

NEONATAL ABSTINENCE SYNDROME - CASE REPORT

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Neonatal abstinence syndrome (NAS) refers to the constellation of signs and symptoms exhibited by a newborn of drug-abusing mother. NAS is multisystemic disorder, most frequently involving central nervous and gastrointestinal systems with irritability, high-pitched cry, hyperactive reflexes, increased muscle tone, tremors, generalized convulsions, feeding and sleeping disorders, tachycardia, tachypnea, apnea, termolability and sweating, frequent hiccups, yawning and sneezing, vomiting, diarrhea and dehydration.

Intrauterine narcotic disposition can give some other adverse effects beside NAS: fetal distress, premature birth, intrauterine growth retardation, microcephaly, increased incidence of congenital anomalies (cardiac and genitourinary anomalies, cleft palate, biliar atresia). Significantly increased risks of sudden infant's death syndrome (SIDS), abnormalities in neurocognitive and behavioral development and deficiency in motor functions have also been noticed after the long-term surveys of these children.

This paper is a case report of a newborn with developed clinical signs of NAS, but it also discusses diagnostics and management of such cases *Acta Medica Medianae* 2008;47(1):55-59.

Key words: neonatal abstinence syndrome, newborn, drug abuse, convulsions, tremor

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Introduction

Neonatal abstinence syndrome (NAS) refers to the constellation of signs and symptoms exhibited by newborn of drug-abusing mother (1). Practically, every drug used during pregnancy can transfer across the placenta and accumulate in the fetus and amniotic fluid (2). Most of these substances either bind to various central nervous system (CNS) receptors or affect the release and reuptake of various neurotransmitters (2), so the fetus too can develop drug dependence. At delivery, transplacental drug transfer ceases while neonatal drug metabolism and excretion continue, leading to drug disappearance and, consequently, manifestations of neonatal "withdrawal" or "abstinence" (3). Incidence of NAS is directly proportional to number of drug abusers in the overall population, and that number is constantly increasing in modern society. At least, one quarter of drug abusers are women, almost all in fertile age (4). Based on the National

Survey on Drug Use and Health in the United States in 2003, the prevalence of illicit drug use among Americans is 8.2%, and, among pregnant females aged 15-44 years, the prevalence is 4,3%. Marijuana is the most common illicit drug used (1). According to Europe Agency for Reconstruction survey about drug abuse, there is approximately 100000 drug-abusers in Serbia, and almost 11% of Serbian population have tried at least once some of the illicit narcotics, most frequently marijuana. NAS occurs in 60% of all fetuses exposed to drugs (5), that is in 55-94% cases of newborns prenatally exposed to opiates or heroin (6). The incidence of NAS is hard to obtain because of very unreliable data of prenatal drug exposure and limited diagnostic tools.

The aim of this paper was to point out diagnostic procedures and management of abstinence syndrome in newborns.

Case report

A boy suffering from NAS was born at the Clinic of Gynecology and Obstetrics in Novi Sad in January 2, 2006. According to anamnesis data obtained from the boy's mother, it was her first pregnancy, regularly controlled. The mother was on oral Fe medication because of anemia. Trough whole pregnancy, she smoked a pack of cigarettes per day. Her gynecologist advised her to

perform HIV and hepatitis test, which both were negative. Two days before delivery, the mother consumed marijuana; on questions about previous drug abuse, or other substances and alcohol, besides marijuana, she gave negative answers. Mother was born in 1978, finished high school, worked as croupier in local casino until she had found out about her pregnancy. She lived with the boy's father, but they were not married.

Data obtained from the boy's father pointed to regular intravenous narcotic abuse by boy's father and mother's sister; they also claimed that the boy's mother was drug abuser, too.

The delivery was preterm, in 36 4/7 gestational weeks, started with labor pains. Amniotomy was performed, with green meconial amniotic fluid. The child's Apgar score was 10/10, birth weight 2920 g, birth length 46 cm, head circumference 34 cm (eutrophic parameters). In the first 5 days, the newborn was treated in the Nursery Ward in the Clinic of Gynecology and Obstetrics, than transported to our Institute with the following diagnosis: Neonatus praetemporarius masculinus eutrophicus. Fetal distress. Respiratorius distress. Iritabilitate cerebri. Fractura claviculae.

