Adult Respiratory Distress Syndrome Secondary to Varicella Infection in a Young Adult

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SUMMARY: A case is described of chickenpox in a young non-immunosuppressed adult, resulting in adult respiratory distress syndrome and hepatitis, which was successfully managed with artificial ventilation and vidarabine.

Introduction

Chickenpox is usually a benign childhood illness. However, in adults the disease may run a much more severe course, characterised by a florid rash and a variety of systemic complications, including secondary infection, pneumonitis, hepatitis, encephalitis, myocarditis, purpura and venous thrombosis. All these complications are common in patients who are immunosuppressed. We report a case of chickenpox complicated by the adult respiratory distress syndrome and hepatitis who responded well to a combination of ventilatory support and intravenous vidarabine. It is unusual for patients with varicella pneumonitis to require artificial ventilation and vidarabine.

Case Report

A 33 year old housewife presented with primary chickenpox. Multiple sclerosis had been diagnosed two years previously and she had received three short courses of ACTH, the last one some 14 months prior to her admission. She smoked 20 cigarettes a day.

The children of the patient contracted classical chicken-pox following which the patient herself developed a sore throat, a non-productive cough and a headache associated with general malaise. Two days later there appeared the typical exanthem of varicella infection. She became increasingly dyspnoeic and was admitted to hospital a further two days later. On admission she was obviously distressed with tachypnoea, pyrexia (38°C) and an extensive but not confluent, chicken-pox rash. There were fine inspiratory rales at both lung bases and a tachycardia of 90/min. Results of investigations were as follows:- haemoglobin 16g/dl, total white cell count $9 \times 10^9/l$ (80% polymorphs, 16% lymphocytes, 3% monocytes, 1% eosinophils), total bilirubin $7 \mu\text{mol/l}$, AST 110 u/l, ALT 91 u/l, GGT

167 u/l, ALP 438 u/l, total protein 49 g/l, albumin 29 g/l. A chest X-ray (Fig. 1) showed nodular shadowing throughout both lung fields. A diagnosis of chicken-pox pneumonia was made.

During the following 24 hours the rash became confluent on her face and trunk and she became increasingly more breathless. Her respiratory rate increased to 22/min, and her pulse rate to 120/min. An arterial blood sample revealed PaO_2 6.03 kPa and PaCO_2 3.33 kPa. She was commenced on treatment with intravenous acyclovir 10 mg/kg 8 hourly plus 40% oxygen by mask. The condition of the patient continued to deteriorate and 32 hours after admission she was exhausted and increasingly dyspnoeic (respiratory rate 26/min and measured vital capacity was <1 litre with corresponding much reduced tidal volume <300 ml).

Fig 1. P.A. chest X-ray on admission.

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Fig 2. A.P. portable chest X-ray at 33 hours after admission following intubation.

Repeat arterial blood sampling showed PaO_2 6.33kPa and PCO_2 4.38kPa on 40% oxygen by mask but only PaO_2 4.40kPa; PCO_2 3.98kPa on room air. Repeat chest X-ray (Fig. 2) demonstrated increased opacity of the lung fields due to confluent pneumonic shadowing. A diagnosis of respiratory failure was made and the patient transferred to the Intensive Care Unit for artificial ventilation. Anaesthesia was induced with sodium thiopentone 250mg and the patient intubated with a cuffed nasal tube using suxamethonium 100mg. IPPV (intermittent positive pressure ventilation) was commenced with a CPU-1 (Medishield) ventilator. Sedation was achieved with a Midazolam infusion (10mg/hr.) and intermittent intravenous doses of papaveretum 5mg hourly. However it was found necessary to use a muscle relaxant (vecuronium 2-4mg/hr) in addition in order to obtain control of ventilation. Inflation pressures remained elevated between 40-60cm H_2O in keeping with the reduced compliance associated with ARDS (Adult Respiratory Distress Syndrome). Initial arterial blood gas results on IPPV with an inspired oxygen concentration of 50% were: PaO_2 6.79kPa, PCO_2 5.03kPa from which a 50% shunt was calculated. Consequently it became necessary to increase the inspired oxygen concentration to 70% with +5cms H_2O of positive end expiratory pressure (PEEP). This increased the PaO_2 to 8.3kPa. At this point (42 hours after admission) it was decided to substitute vidarabine 10mg/kg intravenously for the acyclovir. This was combined with prophylactic flucloxacillin 500mg six hourly and gentamicin 80mg 8 hourly. These were continued for a total of five days. The patient's blood pressure remained stable although she continued to have a tachycardia of approximately 140/min which, for a short time, was associated with runs of atrial ectopic beats occurring some 24 hours after commencing IPPV. Urine output and serum electrolytes were maintained within normal limits throughout the acute phase of the

illness. Repeated blood coagulation studies showed no gross abnormality apart from platelet clumping.

On the third day after commencing IPPV PaO_2 had increased to 10.75kPa and the inspired oxygen concentration was reduced to 40% and by day six it had risen to 16kPa. The patient was taken off the ventilator on day seven. She continued to improve clinically and by the 16th day after admission her arterial blood gases were PaO_2 10.74kPa and PCO_2 4.67kPa breathing room air. Her liver function tests began to settle seven days after admission but both her GGT and ALP remained elevated at 120 /l and 424 /l respectively some 27 days later.

