Neonatal Abstinence Syndrome

Neonatal abstinence syndrome (NAS) is a medical condition that primarily affects central and peripheral parts of the nervous system and gastrointestinal tract. This syndrome refers to a constellation of symptoms caused by the withdrawal of a particular substance that the neonate's mother consumed during pregnancy. Opioids are a particularly common cause of NAS. Common clinical manifestations include diarrhea, irritability, sneezing, tremor, increased Moro reflex, and tachypnea. Maternal screening is key to prevention. Nonpharmacologic therapy is targeted at alleviating symptoms and prevention of complications. Opioids may be used for refractory cases.

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Pathogenesis

Maternal Substance Abuse

Pregnant-woman-drug bottle Substance-abuse mark

Neonatal abstinence syndrome (NAS) is a neurobehavioral disorder in neonates born to mothers with substance use and abuse during pregnancy, most commonly secondary to opioid use. The exact pathophysiology of neonatal abstinence syndrome is incompletely understood, but genetic susceptibility, maternal-fetal-placental pharmacokinetics, changes in receptor sensitivity, and neurotransmitter dysregulation seem to play roles.

Withdrawal Symptoms in Neonate

Neon-natal Baby Withdrawal from ATM

Neonatal abstinence syndrome is characterized by withdrawal symptoms after birth when the exposure to the substance is terminated. Withdrawal symptoms include hyperirritability, cholinergic symptoms (e.g., diarrhea, sneezing), tachypnea, and termors.

Clinical Manifestations

Diarrhea

Toilet

Opioids cause constipation by binding to opioid receptors in the gastrointestinal tract resulting in decreased bowel motility through direct and indirect (anticholinergic) mechanisms. Withdrawal from the effects of the opioids leads to the elevation of acetylcholine levels, which causes cholinergic effects (e.g., diarrhea, sneezing) in neonates with neonatal abstinence syndrome.

Irritability

Irritated

A lack of opioids leads to decreased dopamine release, decreased serotonin release, and increased norepinephrine release. These changes in neurotransmitters result in hyperirritability. It is hypothesized that decreased dopamine plays a major role in the development of hyperirritability in patients with neonatal abstinence syndrome.

Sneezing

Sneezing

Neonatal abstinence syndrome is associated with increased acetylcholine levels, which leads to cholinergic symptoms such as sneezing.

Tremor

Weed trimmer

Tremor is a common manifestation of neonatal abstinence syndrome and is likely related to changes in the neurotransmitter levels (e.g., increased norepinephrine, acetylcholine).

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Increased Moro Reflex

Moro-monster Up-arrow

The Moro reflex is an infantile reflex characterized by involuntary abduction of the arms followed by involuntary adduction of the arms and crying in response to a rapid lowering of the infant. An exaggerated Moro reflex is characterized by a hyperactive response with excessive abduction at the shoulder and extension at the elbow. Neurotransmitter changes likely contribute to this.

Tachypnea

Tac-P-lungs

Cholinergic symptoms (e.g., congestion), irritability, crying, and withdrawal from opioids (which normally decrease respiratory rate) lead to tachypnea, which is defined by abnormally increased breathing.

Management

Maternal Screening

Screen-door Pregnant-woman

Maternal screening for substance use and early screening of newborns who are at risk is the key to the prevention and effective management of this condition.

Nonpharmacologic Therapy

Nun-pharmacological

Nonpharmacologic therapy is mainly targeted at alleviating symptoms and preventing complications. Gentle vertical rocking and caring in a quiet room is used for neonates with hyperirritability. Positioning and swaddling can be used to prevent motor hyperactivity in neonates with tremors.

Opioids

Poppy-droid

Opioids can be used for the treatment of neonatal abstinence syndrome if symptoms are severe (e.g., severe irritability, severe diarrhea). Oral morphine sulfate is the preferred medication.

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