On admittance, the newborn was 5 days old, rectal temperature 37,7°C, with icteric skin with few petechiae in abdominal region. Slightly lower, skin turgor. Excessive cry, periodically high pitched. Severe tremor after tactil stimulation, mild spontaneous tremor. Occasionally, the presence of slurping movement. Tachypnea - respirations 68/min. Increased axial and segment muscle tone, as well as Moro reflex. All these findings were present with phenobarbital treatment, started in the Clinic of Gynecology and Obstetrics.

The infant was placed in a separate darkened room. Feedings every 2-3 hours, adapted premature infants formula; meals well tolerated.

Because of the presence of clinical findings consistent with NAS, drug treatment with Phenobarbital proceeded in the same dosage (20 mg/kg); repeated everyday scoring using the modified version of a scale developed by Finnegan was performed. On the first day of admittance, the score was between 12 and 15, with gradual decreasing during the following days. The signs of hyperreactivity of central nervous system dominated in clinical findings, with practically normal gastrointestinal functions. Parallel with withdrawal of signs of NAS, the Phenobarbital therapy was gradually reduced until discontinuation. There was no clinical aggravation during the period of reducing Phenobarbital, as well as 48 hours after Phenobarbital discontinuation. In the last couple of days of hospital stay, all infant's discomforts were completely withdrawn.

Appropriate laboratory and microbiology tests showed no presence of hypoglycemia, hypocalcemia, neonatal sepsis. HIV and hepatitis tests were negative.

Mother was not with the infant during intrahospital management, but regularly visited her child.

Discussion

Drugs most often connected with NAS are opiates, cocaine and his derivatives, amphetamine (speed) and alcohol (7). Drugs frequently associated with neonatal problems include also the following: barbiturates, caffeine, chlorthalidone, diazepam and lorazepam, diphenhydramine, marijuana, phencyclidine. Neonatal nicotine abstinence syndrome is also described (8,9). Maternal polydrug use has been reported to result in more frequent and more severe neonatal withdrawal signs than single drug use (3). Besides drugs themselves, lifestyle and behavioral habits of drug-abusing women have also adverse effects on pregnancy outcome: sexual transmitted diseases, malnutrition, poor prenatal care (10).

Although the full spectrum of physical damage that drugs of abuse can cause is not documentable, one thing is certain: the effect of maternal drug use on fetal brain development is the most critical and most studied effect. Continuous abuse, especially during the first half of gestation, is likely to disrupt the complicated neural wiring and associative connections that allow the developing brain to learn and mature (5).

Intrauterine narcotic disposure can give some other adverse effects beside NAS: fetal distress, premature birth, intrauterine growth retardation, microcephaly, increased incidence of congenital anomalies (cardiac and genitourinary anomalies, cleft palate, biliar atresia).

Manifestations of NAS depend on various factors, including the drug used, its dose, frequency of use, infant's last intrauterine drug exposure and mother's and the infant's own metabolism and excretion of the active compound or compounds (1). The onset of narcotic withdrawal, is frequently during the first 48 to 72 hours, but may be delayed as late as 4 weeks. Subacute signs of narcotic drug withdrawal may last up to 6 months. (6). NAS is multisystemic disorder, most frequently involving central nervous and gastrointestinal system with irritability, high-pitched cry, hyperactive reflexes, increased muscle tone, tremors, generalized convulsions, feeding and sleeping disorders, tachycardia, tachypnea, apnea, termolability and sweating, increased hiccups, yawning and sneezing, vomiting, diarrhea and dehydration.

Intrauterine cocaine exposure has also been associated with an increased risk of necrotizing enterocolitis and central nervous system stroke or hemorrhage (11).

