Midwifery 50 (2017) 106–109

Contents lists available at ScienceDirect

Midwifery

journal homepage: www.elsevier.com/locate/midw

The influence of intrapartum opioid use on breastfeeding experience at 6 weeks post partum: A secondary analysis

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ARTICLE INFO

Keywords:
Breastfeeding
Pethidine
Fentanyl
Intrapartum
Analgesia

ABSTRACT

Objective: To examine breastfeeding experiences up to 6 weeks postpartum for mothers administered intranasal fentanyl, subcutaneous fentanyl or intramuscular pethidine for intrapartum analgesia.
Design: A secondary analysis was undertaken using the per-protocol dataset to examine the third phase of a larger randomised controlled trial. This phase of the study examined breastfeeding intention and experience from the first hour of birth to 6 weeks postpartum. Medical records were audited and women were contacted at 6 weeks postpartum to complete a telephone questionnaire.
Setting: Two maternity hospitals in South Australia.
Participants: Healthy women birthing at term received intranasal fentanyl (n=37), subcutaneous fentanyl (n=37), or intramuscular pethidine (n=35).
Findings: While maternal characteristics and birth outcomes were comparable between groups, women who received either intranasal fentanyl or subcutaneous fentanyl experienced fewer difficulties in establishing breastfeeding by 6 weeks postpartum when compared to intramuscular pethidine ($p < 0.01$).
Key conclusions: Women who received fentanyl reported that their neonates had less difficulties establishing breastfeeding, compared to those who received pethidine. Therefore, for woman who intend to breastfeed, fentanyl should be the preferred opiate, for the relief of pain in labour.
Implications for practice: When providing education to women in relation to intrapartum pain relief it is important to consider the potential influence on breastfeeding experience. This research provides evidence that fentanyl is a suitable alternative to pethidine for women requesting parenteral analgesia in labour.

Introduction

Breast milk is recognised as the normal source of nutrition for infants, with exclusive breastfeeding recommended until the age of 6 months (World Health Organization, 2003). Breastfeeding is reported to reduce child mortality and has health benefits that extend into adulthood (Victora et al., 2016). In Australia, before giving birth, the woman's intention to breastfeed is high, but an Australian National Infant Feeding Survey conducted in 2010 reported rates reduce quickly within the first few months, from an exclusive breastfeeding rate of 90.4% at birth, 61.4% at 1 month, 39% at 3 months and only 15% at 5 months (Australian Institute of Health and Welfare, 2011). The decline in breastfeeding by women over a 5 month period may be attributed to age, education, a change in the woman's desire to breastfeed, and/or return to work (Tawia, 2012; Forster et al., 2006).

When providing information to women about options for pain relief in labour it is important to consider the potential for neonatal effects. In particular, difficulties in initiation and establishment of breastfeeding have been associated with intrapartum opioid use (Rajan, 1994). In many maternity units it is standard practice for women who request analgesia during labour to be administered intramuscular (IM) pethidine (Jones et al., 2012). However, intrapartum use of pethidine is attributed to negatively affecting the woman's ability to breastfeed in the postnatal period (Ransjo-Arvidson et al., 2001). This may also relate to adverse maternal affects such as sedation (Fairlie et al., 1999), vomiting (Ullman et al., 2010) and prolonged labour (Khooshideh and Shahriari, 2009).

A further consideration is inadvertent fetal exposure to pethidine as a consequence of maternal administration of the opioid. Drug exposure in the fetus is prolonged as a result of delayed elimination of the drug due to the immature fetal liver and ion trapping of pethidine in the fetal compartment. Further, metabolism of pethidine results in the forma-

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http://dx.doi.org/10.1016/j.midw.2017.03.024
Received 14 November 2016; Received in revised form 26 March 2017; Accepted 29 March 2017

tion of norpethidine, an active metabolite, which is toxic at high concentrations and has been associated with neuronal depression in the neonate up to 60 hours post-birth (Morselli and Rovei, 1980). Pethidine has also been linked to acidosis (Sosa et al., 2006), reduced Apgar scores at birth (Sharma et al., 2004) and feeding difficulties for up to six weeks post partum (Belsey et al., 1981).

An alternative opioid, fentanyl has the advantage of providing rapid pain relief to the mother and is cleared more quickly than pethidine from the neonatal system without the formation of toxic metabolites (Anderson, 2011). Until recently, all studies that reported the parenteral use of fentanyl for pain relief in labour examined the effects of intravenous (IV) administration. These studies showed that IV fentanyl produced less sedation and nausea in women than did pethidine. A review of the literature of fentanyl use in labour found no long-term fetal or neonatal effects (Fleet et al., 2011). A recent study that examined fentanyl levels in cord blood at birth, following the use of a maximum of 250 micrograms intranasal (IN) fentanyl in labour, found fentanyl levels were low or undetectable (Kokki et al., 2015). This result may help explain the observation from our randomised control trial that fewer neonates were admitted to the neonatal nursery when women used intrapartum fentanyl compared to IM pethidine (Fleet et al., 2015).

While fentanyl is regarded as safe for both mother and neonate, few studies have examined the effects of its use on breastfeeding outcomes (Jones et al., 2012). Therefore, a secondary analysis of data arising from our initial randomised control trial was conducted to examine this issue.

