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Factors associated with obstetric anal sphincter injuries in midwife-led birth: A cross sectional study

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ABSTRACT

Introduction: Obstetric anal sphincter injurie (OASI) in vaginal births are a serious complication, and are associated with maternal morbidity. Focus on modifiable factors in midwives clinical skills and competences contributing to prevent the occurrence of OASI are essential. The objective of this study was to investigate the association between OASI and factors related to midwife-led birth such as manual support of perineum, active delivery of baby's shoulders, maternal birth position, and pushing and breathing techniques in second stage of labour. *Methods:* A prospective cross sectional study including primiparous (n = 129) and multiparous (n = 628) women in

midwife-led non-instrumental deliveries with OASI (n = 96) or intact perineum (n = 661). Data were collected in a university hospital in Norway with two different birth settings: an alongside midwife-led unit with approximately 1500 births per year and an obstetrical unit with approximately 3500 births per year. *In midwife-led births, there were a total of 2.6% OASI and 18.9% intact perineum.*

Results: The sample consisted of 757 women, 12.7% suffered OASI and 87.3% of participating women had an intact perineum. This selected sample compares the most serious outcome (OASI), and the optimal outcome (intact perineum). *In primiparous women, 61 women suffered OASI and 68 women had intact perineum, while for multipara women, 35 women suffered OASI and 593 women had intact perineum.* There was an increased risk of OASI if women actively pushed when the head was crowning compared to breathing the head out (adjusted OR: 3.10; 95% CI: 1.75 to 5.47). The maternal birth position associated with the lowest risk of OASI was kneeling position (adjusted OR: 0.15; 95% CI: 0.03 to 0.70), supine maternal birth position (adjusted OR: 2.52; 95% CI: 1.04 to 4.90) and oxytocin augmentation more than 30 min in second stage (OR: 1.93; 95% CI: 1.68 to 15.63) were associated with an increased risk of OASI, when adjusting for maternal, foetal, and obstetric factors.

Conclusion: Our study suggests that actively pushing when the baby's head is crowning, a supine maternal birth position and oxytocin augmentation more than 30 min in second stage, were associated with increased risk of OASI when compared to intact perineum. A kneeling maternal birth position was associated with a decreased risk of OASI.

Introduction

Obstetric anal sphincter injuries (OASI) are one of the most serious maternal complications in vaginal births (Laine et al., 2011; Sundquist 2012; Soerensen et al., 2013). Occurrence of anal incontinence after primary repair of OASI has been reported to be as high as 30–60% (Norderval et al., 2004; Marsh et al., 2011; Sundquist 2012). Known risk factors associated with OASI include parity, maternal age,

foetal head circumference, birth weight, and assisted vaginal deliveries using vacuum or forceps (Baghestan et al., 2010; Ampt et al., 2013; Pergialiotis et al., 2014; Hauck et al., 2015). The impact of episiotomy on OASI is debated; episiotomy in assisted vaginal deliveries may reduce risk, the angle of the episiotomy seems to be important, and restrictive use of episiotomy in spontaneous vaginal births is recommended (Carroli and Mignini 2009; Raisanen et al., 2012; Kapoor et al., 2015; Ampt et al., 2015b). The use of oxytocin

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augmentation during labour is reported in as many as 50% of births, but few studies have investigated the association between oxytocin augmentation and OASI (Blix et al., 2002; Rygh et al., 2014; Bor et al., 2016).

There is a lack of knowledge identifying modifiable clinical factors for OASI related to the skill and competence of midwives. Previous intervention studies including manual support of perineum have shown a reduction in OASI (Laine et al., 2008; Hals et al., 2010; Stedenfeldt et al., 2014). Recent studies have examined evidence behind interventions, and a more thorough analysis of effect and side effects before implementation has been recommended (Poulsen et al., 2015; Skriver-Moller et al., 2016). It has been assumed that midwives' moving towards a more hands-off approach to perineal support has resulted in the increase of OASI (Fretheim et al., 2011; Trochez et al., 2011; Bulchandani et al., 2015; Ampt et al., 2015a). However, there is no conclusive evidence that perineal support, or one specific technique of perineal support, will decrease the occurrence of OASI (McCandlish et al., 1998; Albers et al., 2005; Poulsen et al., 2015; Aasheim et al., 2017). Different pushing techniques in the second stage of labour have not been shown to influence the occurrence of OASI (Lemos et al., 2015). The most critical phase of labour regarding the risk for perineal injuries is when the baby's head is crowning. It is generally accepted that the head should be delivered slowly; this is also one of the initiatives in the intervention studies (Laine et al., 2008; Hals et al., 2010; Stedenfeldt et al., 2014). However, there is no consensus on whether this should involve only breathing or careful pushing (Norwegian Guidelines for Obstetric and Gynecology 2006). Two systematic reviews (Gupta et al., 2012; Priddis et al., 2012) have investigated the association between maternal birth position and perineal trauma and both conclude that there is a lack of consistency and no birth position is preferable to others.

