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Paper Poster Session II

Viral infections of the central nervous system

Prevalence of meningitis and utility of a meningitis/encephalitis molecular panel in a paediatric hospital

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Objectives: Meningitis and encephalitis are significant causes of morbidity and mortality in children, with a broad-spectrum of bacterial, viral and fungal etiologies. However, in a significant proportion of cases the causative pathogen remains elusive. As therapeutic strategies differ significantly depending on etiology, rapid diagnosis of CNS infections is imperative for appropriate management. This study assessed the epidemiology of CNS infections in children admitted to Children's Hospital Los Angeles (CHLA), a tertiary care, pediatric hospital, as well as the performance characteristics of the FilmArray meningitis/ encephalitis (ME) molecular panel for the detection of bacteria, viral and fungal pathogens in CSF.

Methods: To determine prevalence and frequency of etiologic assignment for CNS infections using conventional diagnostic methods, retrospective data analysis was performed on 358 patients whose cerebrospinal fluid (CSF) was submitted for viral and bacterial studies to rule out infectious etiology from January, 2010 to August, 2012. Subsequently, prospective analysis of the FilmArray ME panel was performed on residual CSF submitted on an additional 77 patients from April to September, 2014 and results were compared to conventional culture methods and/or molecular analysis. Chart review was performed on all positive cases to determine correlation with clinical presentation.

Results: Median age range of the 358 patients was 2.7 months, ranging from 1 day to 20 years. Most frequent indications for lumbar puncture were fever (194/358), seizures (101/358), and irritability (40/358). Of the 358 cases, 22 (6.1%) were positive for virus, and 8 (2.2%) were positive for bacteria, resulting in an overall prevalence rate of 30/358 (8.3%). A plausible etiology of their clinical presentation was identified in 117/358 whereas no etiology could be identified in 211/358 (58.9%) of cases. Assessment of CSF parameters in nontraumatic lumbar puncture cases (151/358) revealed abnormal findings in 10/12 (83.3%) positive cases. Of the 77 patients included in FilmArray ME assessment, 13 targets from 11 (14.3%) patients were positive: 8 Enteroviruses, 3 Epstein-Barr virus (EBV), 1 Human Herpes Virus-6 (HHV-6), 1 Parechovirus. Abnormal CSF findings were noted in 6/11 (54.5%) patients and viral targets were confirmed in 8/11 patients. 3/8 patients with confirmed viral CNS infection, had no viral studies ordered at CHLA, resulting in missed cases of Enterovirus, Parechovirus and HHV-6 CNS infections. Of the 3/11 patients with unconfirmed FilmArray ME results, alternate diagnosis was made for the 2 EBV cases and no definitive diagnosis was made for the 1 Enterovirus case.

Conclusions: Infectious etiologies in our pediatric patient population has viral predominance. Rapid laboratory diagnosis of CNS infection is imperative to the treatment and management of pediatric patients. A ME diagnostic panel offering a rapid diagnosis of common CNS pathogens may increase the diagnostic yield and assist clinicians in the diagnostic work up.