ANALGESIA WITH INTRANASAL (IN) MORPHINE IN A NEONATE UNDERGOING MINOR PROCEDURES

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Introduction: Historically, procedural pain in pediatrics has been under-treated and under-recognized. Research has shown that neonates are able to differentiate levels of pain intensity and preterm neonates may have increased sensitivity to pain. The immediate consequences of untreated neonatal pain range from increased HR, raised BP, changes in autonomic tone, drop in arterial oxygen saturation and reduced skin blood flow. Greater than expected pain responses at 4-6 months of age were seen in infants after leaving the NICU. Larger numbers of invasive procedures is associated with more posttraumatic stress disorder and medical fears 6 months after hospital discharge. Despite all the consequences surrounding untreated neonatal procedural pain, neonates still undergo procedures without any analgesia. For example, Simons et al. noted that preemptive analgesic therapy was provided to fewer than 35% of neonates per study day, and 39.7% of neonates didn’t receive any analgesic therapy in the NICU. In general, studies have shown no relation between pain intensity ratings and the amount and type of analgesia administered.

Case Presentation: 8 week-old neonate was born at 34 weeks GA with prenatal diagnoses of omphalocele and ASD. Delivery was complicated by PPROM for 6 hours. Delivery was by C-section with Apgar scores of 71 and 75. Physical exam was remarkable for pt weight of 1465 g (10th %), and a 7 cm abdominal defect including a sac containing intestines and the liver margin. He was subsequently admitted to the NICU for further management of the omphalocele.

Hospital course was complicated by enlarging bilateral inguinal hernias and bilateral hydroceles. Reduction of hernias by general surgery was noted to cause significant discomfort in the patient. During subsequent bilateral hernia reduction, he was administered IN morphine in a dose of 0.01 mg/kg. Patient ceased crying after approximately 10 minutes with estimated effect of 1.5 hours based on neonatal infant pain scale scores. Subsequently, pt underwent bilateral inguinal hernia repair.

Discussion: Since the need remains for analgesia in neonates experiencing minor procedural pain, other methods of analgesia should be explored that are safe, fast-acting, easily administered, and cost-effective. Unfortunately, oral analgesia (the preferred route) is often inadequate due to drug choice limitations and low bioavailability. Rectal administration is difficult due to slow and highly variable onset. Rodents have been used to illustrate the transfer of morphine along the olfactory pathway to the olfactory bulbs and a ventricle in the brain. IN morphine has also been studied in the adult population primarily for relief of breakthrough pain in cancer patients. These patients require chronic pain management that is fast-acting and easily administered since breakthrough pain occurs frequently, is moderate to severe in intensity, is rapid in onset and escalates rapidly, and is relatively of brief duration.

In general the bioavailability of nasal opioids ranges from 50-70%, which is much higher than either oral or rectal administration. Nasal drug absorption is facilitated by a highly vascular epithelium, a large surface area, and avoidance of first-pass metabolism. Specifically, IN morphine has been found to have a rapid onset around 2.4 minutes. This treatment is associated with reduced pain intensity scores and high patient satisfaction. Side effects of IN morphine have been minimal and limited to minor irritation such as burning or stinging sensations, and sedation.
IN morphine use in pediatric patients has received less attention than its use in adults. Much of the research concerns diamorphine, a drug not legally available in the US. Diamorphine is highly water soluble and easily prepared at high concentrations. Furthermore, it has double the potency of morphine salts and similar onset and duration of action. In a randomized controlled trial of IN diamorphine for use on children and teenagers with clinical fractures, IN diamorphine resulted in more rapid analgesia than IM morphine. Also, the IN spray was better tolerated and more widely accepted. Furthermore, the safety profile was acceptable and no serious adverse events were noted with IN diamorphine during the study. IN morphine should be further researched in the context of pediatric procedural pain.

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