

Current recommended doses range from 0.10–1.48 $\mu\text{mol/kg/day}$,^{4,5} and some recommend that copper be excluded completely from short term parenteral nutrition.⁶ Our experience suggests that potentially toxic concentrations of copper can be achieved in critically ill preterm infants and that intravenous copper supplements should be withheld until the babies are stable, and then their serum copper concentrations should be monitored. Further studies are needed to define optimal intravenous copper requirements.

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Correspondence to Dr Karen Simmer, Department of Paediatrics, Flinders Medical Centre, Bedford Park, South Australia 5042.

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Maternal narcotic abuse and the newborn

L G ALROOMI,* J DAVIDSON,† T J EVANS,† P GALEA,* AND R HOWAT*

*Glasgow Royal Maternity Hospital and †Stobhill General Hospital, Glasgow

SUMMARY In 50 infants born to women who continued to take heroin during all or part of their pregnancy the drug withdrawal symptoms were mild and were noted in 21 infants (42%). Only nine infants required treatment. Sudden infant death syndrome occurred in two infants at 4 and 6 months.

An increasing number of infants are being born to mothers addicted to narcotic drugs. Reports about the effects of maternal drug abuse on the infant are conflicting. Previous series, largely from North America, have reported increased neonatal mortality and morbidity in these infants.^{1,2} Recently, Klenka reported minor withdrawal symptoms in more than 70% of infants but noted a low incidence of severe symptoms.³ This was attributed to smoking heroin rather than to intravenous abuse. In order to ascertain the current risk we studied 50 infants born between 1983 and 1986.

Patients and methods

During the study period, 44 women known to be addicted to narcotic drugs delivered 50 infants in two Glasgow maternity hospitals. One mother had a twin pregnancy, and five women delivered twice

during this period. The combined annual delivery rate in these two hospitals is roughly 6000.

All except one of the mothers were using heroin, either alone or in combination with a variety of other drugs. The one exception was a methadone addict. The mean (SD) duration of addiction before delivery was 2.7 (1.5) years. The amount of heroin used varied widely and was difficult to ascertain. Most of the women (75%) were intravenous heroin abusers; the rest either smoked or snorted the drug. Twenty four women had partners who were also drug addicts.

The ages of the mothers ranged from 17–34 years: mean (SD) 21.5 (3.4). All were offered routine antenatal care with the addition of an inpatient detoxification programme. Nineteen of the women had little or no antenatal care, and two concealed their pregnancies.

The infants were admitted routinely to the special care nursery after delivery and were observed for signs of drug withdrawal for 48 hours. Symptomatic infants remained under close observation. Treatment was initiated if there were constant tremulous movements, convulsions, or a disturbed sleep or behavioural pattern such as restlessness or crying within one hour of a feed. The drugs used in treatment were phenobarbitone, chloral hydrate, and phenobarbitone either singly or in combination depending on the individual clinician.

Results

Signs of drug withdrawal were noted in 21 infants (42%) (table 1). In most of the infants these were mild but nine (18%) had symptoms considered sufficient to warrant treatment. Five had late or prolonged withdrawal symptoms with irritability and excessive hunger.

The birth weight of affected infants ranged from 1.1–3.54 kg: mean (SD) 2.77 (0.58). Neonatal problems, other than drug withdrawal symptoms, in the infants of addicted mothers are documented in table 2. In 19 pregnancies there had been little or no antenatal care and 11 (57%) of them resulted in preterm delivery. Thirty nine (78%) of the infants were discharged home, eight under supervision orders. Nine were discharged to foster care, and two were adopted.

Few of these children were followed up successfully. Most failed to attend outpatient appointments. Three are known to have long term problems. One child is microcephalic and severely handicapped, one has a cleft palate, and one is deaf. There were no neonatal deaths in this group. Two infants suffered sudden infant death syndrome at 4 and 6 months.

Table 1 *Drug withdrawal symptoms in 21 affected infants*

<i>Symptom</i>	<i>No of infants (%)</i>
Jitteriness	21 (100.0)
High pitched cry	11 (52.4)
Snuffles	10 (47.6)
Sleep disturbance	9 (42.9)
Vomiting	6 (28.6)
Abnormal feeding pattern	5 (23.8)
Tachypnoea	4 (19.0)
Fever/excess sweating	1 (4.8)
Convulsions	1 (4.8)

Table 2 *Neonatal complications occurring in infants (n=50) of addicted mothers*

<i>Complication</i>	<i>No of infants (%)</i>
Preterm delivery (<37 weeks)	14 (28)
Small for gestational age	14 (28)
Occipitofrontal head circumference <10th centile	17 (34)
Delivery by caesarean section	8 (16)
Delivery by forceps	7 (14)
Fetal distress (cardiotocographic changes with or without meconium staining)	18 (36)
Apgar scores <6 at one minute	14 (28)
Idiopathic respiratory distress syndrome	4 (8)
Required assisted ventilation	3 (6)

Discussion

The incidence and severity of drug withdrawal symptoms in the group of infants studied is lower than previously reported in infants of narcotic addicts. Klenka attributed a reduced severity of symptoms to low dose exposure in mothers who smoked rather than injected heroin.³ In our series, however, 75% were intravenous drug abusers.

