Neonatal Abstinence Syndrome

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Abstract

A 12 month review of infants admitted with neonatal abstinence syndrome to a neonatal intensive care unit was undertaken. The relationship of maternal drug abuse to symptoms, the effectiveness of pharmacologic agents in controlling symptoms and the length of inpatient stay were investigated.

A retrospective review of maternal and infant records was performed. Those infants with a serial Finnegan score greater than 8 were treated. Pharmacologic treatment was oral morphine sulphate (0.2mg 4-6 hourly), phenobarbitone (3-7mgs/kg/day), or combination of the above.

43 infants were admitted to the hospital during the year. The average maternal age was 24.6 years, (18-34 years). Drug use volunteered by the mothers was methadone alone in 6 cases, methadone and benzodiazepines in 14, methadone and heroin and benzodiazepines in 7, methadone and heroin in 10, heroin alone in 2, and other multiple drug use including oral morphine sulphate, dothiepin and cannabis in 4. Average gestational age was 40.3 (35-42 weeks). The average birthweight was 2.81 kgs (1.89-3.91 kgs). Time to onset of withdrawal symptoms was 2.8 <1-13) days. The duration of pharmacologic treatment (oral morphine sulphate and/or phenobarbitone) was 21.8 (1-62) days. The total hospital stay for the 43 infants was 1,011 days.

This study confirms that polydrug abuse is the commonest type of drug abuse in Dublin, The duration of withdrawal symptoms is loosely related to drug type. but increasing duration of symptoms is noted for infants exposed to benzodiazepines. Our experience would favour the use of morphine sulphate to treat pure opiate withdrawal symptoms. Over the 12-month period, there was an average occupancy of 3 beds per day in the paediatric department.

Introduction

A newborn infant born to a mother dependent on opiates may develop signs of drug withdrawal, the Neonatal Abstinence Syndrome (N.A.S.)[1]. This study was prompted by the large increase in the number of infants born to drug addicted mothers admitted to the paediatric unit at the Rotunda Hospital. The extent of drug abuse in Ireland is difficult to quantify accurately[2]; it is an illegal activity and therefore it is difficult to obtain accurate prevalence rates. Criminal detection statistics and numbers presenting at drug treatment centres are the best sources of data.

Continuing audit is important to document the changing drug habits of addicted mothers, and the implications of the ensuing workload on limited hospital resources.

Methods

A retrospective review of all infants admitted with NAS from 1st January to 31st December 1996 was performed. Those infants with mild withdrawal symptoms not requiring pharmacologic intervention were excluded. All babies were monitored clinically and symptoms were recorded objectively using the Finnegan Drug Withdrawal Score[3]. The decision to start pharmacology; treatment for N.A.S, was made by the paediatric registrar on duty based on the Finnegan score[1]. If scores were <8 for 3 days, maintenance dose was reduced by 10-15% per day. Pharmacologic

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treatment was discontinued when the infants clinical condition was stable on daily dosing of medicine.

Data collected included maternal age, drugs abused, gestation, birth weight, duration of N.A.S, and agents used to control withdrawal symptoms. The duration of N.A.S. was defined as the period for which phenobarbitone and/or oral morphine sulphate were required to control withdrawal symptoms.

Results

During the one year period reviewed. 43 newborn infants with NAS were admitted to the Paediatric Department. A further 7 infants did not require admission nor pharmacologic intervention and these were excluded from the review.

The average maternal age was 24.6 (18 to 34 years). Table I shows the drug use volunteered by the 43 mothers. The most common drug used was methadone. No distinction was made between smoking or injecting of heroin. The drugs abused in the "multiple" group include oral morphine sulphate, cannabis, dothiepin, Prothiaden® and diazepam.