Discussion

This patient developed ARDS and hepatitis as a complication of chickenpox. She had an extensive rash on admission which became confluent later. Over the same period of time her respiratory and liver function deteriorated. As the rash improved so did the respiratory and liver function a correlation previously noted in other cases¹. The fatality rate of chickenpox in England and Wales for all ages is 7.7 per 100,000 cases. However in young adults it is much higher at 13.3 per 100,000 cases of which 43% are due to pneumonia². The incidence of chickenpox pneumonia is less clearly documented but it appears to occur in between 16% and 50% of all adult cases^{1,2,3,4} and to be associated with smoking⁵. Chickenpox pneumonia presents a spectrum of severity. Some patients are totally asymptomatic, but have chest X-ray changes. Others have respiratory symptoms of increasing significance to the worst who develop ARDS⁵. As in this case the physical signs in the chest frequently bear little relation to the degree of functional impairment^{6,7}. Hence a routine chest X-ray supplemented by arterial blood gas measurements are invaluable in the assessment of respiratory involvement.

The respiratory function in our patient deteriorated rapidly over 8 hours, similar to the rapid deterioration which has been observed in other cases⁸. Hence careful monitoring is essential once pulmonary involvement has been confirmed.

Our patient had a tachycardia on admission which became more pronounced during her illness and persisted at around 100 /min, for one week after ventilation had been discontinued. During ventilation she had several runs of atrial ectopic beats but this did not appear to affect her cardiac output. The aetiology of the tachycardia and atrial ectopics is not clear. However dysrhythmias associated with a myocarditis in chickenpox have been described⁹ and this may have been the aetiology in our case as the tachycardia persisted well beyond the period of respiratory embarrassment.

The optimum chemotherapeutic treatment for chickenpox pneumonia has not yet been defined. Vidarabine has been shown to decrease the mortality and the occurrence of secondary localisations in

chickenpox in immunocompromised patients^{10,11}. Likewise, acyclovir has been shown to prevent the occurrence of varicella pneumonia but has not been proven to reduce mortality^{12,13}. However a small comparative trial of acyclovir and vidarabine in disseminated varicella zoster viral infections in immunocompromised patients failed to show any difference in efficacy¹⁴. In addition, the large amount of solute required for the administration of vidarabine makes acyclovir a more convenient preparation.

In conclusion, chickenpox in adults may progress rapidly to a serious illness with a high mortality. It is important therefore to assess respiratory function thoroughly using radiology and blood gases and to consider the use of antiviral therapy and artificial ventilation if the patient deteriorates.

REFERENCES

1. MERMELSTEIN R H and FREIREICH A W. Varicella pneumonia. *Ann Intern Med* 1961; **55**: 456-463.
2. JOSEPH C A and NOAH, N D. Epidemiology of chickenpox in England and Wales 1967-85. *Br Med J* 1988; **296**: 673-676.
3. SELTGER R A. Varicella pneumonia. *Dis Chest* 1964; **45**: 210-214.
4. WEBER D M and PELLECHIA J A. Varicella pneumonia; Study of prevalence in adult men. *JAMA* 1965; **192**: 570-573.
5. ELLIS M E, NEAL K R and WEBB A K. Is smoking a risk factor for pneumonia in adults with chickenpox? *Br Med J* 1987; **294**: 1002.
6. HOCKBERGER R S and ROTHSTEIN R J. Varicella pneumonia in adults, a spectrum of disease. *Ann Emerg Med* 1986; **15**(8): 931-34.
7. BOYD K and WALKER E. Use of acyclovir to treat chickenpox in pregnancy. *Br Med J* 1988; **296**: 393-394.
8. CHITKARA R, GORDON, R E and KHAN, F A. Acyclovir in the treatment of primary varicella pneumonia in non-immunocompromised adults. *NY State J Med* 1987; **87**(2): 237-238.
9. WOOF P K, *et al*, Life threatening dysrhythmias in varicella myocarditis. *Clin Pediatr* 1987; **26**: 480-482.
10. JOHNSON M T, *et al*, Treatment of varicella zoster virus infections with adenosine-arabinoside. *J Infect Dis* 1975; **131**: 225.
11. WHITLEY R, *et al*, and the NIAID Collaboration Antiviral Study Group. Vidarabine therapy of varicella in immunosuppressed patients. *J Pediatr* 1982; **101**: 125-134.
12. SELBY P J, *et al*, Parenteral acyclovir therapy for herpes infections in man. *Lancet* 1979; **ii**: 1267-1270.
13. VAN DER MEER J W M, *et al*. Treatment of chickenpox pneumonia with acyclovir. *Lancet* 1980; **ii**: 473-474.
14. VILDÉ J L, *et al*. Comparative trial of acyclovir and vidarabine in disseminated varicella-zoster virus infections in immunocompromised patients. *J Med Virol* 1986; **48**: 127-134.