOVA (ELECTRO-COAGULATION VERSUS SUTURE-LIGATION OF LYMPHATIC IN KIDNEY TRANSPLANT RECIPIENT SURGERY)

		Sum of Squares	df	Mean Square	F	Sig.
Operating time for group-A Electro-coagulation	Between Groups	2228.111	22	101.278	.846	.651
	Within Groups	2634.867	22	119.767		
	Total	4862.978	44			
Operation time for Group-B Suture-ligation of Lymphatics	Between Groups	2453.328	22	111.515	.592	.886
	Within Groups	4142.450	22	188.293		
	Total	6595.778	44			

Table 1

The above table 1 indicates that electrogulation (0.651) is more significant than Suture-ligation of Lymphatic (0.886).

STATISTICS

Clinical diagnosis	Operating time of electrocoagulation	Operating time of Lymphatics
N	45	45
Mean	95.9778	109.7778
Std. Error of Mean	1.56718	1.82516
Std. Deviation	10.51295	12.24353
Minimum	80.00	80.00
Maximum	120.00	130.00

Table 2

Coefficient of variation of (Electro coagulation) = (Standard deviation / Mean) X 100

Coefficient of variation (Electro coagulation) · 10.51/ 95.97 X 100

Coefficient of variation (Electro coagulation) = 10.94 %

Coefficient of variation of (Lymphatics) = (Standard deviation / Mean) X 100

Coefficient of variation (Lymphatics) = 12.15 / 109.7 X 100

Coefficient of variation (Electro coagulation) = 11.15 %.

In these both techniques the first one has little error of variation therefore, it is better.

asymptomatic but a larger one can be a cause of graft dysfunction.[6]

Lymphocele may either originate from the lymphatic system of the recipient or the transplanted kidney.[7,8]

The use of immunosuppressive agent Sirolimus(SRL) has been associated with significant increase in lymphocele formation.[9,10] Increase in body mass index (BMI)[11] and acute cellular rejection[8] have also been attributed as causative factors for the formation of lymphocele.[10]

Lymphoceles can cause morbidity and rarely mortality by compression of adjacent structures and infectious complications.[12] Intervention for the lymphocele can also be a cause of graft loss.[13]

The incidence of lymphocele after kidney transplant is upto 18%.[7] Some authorities believe it to be as high as 40 %.[13]

The majority of lymphoceles forming as a result of renal transplantation present or are detected within 6 months of surgery. There have been reports of lymphocele developed 8 years after renal transplantation.[14]

The diagnostic criteria for lymphocele is ultrasonic evidence of a perinephric fluid collection and analysis of that fluid for blood urea nitrogen(BUN), creatinine and electrolytes as compared with the patient's plasma concentration.[15] The indication for treatment is when it becomes symptomatic.[16] Treatment is conservative[5] and should start with the minimally invasive measures[7] based on precutaneous drainage until lymphatic leakage cessation.[5] Percutaneous catheter drainage with sclerotherapy procedure with various sclerosing agents is well recognized. Ethanol, povidone-iodine, tetracycline, doxycycline, bleomycin, talc and fibrin glue can be used as sclerosing agents. Combination of sclerosing agents to percutaneous catheter drainage significantly improves success rate in the treatment of pelvic lymphoceles. Infected lymphoceles are usually treated solely with percutaneous catheter drainage. Percutaneous treatment can be tailored according to volume of lymphoceles.[12] Other options include open or laparoscopic fenestration.[17] The laparoscopic method has less morbidity, a

STATISTICS

Clinical diagnosis	Drainage of patient in ml (Electro coagulation)	Drainage of patient in ml (Lymphatics)
Mean	90.0000	99.1667
Std. Error of Mean	38.96580	31.47530
Median	52.5000	67.5000
Std. Deviation	95.44632	77.09842
Minimum	.00	20.00
Maximum	220.00	200.00
Sum	540.00	595.00

Table3

shortened hospital stay & less infection than open method[11] and it has been widely accepted.

The present study compared the two groups of patients in whom two different modalities of obliterating the lymphatics were adopted for preparing the external iliac vessels for vascular anastomosis. In group-A, the lymphatics were electro-coagulated and suture-ligated in group-B respectively.

The objective of the study was to compare the results in each group in terms of length of operating time, cost effectiveness, and presence of postoperative drain and the incidence of lymphocele.

