Treatment Options for Chronic Parvovirus Viremia in Pediatric Heart Transplant Patients in a Tertiary Care Center

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Introduction

1. Parvovirus Infections
- Parvovirus (B19) in humans was discovered in 1976
- Replicates in red blood cell precursors
- Parvovirus-specific IgM and IgG typically are able to control infection
- Common clinical manifestations:
  - -Immune-competent host: flu-like symptoms
    erythema infectiosum
  - -Immune-deficient host: aplastic crisis
    myocarditis

2. Parvovirus Infections (PV) in cardiac transplant patients
- Pediatric heart transplant patients are often thymectomized and immunosuppressed
- Susceptible to infections such as parvovirus viremia
- Can be life threatening and compromise the transplanted heart
- First-line therapy is high dose IVIG treatment (HD IvIg) may not be:
  - -effective (e.g. persistent viremia)
  - -tolerated (e.g. adverse events such as aseptic meningitis)

Objectives

We aimed to:
- Describe patients with cardiac transplant and parvovirus viremia (PV)
- Describe how therapy was modified for patients with severe PV
- Identify risk factors for severe PV

Method

- Inclusion criteria: pediatric heart transplant patients with PV
- Retrospective medical record review regarding clinical presentation & treatment
- Laboratory evaluation:
- Immunoglobulin levels (IgG, IgM), T cell count (CD4 and CD8)

Results I.

- We identified 3 patients with PV (clinical presentation, **Table 1**) with varying response to HD IvIg (**Table 2**)

Table 1. Clinical Presentation

Patient	Age	Cardiac Diagnosis	Cardiac Treatment	Lymphocyte levels
A	19	hypoplastic left heart syndrome	Heart Transplant and Thymecotmy	Severe T cell lymphopenia
B	7	pulmonary atresia with an intact ventricular septum	Heart Transplant and Thymectomy	Below average CD8 and CD4 counts
C	10	hypoplastic left heart syndrome	Heart Transplant and Thymectomy	Below average CD8 and CD4 counts

Table 2. Treatment response to HD Ig

Patient	Treatment	Response
A	1. HD IvIg 2. Sc Ig	1. Viral load remained high (**Figure 1A)** & treatment caused severe aseptic meningitis 2. Viral load dropped steadily (**Figure 1A)** & caused no side effects
B	1. HD IvIg	1. Responded well & viral load dropped (**Figure 1B**)
C	1. HD IvIg	1. Responded well & viral load dropped (**Figure 1C**)

Figure 1. Viral Load at times of IgG Infusion

A.

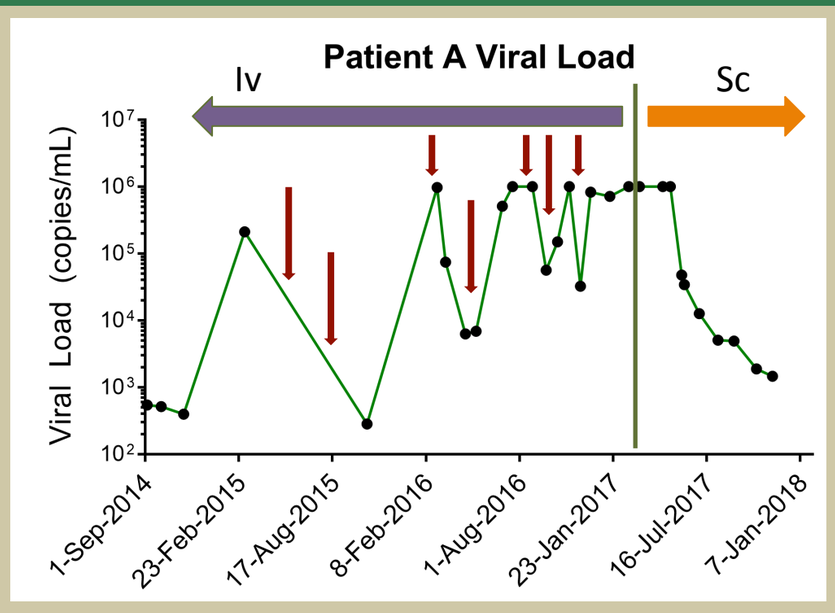
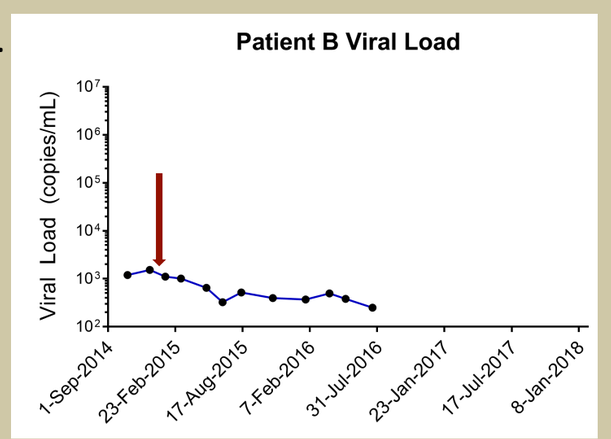