The average gestation of infants admitted was 40.3 (35-42 weeks)

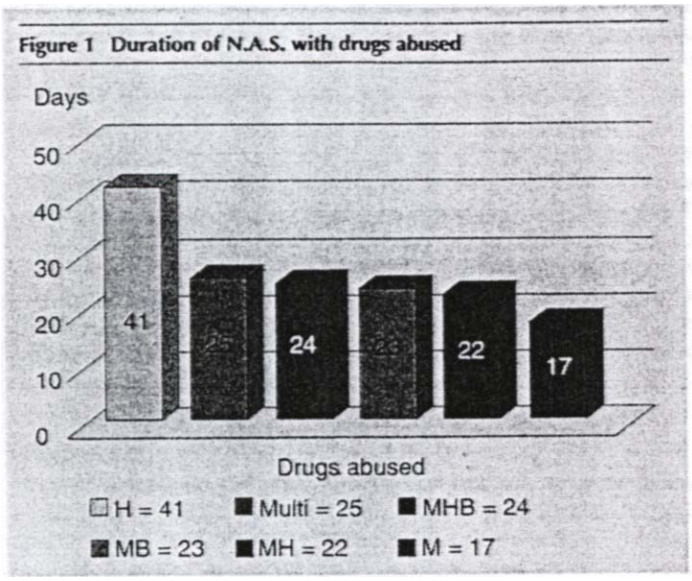
Table 1 Maternal Drug Use	
Drug used:	
Methadone	6
Heroin	2
Methadone + Heroin	10
Methadone + Benzodiazepines	14
Methadone + Heroin + Benzodiazepines	7
Multiple	4
	n = 43

with a mean birth weight of 2.81 (1.89-3.91 kgs). The birthweights of 11 of the infants were less than 2.5 kg and 15 weighed less than the 10th percentile for gestation. The average weight loss during the admission was 7.2% of the birth weight (1.2%-16%). Infants at discharge were 10% above their birth weight on average (0.34%). The mean time to onset of withdrawal symptoms was 2.8 (1 to 13) days; one baby was admitted on day 13 with irritability, jitteriness and poor feeding. The mean duration of N.A.S. was 21.8 (1-62) days. Table 2 illustrates the duration of the N.A.S. More than 50% of babies stayed for 15 to 28 days, while one stayed for a total of 62 days.

Table 2 Duration of N.A.S.; length on pharmacologic treatment.		
	No.	**%**
7 – 14	9	21
15 – 28	26	60
29 – 42	4	9
43 – 56	3	7
>56 days	1	2
Total	43	

Figure 1 shows the duration of N.A.S. in relation to the drugs abused. Infants stayed seven days longer in the benzodiazepine group compared to those taking methadone alone, the latter required least pharmacological support. Agents used to treat N.A.S. included a loading dose of phenobarbitone (10-20mg/kg/day) and a maintenance dose titrated using the Finnegan score. During the second six month period oral morphine sulphate (0.2mg four hourly initially and then

gradually reducing) was given to infants of mothers taking opiates only. The average duration of therapy was 26 days in the first six months, decreasing to 17.5 in the second six months with the



introduction of oral morphine sulphate. Six infants required both phenobarbitone and oral morphine sulphate. The average duration of N.A.S. in this group was 16 days. The total inpatient stay for the study group was 1011 days. This approximates to almost 3 hospital bed-years or 3 bed spaces occupied continuously over a one year period.

Discussion

Polydrug abuse is prevalent in the Dublin population studied here. Preliminary figures for 1995 show that the total number of cases presenting for drug treatment in the greater Dublin area was 3,593,[2] Estimates suggest there are 8,000 heroin addicts in Dublin, 2.500 of who are willing to go on methadone programmes. The 15 to 24 years age group account for 64% of the total number receiving treatment[2]. The Ministerial Report published in October 1996 on measures to reduce the demand for drugs in Dublin, observed a 20% increase in 1995 in those attending for drug treatment compared to 1994.

Perinatal mortality in the pregnant drug abusing population is increased, mainly because of an increase in delivery of low birth weight infants.[4] The largest reported experience in managing babies comes from the United States. There are marked differences in Ireland in the drugs abused, in the abusers lifestyles and in the social supports available. The prevalence of cocaine abuse in the pregnant population ranges from 6 to 27%, Bosio et al detected one case of cocaine abuse in 504 antenatal patients[5].

Increasing drug abuse is a worldwide phenomenon[6]. A quarter of drug abusers are female, almost all of child bearing age[2]. As N.A.S. is associated with intra uterine growth retardation, placental insufficiency and foetal distress, its effect on long term foetal outcome is unclear. A further compounding factor effecting follow up studies are poor social circumstances. The social work department monitors the mothers through the antenatal period, arranges weekly interviews during the abstinence period and sees the parents fortnightly during the initial discharge period. In our study most infants were discharged home with their mothers, almost always after a case

conference was held.

