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Sudden death in childhood due to varicella pneumonia: a forensic case report with clinical implications

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Abstract Varicella (chickenpox) is one of the most frequent highly infectious diseases in childhood. It is caused by varicella–zoster virus. Lethal complications are rare. Focused on histological findings, we present a case of a sudden unexpected death of an otherwise healthy 18-month-old girl due to varicella-induced pneumonia. The histological and immunohistochemical investigations of the lung tissue revealed typical findings of a varicella pneumonia: haemorrhagic and necrotic nodules, intra-alveolar fibrin, numerous neutrophilic granulocytes, lymphocytes, plasmacells, macrophages, multinucleated giant cells and hyaline membranes. Varicella-related deaths are preventable by vaccine. To prevent complications and lethal outcome of varicella as reported here, the recommendations concerning vaccination against varicella must be taken into account in paediatric practice.

Keywords Chickenpox pneumonia · Varicella–zoster virus · Sudden death · Vaccination

Introduction

Varicella is a common, usually mild, childhood infection due to varicella–zoster virus. The annual number of varicella infections is estimated to approximately the size of annual birth cohort [13]. In Germany, an estimated 740,000 individuals contracted varicella yearly [2], 0.003% of the cases end fatal and pneumonia is the most common complication requiring hospitalization [2]. Varicella–zoster virus pneumonia occurs most often in adults and in immunocompromised [5]. Pulmonary involvement is seen in less than 1% of primarily infected children and in about 15% of

primarily infected adults [8]. The incidence of a fatal outcome in adults is up to 30 times higher than for children [4].

However, varicella may result in life-threatening complications even in healthy children [9, 10, 16]. Before licensing of the vaccine in the USA, between 0.1 and 0.6% of children were admitted to hospital as a result of varicella or an associated complication [3]. Increased risk of serious complications was observed among infants less than 1 year of age [6], and the mortality in this age group was higher than in older children [7]. Involvements of several internal organs are described [1].

Here, we report a forensic case of a sudden unexpected death of an 18-month-old girl affected by varicella.

Case history

An 18-month-old girl suffering from varicella was found in the morning dead in her bed. Four days before death, the girl had developed a characteristic rash of chickenpox, fever and cough. The disease had been treated symptomatically. The child had not been immunized against varicella.

Autopsy findings

Typical dermal efflorescences with numerous scabs surrounded by red walls and mucosal vesicles were found.

Further findings were:

- Oedema of the brain
- Otitis media dextra
- Tonsillitis
- Multiple hard consistent haemorrhagic foci in the lungs (Fig. 1a,b)

Histology

Skin The typical dermal efflorescences were characterised by subepithelial haemorrhages and lymphocyte infiltrates

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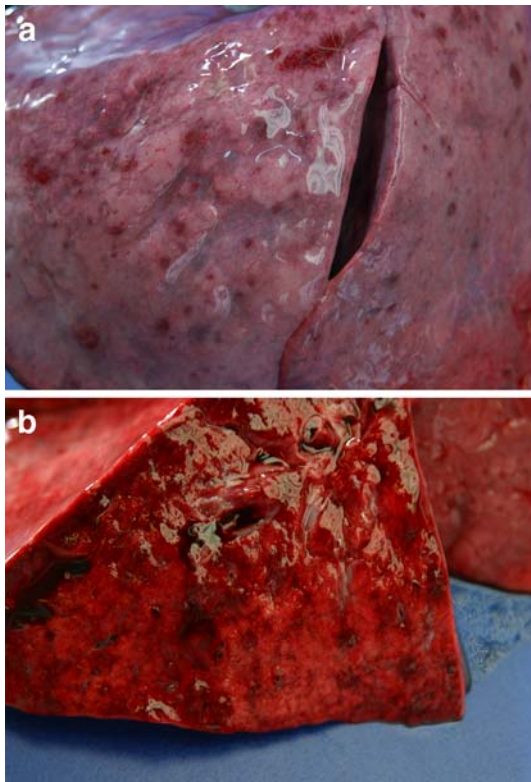


Fig. 1 Macroscopic lung findings: subpleural bleedings (a) and multiple hard consistent haemorrhagic foci in the lung tissue (b)

surrounding epithelial caves which were coated by crabs (Fig. 2).

