Beyond successful external cephalic version

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Chapter 4

Risk factors for caesarean section and instrumental vaginal delivery after successful external cephalic version

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Abstract

OBJECTIVE

To examine if we could identify factors that predict caesarean section and instrumental vaginal delivery in women who had a successful external cephalic version.

METHODS

We used data from a previous randomized trial among 25 hospitals and their referring midwife practices in the Netherlands. With the data of this trial we performed a cohort study among women attempting vaginal delivery after successful external cephalic version. We evaluated whether maternal age, gestational age, parity, time interval between external cephalic version and delivery, birthweight, neonatal gender, and induction of labour were predictive for a vaginal delivery on one hand or a caesarean section or instrumental vaginal delivery on the other hand. Unadjusted and adjusted odds ratios were calculated with univariate and multivariate logistic regression analysis.

RESULTS

Among 301 women who attempted vaginal delivery after successful external cephalic version, the caesarean section rate was 13% and the instrumental vaginal delivery rate 6%, resulting in a combined operative delivery rate of 19%. Nulliparity increased the risk of caesarean section (OR 2.7 (95% CI 1.2-6.1)) and operative delivery (OR 4.2 (95% CI 2.1-8.6)). Maternal age, gestational age at delivery, time interval between external cephalic version and delivery, birthweight and neonatal gender did not contribute to the prediction of failed spontaneous vaginal delivery.

CONCLUSIONS

In our cohort of 301 women with a successful external cephalic version, nulliparity was the only factor that predicted the risk for caesarean section and instrumental vaginal delivery.

Introduction

Breech presentation occurs in 3 to 4% of all term pregnancies and significantly contributes to the overall caesarean section (CS) rate for term pregnancies.[1] External cephalic version (ECV) is a safe and effective procedure to reduce the frequency of breech presentation at term, and consequently reduces the CS rate. A Cochrane review of seven randomized controlled trials showed a reduction in the CS rate from 78% to 37% when ECV was attempted.[2] Nevertheless, the risk of CS after successful ECV is still increased compared to this risk for women with a spontaneous cephalic presentation. In a recently conducted meta-analysis of 11 studies we found that after successful ECV, women had a more than doubled risk of CS (OR 2.2, 95% CI 1.7-2.8) and instrumental vaginal delivery (OR 1.4, 95% CI 1.1-1.7) compared to women with a spontaneous cephalic presentation.[3] Identification of risk factors for operative delivery would be useful, as it would optimize intra-partum care for women after successful ECV. Therefore, the aim of the present study was to assess risk factors for the prediction of caesarean and instrumental vaginal delivery after successful ECV.

Material and methods

We used data from a recently published cluster randomized controlled trial conducted in the Netherlands.[4] This trial evaluated the effect of different ECV implementation strategies. The trial was performed between January 2011 and August 2012, in 25 hospitals and their referring midwife practices (Dutch trial registry, number NTR 1878). During the study period, it was protocol that women with a singleton pregnancy in breech presentation at or after 34 weeks gestation were offered an ECV. Women with a contraindication for ECV according to national guidelines,[5] an indication for primary CS other than breech presentation, and a fetus with major congenital malformations related to poor neonatal outcome, were not offered ECV. After successful ECV the prenatal care was identical to that of women with a primary cephalic presentation. Both the design and main results of this study have been presented elsewhere.[4]

With the data of this trial we performed a cohort study among women attempting vaginal delivery after successful ECV. We evaluated whether maternal age, gestational age, parity, time interval between ECV and delivery, birthweight, neonatal gender, and induction of labour were predictive for a vaginal delivery on one hand or a CS or instrumental vaginal delivery on the other hand. Unadjusted and adjusted odds ratios were calculated with univariate and multivariate logistic regression analysis. A p-value of less than 0.05 was considered statistically significant. Analyses were performed using SPSS 22.0 (IBM, Armonk (NY), US).

Results

A total of 1,169 women underwent an ECV attempt, of whom, 452 women (39%) had a fetus in cephalic presentation after the procedure. In 346 women the fetus remained in cephalic presentation until birth. Complete follow-up data on delivery outcome was available from 301 ECV attempts with the child in cephalic position after the procedure, and could therefore be included in our analysis.

Overall the CS rate was 13% (38 women) and the combined CS and instrumental vaginal delivery rate was 19% (56 women). We found no significant difference in maternal age, gestational age at delivery, time interval between ECV and delivery, birthweight or gender of the neonates, between both groups. Data regarding the initiation of labour was known for 248 women (83%) and was not found to be significantly different between women with a spontaneous vaginal birth, caesarean or operative delivery.