Infants of drug abusers have an increased risk of sudden infant death[6], developmental delay and poor school performance[7]. At 18 months only 81% in one study were living with their parents, highlighting the broader social implications[8]. Most reviews note an increase in neurologic abnormalities, e.g. muscle tone discrepancies, articulation disorders, as well as weak visual, motor and perceptual skills. Lower Bayley developmental scores[9] have been attributed to lack of stimulation and genetic factors, as well as drug effects. Infants of women abusing opiates during pregnancy appear to have attachment difficulties e.g. behavioural problems, inattention. disorganisation and distractibility, and are ultimately at risk of child abuse and neglect[12]. However a recent study showed no significant difference in development of children born to drug abusing mothers[8]. These young mothers may go on to a further pregnancy and should be educated about the risks of drug abuse. In our study Hepatitis C serology was available on 32 mothers. 21 of these mothers (65.6%) were positive for hepatitis C. Two mothers had evidence of HIV and one of Hepatitis B infection. All of these infants were protected by maternal antibody as none to date have evidence of HIV/Hepatitis C infection. The infants were not routinely immunised against Hepatitis B. Preventive measures should include school education programmes, health promotion strategies and treatment services[10]. A collaborative community health, obstetric and paediatric approach should heighten awareness of attendant risks and reduce the incidence, severity and duration of N.A.S.

A retrospective study relies on accurate history taking and urinalysis. A recent Irish study of chemical substance abuse in an obstetric population found that none of the women found positive on urinalysis had been identified on history alone.[5] Moreover, single urinalysis screening is of limited value and serial screening of high-risk mothers should improve identification. Toxicologic screening of urine was not performed routinely in this group. N.A.S. typically presents within four days of delivery but may be present at birth[11]. Symptoms may not however appear until much later[11] as seen in our study. Shaw et al in Liverpool advocate discharge after three days if no major signs of withdrawal are observed[1]. In the present study the shortest withdrawal periods were seen in infants exposed to methadone only and the longest stay occurred with heroin. This contrasts with other studies[12]. This surely reflects two ends of the spectrum from compliance with a methadone programme through to the worst scenario of abusing street drugs. Maternal methadone doses of less than 20mg daily are associated with mild withdrawal symptoms and this is a therapeutic aim in many drug addiction centres[6]. Infants stayed longer in the benzodiazepine groups[13] compared to those taking methadone alone, underlining the unsuitability of these drugs for the pregnant addict.

Treatment of the neonate should be primarily supportive as unjustified pharmacologic administration will prolong hospitalisation[11]. Supportive care includes swaddling to decrease sensory stimulation, frequent small feeds, high calorie low birth weight formula feeds, and observation of sleeping habits, temperature, weight gain or loss, and change in symptomatology which might suggest another diagnosis, e.g. sepsis. Nursing care and other activities should be organised to allow uninterrupted rest periods. Pacifiers for non-nutritive sucking are beneficial. Suppression of the centrally excited noradrenergic cells can be achieved with morphine or phenobarbitone, the objective being to control withdrawal signs with avoidance of side-effects, Phenobarbitone, however, by virtue of its long acting nature may depress sucking behaviour. In order to achieve equivalent receptor mediated cell suppression and a more gradual withdrawal, infants exposed to maternal heroin or methadone should receive an opiate such as oral morphine sulphate. The targeting of pure opiate withdrawal with oral morphine sulphate in this study reduced hospital stay. The infants were seen weekly at a consultant clinic in the initial discharge period and monthly thereafter.

An additional £9 million was made available in 1996 for the management of drug addiction in the community, a clear acknowledgement of the problem. There are concomitant implications for the neonatal and maternity services: over the 12 month period studied, 8.3% of the total bed occupancy and 3.5% of all paediatric admissions were occasioned by N.A.S. at the Rotunda Hospital. Staffing and resources need to be increased, if the needs of the most vulnerable victims of drug abuse are to be met.

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