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Dexmedetomidine Levels in Breast Milk: Analysis of Breast Milk Expressed During and After Awake Craniotomy

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Introduction

The transfer of dexmedetomidine, an α2-adrenergic agonist used for surgical sedation, into breastmilk has been historically unstudied. Traditional views on breastfeeding post-surgically have been conservative, with many physicians, parents, and lactation consultants hesitant to recommend continuation of feeds due to potential risk of excessive sedation of an infant. However, the low oral bioavailability[2] (~16%) and relatively short half-life (2.5 hours) of dexmedetomidine suggest that breastfeeding mothers may not need to halt feeding following surgical procedures due to the low likelihood of transfer to the infant.

Methods

Case Report:

- 29-year-old lactating woman (1-month postpartum) with large frontal mass near eloquent cortex requiring left frontal craniotomy and tumor resection
- Minimal sedation needed during procedure to allow for testing to assess language, cognitive function. All sedation paused during testing
- Dexmedetomidine 45 µg IV bolus given, followed by continuous infusion of 0.7-1.0 µg/kg·hr with dosing weight of 95.6 kg
- Additional sedation provided with propofol and remifentanil
- Lactation consultant present during intraoperative, postoperative phase
- Due to study type, study was exempt from IRB review

Methods:

- Breast milk expression every 3- to 4-hours via electric breast pump, hand expression
- Breast milk was stored at -80 °C until analysis
- Samples analyzed via ABSciex QTRAP 5500 UPLC MS/MS tandem mass spectrometer with calibration curve range 0.0078-1 ng/mL, coefficient of variation r^2as 0.99
- Milk extraction completed with protein precipitation with acetonitrile

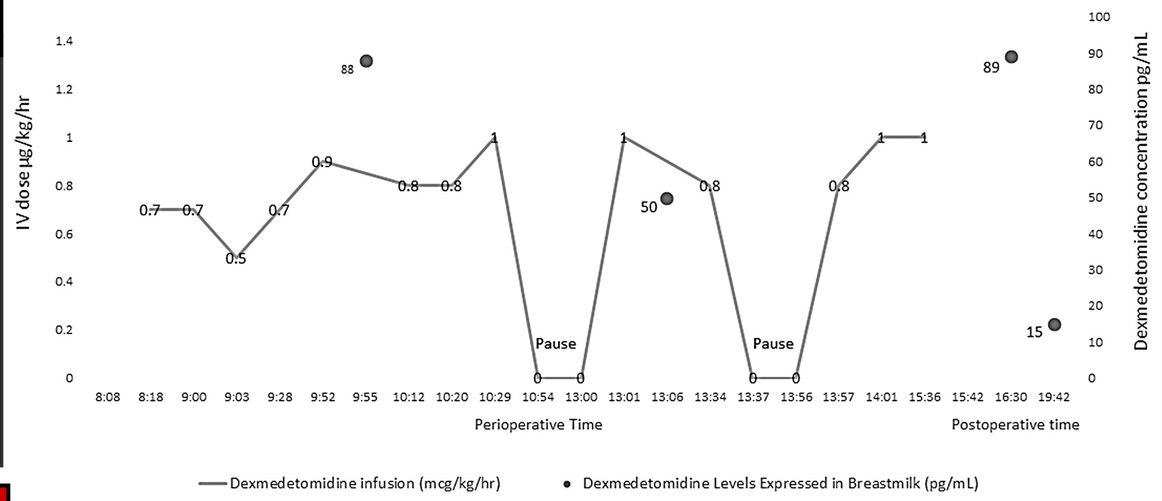

Figure 1: Representation of milk samples collected with respect to the dexmedetomidine IV infusion dose

Patient samples	Time of collection	Concentration (pg/mL)
Infusion start	*08:08 am*	
Perioperative samples		
1	09:55 am	88
2	13:06 pm	50
Infusion end	*15:42 pm*	
Postoperative samples		
3	16:30 pm	89
4	19:42 pm	15

Table 1: Dexmedetomidine levels in expressed milk samples

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Results

The dose of dexmedetomidine administered during surgery was compared to 2 samples of milk collected during the perioperative phase and 2 samples collected during the postoperative phase (Figure 1). The concentration of perioperative sample collected after bolus administration of dexmedetomidine was 88 pg/mL, followed by a sample concentration collected after infusion found to be 50 pg/mL (Table 1). After 48 minutes following discontinuation of sedation, a milk sample had a dexmedetomidine concentration of 89 pg/mL. Breast milk samples collected 4 hours after discontinuation had a concentration of dexmedetomidine of 15 pg/mL.

Discussion, Conclusion

The quantification of breastmilk concentration of dexmedetomidine during the perioperative and postoperative phases illustrated the low concentration of dexmedetomidine present in breastmilk following infusion. If the infant was to consume 4 oz of milk 1- hour after the end of maternal sedation, they would receive approximately 11 ng of dexmedetomidine. This infant dose is far below intravenous infant doses used for sedation; so much so to be considered clinically irrelevant. Previous recommendations from providers to breastfeeding mothers would be to discontinue breastfeeding for at least 24 hours after sedation, which may disrupt milk production and hinder mothers from continuing breastfeeding. However, following this study suggests that a return to breastfeeding 1-hour after sedation with dexmedetomidine is likely safe.

References:

1. Dodd SE, Hunter Guevara LR, Datta P, Rewers-Felkins K, Baker T, Hale TW. Dexmedetomidine levels in breast milk: analysis of breast milk expressed during and after awake craniotomy. *Breastfeed Med.* 2021. doi: 10.1089/befm.2021.0138.
2. Anttila M, Penttila J, Helminen A, Vuorilehto L, Scheinin H. Bioavailability of dexmedetomidine after extravascular doses in healthy subjects. *Br J Clin Pharmacol.* 2003;56(6):691-693. doi: 10.1046/j.1365-2125.2003.01944x.