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THE OUTCOME FOR ANASTOMOSIS OF RENAL ARTERY TO EXTERNAL ILIAC ARTERY ANDINTERNAL ILIAC ARTERY IN KIDNEY TRANSPLANT PATIENTS

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ABSTRACT

Background: This study compares renal artery end-to-side and end-to-end anastomoses to external and internal iliac arteries. This research compares both methods to determine their effectiveness. The Baghdad medical city kidney transplant center conducted this retrospective analysis. The aim of study is to compare renal artery end-to-side and end-to-end anastomosis to the external and internal iliac arteries in kidney transplant patients for ischemia time, post-operative renal function parameters, lymphocele formation, erectile dysfunction, and post-transplant hypertension. **Method:** In a study of 60 kidney transplant recipients, patients were divided into two groups: 30 underwent end-to-end renal artery to internal iliac artery anastomosis, and 30 had end-to-side anastomosis with the external iliac artery. Key parameters evaluated included ischemia times, post-operative hypertension, lymphocele formation, erectile dysfunction, and urea creatinine levels on day 7 and at 1, 3, and 6 months' post-surgery. **Results:** In a comparison of two groups of kidney transplant recipients, it was observed that ischemia times were marginally longer in patients with end-to-end anastomosis to the internal iliac artery. The time taken for arterial anastomosis was similar in both groups, though slightly extended in the internal iliac artery group. Erectile dysfunction was more prevalent in patients with end-to-end anastomosis (14 patients) compared to those with end-to-side anastomosis to the external iliac artery (8 patients). However, post-transplant hypertension, lymphocele formation, renal function, and hospital stay were similar in both groups. **Conclusion:** After a kidney transplant, patients with renal artery end-to-side anastomosis to the external iliac artery have decreased erectile dysfunction. Patients with renal artery anastomosis to the internal iliac artery had somewhat longer ischemia times.

KEYWORDS: The outcome, anastomosis, renal artery, external iliac artery, internal iliac artery, kidney transplant.

INTRODUCTION

Kidney transplantation is a critical and cost-effective treatment for end-stage renal disease, significantly enhancing patient survival and quality of life compared to dialysis. The success of transplantation depends on careful donor and recipient selection, advancements in surgical techniques, immunosuppressive therapy, organ preservation, and antimicrobial therapy.[1,2] In the procedure, vascular anastomosis is vital, typically involving the donor renal artery to the recipient's external iliac artery and the donor renal vein to the recipient's external iliac vein. Two main techniques are employed: end-to-end anastomosis of the internal iliac artery and end-to-side anastomosis of the external iliac artery. The choice between these techniques often depends on the recipient's vascular condition and previous surgeries.[2,3] Ischemia time is a significant factor in transplantation outcomes. It starts when the organ is retrieved, interrupting blood supply. Cold ischemia time is particularly critical, with studies showing that every hour of cold ischemia increases the risk of graft loss and mortality by at least 1%. Ideally, cold ischemia time should be under 12 hours, but less than 24 hours is acceptable, with risks increasing significantly if it exceeds 18 hours.[4,5] Post-operatively, close monitoring of renal function is essential, with serum creatinine levels being a primary indicator. These levels should be measured daily for the first week, then two to three times per week for the first month, followed by a tapering frequency.[6] Complications like lymphocele formation

are common post-transplant. They usually appear within 6 weeks but can emerge up to 6 months post-transplant. Surgical factors, like dissection of lymphatics and complex arterial anatomy of the donor kidney, and non-surgical factors, such as acute rejection, use of specific drugs, and recipient conditions like obesity, contribute to lymphocele risk.[7-9] Erectile dysfunction (ED) is a prevalent issue in male transplant recipients, with contributing factors including underlying causes of renal failure and transplant-related factors. Post-transplant, the internal iliac artery is less commonly used for renal artery anastomosis due to its association with higher rates of vasculopathic impotence. Erectile function in transplant patients is typically assessed using the International Index of Erectile Function (IIEF-5). Treatments include phosphodiesterase-5 inhibitors, intracorporal injections, or penile prostheses.[10-12] Hypertension is a common issue post-transplant, often resulting from pre-existing conditions and the effects of immunosuppressive drugs. It can arise from increased vascular resistance or intravascular volume, with the extent of graft function influencing its mechanisms.[13,14] The aim of study is to compare between anastomosis of the renal artery end to side to external iliac artery and end to end to the internal iliac artery in kidney transplant patient looking at ischemia time, post-operative returning of renal function parameters, lymphocele formation, erectile dysfunction and post-transplant hypertension.

