

Pediatric Hematopoietic Stem Cell Transplant Patients with Respiratory Viral Detection

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Received date: November 02, 2021; Accepted date: November 16, 2021; Published date: November 24, 2021

Citation: Wilson C (2021) Pediatric Hematopoietic Stem Cell Transplant Patients with Respiratory Viral Detection. Pediatric Infect Dis.Vol.6 No.11.

Abstract

In hematopoietic stem cell transplant (HSCT) patients, respiratory virus infections (RVI) are a common cause of morbidity and mortality. Asymptomatic pediatric HSCT pre-transplant patients and symptomatic post-transplant patients were studied for clinical features and respiratory viral detection. Pre-transplant and at the first post-transplant event, coxsackie/echovirus (the most prevalent virus detected pre and post-transplant), rhinovirus, and coronavirus were all detected, indicating sustained detection. There was no link between viral identification and any of the clinical features studied, and there was no increase in mortality related with asymptomatic viral detection.

Keywords: Pediatrics; Hematopoietic stem cell transplant; Respiratory virus.

Introduction

Infections, such as respiratory viral infections (RVI), are a primary cause of morbidity and mortality in hematopoietic stem cell transplant recipients, due to infectious and non-infectious complications such as graft versus host disease and allo-immune lung syndromes. Few studies in pediatric HSCT patients have looked at the presence of viruses from the pre-transplant period to the post-transplant period, and it has been suggested that patients with asymptomatic viral detection do not have an increased mortality rate, while those with symptomatic viral detection do. Screening for respiratory viral infections may influence a physician's decision on when to perform HSCT, and the procedure may be postponed until viral clearance is confirmed. Rhinovirus was discovered as a prevalent virus in the pediatric HSCT transplant population in pre-transplant studies and rhinovirus, coronavirus, parainfluenza virus, respiratory syncytial virus, and adenovirus in post-transplant studies [1]. To investigate the epidemiology and clinical parameters associated with viral detection, we tested asymptomatic pediatric HSCT patients for the presence of respiratory virus in the immediate pre-transplant period and symptomatic patients for up to 90 days post-transplant.

Hematopoietic stem cell transplantation (HSCT) is a well-established and commonly used treatment for a wide range of malignant and non-malignant diseases. Pediatric HSCT indications and techniques differ greatly from adult HSCT in various ways, including underlying illnesses, co-morbidities, and stem cell sources. Different groups have reported on HSCT trends over time in both adult and pediatric patients, but a concentrated devoted pediatric-specific HSCT patterns is rare [2]. Patients, donors, physicians, healthcare providers, and regulatory agencies all need to know about transplant activities. Establishing the overall trend and activity of HSCT in the pediatric population could help researchers better understand current clinical practices, identify areas of health care and resource inequities, and plan future prospective studies. Finally, these could aid in forecasting future trends in the sector and allocating resources to better patient outcomes.

Discussion

RVIs are one of the primary causes of morbidity and death in HSCT recipients, with a case-fatality incidence of 10% in the pediatric HSCT group according to one recent study. Although clinical scoring methods have been proposed, clinical signs to diagnosis respiratory infection in immunocompromised patients can be unreliable. In our research, no unique demographic, sign, or symptom was shown to be linked to viral detection in pre- and post-transplant patients [3]. The most common viral etiology observed both in the asymptomatic pre-transplant phase and the symptomatic post-transplant period was coxsackie/enterovirus. During the post-transplant period, Boca virus was also commonly found. In other investigations of the pediatric HSCT population, rhinovirus was discovered as a prevalent virus in the pre-transplant period, as well as rhinovirus, coronavirus, parainfluenza, and respiratory viruses. In the post-transplant period, syncytial virus and adenovirus are common. These investigations discovered patients with respiratory syncytial virus and influenza in their study populations, but neither virus was diagnosed in our patients, despite enrollment during normal respiratory seasons.

A variety of viruses (coxsackie/echovirus, rhinovirus, and coronavirus NL63) were found at baseline and during acute respiratory episodes in our investigation, implying the possibility of asymptomatic infection prior to HSCT resulting in protracted shedding, possibly due to immunosuppression [4]. In addition, subclinical respiratory viral infection has been described and is thought to be contagious. There was no increased mortality with asymptomatic viral detection, including those with asymptomatic pre-transplant viral detection; however there was increased mortality with symptomatic viral detection, including those with symptomatic pre-transplant viral detection. We also observed no link between asymptomatic pre-transplant virus detection and higher mortality [5].

The tiny sample size of the study constituted a key flaw. It would also have been fascinating to undertake viral sequencing and continue to test pre-transplant patients with positive viral detection on an ongoing basis to identify the duration of viral persistence and analyze its impact on patient outcome more closely [6]. The prospective aspect of this investigation, as well as the use of internal controls during RT-PCR testing that verified the integrity of the archival specimens, are key strengths.

Conclusion

While these respiratory viruses can now be identified in this population, their relevance in the final clinical outcome and the degree of nosocomial transmission is still unknown. The number of patients having HSCT is increasing, as is the complexity of the procedure. However, novel medications are being explored for the treatment of viral infections in this population (e.g., adenovirus, parainfluenza virus, and respiratory syncytial virus), and they have the potential to suppress or eliminate these viruses throughout the peri-transplant continuum. More prospective studies will be needed to assess the clinical impact of RVIs in this population, as well as the best prevention and treatment measure.

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