Lungs Haemorrhagic and necrotic nodules were present. The affected alveoli contained debris, fibrin, numerous neutrophilic granulocytes, lymphocytes, plasmacells, macrophages, multinucleated giant cells and hyaline membranes (Fig. 3a-d).

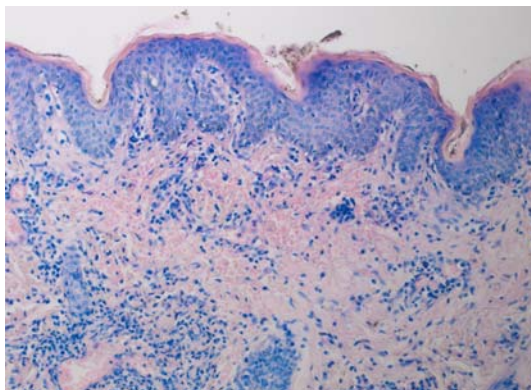


Fig. 2 Histology of the skin efflorescences: an epithelial cave is coated by crabs. In its surrounding, subepithelial haemorrhages and lymphocyte infiltrates are located (Giemsa, $\times 100$)

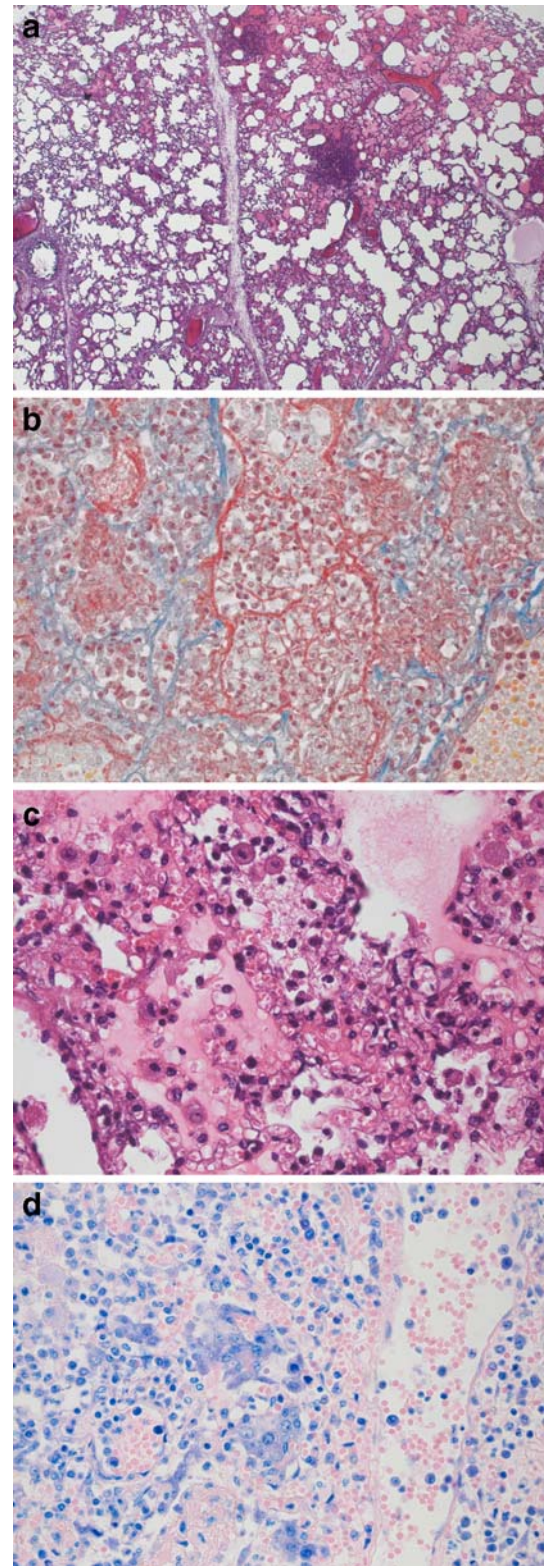


Fig. 3 Histology of the lung tissue: haemorrhagic and necrotic nodules with cellular infiltration are diffuse spread (a; H & E, $\times 50$). The affected alveoli contain debris, fibrin (b; MSP, $\times 200$), numerous neutrophilic granulocytes, lymphocytes, plasmacells, macrophages (c; H & E, $\times 400$) and multinucleated giant cells (d; Giemsa, $\times 400$)