METHOD

In a comprehensive study involving 60 male kidney transplant recipients, all participants had undergone transplantation at least 6 months prior to the study. They were divided into two groups: 30 patients who underwent end-to-end anastomosis of the renal artery to the internal iliac artery (IIA) and another 30 with end-to-side anastomosis to the external iliac artery (EIA). The study aimed to compare the outcomes of these two surgical techniques.

Demographic Variables

1. Age ranged from 17 to 65 years.
2. None of the participants had prior renal transplant surgeries.
3. All patients adhered to a 6-month follow-up schedule, which included abdominal ultrasounds, blood tests, and blood pressure monitoring.
4. Comprehensive documentation was maintained, including surgery site, anastomosis type, and drain details.
5. Ischemia times were recorded.
6. Medical and surgical histories were thoroughly reviewed, including data on diabetes, hypertension, erectile dysfunction, kidney disease duration, and history of hemodialysis.

Data Collection Tools: A detailed questionnaire was utilized to gather information on age, gender, medical history (diabetes, hypertension, erectile dysfunction, kidney disease, hemodialysis), surgical history (previous kidney transplantation, lower abdominal/pelvic surgery), medication history (hypoglycemic agents, antihypertensives, immunosuppressives, steroids), anastomosis type, ischemia time, and intra-operative and postoperative details.

Surgical Procedure: Both groups underwent elective surgery under general anesthesia, with pre- and postoperative antibiotics and immunosuppressive drugs. A standard Gibson incision was made, and the retroperitoneal space was developed. The iliac vessels were dissected, and lymphatic tissues around these vessels were either ligated or cauterized. The renal artery was anastomosed end-to-end to the internal iliac artery or end-to-side to the external iliac artery, and the renal vein was anastomosed end-to-side to the external iliac vein. Post-surgical procedures included urinary tract reconstruction and lymph node removal near the external iliac artery and vein. Two tube drains were inserted and removed when drainage was below 50 mL or within 21 days.

Postoperative Follow-Up: Patients underwent a postoperative ultrasound on day 5 and a follow-up ultrasound at 4-6 months or as needed.

Statistical Analysis: Data were collected and analyzed using Microsoft Excel 2007 and IBM-SPSS 26. The Shapiro-Wilk test assessed the normality of the data. Numerical data were summarized using means and standard deviations, while nominal data were represented as proportions. The Chi-square test was used for nominal data, and the t-test for independent means for numerical data. A p-value ≤ 0.05 was considered statistically significant.

This comprehensive study aimed to evaluate and compare the outcomes of two different surgical techniques for kidney transplantation, focusing on various aspects including ischemia time, surgical details, and post-operative recovery. The follow-up and data analysis were methodically conducted to ensure reliable and significant results.

RESULTS

Table (1) shows the mean age of patients undergo anastomosis of external iliac artery is 36.13±9.215 years while that of internal iliac artery is 38.55±6.509 years. The difference is statistically non-significant.

Table (1): The difference in the mean age of patients.

Age /years	External iliac artery n=30	Internal iliac artery n=30	p-value*
	Mean ±Sd	Mean ±Sd	
	36.13±9.215	38.55±6.509	0.003
*t-test for independent two means			

Table (2) shows the comparison between external and internal iliac artery anastomosis in relation to post transplant HT and depicts that 70.0% of external iliac artery and 63.3% of internal iliac artery have post-transplant HT, the difference is statistically non-significant.

Table (2): The comparison between external and internaliliac artery anastomosis in relation to post transplant HT.

Post-transplant HT	External iliac artery	Internal iliac artery	p-value*
	No. (%)	No. (%)	
Yes	21 (70.0%)	19 (63.3%)	0.584
No	9 (3.0%)	11 (36.7%)	
*Chi square test			

Table (3) demonstrates the comparison between external and internal iliac artery anastomosis in relation to Lymphocele formation and shows that the difference in Lymphocele formation is statistically non-significant.

Table (3): The comparison between external and internal iliac artery anastomosis in relation to Lymphocele formation.

Lymphocele formation	External iliac artery	Internal iliac artery	p-value*
	No. (%)	No. (%)	
Yes	5 (16.6%)	6 (20.0%)	0.739
No	25 (83.4%)	24 (80.0%)	
*Chi square test			

Table (4) demonstrates the comparison between external and internal iliac artery anastomosis in relation to mean of post-operative normal renal function in days and portrays a statistically non-significant difference.

