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Original Contribution

The impact of breastfeeding on postpartum pain after vaginal and cesarean delivery☆,☆☆

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Abstract

Study Objective: Oxytocin may play a role in pain modulation. The analgesic effects of breastfeeding with its associated endogenous oxytocin release have not been well investigated. To determine the impact of breastfeeding on incisional, perineal, and cramping pain after cesarean and vaginal delivery.
Design: Institutional review board–approved prospective observational study.
Setting: Labor and delivery and maternity wards.
Patients: Healthy (American Society of Anesthesiology physical statuses 1 and 2) multiparous women who had cesarean (n = 40) and vaginal (n = 43) deliveries of singleton term infants and who were breastfeeding were enrolled.
Interventions: Women completed diaries to record incisional, perineal, or cramping pain scores 5 minutes before, during, and 5 minutes after breastfeeding.
Measurements: Demographic, obstetric, and neonatal variables, as well as analgesic use, were recorded.
Main Results: There was no difference in incisional pain before, during, and after breastfeeding in women post–cesarean delivery. Cramping pain was significantly increased during, as compared with before or after breastfeeding in both the vaginal ($P < .001$) and cesarean ($P < .001$) delivery cohorts.
Conclusions: There was no analgesic effect on incisional pain during breastfeeding, indicating that endogenous oxytocin associated with breastfeeding may not play a significant role in postpartum cesarean wound pain modulation. Breastfeeding increased cramping pain after vaginal and cesarean delivery. The increase in cramping pain is most likely due to the breastfeeding-associated oxytocin surge increasing uterine tone.

1. Introduction

Most women (65%) attempt breastfeeding in the early postpartum period in the United States [1]. Breastfeeding is nationally promoted as the ideal method of infant nutrition due to benefits for both mothers and infants [2,3]. Maternal benefits of breastfeeding include diminished plasma cortisol, decreased blood pressure, increased uterine tone, and

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enhanced uterine involution [4–13]. Benefits to the infant include comprehensive nutrition, increased immunity, and higher levels of cognitive development [14].

During breastfeeding, pulsatile levels of endogenous oxytocin are detected in the plasma [7]. Oxytocin has an established physiological role in increasing uterine tone and promoting lactation [14–17]. More recently, animal studies have explored oxytocin's role in pain modulation. Intraventricular and intrathecal oxytocin in rat and mouse models has been shown to enhance antinociception [18–22]. The analgesic effect of oxytocin was diminished or absent in oxytocin knockout mice and with co-administration of oxytocin antagonists [23–25]. Oxytocin cannot cross the blood-brain barrier [26], and the analgesic effects that are seen when oxytocin is delivered intrathecally are absent when oxytocin is administered systemically [27]. The potential analgesic effects of breastfeeding with its associated endogenous oxytocin release on incisional and perineal wound pain have not been adequately investigated in a clinical setting. The study hypothesis was that oxytocin secreted by the pituitary may increase local (intracranial/cerebrospinal fluid) levels and have similar pain modulating benefits that are seen when it is injected intrathecally [27].

The study aim was to determine the analgesic impact of breastfeeding on incisional and perineal pain, as well as cramping pain after cesarean and vaginal delivery, respectively. The null hypothesis was that breastfeeding would have no effect on incisional and perineal pain.

2. Materials and methods

After obtaining Stanford University Human Subjects Institutional Review Board approval and written informed consent, 83 participants who underwent vaginal delivery or scheduled cesarean delivery and who were planning on breastfeeding were enrolled in this prospective observational study from August 2011 to June 2012. Patients were approached after delivery for study enrollment 12 to 24 hours after vaginal delivery and within 24 hours after cesarean delivery. Inclusion criteria included the following: age $\geq$18 years, American Society of Anesthesiology physical status 1 or 2, term gestation ($\geq$37 weeks), multiparous with prior breastfeeding experience, and Pfannenstiel incision for cesarean delivery (if applicable). Patients were excluded from study participation if they met any of the following criteria: chronic pain, recent antenatal use of analgesia medication, substance abuse, classical cesarean incision, emergency cesarean delivery, not planning to breastfeed, and psychiatric or cognitive disorder (eg, anxiety or depression). All potential qualifying patients were approached consecutively for study enrollment when the study investigators were available.

Anesthesia for cesarean delivery consisted of bupivacaine 12 mg, fentanyl 10 mcg, morphine 100-200 μg intrathecally, using either a single-shot spinal or combined spinal-epidural technique. Post–cesarean delivery pain was managed as per standardized institutional treatment protocols with scheduled nonsteroidal anti-inflammatory drugs (oral ibuprofen 600 mg every 6 hours or intravenous ketorolac 15 mg every 6 hours if unable to take oral medication) and an oral opioid analgesic (oxycodone or hydrocodone 5-10 mg), with acetaminophen for breakthrough pain as needed. Intravenous morphine was available for severe pain or pain not responding to the above analgesics.

All participants received diaries 12 to 24 hours after vaginal delivery and 24 hours post–cesarean delivery, which were available in English and Spanish text. Women were instructed to record verbal numerical pain scores (0-10; 0 = no pain and 10 = worst pain imaginable) 5 minutes before, during, and 5 minutes after each breastfeed, for 5 consecutive breastfeeds. *Incisional pain* was defined as pain at the cesarean wound site, *perineal pain* was defined as pain in the vaginal area, and *cramping pain* was defined as intermittent pain in the lower abdomen.

Demographic (age, weight, height, race), obstetric (parity, number of prior cesarean and vaginal deliveries), and neonatal (birth weight, Apgar score at 1 and 5 minutes) data were collected. We also recorded time to first successful breastfeed as documented by the bedside nurse (minutes), the number of breastfeeds documented by the bedside nurse in the first 24 hours postdelivery, and breastfeeding success (yes/no) at 6 weeks postdelivery. These breastfeeding outcomes were self-reported. In the vaginal delivery cohort, the duration of *active* labor, percentage of women who received an epidural for labor analgesia, and the percentage sustaining a vaginal laceration or episiotomy was recorded. Postdelivery analgesic outcomes for both vaginal and cesarean delivery patients included time to first analgesic (in minutes), opioid and nonsteroidal antiinflammatory drug use, satisfaction with analgesia (0-10; 0 = totally unsatisfied and 10 = totally satisfied), and perineal or incisional pain (yes/no) at 6 weeks postdelivery. The number of episodes of vomiting, antiemetic drug use, and antipruritic drug use postdelivery were also recorded. Doses of oral oxycodone and hydrocodone were converted to intravenous morphine milligram equivalents using a conversion ratio of 0.5 for analysis [28], and the total amount of supplemental opioid and nonsteroidal antiinflammatory drug medication consumed in the 24 and 48 hours postdelivery periods was recorded.

2.1. Statistical analysis

The primary outcome of this study was the difference in incisional pain (post–cesarean delivery) during compared with before breastfeeding. An a priori sample size analysis based on pilot data predicted that 40 subjects were required to detect a 30% change in incisional pain scores within the same subjects, during breastfeeding compared with before