MATERIAL AND METHODS

The study was conducted at the department of Urology and Kidney Transplantation Hearts International Hospital Rawalpindi during the period January 2003 to July 2005. A total of 90 patients suffering from End-Stage Renal Disease were included in the study. These patients were randomly divided into two groups' viz., Group A and Group B. All these patients underwent live voluntary donor first kidney transplant. The age range was 12 years to 72 years with a mean age of 37.8 years in group a and 38.2 years in group B. There were 35 males and ten females in group A and in group B 27 males and 18 females respectively. All these patients were operated upon by one surgical team. Recipients of renal allograft with multiple renal arteries were excluded from the study. The lymphatics coursing over the renal vessels of the donor were diathermised and divided during graft harvesting. A standard right lower quadrant curved incision (Gibson's incision) was made in each case and renal bed was prepared extraperitoneally in the right lower quadrant. External iliac vein and external iliac artery were chosen for vascular anastomoses for the renal allograft.

On all the 45 patients included in Group-A clearance of the external iliac vein and external iliac artery was achieved by electrocoagulation with monopolar diathermy and division of the lymphatics. Suture-ligation of the lymphatics was not carried out in this group. Utmost care was taken to protect the external iliac vessels from the effects of electrical current and to avoid collateral damage as well. The lymphatics channels were clearly identified before electro-coagulation and division so that vascular tributaries and branches were not inadvertently picked up.

45 patients included in Group-B had suture-ligation and division of the lymphatics coursing over the external iliac vein and artery using 4/0 vicryl suture. Even the finest lymphatic channels were also suture-ligated and divided and the electrical diathermy was not used to clear the external iliac vein and artery. Again minimal length of the external iliac vessels was cleared of lymphatics for application of vascular clamps and fashioning the anastomoses.

All the patients include in both groups had a stented ureterovesical anastomoses following Gregoire-Lich anti-reflux technique. All the patients had gravity dependent closed drainage of the renal bed postoperatively. In both groups the fluid collected from the drainage was sent for creatinine estimation along with serum creatinine estimation each day.

All the patients in both these Groups A & B received the standard triple regime immuno-suppression viz Cyclosporin A, Azathioprin, and Steroids. Observation were recorded in term of length of operating time, expense of suture material, persistence of drain from the renal bed and development of lymphocele. The follow-up period of the detection of the lymphocele was 6 months. An ultrasound scan of the whole abdomen was carried out at two weeks, one month, three months and then at six months postoperatively. The result in both group-A and group-B were compared and conclusions were drawn.

RESULTS

The length of operating time in Group-A ranged between 80 minutes to 120 minutes. The average operating time was 95.97 minutes. While in Group-B the operating time ranged between 90 minutes to 130 minutes. The average operating time in this group was 109 minutes (Table 1). The average operating time in patients of Group-A was less by 15 minutes. Regarding expense of suture material, electro-coagulation and division of lymphatic in patients of Group-A did not require any suture material, while on suture ligation of lymphatic in patients of Group-B, two to three packets of 4/0 vicryl were consumed per patient. Statistical analysis by ANOVA shows that group-A

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
Drainage of patient in ml (electro coagulation)	Between Groups	25550.000	4	6387.500	.319	.848
	Within Groups	20000.000	1	20000.000		
	Total	45550.000	5			
Drainage of patient in Lymphatics	Between Groups	13520.833	4	3380.208	.209	.906
	Within Groups	16200.000	1	16200.000		
	Total	29720.833	5			

Table 4

Similarly in table 4 show drainage of Patient in milli-liter(ml) comparison, which indicate that electro-coagulation techniques (0.848) is more significant than suture ligation technique. Therefore, it is easy to say that the first one is more useful technique.

has the p-value less than group-B and more significant (table 1). The electro-coagulation group-A has co-efficient of variation 10.94% as compared to 11.5% for the suture-ligation group-B (Table-2).

The 24 hours average volume of drainage collected in patients in both groups is shown as in Table 3 and 4 respectively. All the patients in group-A had their drains withdrawn by postoperative day 5 while all the patients included in group-B had their drain removed by postoperative day 6. The statistical analysis of the 24 hour average volume of drainage from the renal bed in patients included in both groups showed that electro-coagulation was more significant than suture-ligation. The level of creatinine of the drain fluid matched the serum level of creatinine each day in both groups of patients (confirming no urine leak). Regarding occurrence of lymphocele, there was no incidence of lymphocele in patients included in group-A (0%) while one patient in Group B developed a moderate lymphocele (2.2%) detected on ultrasound performed one month postoperatively. Percutaneous aspiration of the lymphocele was carried out and 10% Povidone-Iodine was injected. There was no recurrence of the lymphocele.