Long-term follow-up of intrauterine drug - exposure is not easy to estimate having in mind the potential for difficult social situations, such as increased risk for child abuse and neglect (11,16). Nevertheless, significantly increased risk of sudden infant's death syndrome (SIDS) (1,11), abnormalities in neurocognitive and behavioral development (11,17) and deficiency in motor functions (16) have

been confirmed in these children by several studies. In a small study, developmental scores on the mental index on the Bayley Scales of Infant Development were not affected by severity of withdrawal or the treatment chosen (6).

Diagnosis of NAS is not easy to obtain. Maternal history of drug use is often unreliable. Few studies showed that 24–63% of mothers with positive cocaine tests deny cocaine use (11). Even if the mother does admit to substance abuse, the accuracy of the recall about frequency of use, range of drugs used including alcohol and nicotine, is often poor. Clinical diagnosis is complicated by the fact that some drug-exposed infants do not have immediate or specifically recognizable symptoms in the newborn period. Differentiating neonatal signs of drug withdrawal from irritability of the CNS resulting from infectious or metabolic disorders, such as hypoglycemia and hypocalcemia, may be difficult; no clinical signs should be attributed solely to drug withdrawal without appropriate assessment and diagnostic tests to rule out other causes (6). So, the foundation of NAS diagnosis is a combination of maternal history, newborn clinical symptoms, and laboratory toxicological testing of the mother and newborn (11).

Indicators of increased risk for intrauterine drug exposure of a newborn are (6,11):

1. Maternal characteristics: history of drug abuse in present or previous pregnancies, history of drug – abusing partner, homelessness, severe mood swings, previous unexplained fetal demise, cerebrovascular accidents, no or poor prenatal care, history of hepatitis B, AIDS, syphilis, gonorrhea, prostitution, precipitous labor, abruptio placentae, unexplained preterm labor.
2. Infant characteristics: prematurity, unexplained intrauterine growth retardation, neurobehavioral abnormalities, atypical vascular incidents, such as cerebrovascular accidents and necrotizing enterocolitis in otherwise healthy full-term infants, unexplained convulsions or apnea, signs and symptoms that correlate with NAS (hypertonia, irritability, convulsions, tremors, muscular rigidity, diarrhea).

In case of strong suspicion of NAS, consider toxic screening:

1. Urine screening of the newborn – most widely used; will have a high a false-negative rate because only results for infants with recent exposure will be positive (6).
2. Meconium drug testing – although not conclusive if results are negative, is more likely to identify infants of drug-abusing mothers than is infant urine testing (6); more expensive and less available testing (1)
3. Hair analyses – expensive method available only in largest centers; drug metabolites can be detected in infant hair for 2-3 months after birth (1), but recent exposure can be missed because of slow hair growth.

If the mother is an intravenous drug abuser, screen for HIV, hepatitis B and C, Chlamydia, syphilis, and gonorrhea (1,5).

Social services should be alarmed because of many legal – social issues of this situation (11).

Treatment of a newborn suffering from NAS consists of:

1. Supportive care,
2. Drug treatment.

The best and most widely used scale to evaluate the neonate for NAS is the modified version of a scale developed by Finnegan, which we also used in our case. Using 16 items, it allows a semiquantitative measure of the degree to which the newborn is experiencing symptoms of withdrawal. This scale can also be used to assess the resolution of signs and symptoms after initiating treatment (1). An infant of a drug – abusing mother should be scored 2 hours after birth or even earlier, if there is evidence of NAS signs, and measurements should be performed every 2-4 hours (1/2–1 hour after feeding) (2,5). In the case of finding three consecutive scorings equal to or greater than 8, drug treatment for withdrawal is indicated (1,2,5).

