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Labour duration and timing of interventions in women planning vaginal birth after caesarean section

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ABSTRACT

Objective: understanding the labour characteristics of women attempting vaginal birth after caesarean (VBAC) may suggest how to improve intrapartum management and may enhance success rates. Promoting VBAC is a relevant factor in decreasing overall caesarean section (c-section) rates. However, the labour processes of women attempting VBAC are not well investigated. The aim of this paper is to compare multiparae planning a first VBAC (pVBAC) with primiparae and with multiparae planning a second vaginal birth, all starting to give birth vaginally, with regard to (a) perinatal characteristics, (b) the timing of intrapartal spontaneous rupture of membranes (SROM) and of interventions, and (c) labour duration, with respect to the first and second stages.

Setting: cohort study of women planning vaginal birth in 47 obstetric units in Lower Saxony, Germany.

Participants: 1897 primiparae, 211 multiparae with one previous c-section and 1149 multiparae with one previous vaginal birth.

Measurements: secondary analysis of data from an existing cohort study. Kaplan–Meier estimates, log rank test, Wilcoxon test and shared frailty Cox regression models including time-varying covariates were used to compare the timing of interventions and labour duration between the subsamples. Analyses were done with the statistics programme Stata 13.

Findings: perinatal and labour characteristics of multiparae with pVBAC mainly resembled those of primiparae and differed from those of multiparae planning a second vaginal birth. However, compared to primiparae, multiparae with pVBAC received oxytocin less often (48.82 versus 56.95%, $p=0.024$) and gave birth vaginally significantly less often (69.19 versus 83.40%, $p<0.001$). The timing of intrapartal SROM (2.67 versus 3.42 hours, $p=0.112$) and of interventions (amniotomy: 5.50 versus 5.83 hours, $p=0.198$; oxytocin: 5.75 versus 6.00 hours, $p=0.596$; epidural: 4.00 versus 4.67 hours, $p=0.416$; opioids: 3.83 versus 3.78, $p=0.851$) was similar to that in primiparae although timings of all interventions but not of SROM differed significantly from that in multiparae with second vaginal birth (SROM: 2.67 versus 2.67 hours, $p=0.481$; amniotomy: 5.50 versus 3.93 hours, $p<0.001$; oxytocin: 5.75 versus 4.25 hours, $p<0.001$; epidural: 4.00 versus 3.50 hours, $p=0.009$; 3.83 versus. 2.75 hours, $p=0.026$). Overall and first-stage labour duration were comparable to primiparae (overall labour duration: 8.83 versus 8.57 hours, HR=0.998, 95% CI=0.830 – 1.201, $p=0.987$; first stage: 7.42 versus 7.00 hours, HR=0.916, 95% CI=0.774-1.083, $p=0.303$) but significantly longer than in other multiparae (overall labour duration: 8.83 versus 4.63 hours, HR=0.319, 95% CI=0.265 – 0.385, $p<0.001$; first stage: 7.42 versus 4.25 hours, HR=0.402, 95% CI=0.339-0.478, $p<0.001$). However, the second stage of labour was significantly shorter in multiparae with pVBAC than in primiparae (0.55 versus 0.77 hours, HR=1.341, 95%

Abbreviations: Primiparae, primiparous women; Other multiparae, multiparous women planning their second vaginal birth; Multiparae with pVBAC, multiparous women with first planned vaginal birth after one previous caesarean section; c-section, caesarean section; ERCS, elective repeat caesarean section; VBAC, vaginal birth after caesarean section; pVBAC, planned vaginal birth after caesarean section; SROM, spontaneous rupture of the membranes; ARM, artificial rupture of the membranes; IQR, interquartile range; HR, hazard ratio; CI, confidence interval

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CI = 1.049 – 1.714, $p = 0.019$), but longer than in multiparae with second vaginal birth (0.55 versus 0.22 hours, HR = 0.334, 95% CI = 0.262–0.426, $p < 0.001$).

Key conclusion: labour patterns of multiparous women planning a VBAC differ from those of primiparae and other multiparous women. Multiparae with pVBAC should be considered as a distinct group of parturients.

Implication for practice: expectations regarding labour progression for multiparae with first pVBAC should be similar to those for primiparae. However, the chance that the second stage of labour might be shorter than in primiparae is relevant and motivating information for pregnant women with a previous c-section in deciding the planned mode of birth.

Introduction

Understanding labour characteristics of women planning vaginal birth after caesarean section (VBAC) may suggest how to improve intrapartum management. This is relevant for achieving a successful and safe VBAC (Scott, 2014). Promoting VBAC is a relevant factor in decreasing overall caesarean section (c-section) rates (Cheng et al., 2011; Sabol et al., 2015) and supports efforts to avoid multiple c-sections with increasingly adverse outcomes (Marshall et al., 2011). Rising c-section rates are of international concern and cannot be explained by risk factors such as age and parity (EURO-PERISTAT, 2013; ACOG et al., 2014).