There is still a need to identify methods that contribute towards preventing the occurrence of OASI without restricting women's freedom and choices during labour (Gupta et al., 2012; Priddis et al., 2012; Bulchandani et al., 2015). To our knowledge, no previous studies have examined these modifiable factors in midwives' clinical skills, when adjustments are made for maternal, foetal, and obstetric factors.

The objectives of the present study are to study the association between OASI and modifiable clinical factors associated with midwife-led births such as manual support of the perineum, active delivery of the baby's shoulders, maternal birth position, pushing, and breathing techniques in the second stage of labour. *Related to midwife-led birth, regardless of birth setting.*

Methods

This is a prospective cross-sectional study of OASI and intact perineum in midwife-led births conducted at Haukeland University Hospital, Norway. The hospital has two birth settings: an alongside midwifeled unit with approximately 1500 births per year and an obstetrical unit with approximately 3500 births per year. The midwife-led unit is restricted to low-risk pregnancies; women requiring epidural anaesthesia, monitoring for foetal distress in the first stage of labour, or who are suffering any maternal complication are transferred to the obstetrical unit.

Informed consent was obtained from the participants at recruitment and midwives filled out a standard registration form after receiving written consent from each woman. *The information was introduced to the woman within two hours after birth, when the midwife found it not interfered with the mother or child*. The registration form contained information about maternal, foetal, and obstetric factors in addition to factors related to the skills and competence of the midwives. A project group was established and midwives from both units were responsible to inform all the staff midwives to achieve a common understanding of care. An illustration showing the manual support techniques were also available (Fig. 1).

Data was collected from December 1, 2007, until November 30, 2008, at both units. All non-instrumental vaginal births led by midwives

in Norwegian or English speaking women older than 16 years with a singleton foetus in vertex presentation and a gestational age of 37 weeks or longer were included in the study.

To investigate factors associated with the skills and competence of the midwives, the two endpoints of perineal outcome were investigated: the most serious outcome (OASI) compared to the optimal outcome (intact perineum). OASI were classified according to the International Classification of Diseases 10th Revision, ICD-10 (WHO 2011) and the hospital's guidelines based on the Norwegian guidelines in obstetrics (Norsk Gynekologisk Forening 2014) as: 3a) less than 50% injury to external anal sphincter muscle; 3b) more than 50% injury to external anal sphincter muscle; 3c) damage of both internal and external anal sphincter, and 4th degree tear involving the anal sphincter muscle and rectal mucosa. An intact perineum was classified as a perineum with no tears or superficial tears with no need for suture. The midwife responsible for the birth inspected the perineum, perineal muscles, vagina, and labia after childbirth and diagnosed intact perineum, vagina, and labia (no need for suture) or OASI. The midwife, who inspected perineum after birth, diagnosed intact perineum, if she was in doubt whether the tear should be classified as an intact perineum or a superficial grade 1, another midwife was consulted. When OASI was observed or suspected, an obstetrician was consulted to classify the tear.

The dependent variable was dichotomised as OASI or intact perineum. The independent variables according to the aim of the study were variables including skills and competence of midwives and comprised: manual support of the head to slow down the speed of delivery; manual support of perineum when the baby's head was delivered; pushing techniques before the baby's head was crowning and pushing or breathing techniques used when the baby's head was crowning, active delivery of the baby's shoulders, and maternal birth positions. Manual support of perineum was categorized in three categories, and instructions with pictures of the three most common techniques were attached to the information sheet (Fig. 1), and were defined as either hand with straight fingers, hand with bended fingers, or modified Ritgen's manoeuvre (Cunningham 2008). The breathing and pushing technique used in the second stage of labour was defined as spontaneous pushing if the woman was free to follow her own instincts, Valsalva pushing technique (Lemos et al., 2011), or unknown if information was missing or if the midwife was unsure how to classify the situation. Pushing methods when the baby's head crowned were categorised as breathing out, pushing out, or unknown. Maternal birth positions were categorized to be comparable in relation to the pelvic channel downward direction. Sitting positions included using a birth seat or squatting, kneeling positions included standing or kneeling on all fours (kneeling and all four were named interchangeably, both with the upper body against the bed). The lateral position, supine position and sitting with stirrups were coded individually. The independent variables according to maternal, foetal, and obstetric factors were defined as adjustment variables. Maternal variables comprised parity, maternal age, gestational age, ethnicity, and Body Mass Index (BMI). BMI was calculated from the weight and height noted in the woman's pregnancy journal, using the Norwegian Public Health BMI calculator (kg/m²) (Norwegian Institute of Public Health 2004). Foetal variables included birth weight and head circumference. Obstetric variables comprised oxytocin augmentation in first or second stage of labour, monitoring of the foetus (last 2 h of labour), duration of second stage of labour, and epidural. First stage of labour was defined as regular contractions with intervals of less than 10 min, based on the World Health Organisation (WHO) classification (WHO 1996). The second stage of labour was defined as latent and active phase, where latent phase was calculated from the time when cervix was fully dilated to active pushing started, and active phase was calculated from the time the woman actively started to push until the baby was born. In present study, duration of second stage was calculated from active phase of second stage. Epidural anaesthesia was available on request by the woman or in case of obstetrical complications. The characteristics of each variable, according to OASI and intact perineum, are shown in Table 1.

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