DISCUSSION

Pelvic lymphocele, also known as lymphocyst, is a cystic structure caused by lymphatic injury usually secondary to pelvic lymphadenectomy and renal translantation.[12]

Development of lymphocele after renal transplantation is a well-described complication that occurs with relative frequency.[18] The occurrence of post renal transplant lymphocele is variable and the best approach to treatment is not well defined.[11]

Surgical complications still represent a challenge that increments morbidity and mortality among kidney transplant recipients.[1] Most transplant surgeons select external iliac vein and artery for anastomoses with renal vein and renal artery respectively.[2] Iliac vessels are covered with dense lymphatic channels which course over them in a variable pattern. These lymphatics have to be cleared from the surface of these vessels before anastomoses. Traditionally suture-ligation and division of these lymphatic channels is being practiced and specifically recommended by some authors.[3] However electro-coagulation and division is an alternative technique and opposed by some for the increased frequency of lymphocele.[4] While in our series we did not find any case (0%) of lymphocele in the electro-coagulation group and one case (2.2%) in the suture-ligation group. Atray et al[11] gets a 26% incidence of lymphocele in his series and finds a significant association between increased body mass index (BMI) and development of lymphocele. However, the patients in our study were randomly divided in Groups A & B and BMI was not considered as a variable. While Hamza- A et al retrospectively studied there series of fifteen years focusing on the possible predisposing factors for the development of the lymphocele. He finds no connection between lymphocele formation and the following parameters; the extent to which the iliac vessels had been prepared, the materials used for the preparation, or whether clips or ligatures were applied. He however recommends to restrict the transplanted bed to the smallest permissible level and careful ligature of the lymphatics.[7] Marten Jabaloyas JM et al in a series of 517 cases studied the influence of age, sex, time in dialysis, presence of tubular acute necrosis in the graft following placement, acute rejection and immunological regime, for the appearance of lymphocele. They had 5.2% incidence of lymphocele. In there observation age and lack of acute tubular necrosis were the only two significant factors.[8] Khauli and collegues had the observation of allograft rejection as the most significant factor for lymphocele development.[19] While Geol et al have concluded that Sirolimus (SRL), obesity with increased body mass index of greater than thirty (BMI >30) and acute rejection as independent risk factors on lymphocele formation.[20] Similar observations were also made by Langer RM and Kahan BD with Sirolimus.[10] In the study of Tandolo V et al, the incidence of lymphocele was not significantly different among the various immunosuppressant regimens.[9]

Now comparing our study results with the international data and the variables we considered did not include BMI we did not use Sirolimus (SRL) as an immunosuppressant. More over we had not even a single allograft rejection episode.

On the contrary to the above observations and recommendations, Perez Fentes DA et al have stressed on a single surgical team and the same technique for the lower complication rate in renal transplant surgery.[21] Since in the present study, there was only one surgical team involved and our technique was meticulous with careful division, electro-coagulation (group-A) or suture-ligation (group-B) of all the lymphatics. This may be the cause of one of the lowest complication (0%) in the group-A and 2.2 % in the group-B respectively. The only one patient in group-B who developed a moderate lymphocele was successfully aspirated after detection on abdominal ultrasound scan one month post operatively. Instillation of 10% povidone iodine was done with no recurrence of the lymphocele (0%). While lymphocele recurrence after per-coetaneous aspiration has been reported as high as 20%.[13] Percutaneous aspiration is safe and effective for treatment of symptomatic postoperative lymphoceles.[22]

When we compare the results between our two groups i.e. electro-coagulation (group-A) and suture ligation(group-B) in the present study, we find that group-A has lesser incidence of lymphocele, shorter operating time, less cost of the suture material and less post operative drainage.

CONCLUSION

These patients are chronically ill, they have low hematocrit and they suffer from derangements of fluid and electrolytes. Therefore, reduction in operating time and less exposure to anesthetic agents is highly desirable in these patients. We also noticed that electro-coagulation group had a decreased quantities of fluid collected in the drain in the postoperative period and the drains were withdrawn a day earlier in the patients of group-A.

We conclude that carefully performed electro-coagulation of the Lymphatics coursing over the iliac vessels in renal transplant recipient operation is a safe procedure. Different surgeons have observed different factors. In our view it is the experience of the surgical team which is the most important factor. Surgeons should follow the same procedure in routine so that precision and delicacy may be achieved.

However, there is a word of caution regarding electro-coagulation of lymphatics. The procedure has to be executed with extreme care and the iliac vessels must be safeguarded from the direct effect of diathermy and collateral damage otherwise serious complications might result.

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