

Varicella and secondary pneumonia in a healthy child: is it time to introduce varicella vaccine in the UK?

Introduction

Chickenpox (varicella) is a highly infectious transmissible disease among children living in temperate regions. It is caused by the varicella zoster virus. It is estimated that in England and Wales the incidence of chickenpox is around 1290 cases per 100 000 person-years and in Scotland and Northern Ireland it remains a notifiable disease (Department of Health, 2006).

Although chickenpox is usually a self-limiting disease, complications can occur both in immune-compromised and previously healthy children. The most common complications seen in healthy immune-competent children include secondary bacterial infections of the varicella lesions, otitis media, secondary pneumonia, subclinical hepatitis and cerebellar ataxia (Ziebold et al, 2001; Cameron et al, 2007). Some children with secondary bacterial infections of the lesions will require paediatric intensive care unit treatment because they develop streptococcal toxic shock and necrotizing fasciitis (Cameron et al, 2007).

Although most varicella-related deaths occur in adults, figures from the Office of National Statistics for England and Wales (2007–10) show that varicella and herpes zoster accounted for between 8 and 19 deaths in children aged 0–19 years. This article describes a case of varicella pneumonia, and suggests that a routine childhood varicella immunization programme should be considered in the UK, as in many other countries around the world.

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Discussion

This case demonstrates the need to consider a secondary pneumonia (even in the absence of respiratory symptoms) in a previously healthy child with chickenpox when a high temperature persists after eruption of the initial lesions. Secondary infection should also be considered if systemic manifestations do not improve in 3–4 days, the fever returns or worsens, or the child's condition deteriorates after initial improvement. Serious complications of chickenpox include varicella pneumonopathies and pneumonia, severe invasive group A streptococcal disease, bacterial infections, thrombocytopenia, arthritis, hepatitis and encephalitis (Centers for Disease Control and Prevention, 2003).

Varicella pneumopathy is a common complication seen with varicella infection; however, primary varicella pneumonia, although rare, is often severe. Most secondary lower airway infections seen in patients with chickenpox are associated with other co-infections (Mijailović et al, 2011). Respiratory symptoms usually appear 3–4 days after the rash. A study of 112 children aged <16 years, hospitalized in the UK and Ireland over a 13-month period as a result of complications of a varicella infection, identified pneumonia in 30/112 cases (27%) (Cameron et al,

2007). In another study of 213 children admitted to hospital with complication of chickenpox in Mallorca, Spain, pneumonia was diagnosed in 17/213 (8%), with one child confirmed to have primary varicella pneumonia (Hervás et al, 2011). Data show that varicella zoster virus pneumonia occurs in 1 out of 400 cases of varicella infection, with an extremely high mortality (Mijailović et al, 2011).

According to available data from the United States for 25 years (1972–97), approximately 95% of all cases, 66% of hospitalizations, and 45% of varicella-related deaths occurred in patients younger than 20 years of age; with deaths occur-

Figure 1. Chest X-ray showing right upper lobe collapse and consolidation.



Case Report

A previously healthy 8-month-old boy presented to the emergency department with a 1-week history of chickenpox infection. His routine immunizations were up-to-date. His parents reported a high temperature (up to 39.5°C) in the preceding 48 hours and that he also had a mild cough, episodes of vomiting and loose stools. He had fed poorly in the 24 hours before presentation. Clinical assessment revealed a temperature of 36.7°C, heart rate 130/min, respiratory rate of 34/min and crusted chickenpox lesions. The infant was alert, smiling and playful, and systemic examination was otherwise unremarkable. He was admitted for monitoring of his fluid intake and temperature.

As the infant continued to vomit intermittently in the 6 hours post admission, blood investigations were done and intravenous fluids were commenced. Laboratory investigations did not reveal biochemical evidence of dehydration, but they did show raised inflammatory markers: white blood cell count 24.8×10^9 /litre, neutrophil count 19.8×10^9 /litre and C-reactive protein 227 mg/litre. In view of these results and the ongoing high fever, a chest X-ray was performed, revealing right upper lobe consolidation and collapse (Figure 1). Oral amoxicillin and flucloxacillin were started and oral feeding was successfully reestablished over the next 24 hours. He was discharged home after 48 hours, to complete a full 7-day course of oral antibiotics.

ring more frequently in children aged less than 10 years (Centers for Disease Control and Prevention, 1999). Although deaths are more likely in immune-compromised children, chickenpox can cause serious morbidity and mortality in otherwise healthy children (<1 in 10 000 cases).

Chickenpox is not without significant economic implications for individuals, families and the state. In the first 12 years post introduction of a single dose of varicella vaccine in the USA (in 1995), the annual average mortality rate with varicella as an associated underlying cause has declined by 88%, with the greatest decrease noted among children and adolescents younger than 20 years of age (97% reduction) (Marin et al, 2011).