Figure 1. A-C Parvovirus viral load (copies/ml) detected in patients (A-C) during chronic viral infection treated by high dose IvIg (red arrow). **Figure1 A**. Distinction between IvIg treatment and subcutaneous route (Sc Ig).

B.



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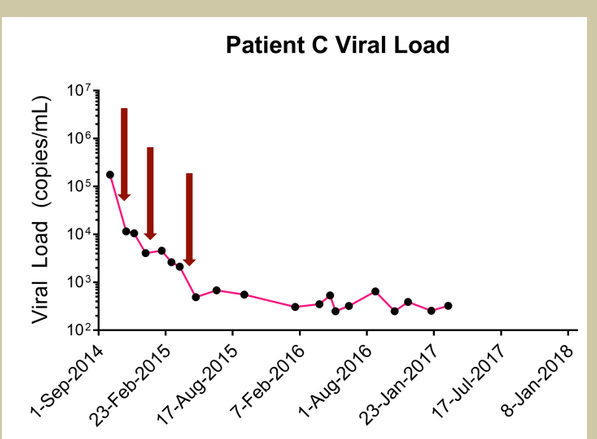
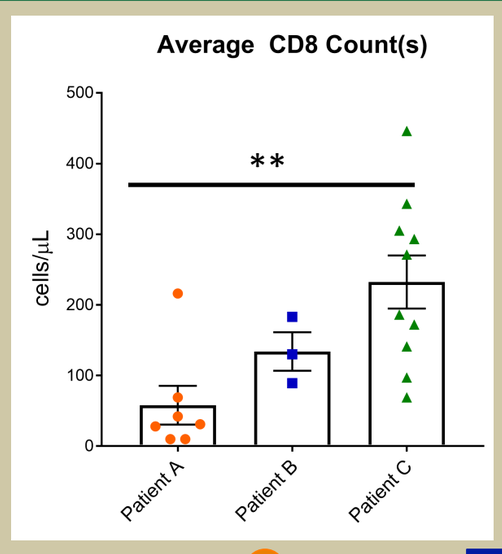
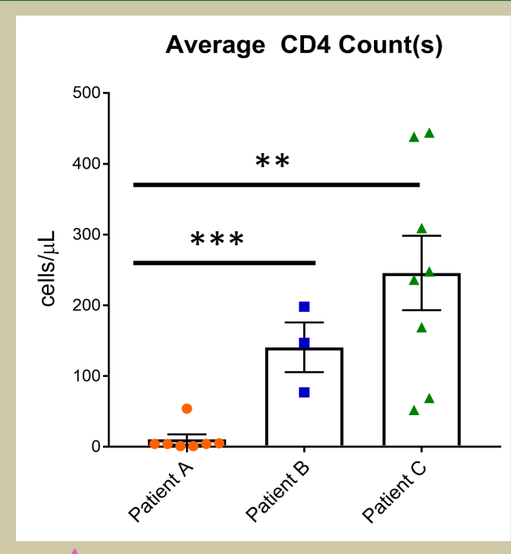


Figure 2. CD8 & CD4 T cell counts

D.



E.



Patient A Patient B Patient C

Figure 2E. P values between patients A & B **= 0.0012, ***= 0.0006
Figure 2D. P value between patients A & C.**= 0.0037

Results II.

- **Figure 1** summarizes the treatment course and parvovirus viral load in Patient A-C. Patient A had prolonged severe viremia against frequent HD IvIg treatment compared to Patient B and C with adequate response
- **Figure 1A** depicts the dramatic response in decrease in viral load after the introduction of subcutaneous Ig (ScIg) therapy
- Laboratory features: All patients suffer from varying degrees of T cell lymphopenia. CD4 and CD8 T lymphocyte levels are inversely correlated to parvovirus viral load (**Figure 2**)

Conclusions

Subcutaneous Ig for a patient with severe T cell lymphopenia and parvovirus infection:
- Controlled viremia
- Improved quality of life
- Decreased need for hospitalization and therefore cut healthcare costs