

A Study on the Correlation of Resistive Index with Acute & Chronic Rejection among Renal Transplant Recipients in Burdwan Medical College, West Bengal

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I. Introduction

Kidney transplantation is the transfer of a healthy kidney into patient with end stage renal disease (ESRD) (glomerular filtration rate of 5% of the normal). Various diseases like diabetes, malignant hypertension, focal segmental glomerulosclerosis, polycystic kidneys and autoimmune conditions like SLE are the common diseases that lead to ESRD. Kidney transplantation offers them permanent cure and only chance of survival. Since kidney transplantation was documented in 1950, it has become widely available and popular modality of treatment in ESRD.^{1,2,3} However, with increasing number of renal transplant comes for a fast, reliable diagnostic tool of multiple possible complications that inevitably occur after such complex procedure.

Doppler ultrasonography often the initial diagnostic modality as it is non-invasive, relatively inexpensive, does not involve intravenous contrast, can be obtained at the bedside.^{4,5,6} Ultrasonography can detect most of the complications of kidney transplantation, notably and most importantly the vascular complications. Ultrasound imaging of kidneys has greatly improved in the recent years with introduction of wideband transducer and advances of beam former technology. While the conventional sonography can detect perigraft fluid collections, Doppler study with resistive indices analysis provide additional informations. Previously it was thought that rise of resistive index can diagnose acute rejection, a very frequent complication of kidney transplantation, subsequently it was known that rise of resistive index is a nonspecific finding occurring both in acute rejection and ATN.^{7,8} Sonography lacks the ability in differentiating between these two conditions.^{9,10}

Here lies the importance of kidney biopsy. Kidney biopsy is a very important technique in clinical nephrology. The performance of kidney biopsy with an automatic spring loaded Tru-cut biopsy device under ultrasound guidance has greatly improved the safety of the method itself and reduces the incidences of serious complications. Materials for light microscopy, electron microscopy & immune-fluorescence are obtained by percutaneous kidney biopsy. Thus, percutaneous kidney biopsy remains the gold standard to diagnose and differentiate between the conditions like acute rejection, ATN, Chronic rejection. In view of paucity of research activity of India in this common yet unexplored field the present study has been designed to determine of resistive index (R.I) with biopsy findings in patients using Doppler ultrasound in transplanted patients with graft dysfunction as well as to detect the relative incidence of different complications after kidney transplantation.

II. Materials & Methods

Study Area: Dept. of Radiology & Dept. of Urology, Burdwan Medical College, Burdwan

Study Population: 132

a) Inclusion Criteria:

Patients with renal transplant referred to the Radiology dept. for Ultrasonic evaluation in post-transplant period as well as patients of dept. of Urology after kidney transplantation.

b) Exclusion Criteria:

1. Patients declared for surgery.
2. Patients with graft dysfunction due to any other systemic disease other than transplantation.
- 3.

Study Period: 18 months (January 2016- July 2017)

Sample Size: Complete enumeration method was followed and 132 patients were included.

Sample Design: Cases were the consecutive patients fulfilling all the criteria of the study population.

Study Technique: Patients were obtained from Urology dept. of Burdwan medical college & hospital as well as other hospitals for kidney transplantation. The study was conducted in the Dept. of Radiology, Burdwan medical college & hospital in collaboration with the Dept. of Urology, Burdwan medical college & hospital.

The donor kidney 1st evaluated before transplantation in both B-mode, to detect size, shape as well as R.I value & condition of renal vessels. After transplantation the recipient underwent USG examinations for any post-operative complications mentioned above as well as R.I values & condition of renal vessels & the spectral pattern on 7th post-operative day, 21th day & 6th months. In cases of acute or chronic rejections biopsy is undertaken to confirm the type of the rejection & R.I of the corresponding kidney is calculated for correlation.

The data of each patient is evaluated in separate data sheet from each patient.

Study Tools:

1. An ultrasound machine of Toshiba makes Xario with a 3.5 MHz convex probe with duplex Doppler facility.
2. Automatic biopsy device- Bard Biopsy Gun.
3. Histopathological report of biopsy specimen.

III. Study Design: Prospective study.

Analysis of data: Statistical analysis was done by SPSS version 20.0

Results: Majority of the study population belonged to >40 years of age (75.0%), were males (78.1%), were hindu by religion (72.7%) & belonged to upper socio-economic status (74.2%). [Table 1] Among the patients who developed complications majority developed hematoma (39.4%), followed by rejection (27.2%) & renal vein thrombosis/ATN.(19.7%).

All these complications were found more among the patients who had a higher RI. Acute rejection, ATN, renal vein thrombosis and hematoma were noted among 75.0%, 80.8%, 65.4% & 65.9% patients with higher RI, respectively. This association was found to be significant by chi-square test. (P,0.05)

Higher value RI is significantly & positively correlated with complications. (r=0.63, P<0.05) This relationship is true for individual complication also. Pearson's correlation coefficient of RI with acute rejection, ATN, RVT& hematoma were 0.63, 0.59, 0.47 & 0.67 respectively. (P<0.05)

RI came out as an important cause of complications with an adjusted odds ratio of 12.1 (95% CI: 10.0-14.2) , 9.2 (95% CI: 7.1-11.3), 7.1 (95% CI: 5.4-9.8) & 5.6 (95% CI:2.6-8.6) for Acute rejection, ATN, RVT& hematoma formation respectively.

In the binary logistic model, RI can explain 34.0-59.2 % of complications.

Discussion: The mean age of our study population is 52.1±13.7 years & 78.1% of them were male. There is significant positive correlation off RI with complications. Higher RI is associated with higher rates of complications.

Acute rejection, ATN, RVT& hematoma were the most frequent complications identified in our study which is in consistent with the findings of Pelling M *et al*, GermainMJ*et al*&Stojković D *et al*. But the complication rates were slightly higher in the study of GermainMJ*et al*. Some other complications were reported by different investigators, but less in frequency like lymphocele, renal artery pseudo-aneurysm etc. But these were not found in our study.¹¹⁻¹³

In our study we found that higher RI is associated with acute rejection & this is supported by the findings of Rigsby CM *et al*.¹⁴ But unlike them we did not find out any cut-off value. Similar to our findings van Leeuwen MS *et al*¹⁵ also found RI as important predictor of ATN. The main limitation of this study is sample size. However, it can be taken as a pilot study and further multicentric studies should be undertaken for better evaluation of RI as a predictor of complications of renal transplant.

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