A 74% reduction in direct inpatient and outpatient medical expenditure was reported from the USA post routine immunization (Marin et al, 2008). In Europe routine childhood vaccination against varicella is only available in Germany and Greece, with similar success stories reported from both countries (Bonanni et al, 2009).

One of the main arguments against introduction of a routine early-childhood vaccination programme is a potential (temporal) increase of the incidence of herpes zoster among the elderly population (Rozenbaum et al, 2008). Longer term outcome measures are awaited at present (Anonymous, 2012), but there is a lack of data to substantiate this argument and the benefits of herd immunity need to be considered. Two varicella vaccines are licensed in the UK; both vaccines contain live attenuated varicella zoster virus propagated in human diploid cells. At present, varicella vaccine in the UK is restricted to health-care profession-

als who are found to be non-immune to chickenpox after serological testing and for healthy susceptible contacts of immunocompromised patients where continuing close contact is unavoidable (e.g. siblings of a leukaemic child, or a child whose parent is undergoing chemotherapy) (Department of Health, 2006).

Conclusions

Chickenpox is usually a benign self-limiting disease in children, and almost all children recover uneventfully. However, chickenpox is not without significant associated morbidity and varicella-related complications are often seen in clinical practice. Early recognition and treatment is vital to reduce morbidity and mortality. At present, the UK has urgent priorities for regular vaccination in childhood, i.e. meningococcal serogroup B vaccine, but the authors propose that the introduction of routine varicella vaccination in the UK is likely to be beneficial and cost effective in the long term. **BJHM**

- Anonymous (2012) Routine vaccination against chickenpox? *Drug Ther Bull* **50**: 42–5
 Bonanni P, Breuer J, Gershon A et al (2009) Varicella vaccination in Europe - taking the practical approach. *BMC Med* **7**: 26
 Cameron JC, Allan G, Johnston F et al (2007)

- Severe complications of chickenpox in hospitalised children in the UK and Ireland. *Arch Dis Child* **92**(12): 1062–6
 Centers for Disease Control and Prevention (1999) Evaluation of Varicella Reporting to the National Notifiable Disease Surveillance System— United States, 1972–1997. *MMWR Morb Mortal Wkly Rep* **48**: 55–8
 Centers for Disease Control and Prevention (CDC) (2003) Decline in annual incidence of varicella-selected states 1990–2001. *MMWR Morb Mortal Wkly Rep* **52**: 884
 Department of Health (2006) *The Green Book. Immunisation Against Infectious Disease*. www.gov.uk/government/uploads/system/uploads/attachment_data/file/148515/Green-Book-Chapter-34-v2_0.pdf (accessed 20 May 2013)
 Hervás D, Henales V, Yeste S et al (2011) How frequent is varicella-associated pneumonia in children? *Eur J Clin Microbiol Infect Dis* **30**(3): 435–7
 Marin M, Meissner HC, Seward JF (2008) Varicella prevention in the United States: a review of successes and challenges. *Pediatrics* **122**: e744–51
 Marin M, Zhang JX, Seward JF (2011) Near Elimination of Varicella Deaths in the US After Implementation of the Vaccination Program. *Pediatrics* **128**: 214–20
 Mijailović Z, Canović P, Todorović Z et al (2011) Characteristics of radiological changes in lungs during varicella zoster viral infection. *Med Glas (Zenica)* **8**(2): 280–3
 Rozenbaum MH, van Hoek AJ, Vegter S et al (2008) Cost-effectiveness of varicella vaccination programs: an update of the literature. *Expert Rev Vaccines* **7**(6): 753–82
 Ziebold C, von Kries R, Lang R et al (2001) Severe complications of varicella in previously healthy children in Germany: a 1-year survey. *Pediatrics* **108**: e79

LEARNING POINTS

- Complications following varicella infection can occur in previously healthy children.
- Secondary infection should be suspected if fever recurs or worsens, systemic manifestations do not settle or clinical deterioration occurs.
- Varicella pneumopathy is a common complication manifested by respiratory symptoms e.g. fever, cough or difficulty in breathing.
- Primary varicella pneumonia is rare but often severe and associated with high mortality.
- Varicella vaccine has been proved to decrease mortality and be cost effective.

Forthcoming case reports

Adenoma with a case of a rectal villous diarrhoea and severe hypokalaemia

Spontaneous rupture of the spleen resulting from infectious mononucleosis

Fever, rash and neutrophilia: not always an infectious cause

Erythroderma is not all psoriasis: a case of Sézary syndrome

Parkinsonism hyperpyrexia syndrome as a result of abrupt withdrawal of ropinirole

Brainstem abscess presenting with lateral gaze palsy in a healthy adolescent patient