Effects and Treatment of Neonatal Abstinence Syndrome

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Abstract

Prenatal exposure to illicit drugs adversely affects the developing fetus, according to recent studies. The placenta once was believed to provide a protective barrier; however, studies have revealed that some substances can cross that barrier, causing withdrawal symptoms in the infant post partum. The Center for Disease Control and Prevention identified a rapid increase in opioid use during pregnancy, with some states in the US having over 33 cases in 1000 births (CDC.gov, 2017). According to the National Institute of Drug Abuse, every 25 minutes, a baby is born experiencing postnatal opioid withdrawal (NIDA, 2015). Neonatal Abstinence Syndrome (NAS) is the term for the difficulties an infant experiences when withdrawing from exposure to narcotics. The term narcotics refers to opium, opium derivatives and related synthetic substances. The more current term for narcotics is "opioids" (DEA, 2019). Infants exposed to opioids in utero have a 50-80% chance of developing neonatal withdrawal and thus a chance of developing NAS. (Heller, 2017). This entry is an overview of the effects of prenatal drug exposure on the developing fetus and the different forms of treatment.

The Rise of NAS

There are two major types of NAS, one being the more recognized type, due to prenatal maternal use of substances, including morphine, codeine, heroine, and oxycodone, and the other due to an abrupt discontinuation of analgesia (morphine) used as post-procedure pain management or sedation for the infant. Drug use among pregnant women is on the rise, with a 433% increase since 2004 (Nelson, 2016). National statistics indicate that illicit drug use among all teenagers is 18.3% and drug use among pregnant teenage women is 9.0% (Nelson, 2016). Chronic use of opioids is associated with tolerance, which leads to dependence, which can cause withdrawal symptoms in for the user when there is an absence of the drug (Maguire, 2013).

Opioids in the Bloodstream

The placenta is a disc-shaped organ, which provides the sole link between the mother and the developing fetus. The placenta is responsible for the transfer of oxygen and carbon dioxide to and from the fetus. Nutrients, such as glucose, amino acids, electrolytes, water and other viable substances, easily cross the placenta to nourish the developing fetus. Opioids, too, readily cross the placenta in significant amounts (Griffiths & Campbell, 2015). Morphine and Fentanyl most easily cross the placenta because they are soluble and easily bind to proteins that cross the placenta rapidly. This rapid crossing of harmful substances through the placenta can adversely affect the fetus with differing levels of severity.

Results From Studies

Symptoms of NAS

- High-pitched inconsolable crying
- Gastro-intestinal distress
- Seizures and Tremors
- Feeding Difficulties
- Sleeping Difficulties
- Excessive Sucking
- Irritability and Jitteriness

(Heller, 2017, Bandstra et al., 2014)

Female infants more likely to exhibit significant gastro-intestinal distress and sleep disturbances

Male infants more likely to exhibit significantly greater hyperactive Moro reflex when startled

Female infants had less total Methadone administered during trial period.

Male infants spent more time in NICU (Stevens et al., 2018)

Effects of NAS Later in Life

- 25% more likely to be diagnosed with ADHD, intellectual disabilities, communication disorders, and Autism spectrum disorders

(Nygaard et al., 2016, Carrico, 2019)

Treatment of NAS:

Non-Pharmacological

- Dim lighting
- Soft music
- Swaddling
- Rocking
- Motivational Interviewing

Pharmacological

- Methadone – "Gold Standard" (Administered to mother during pregnancy or directly to infant post-partum)
- Buprenorphine – "The Alternative"

Methadone is used in more than 80% of infants who require treatment for NAS (Kraft, 2017)

Buprenorphine-treated infants required 89% less morphine to treat withdrawal symptoms. (Coyle et al., 2012)

Methadone-treated infants required more comfort care measures to reduce stress and excitability. (Coyle et al., 2012)

Buprenorphine-treated infants spent, on average 43% less time in the hospital post partum. (Coyle et al., 2012)

Discussion

There is little research available for specific treatment of children prenatally exposed to drugs as they age, but a wealth of research available for treatment for the infant with NAS as well as the developing fetus prenatally. It is important for research on the subject to increase in order to gain more information about effective treatment options. There has not yet been a form of pharmacological treatment found to extinguish NAS symptoms completely, as any drug exposure to the developing fetus has been found to have adverse effects both post partum and long-term. More research is warranted on this topic in order to create alternative methods of treatment and increase prevention measures in the future.

Conclusions

Prenatal exposure to illicit drugs has been found to have adverse effects on a developing fetus, and the use of these drugs continues to rise. With maternal drug use on the rise, it is expected that the incidence of Neonatal Abstinence Syndrome will exponentially increase with it (Beckwith & Burke, 2014). NAS in infants is caused by mothers' use of illicit drugs, specifically opioids, during pregnancy. Due to the absence of drugs after the infant is born, symptoms of withdrawal include high-pitched, inconsolable crying, gastro intestinal distress, seizures, tremors, feeding difficulties, sleeping difficulties, poor sucking reflexes, excessive sucking, irritability, jitteriness, sweating, and sneezing (Heller, 2017, Bandstra et al., 2014).

There are non-pharmacological treatment methods that are administered first, followed by pharmacological methods if necessary. Additional research is warranted for alternative treatment methods and the long-term effects of prenatal drug exposure. However, some known possible long-term effects of NAS are intellectual disabilities, communication disorders, autism spectrum disorders, learning disabilities, specific learning disorders, and attention-deficit/hyperactivity disorder (Sandorv et al, 2018). It is important for researchers to conduct more studies on NAS, as opioid use and the amount of prenatally exposed infants are on the rise. The more information learned about the symptoms and long-term effects of NAS, the more research can be conducted to find the best forms of treatment. This entry has served as an overview of symptoms of prenatal exposure to a variety of drugs and the current treatment methods available for mothers and infant.

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