Utility of Cytomegalovirus (CMV) quantiFERON Enzyme Linked Immunosorbent Assay (ELISA) in predicting CMV Infection in Kidney Transplant Recipients

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Introduction

CMV infection remains a major infective complication among kidney transplant recipients despite advances in diagnostic and monitoring modalities, potentially leading to invasive disease, acute graft rejection and graft loss. We aim to analyse the utility of CMV quantiFERON assay in predicting CMV infection in the first 100 days following kidney transplantation.

Method

This prospective study included 23 patients who underwent kidney transplantation in Hospital Kuala Lumpur from March 2021 to January 2022 who had a minimum of 3 months follow up at the time of analysis. CMV quantiFERON ELISA was taken prior to the transplantation procedure. Clinical data were extracted from medical records and analysed using SPSS version 26.

Results

The median age in this study was 30 years (interquartile range, IQR 27-35 years) and 12 (52%) were female. The commonest ethnicity in this study were Malay followed by Indian, with 14 (61%) and 5 patients (22%) respectively. Five (22%) had diabetes and 21 (91%) underwent living related kidney transplantation. Based on CMV serology at baseline, 18 patients (78%) had moderate CMV infective risk whereas 2 patients had high CMV infective risk and were given valganciclovir prophylaxis. Among the 17 recipients with seropositive CMV (R+) status, 3 (18%) yielded reactive quantiFERON assay results and none among the 5 seronegative (R-) recipients (p=0.57). 5 R+ patients developed CMV infection compared to 1 R- patient (p=1.00). There were no CMV infections among the 3 patients with reactive CMV quantiFERON assay compared to 4 cases among 16 patients (25%) who had nonreactive assay (p=0.57). There was no acute graft rejection or loss reported in this study.

Demographics and results (n=23)	Descriptive statistics
Age	
• Median (IQR)	30 (27-35)
Gender	
• Male	11 (48%)
• Female	12 (52%)
Ethnicity	
• Malay	14 (61%)
• Chinese	4 (17%)
• Indian	5 (22%)
Transplant type	
• Living	21 (91%)
• Deceased	2 (9%)
CMV status	
• D+R-	2 (10%)
• D+R+	15 (71%)
• D-R+	1 (5%)
• D-R-	3 (14%)
Immunological risk	
• ABOI	2 (9%)
• PRA class I	3 (13%)
• PRA class II	5 (22%)
• Presence of DSA	1 (4%)
• HLA missmatch, Median(IQR)	2 (0-3)
• Cold ischemic time (min), Median (IQR)	63 (58.5-74.5)
CMV quantiferon baseline	
• Reactive	3 (14%)
• Non reactive	16 (73%)
• Indeterminate	3 (14%)
CMV infection	
• CMV quantiferon detected	0 (0%)
• CMV quantiferon not detected	4 (25%)

Discussion

Host response to CMV infection is largely mediated by T cell mediated responses and these factors play an important role in the development CMV disease and its recurrence[1]. CMV quantiFERON ELISA measures interferon-γ production by peripheral blood mononuclear cells in response to stimulation by CMV antigens[1]. A negative assay reflects inadequate cellular response and increased risk of CMV infection, which may be used as a tool to decide initiation or extension of CMV prophylaxis[2]. Our results were consistent with these findings where no infections were reported in patients with reactive quantiferon assays compared to 25% patients with negative assays. Limitations of this study include a small sample size and short follow up period.

Conclusion

Higher numbers of CMV infection (25%) were noted in patients with non-reactive quantiFERON assays compared to reactive assays but were not statistically significant due to the small sample size. Further data is required to determine the clinical utility of CMV quantiFERON in predicting CMV infection in the first 100 days of kidney transplant.

References

1. Kumar D et al. A. An Interventional Study Using Cell-Mediated Immunity to Personalize Therapy for Cytomegalovirus Infection After Transplantation. Am J Transplant. 2017 Sep;17(9):2468-2473.
2. Deborska-Materkowska et al. Diagnostic utility of monitoring cytomegalovirus-specific immunity by QuantiFERON-cytomegalovirus assay in kidney transplant recipients. BMC Infect Dis 18, 179 (2018)