The absolute risks for women planning a VBAC and for their children are low (Landon et al., 2004; Nair et al., 2015). Maternal mortality is three times higher with elective repeat c-section (ERSC) than with planned VBAC (pVBAC) (0.013 versus 0.004%, Guise et al., 2010). The risk of infant loss, however, is higher for VBAC than for elective repeat c-section (ERCS) (0.13 versus 0.05%) but comparable to that for women giving birth to their first child (Smith et al., 2002). Uterine rupture is more frequent with pVBAC than with ERCS (Guise et al., 2010). The risk of uterine rupture is lower with spontaneous labour than with induced labour (Dekker et al., 2010; Palatnik and Grobman, 2015). Hospital stays have been found to be shorter, satisfaction with the mode of birth higher, recovery after birth better, quality of life as determined by physical health higher, breast-feeding initiation rates higher and the costs lower with pVBAC than with ERCS (Guise et al., 2010; Kealy et al., 2010; Shorten and Shorten, 2012; Fawsitt et al., 2013; Karlström et al., 2013; Regan et al., 2013; Prick et al., 2015). With conscientious intrapartum management there is a high probability of a safe and successful vaginal birth outcome meaning that caution is needed with induction and augmentation of labour to avoid overstimulation of contractions and that a thorough surveillance regarding signs of uterine rupture is necessary (RCOG, 2007; Scott, 2014). Several studies found that 60–85% of women planning VBAC did indeed give birth vaginally (Balachandran et al., 2014; Knight et al., 2014; Tessmer-Tuck et al., 2014), including even women at high risk (Regan et al., 2015); it is therefore asserted that women should be informed about the high likelihood of a successful outcome (King et al., 2015).

Uterine activity differs according to parity (Arulkumaran et al., 1984). This has a significant impact on labour duration, which is shorter with the second baby than with the first one (Albers et al., 1996; Vahratian et al., 2006; Zhang et al., 2010; Petersen et al., 2011). So far, no other study investigating timing of interventions was found. In the overall sample of the same cohort study including 3963 participants, amniotomy, oxytocin and epidural were performed slightly earlier in multiparae than in primiparae (Petersen et al., 2011). Consequently the median intervention-free time span after onset of labour has been found to be shorter for multiparae than for primiparae (Petersen et al., 2011) and the sequence of interventions differs (Petersen et al., 2013b). There is less evidence on the labour patterns of women with a previous c-section. Graseck et al. (2012) found no difference in cervical dilatation between women with pVBAC and women without a previous c-section. Multiparous women who had had a previous c-section because of dystocia were found to have a similar or longer labour duration than primiparous women (Harlass and Duff, 1990). Grantz et al. (2015) found that labour progression from 4 to 10 cm cervical dilatation was slower in multiparae with first VBAC where labour was induced than in primiparae. Faranesh and Salim (2011) by contrast found shorter active phases of the first stage and shorter second stages of labour for multiparous women with VBAC as compared to primiparae. Multiparous women with second vaginal births by contrast had shorter active phases and second stages than multiparae with first VBAC (Faranesh and Salim, 2011). The frequency and timing of interventions in the cases of women with pVBAC have however not been investigated in previous studies.

The aim of this paper is to compare multiparous women planning a first VBAC with primiparous women and multiparous women planning a second vaginal birth in respect of:

(a) baseline and perinatal characteristics
(b) the timing of intrapartal SROM, amniotomy, oxytocin, epidural and opioid administration
(c) the overall duration of labour and the durations of the first and second stages of labour.

Methods

Study design and setting

This study is based on a secondary analysis of the ProGeb dataset, which was derived from a cohort study undertaken between April and October 2005 in 47 of the 96 maternity units in Lower Saxony with birth rates ranging from 500 to 2000 births per year (Gross et al., 2007, 2009; Petersen et al., 2011, 2013a, 2013b; Gross et al., 2014). Women were eligible for this study if they were expecting a singleton in vertex presentation, were over 34 weeks of gestation and had started to give birth vaginally after onset of labour assessed by the midwife in terms of regular or irregular contractions associated with cervical dilatation (Gross et al., 2009). Parturients over 34 weeks were included because recommendations in German guidelines consider them together with women at term as one target group (DGGG, 2006, 2010b, 2012). Midwives in the current study defined onset of labour as the moment when labour started to progress without being tied to exact centimetres of dilatation. This approach was chosen, because there is no homogenous definition which addresses the complexity of onset of labour appropriately (Hanley et al., submitted for publication). In general, German perinatal statistics count labour duration from the onset of regular contraction (Aqua, 2015).

Prospective data was collected from 47 hospitals, and also in addition retrospective data from the medical records of seven of

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