Respiratory depression due to unsuspected narcotic ingestion treated with naloxone

Narcotic drugs can produce respiratory depression leading to coma and death, yet they are constituents of widely used preparations prescribed or bought for the treatment of coughs or diarrhoea. 2 cases are presented to emphasise that narcotic poisoning should be suspected in a child with respiratory depression for no clear cause, and that the diagnosis has been simplified by the use of the narcotic antagonist naloxone which has no agonist activity.

Case reports

Case 1. A 2-year-old girl developed vomiting and anorexia. Her general practitioner started treatment with paracetamol and erythromycin. On the following day she became increasingly drowsy and was admitted in the evening to an infectious diseases hospital. During the night she became unconscious, respiration became irregular with several short apnoeic spells, and she was transferred to this paediatric unit. She was then deeply unconscious with signs of mild dehydration, central cyanosis, and a respiratory rate of 12/min. The pupils were small and the fundi normal. There was no neck stiffness, and no sign of infection in the chest, ears, or throat. Normal investigations included the blood count, blood sugar, lumbar puncture, and skull *x*-rays; blood urea 8 mmol/l (48·2 mg/100 ml), plasma Na 151 mmol/l (151 mEq/l).

The respiratory depression and small pupils suggested the possibility of narcotic poisoning. The parents then remembered that on the previous day, 20 hours before, she had been found playing near a bottle of cough linctus which had been prescribed for another member of the family, but they did not know the name of the linctus. The child now had a further short apnoeic attack. She was given nalorphine 2 mg IV. 20 to 30 seconds later she sat up and cried and her respiration became normal. She required four further doses of nalorphine over the next 12 hours, and was able to return home entirely fit 2 days later. Subsequently the cough linctus was identified as Cosylan, a preparation containing 170 mg ethylmorphine hydrochloride per 100 ml.

Case 2. A 22-month-old girl was cared for by an au pair during the day and had been well although she seemed unusually sleepy during the afternoon and looked flushed. The only time the child had been playing on her own was at about 1 pm. After supper the child went to bed at 6.30 pm and shortly afterwards her mother returned from work and looked in on the child who was asleep and looked normal. The mother went to her bedroom again at 10.30 pm and found her positioned on her knees at the end of the cot with her head resting against the wooden bars. She was grey in colour and breathing only with occasional gasps. She was brought to hospital by ambulance, where she was found to be deeply unconscious and centrally cyanosed. There were some pressure marks and a recent bruise on her forehead, and the pupils were both small. Pulse 90/min. She was breathing only irregularly and became apnoeic shortly after admission. She was intubated and became pink immediately on being ventilated with oxygen, but did not breathe spontaneously. An intravenous line was set up and she was ventilated on a respirator. Chest *x*-ray showed clear lung fields and blood count. Serum electrolytes, and cerebrospinal fluid were all normal, as were her blood gases while on the respirator.

The parents were asked about drugs in the house and they knew only of Mogadon (nitrazepam) and diazepam, neither of which had been tampered with. However the unexplained respiratory depression with small pupils suggested narcotic poisoning, and she was given naloxone 0·2 mg IV. After only 20 to 30 seconds she regained consciousness and began breathing spontaneously. She gagged vigorously on the endotracheal tube, which she tried to pull out, and vomited. After 50 minutes she became drowsy again and a second dose of naloxone was given with immediate return to full consciousness and normal respiration. Four further doses of naloxone were required over the following 24 hours.

She developed signs of a chest infection, chest *x*-ray now showed patchy shadowing in both midzones, and she was treated with ampicillin. She recovered quickly and left hospital 2 days later.

When the parents returned home they found that the father's sponge bag, unused since a holiday abroad 6 months before, had been disturbed; inside was an open bottle of Lomotil tablets (diphenoxylate hydrochloride 2·5 mg and atropine sulphate 0·025 mg) from which about 15 tablets were missing. Analysis of the blood taken shortly after admission (about 12 hours after the probable time of ingestion) showed a plasma concentration of diphenoxylic acid of 280 ng/ml.

Discussion

Respiratory problems are common in young children and the cause often becomes clear when taking the history and examining the child. But sometimes the diagnosis is not clear, and if the pupils are

constricted and the breathing becomes more shallow it is reasonable to suspect that the child may have ingested something containing a narcotic. The distressed parents may say that the child has not had any drugs, but many cough mixtures and medicines prescribed for diarrhoea contain narcotics or their derivatives, and bottles of these may lie around forgotten in the house.

Before naloxone became available both the current narcotic antagonists, i.e. nalorphine and levallorphan had some agonist activity of their own, and could themselves produce respiratory depression in the absence of a narcotic (Blumberg and Dayton, 1972), thus worsening the respiratory depression caused by nonopiate drugs such as barbiturates. Naloxone has virtually no agonist activity and therefore is without this disadvantage. It can be given as a diagnostic test and will not produce more depression in non-narcotic overdoses (Evans *et al.*, 1973) or if given in excess (Rumack and Temple, 1974). Therefore if a child presents with unexplained respiratory depression and with constricted pupils, part of the management is to ensure the airway and support respiration if necessary and then to give a diagnostic dose of naloxone 0·01 mg/kg IV.

Case 2 illustrates several further points. The duration of action of naloxone is short while that of many of the narcotics including diphenoxylate is long, and therefore repeated doses of naloxone will usually be needed. The clinical response to IV naloxone is dramatic and immediate. It is important to anticipate the sudden return to full consciousness and to protect intravenous infusions and endotracheal tubes from forcible rejection. Finally, poisoning with Lomotil, the management of which has been well reviewed by Rumack and Temple (1974), can now be confirmed by measuring plasma diphenoxylic acid levels (Ford *et al.*, 1976). The level obtained in this patient, in blood taken 12 hours after the probable time of ingestion, was very high, since similar levels would be expected in an adult as a peak concentration one hour after oral ingestion.

Summary

Two patients are presented with respiratory depression for which no cause was apparent. Both had ingested narcotics without the parents' knowledge. Narcotic ingestion should be suspected if signs of respiratory failure with constricted pupils are present, and a diagnostic test with naloxone should be performed.

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Estimation of gestational age at birth

Comparison of two methods

A scoring system for the estimation of gestational age of newborn babies using 10 neurological measures and 11 external characteristics has been shown by several workers to produce accurate results (Dubowitz *et al.*, 1970; Hancock, 1973; Jaroszewicz and Boyd, 1973; Nicolopoulos *et al.*, 1976). However, the necessary skills for using this system may be difficult to acquire and the system may also be time consuming and disturbing to the sick neonate (Parkin *et al.*, 1976). In a large community where the majority of the mothers are uncertain of the date of their last menstrual period and where there is a high incidence of small-for-dates babies, there is a real need for a method of estimating gestational age that is at once both rapid and accurate.

Five neurological reflexes which appear at certain stages of gestation were found to be good measures of gestational age (Robinson, 1966). We examined the accuracy of these 5 reflexes as a group measured against the scoring system of Dubowitz *et al.* (1970) for the estimation of gestational age.

Patients and methods

Selection of babies. 73 Cape coloured babies were sequentially selected for birthweight equal to or less than 2800 g (i.e. 10th centile for weight at 40 weeks for the Cape coloured male who is later born), from mothers who had had regular menstrual periods and