Initial treatment of the neonate experiencing drug withdrawal should be primarily supportive, because pharmacologic therapy subject the infant to exposure to drugs and may prolong hospitalization (6). Supportive care includes residence in darkened room to decrease sensory stimulation and irritability, frequent small feedings of hypercaloric formula to supply the additional caloric requirements, and observation of sleeping habits, temperature stability, weight gain or loss, or change in clinical status that might suggest another disease process (4,6). Gentle swaddling with positioning that encourages flexion and prevention of excessive crying with a pacifier is advisable (2). Supportive care in the form of intravenous fluids and replacement electrolytes may be necessary to stabilize the infant's condition in the acute phase without the need for pharmacologic intervention. The clinical signs of many infants who manifest drug withdrawal may be treated in this manner (6).

As was previously stressed, if supportive care alone can't lower clinical scores in three consecutive scorings under 8, a drug treatment is indicated. Pharmacologic therapy of withdrawal-associated seizures is indicated; other causes of neonatal seizures must be evaluated as well. Vomiting, diarrhea, or both, associated with dehydration and poor weight gain, in the absence of other diagnoses, are relative indications for treatment, even in the absence of high total withdrawal scores (6). Most widely used are morphine preparates (paregoric, tincture of opium) and Phenobarbital, less often chlorpromazine, clonidine, diazepam (2). Combination therapy is sometime applied – morphine and Phenobarbital, especially when poly-drug and alcohol use are suspected. The general aim of treatment is to allow sleep and feeding patterns to be as close to normal as possible, without oversedation of the newborn (2). Naloxone administration is an absolute contraindication in the resuscitation of a neonate born to a mother who used narcotics; use of naloxone, especially if respi-

ratory depression exists, leads to abrupt withdrawal (1,2,3,4,5,6).

Advise breastfeeding, because it confers, among other benefits to the neonate, bonding benefits essential to the mother who is drug dependent. Breastfeeding is contraindicated if the mother is still using illicit drugs or has infections such as HIV or hepatitis (1).

Conclusion

It is presumable for neonatal abstinence syndrome to become more frequent neonatologist's

problem, since narcotic abuse in modern society is steadily increasing.

Diagnosis of NAS is not easy to establish; it is necessary to have that possibility in mind, to be able to gather and estimate all relevant data and clinical and laboratory findings. Management of NAS should be led by clinical signs and symptoms, and supportive care is the basic treatment. Any newborn that has been exposed to drugs is considered at risk for developmental and cognitive compromises; therefore, these children should have regular long-term follow-up to quickly identify the potential deficits.

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APSTINENCIJALNI SINDROM NOVOROĐENČETA – PRIKAZ BOLESNIKA

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Apstinencijalni sindrom novorođenčeta (neonatal abstinence syndrome – NAS) predstavlja skup simptoma i znakova koje ispoljava novorođenče majke – narkotičnog zavisnika. NAS je multisistemska poremećaj, koji najčešće uključuje centralni nervni i gastrointestinalni sistem, sa pojavom iritabilnosti, plaćem visokog tonaliteta, hiperaktivnim refleksima, povišenim mišićnim tonusom, tremorom, konvulzijama, poremećajima hranjenja i spavanja, tahikardije, tahipneje, apneje, termolabilnosti i znojenja, učestalog štucanja, zevanja i kivanja, dijareje, povraćanja i dehidracije.

Osim NAS, narkotici mogu dati i druge vidove oštećenja ploda: fetalni distres, pre-vremeno rođenje, intrauterini zastoj rasta, mikrocefaliju, povećanu incidencu kongenitalnih anomalija (srčane mane, genitourinarne anomalije, rascep nepca, bilijarna atrezija).

Takođe je utvrđen signifikantno veći rizik od sindroma iznenadne smrti odojčeta (SIDS), abnormalnog neurokognitivnog i bihevioralnog razvoja kao i deficijentnog motornog razvoja u ovoj subpopulaciji dece.

U radu je prikazan slučaj novorođenčeta sa izraženim simptomima i znacima NAS, te diskusija o dijagnostikovanju i zbrinjavanju ovakve novorođenčadi. *Acta Medica Medianae* 2008;47(1):55-59.

Ključne reči: apstinencijalni sindrom novorođenčeta, novorođenče, zloupotreba narkotika, konvulzije, tremor