Alterations in the severity of symptoms may reflect changing patterns of drug taking: most addicts now take more than one drug. The infant may be affected not only by exposure to heroin but by the other drugs taken. It is well recognised that methadone results in more prolonged withdrawal symptoms. Most mothers in our series were using heroin in combination with other drugs but few were using methadone on a regular basis.

No neonatal deaths occurred in our series. There were two cases of sudden infant death syndrome; an increased incidence has been previously reported in infants of drug addicts.⁴ In keeping with previous reports, we noted suboptimal intrauterine growth, including head growth, in many infants.⁵ This may relate as much to other factors in the lifestyle of the addict as to intrauterine heroin exposure. Smoking, poor diet, and poor antenatal care, all associated with poor fetal growth, are common in these mothers. Where there was little or no antenatal care we noted an increased risk of preterm delivery. This is well recognised in non-addict populations. Perhaps efforts to improve the outlook for these infants should be directed at encouraging the use of antenatal care resources.

The ability of the drug addict to care for her child after discharge is of major concern. Many addicts have unstable backgrounds with no family support. An early assessment of the family and support available to the mother is essential. Debate continues about the long term outlook for these children; there are reports of an increased incidence of behaviour problems and learning difficulties.⁶ Due to difficulties with follow up we were unable to explore this.

No mother in our group was positive for human immunodeficiency virus. With the increasing prevalence of this virus this may well become one of the major risks to these infants in the future.

In conclusion we report a low incidence of severe drug withdrawal symptoms requiring treatment in infants born to drug addicted mothers. The main risks were associated with the mother's lifestyle as a drug addict rather than a direct effect of the drugs.

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Correspondence to Dr L AlRoomi, Paediatric Department, Glasgow Royal Maternity Hospital, Rottenrow, Glasgow G4 0NA.

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Neonatal infections with *Haemophilus* species

L M MILNE,* D ISAACS,† AND P J CROOK*

*Public Health Laboratory and †Department of Paediatrics, John Radcliffe Hospital, Oxford

SUMMARY During a 27 month study seven non-serotypable strains of *Haemophilus influenzae* and two of *Haemophilus parainfluenzae* were isolated from nine neonates. Seven had early infection associated with respiratory distress or conjunctivitis; three had septicaemia one of whom died. The incidence of haemophilus septicaemia was 0.23 per 1000 live births.

The number of reports of infections caused by non-serotypable *Haemophilus influenzae* during the neonatal period is increasing.¹ Any series that includes only cases of bacteraemia or meningitis is likely to under report characteristic clinical features of infection with this organism.² We report a study conducted over 27 months of all haemophilus isolates in one unit.

Material and methods

On 1 January 1985 surveillance of haemophilus infections in our neonatal unit started and we report the results until 31 March 1987. When systemic sepsis was suspected we took samples of blood, urine, cerebrospinal fluid, nose, throat, umbilical, and rectal swabs before starting antibiotics. In addition, endotracheal secretions from babies requiring assisted ventilation were routinely cultured three times a week.

Blood cultures were performed using brain heart infusion broth with and without sodium thioglycolate (Gibco Ltd) with routine subculture to chocolate agar after 48 hours and five days' incubation at 37°C. *Haemophilus spp* were initially identified by their growth and morphology on chocolate agar

after primary culture or following enrichment in cooked meat medium. Strains were speciated and biotyped according to the method of Kilian using laboratory prepared media.³ Slide agglutination was used to attempt to serotype the strains using type specific antisera prepared by the Public Health Laboratory Service (type b) and Wellcome (types a, c, d, e, and f).

Antibiotic sensitivities were performed and interpreted using the comparative method.⁴ To prepare the inoculum six isolated colonies were touched and added to 2.5 ml of 1% tryptone water (Oxoid). *H influenzae* NCTC 11931 was used as the control organism. The test medium was Isosensitest (Oxoid) with 5% saponin lysed horse blood (Tissue Culture Services) and 10 mg/ml β nicotinamide adenine dinucleotide grade III (Sigma). Incubation was performed at 37°C in a 5% carbon dioxide incubator. Disc contents (measured in μ g) were ampicillin 2, cefuroxime 30, gentamicin 10, netilmicin 30, neomycin 10, trimethoprim 1.25, chloramphenicol 10 (Oxoid) and polymyxin B 250 units (Mast Laboratories Limited). The presence of β lactamase was detected with Intralactam strips (Mast Laboratories Limited).

Results

Throughout the study there were 12 910 live births in the hospital. The characteristics of the nine babies with *Haemophilus* are shown in the table. All neonates were born by spontaneous vertex delivery, except cases 1 and 9 who were delivered by caesarean section. Cases 1 and 2 grew *H influenzae* and *H parainfluenzae*, respectively, from respiratory secretions at 3 weeks of age. These were probably nosocomial infections as the two babies were not