Table (4): The comparison between external and internal iliac artery anastomosis in relation to mean of post-operative normal renal function.

Post op normal renal function in days	External iliac artery	Internal iliac artery	p-value*
	Mean ±Sd	Mean ±Sd	
	7.41 ± 0.829	7.29± 0.987	0.612
*t-test for independent two means			

Table (5) shows the comparison between external and internal iliac artery anastomosis in relation to mean of total ischemic time and represents that the ischemic time among the internal iliac artery anastomosis is longer than that of external with statistically significant difference.

Table (5): The comparison between external and internal iliac artery anastomosis in relation to mean of total ischemic time.

Ischemia time	External iliac artery	Internal iliac artery	p-value*
	Mean ±Sd	Mean ±Sd	
	23.09±3.121	28.43 ±3.601	0.001
*t-test for independent two means			

Table (6) shows the comparison between external and internal iliac artery anastomosis in relation to erectile dysfunction. The post-transplant erectile dysfunction develops in 6 patients among external iliac artery group in comparison to 14 patients among internal iliac artery group, a difference which is statistically significant.

Table (6): The comparison between external and internal iliac artery anastomosis in relation to erectile dysfunction.

Erectile dysfunction		External iliac artery	Internal iliac artery	p-value
		No. (%)	No. (%)	
Pre-treatment Erectile dysfunction	Yes	3 (10.0%)	4 (13.3%)	0.688*
	No	27 (90.0%)	26 (86.7%)	
Post-treatment Erectile dysfunction	Yes	6 (20.0%)	14 (46.7%)	0.028**
	No	24 (80.0%)	16 (53.3%)	
***Fissure exact test**	****Chi square test**			

DISCUSSION

In this comprehensive analysis, the study investigates the outcomes of kidney transplantation, focusing on vascular anastomosis techniques. The primary comparison is between end-to-end anastomosis to the internal iliac artery (IIA) and end-to-side anastomosis to the external iliac artery (EIA). The study involved 60 male patients, with a mean age of 36.13±9.215 years for the EIA group and 38.55±6.509 years for the IIA group, reflecting a similar demographic to previous studies by Pal DK,[2] and Daowd R., Al Ahmad A.[15] **Ischemia Time and Renal Function:** Ischemia time, a crucial factor in transplantation success, was found to be slightly longer in the IIA group (28.43 ±3.601) compared to the EIA group (23.09±3.121). This aligns with findings from Pal DK[2], but not with Daowd R., Al Ahmad A.[15] Interestingly, the post-transplant return of renal function was comparable between the two groups, with no significant statistical difference, resonating with the results of Pal DK[2] and Daowd R., Al Ahmad A.[15] **Lymphocele Formation:** The incidence of lymphocele formation, a common post-transplant complication, was similar in both techniques, at 16.6% for EIA and 20.0% for IIA, paralleling findings in studies by Daowd R., Al Ahmad A.[15] and Simforoosh et al.[9] This indicates that the choice of anastomosis technique does not significantly influence the risk of lymphocele formation. **Post-Transplant Hypertension:** Hypertension, a prevalent issue in kidney transplant recipients, showed no significant difference between the two techniques, with rates of 70.0% for EIA and 63.3% for IIA. This similarity in hypertension rates regardless of the anastomosis method suggests that factors such as pre-existing conditions and endocrine changes may play a more substantial role than the surgical technique itself.[16] **Erectile Dysfunction:** Erectile dysfunction (ED) rates differed significantly between the groups, with 20.0% in the EIA group compared to 46.7% in the IIA group. This suggests a potential link between the use of the IIA and increased ED rates, possibly due to reduced blood flow to the pudendal artery. These findings are consistent with the results of Pal DK[2] and Daowd R., Al Ahmad A.[15] where ED was notably higher in patients with IIA anastomosis. **Factors Influencing Discrepancies in Results:** The study acknowledges that variations in results across different research might be due to several factors including sample size, patient demographics (age, body mass index), donor type (living or deceased), immunosuppressive regimens, and specific transplantation techniques and sites.

CONCLUSION

Both techniques anastomosing the renal artery to the external or the internal iliac artery had comparable surgical and clinical complications, without differences in graft and patient survival. Although external iliac artery anastamosis is preferred due to better results in erectile function.

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