Perianesthetic Considerations for the Breastfeeding Mother

Amber Brook Smathers, MSN, CRNA, Shawn Collins, DNP, PhD, CRNA, Ian Hewer, MSN, MA, CRNA

Breastfeeding has been shown to be beneficial in the development of infants, but sometimes, the breastfeeding mother may require anesthesia. It is important for perianesthesia caregivers to understand how the breastfed infant may be affected by the anesthetic medications received by the breastfeeding mother. This article reviews current literature on drug transfer into breast milk and specifically how anesthetic drugs may affect breastfed infants. The pharmacokinetics of drug transfer during lactation is described as well as considerations for perianesthesia providers when caring for breastfeeding patients. The results of this literature review provide evidence that there is little risk to the breastfed infant after the mother receives surgical anesthesia. However, the type of drug, the dosage, the timing of treatment, and the infant's age and health must be taken into consideration.

Keywords: *breastfeeding, perianesthesia, anesthesia, breast milk, drug transfer, newborn.*

OBJECTIVES—AT THE COMPLETION of this article, perianesthesia caregivers should be able to (1) discuss the risks and benefits associated with breastfeeding after anesthesia; (2) describe the basis of drug transfer and clearance in breast milk; (3) identify acceptable perianesthesia medications for use in breastfeeding mothers; (4) describe how to develop a care plan for a nursing mother breast feeding in the perianesthesia period.

Breast milk has been proven to provide nursing infants with nutrients that are beneficial for immune protection, growth and development, and emotional well-being.[1] The American Academy of Pediatrics (AAP) recommends that infants be exclusively breast-fed for the first 6 months of life, and then, breastfeeding should continue until 12 months of age or older.[1] With research on breastfeeding supporting major health benefits to the infant, it is becoming more common for perianesthesia providers to encounter mothers who are breast-feeding.[1-5]

With little information about anesthesia for surgery in breastfeeding mothers, most recommendations in this area have been based on the pharmacologic properties of anesthetic agents and limited studies of drug levels transferred to milk.[6-9] Research on the transfer of anesthetic medications into breast milk is limited because of difficulties in recruiting nursing mothers and neonates for controlled studies.[6,10,11] As a result, much of the available drug information has been published by pharmaceutical companies and consists of legal disclaimers rather than medical-based information. The lack of reliable information on breastfeeding mothers and drug effects on their breastfed infants often leads to mothers being inappropriately

Amber Brook Smathers, MSN, CRNA, Western Carolina University; Shawn Collins, DNP, PhD, CRNA, Director, Nurse Anesthesia Program, Western Carolina University; and Ian Hewer, MSN, MA, CRNA, Assistant Director, Nurse Anesthesia Program, Western Carolina University.

Conflict of interest: None to report.

Address correspondence to Shawn Collins, Western Carolina University, 28 Schenck Parkway, Suite 300, Asheville, NC 28803; e-mail address: shawncollins@wcu.edu.

1089-9472/$36.00

http://dx.doi.org/10.1016/j.jopan.2014.09.006

advised to discontinue breastfeeding or withhold breastfeeding after surgery for up to 24 hours or more. This cautious approach is usually unnecessary as only a small proportion of medications are contraindicated in breastfeeding mothers or associated with adverse effects on their infants.[3,5,12]

The benefits of breastfeeding outweigh the risk of exposure to most therapeutic agents via human milk.[3,8,13] Ideally, research-based recommendations about medications and breastfed infants should be based on the pharmacokinetics of drugs in the maternal system, the oral bioavailability of the medication to the infant, and the infant evaluation.[14] The implications of drugs used in anesthesia in breastfeeding mothers depend on numerous factors, including the age of the infant, the stability of the infant, the length of lactation, and the ability of the infant to clear small quantities of anesthetic medications.[7,15] Current evidence suggests breastfeeding mothers of normal term or older infants undergoing anesthesia can generally begin to breastfeed as soon as their mentation returns to normal and they are awake and alert.[6]

Understanding Lactational Pharmacology

The transfer of drugs into breast milk may be illustrated by a basic pharmacokinetic model. In a single-compartment model drugs enter the plasma then equilibrate rapidly to highly perfused tissues. The drug level in the tissues is a reflection of the drug level in the plasma. Therefore, as the drug level in the plasma declines, the drug level in the tissue compartment also declines. Applying this model to the drug transfer from maternal plasma to breast milk, drugs access the milk via the arterial blood supply to the breast alveolus. The transfer of medications into the breast compartment, or breast milk, is primarily by passive diffusion of non–ionized and non–protein-bound medication from maternal plasma and is dependent on the concentration gradient.[3,16,17] The drug concentration in breast milk is determined by the concentration of drug in the maternal serum.

Several physiochemical and biological properties affect the diffusion of drugs from maternal serum to breast milk (Table 1). Medications that have short half-lives or large volumes of distribution may have brief peak levels in maternal serum and in breast milk. Highly protein-bound drugs, large molecular weight drugs, and drugs that have poor lipid-solubility pass poorly into breast milk.[3,17,19] Drugs that pass freely into the milk may also pass in the reverse direction returning back to maternal plasma, when the plasma drug concentration falls below the milk concentration. Retrograde diffusion of the drug from breast milk to plasma will eventually diminish the drug from the milk, without the mother having to empty her breasts.[20]

Table 1. Physicochemical and Biological Properties that Influence the Passage of Drugs Into Breast Milk[3,18]

- Very small molecules (< 200 Da) equilibrate rapidly between plasma and breast milk.
- Large molecules (>800 Da) such as monoclonal antibodies pass very poorly into milk after the first 3- to 5-d postpartum.
- Weak bases tend to concentrate in breast milk and the passage of weak acids is inhibited because milk is slightly acidic with respect to plasma.
- Highly protein-bound drugs (eg, warfarin, NSAIDS) pass poorly into milk.
- Highly charged molecules (e.g., heparins) pass poorly into breast milk.
- Lipid soluble drugs can concentrate in the milk fat.
- Oral bioavailability in the infant and the mother.
- The half-life in the maternal and infant's plasma compartments.

NSAIDS, non-steroidal anti-inflammatory drugs.

Because the drug level in the milk is a reflection of the plasma drug level, the nursing infant's drug exposure is affected both by the drug concentration in maternal serum at the time of feeding as well as the amount of breast milk ingested by the infant.[3,15,20] When the drug concentration peaks in maternal plasma, it will quickly peak in the breast milk as well.[3,15,17] Therefore, the timing of breastfeeding in regard to maternal peak serum levels is a key consideration in the amount of drug exposure to the nursing infant.[17] In addition to the amount of drug the infant is exposed to during breastfeeding, the ability of the infant to absorb and eliminate the drug determines the exposure. Many drugs have poor oral bioavailability and are not absorbed in the gastrointestinal tract of the infant. In newborns, the impact of a medication may