Discussion

Our case demonstrates that varicella is a serious disease also in childhood, which must not be trivialised because it can result in fatal outcome. Varicella-related deaths are preventable by vaccine. After the implementation of routine immunization of children against varicella in the USA, the number of varicella cases and the associated morbidity and mortality have clearly declined [14]. The greatest decline in mortality occurred among children between 1 and 4 years of age [11]. The European Working Group on Varicella recommends that the varicella vaccine be offered routinely in every European country to all healthy children between ages of 12 and 18 months and to all susceptible children before their 13th birthday [2]. Recently, the German national vaccination commission (STIKO) published recommendations for vaccination of all children within an age between 11 and 14 months [15].

As well as formerly reported forensic cases [12], this case has strong implications to clinical practice: to prevent lethal outcome of varicella as reported here, the recommendations for vaccination against varicella should be routinely taken into account in paediatric practice.

References

- Asano Y, Yoshikawa T, Urisu A, Yazaki T, Mizoguchi Y, Kurata T (1993) Varicella-zoster virus replication site in internal organs of an otherwise healthy child with varicella and sudden death. *Acta Paediatr Jpn* 35:348–351
- Banz K, Wagenpfeil S, Neiss A, Hammerschmidt T, Wutzler P (2004) The burden of varicella in Germany. Potential risks and economic impact. *Eur J Health Econ* 5:46–53
- Choo PW, Donahue JG, Manson JE, Platt R (1995) The epidemiology of varicella and its complications. *J Infect Dis* 172:706–712
- Fairley CK, Miller E (1996) Varicella-zoster virus epidemiology—a changing scene? *J Infect Dis* 174(Suppl 3):S314–S319
- Frangides CY, Pneumatikos I (2004) Varicella-zoster virus pneumonia in adults: report of 14 cases and review of the literature. *Eur J Intern Med* 15:364–370
- Galil K, Brown C, Lin F, Seward J (2002) Hospitalization for varicella in the United States, 1988–1999. *Pediatr Infect Dis J* 21:931–934
- Jaeggi A, Zurbrugg RP, Aebi C (1998) Complications of varicella in a defined central European population. *Arch Dis Child* 79:472–477
- Kayser K (1992) *Analytical lung pathology*. Springer, Berlin Heidelberg New York, p 111
- Kernbach-Wighton G, Oehmichen M, Saternus KS (2003) Fatal outcome of varicella in children. *Leg Med (Tokyo)* 5:S233–S236
- Meyer PA, Seward JF, Jumaan AO, Wharton M (2000) Varicella mortality: trends before vaccine licensure in the United States, 1970–1994. *J Infect Dis* 182:383–390
- Nguyen HQ, Jumaan AO, Seward JE (2005) Decline in mortality after implementation of varicella vaccination in the United States. *N Engl J Med* 352:450–458
- Pfeiffer H, Weiss FU, Karger B, Aghdassi A, Lerch MM, Brinkmann B (2004) Fatal cerebro-renal oxalosis after appendectomy. *Int J Legal Med* 118:98–100
- Preblud SR, Orenstein WA, Kenneth JB (1984) Varicella: clinical manifestations, epidemiology and health impact in children. *Pediatr Infect Dis J* 3:505–509
- Seward JF, Watson BM, Peterson CJ, Mascola L, Pelosi JW (2002) Varicella disease after introduction of varicella vaccine in the United States, 1995–2000. *JAMA* 287:606–611
- Ständige Impfkommission am Robert-Koch-Institut (Hrsg.) (2004) *Empfehlungen der ständigen Impfkommission (STIKO) am Robert-Koch-Institut/Stand Juli 2004*. *Epidemiol Bull* 30
- Tseng HW, Liu CC, Wang SM, Yang YJ, Huang YS (2000) Complications of varicella in children: emphasis on skin and central nervous system disorders. *J Microbiol Immunol Infect* 33:248–252