Methods

A secondary analysis was undertaken using the per-protocol breastfeeding dataset arising from a randomised control trial that was undertaken to examine the clinical effectiveness of IN fentanyl (n=37), subcutaneous (SC) fentanyl (n=37) or IM pethidine (n=35) used in labour. The study was undertaken in two Baby Friendly Health Initiative accredited settings in South Australia. At six weeks postpartum women were contacted by telephone to participate in a questionnaire that examined factors that are recognised to impact on breastfeeding outcomes such as, intention to breastfeed, level of education, intention to return to work, problems encountered and sources of support (Tawia 2012) (see detailed methods described in Fleet et al. 2015).

Data collection

An audit of the participants' medical records was conducted to obtain maternal characteristics and birth outcomes that included maternal age, BMI, gestation, parity, onset of labour, total opioid dose administered, mode of birth, 1 and 5 minute Apgar scores, time for neonate to establish breathing, cord blood pH, birth weight, nursery admission to/special care baby unit, skin-to-skin contact with mother within one hour of birth, maternal breastfeeding intention and if breastfed within the first hour of birth, and length of postnatal stay. In addition, a Telephone Questionnaire was administered at 6 weeks post partum. The Telephone Questionnaire examined the woman's level of education, employment status (unemployed or employed), intention to return to work (within 1 - 6+ months), problems encountered with breastfeeding and sources of support.

Data analysis

Data were analysed as per treatment received regardless of participant's assignment utilising the software package IBM SPSSv21. Normality of the data were examined using a frequency histogram and Bartlett's test for equal variances. Demographic characteristics were examined using an ANOVA. A χ^2 test also was used for categorical variables to determine whether there were significant differences between the IN fentanyl, the SC fentanyl and the IM pethidine groups. Proportions were presented as percentages of the respective denominator. Results are described using CONSORT guidelines.

Table 1
Maternal characteristics.

	IN fentanyl n=37	SC fentanyl n=37	IM pethidine n=35	p
Age (Mean (SD))	29.8 (5.9)	29.7 (4.8)	27.9 (4.8)	0.29
BMI (Mean (SD))	26.0 (5.2)	26.6 (4.7)	26.3 (5.8)	0.89
Gestation (Mean (SD))	39.9 (1.1)	39.9 (1.0)	40.1 (1.2)	0.83
Primiparity (n (%))	31 (83.8)	28 (75.7)	29 (74.3)	0.57
Induction of labour (n (%))	23 (62.2)	14 (37.8)	21 (60.0)	0.06
Level of education				
High school (n (%))	$6/29_{a,b}$ (20.7)	$1/32_{b}$ (3.1)	$10/29_{a}$ (34.5)	
Trade/Certificate/ Diploma (n (%))	$12/29_{a}$ (41.4)	$17/32_{a}$ (53.1)	$10/29_{a}$ (34.5)	0.04
Degree (n (%))	$11/29_{a}$ (37.9)	$14/32_{a}$ (43.8)	$9/29_{a}$ (31.0)	
Employment Status				
Employed (n (%))	30/35 (85.7)	27/37 (73.0)	22/31 (80.0)	0.29

Note. p values are based on one-way ANOVA for continuous measures and χ^2 test for categorical measures. Post-hoc tests for pairwise comparison with Bonferroni adjustment. Different subscript letters show significant difference between pair of groups at the .05 level.

Ethics approval

Ethics approval was granted by the Children's Youth Women's Health Service Human Research Committee on 27 October 2010 and the Southern Adelaide Clinical Human Research Ethics Committee on 14 December 2010 (ethics application number 380.09 and approval number REC2284/9/13). Recruitment occurred between January 2011 and April 2013. Trial registration [ACTRN12609001027202].

Findings

The maternal characteristics (Table 1) and birth outcomes (Table 2) were comparable between groups, with two exceptions: level of education and neonatal nursery admission. While there were no differences between any groups for participants that completed a Trade/Certificate/Diploma or Degree (Table 1), more women in the IM pethidine group completed a high school education than women in the SC fentanyl group. Nursery admissions also were significantly higher for neonates in the IM pethidine group compared to either fentanyl group (Table 2).

Dosage was examined between the three study groups to identify median (IQR) total dose, number of doses administered and duration of use. Women who received IN fentanyl self-administered a median total dose of 486 micrograms (8 doses) over 1.9 h (1.2–3.9). The median time of last IN fentanyl dose to birth was 2.0 h (0.7–5.1). In contrast women administered SC fentanyl received a median total dose of 300 micrograms over 1.7 h (0.0–3.2) with the last dose administered 2.7 h (1.3–7.5) before birth. Whereas the majority of women administered pethidine received only one (100 mg) dose, the median time of last IM pethidine dose to birth was 5.4 h (3.0–9.6) (Fleet et al., 2015).

When breastfeeding experiences were examined it was noted that the majority of women (94/109, 86.2%) expressed an intention to exclusively breastfeed (Table 3). For women who intended to breastfeed, fewer neonates born to women administered IM pethidine, received skin-to-skin contact than those born to women administered IN or SC fentanyl (Table 3).

At 6 weeks post partum, no statistical difference was observed among groups for women who maintained breastfeeding. However, the majority of women (78.3%) who received IM pethidine reported issues in establishing breastfeeding compared to women in the fentanyl