G30 Sudden Death in Toddlers Due To Influenza B Infection: A Report of Two Cases and a Review of the Literature

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After attending this presentation, attendees will better appreciate the importance of viral testing in pediatric autopsy cases. Attendees will have better understanding that influenza may present with atypical symptoms such as abdominal pain, vomiting and shock and have a very short duration between onset of symptoms and death.

This presentation will impact the forensic community and/or humanity by bringing attention to the need for specialized testing in pediatric autopsy cases, more specifically the need for viral testing, especially for influenza. Cases of sudden death among children, especially with atypical symptoms for influenza, usually do not get viral studies collected at the time of autopsy and if viral infections are not considered the cause of death may remain elusive. The authors recommend viral screening for cases of sudden death among infants and children in addition to the more standard specialized testing such as bacterial cultures.

Influenza has historically been a cause of considerable mortality world-wide during pandemics as well as small outbreaks, and continues to be a significant cause of death today. The very young and very old are especially vulnerable. Influenza typically appears during the winter months and classic symptoms include fever, sore throat, sweating, nasal obstruction, and cough and maligns. In severe attacks bronchiolitis and pneumonia may be caused directly by the virus or may result from secondary bacterial invasion of the lungs. Influenza is caused by myxovirus influenzae and there are three distinct serotypes (A, B, and C), each containing antigenic strains. Virus A causes pandemics as well as local outbreaks. It affects all age groups and is associated with a high mortality in the elderly, the very young, and those with pre-existing cardiac and pulmonary disease. Virus B causes sporadic cases and limited epidemics, especially among institutionalized young people. It tends to cause a milder disease with a lower mortality rate. Virus C is occasionally detected in local outbreaks.

Two cases of relatively sudden deaths with atypical symptoms due to influenza type B infection in a 4-year-old girl and a 2-year-old boy with no past medical history or predisposing risk factors are described. Both children presented with mild abdominal symptoms of vomiting and abdominal pain starting within two days of death, and were found dead in their beds by their parents. Scene investigation, medical history, autopsy, metabolic screening, toxicology, bacterial cultures, and toxicology were all negative. Histology of the lungs showed a viral type pattern with a chronic inflammatory infiltrate involving the bronchioles, bronchi, and trachea. The girl also had small patchy areas of intra-alveolar mixed inflammation including macrophages and neutrophils consistent with bronchopneumonia. Viral testing on the lungs of both cases was strongly positive for influenza B (by immunohistochemistry in the girl, and RT-PCR in the boy).

These cases illustrate two atypical cases of influenza B infection that would not have been suspected based on the presenting symptoms and rapidly fatal outcomes. Influenza may be found to be the cause of death if viral cultures are done in similar types of cases.

In the literature there are reported cases in adults of influenza A infection with shock like symptoms and high morbidity and mortality. There is ongoing research into the possible role that cytokines play in causing additional injury in a number of infections including influenza associated encephalopathy, streptococcal toxic shock syndrome and RSV respiratory infections. Immune mediated injury may result from the cytokine storm triggered by the initial infection and may spill over into the systemic circulation and cause devastating consequences in a relatively short period of time. There are some studies that suggest that RNA viruses like influenza may be particularly prone to inducing cytokine and chemokine up regulation including numerous interleukins (including IL-1, IL-6, IL-8, IL-11, IL-16) and tumor necrosis factor. It has been suggested that immunomodulators be used as part of the medical treatment of influenza to help prevent cytokine storm.

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