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Unravelling the Histopathological Finding Of Allograft Biopsies Within First-Year Post-Renal Transplantation

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Introduction

In End-stage kidney disease (ESKD), kidney transplantation is the best treatment option. Kidney transplant outcomes have improved due to advances in immunological treatments and surgical techniques (1). However, the potential occurrence of renal allograft dysfunction still persists. Despite multiple biomarkers being investigated, histologic evaluation of allograft remains the gold standard for determining the cause of allograft dysfunction (2-4).

Objective

This study described the histopathological finding of allograft biopsies within the first-year post-kidney transplant.

Method

A retrospective study was conducted to include all allograft biopsies of patients who received a kidney transplant between 1st January 2016 and 31st December 2022. Only biopsies performed within the first post-transplant were analysed. Data of patients were extracted from Ministry of Health Transplant Audit. Descriptive statistics was used for demographics and categorical data and statistical significance was analysed using Chi-square test.

Table 1 : General Characteristics of Recipients Who Underwent Renal Biopsy in First-year post-transplant

General Characteristics	Living-donor Transplant Biopsy	Deceased-donor Transplant Biopsy	Total
Number of recipients- n (%)	165 (65.7%)	86 (34.3%)	251 (100%)
Mean Age (years)	36.42±12.61	37.43±8.58	
Gender – No (%)			
Male	68.5% (113)	60.5% (52)	
Female	31.5% (52)	39.5% (34)	
Race – n (%)			
Malay	116 (70.3%)	66 (76.7%)	
Chinese	29 (17.6%)	12 (14.0%)	
Indian	15 (9.1%)	4 (4.7%)	
Others	5 (3.0%)	4 (4.7%)	
Number of Biopsies- n (%)	262 (62.4%)	158 (37.6%)	420 (100%)
Mean numbers of allograft biopsies per patient within the first year post-transplant	1.65±1.23	1.83±1.04	
Mean time to first biopsy within the first year post-transplant (days)	71.80±111.49	57.3±84.61	

Results

Between 1st January 2016 to 31st December 2022, a total of 504 recipients underwent kidney transplantation, with 68.3% being living-donor kidney transplants (LDKT) and 31.7% deceased-donor kidney transplants (DDKT). The general characteristics of recipients (n=251) who underwent allograft biopsy within first year post-transplant are presented in Table 1, while Table 2 displays the histopathologic findings.

Table 2 : Histopathologic findings

Biopsy Diagnosis	Living-donor Transplant	Cadaveric Transplant	*P*
Normal	75 (28.6%)	21 (13.3%)	**<0.05**
Acute Allograft	73 (27.9%)	38 (24.1%)	0.457
Rejection			
ABMR	15 (5.7%)	3 (1.9%)	0.104
Borderline	36 (13.7%)	20 (12.7%)	0.867
TCMR	17 (6.5%)	12 (7.6%)	0.815
Mixed	5 (1.9%)	3 (1.9%)	1.00
Toxicity results of Calcineurin Inhibitor	13 (5.0%)	5 (3.2%)	0.527
BKVN	11 (4.2%)	5 (3.2%)	0.785
CMV Nephritis	3 (1.2%)	0 (0%)	0.452
ATN	57 (21.8%)	71 (44.9%)	**<0.05**
Pyelonephritis	4 (1.5%)	5 (3.2%)	0.438
Recurrent Glomerulonephritis	5 (1.9%)	4 (2.5%)	0.937
Others	9 (3.4%)	3 (1.9%)	0.540
Suboptimal	12 (4.6%)	6 (3.8%)	0.893
Total	262 (100%)	158 (100%)	

- Recurrent Glomerulonephritis includes Ig A nephropathy and Focal Segmental Glomerular Sclerosis Others include IFTA (Interstitial Fibrosis and Tubular Atrophy), TMA(Thrombotic microangiopathy), Hypertension and Diabetes Mellitus
- Abbreviations : ABMR-Antibody-mediated rejection, TCMR-T-cell mediated rejection, BKVN-BK virus nephropathy , CMV- Cytomegalovirus, ATN-Acute tubular necrosis

Conclusions

Overall, the data suggested that DDKT required more biopsies per patient compared to LDKT but the acute rejection rates were similar. ATN was common amongst DDKT likely due to delayed graft function. Further analysis could explore factors contributing to these differences including donor organ quality, recipient characteristics, and immunosuppressive regimens.

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