Univariate analysis showed a significantly higher rate of nulliparous women in the CS group (OR 2.9, 95% CI 1.4- 5.8) as well as in the combined CS and instrumental vaginal delivery group (OR 4.2, 95% CI 2.3-7.9). After multivariate analysis this difference remained statistically significant OR 2.7 (95% CI 1.2-6.1) in the CS group and OR 4.2 (95% CI 2.1-8.6) in the combined CS and instrumental vaginal delivery group (Table 1 and 2).

Table 1 - Risk factors for CS after successful ECV

	Caesarean section (N=38)	Vaginal delivery (N=263)	Univariate analysis Unadjusted OR (95%CI)	P value	Multivariate analysis Adjusted OR (95%CI)	P value
Maternal age (y) (mean ± SD)	30.4 ± 4.3	31. 7 ± 4.4	1.1 (0.99-1.2)	0.11	1.0 (0.96-1.1)	0.28
Gestational age (d) (mean ± SD)	279.9 ± 11.4	279.7 ± 8.8	1.0 (0.96-1.0)	0.92	0.97 (0.65-1.5)	0.90
Interval ECV/delivery (d) (mean ± SD)	24.5 ± 13.6	23.2 ± 10.8	0.99 (0.96-1.0)	0.52	1.0 (0.96-1.1)	0.72
Birthweight (g) (mean ± SD)	3415 ± 544	3502 ± 429	1.0 (1.0-1.0)	0.28	1.0 (1.0-1.0)	0.75
Parity (n (%)) Nulliparity	23 (60.5)	91 (34.6)	2.9 (1.4-5.8)	**0.003**	2.7 (1.2-6.1)	**0.013**
Gender (n (%)) Male	15 (39.5)	117 (44.5)	0.81 (0.41-1.6)	0.56	0.98 (0.47-2.1)	0.96
Induction of labour (n (%))[a]	12 (44.4)	77 (34.8)	0.67 (0.30-1.5)	0.33	0.64 (0.26-1.6)	0.33

ECV, external cephalic version, OR, odds ratio
[a]missing n=53 (17.6%)

Table 2 - Risk factors for operative delivery after successful ECV

	Operative delivery[1] (N=56)	Spontaneous vaginal delivery (N=245)	Univariate Analysis Unadjusted OR (95%CI)	P value	Multivariate analysis Adjusted OR (95%CI)	P value
Maternal age (y) (mean ± SD	30.8 ± 4.3	31. 7 ± 4.4	1.0 (0.98-1.1)	0.20	1.0 (0.94-1.1)	0.72
Gestational age (d) (mean ± SD)	281.1 ± 10.2	279.4 ± 8.9	0.98 (0.95-1.0)	0.21	0.93 (0.65-1.3)	0.70
Interval ECV/delivery (d) (mean ± SD)	25.9 ± 12.3	22.8 ± 10.8	0.97 (0.95-1.0)	0.06	1.0 (0.96-1.0)	0.91
Birthweight (g) (mean ± SD)	3480 ± 520	3495 ± 427	1.0 (1.0-1.0)	0.82	1.0 (1.0-1.0)	0.69
Parity (n (%)) Nulliparity	37 (66.1)	77 (31.4)	4.2 (2.3-7.9)	**<0.001**	4.2 (2.1-8.6)	**<0.001**
Gender (n (%)) Male	25 (44.6)	107 (43.7)	0.90 (0.58-1.7)	0.90	1.2 (0.66-2.4)	0.50
Induction of labour (n (%))[2]	17 (39.5)	72 (35.1)	0.83 (0.42-1.6)	0.58	0.87 (0.40-1.9)	0.72

ECV, external cephalic version, OR, odds ratio
[1]Instrumental vaginal delivery and CS
[2]missing n=53 (17.6%)

Discussion

We assessed factors that predicted the risk of caesarean or instrumental vaginal delivery after successful ECV. Apart from nulliparity, a factor known to predict complicated labour in all pregnancies, we were not able to identify other factors.

The strength of our study is the fact that our cohort was based on prospective collected data and that our conclusion was founded by multivariate analysis. Nevertheless, our study has several limitations. First, the data we used were extracted from a larger study on the implementation of ECV, which limited the parameters that we could examine. We were not able to include all earlier reported risk factors for caesarean delivery in spontaneous cephalic presenting fetuses. For instance we had no data on body mass index, fetal head position and epidural use. Secondly, it might be possible that in a larger cohort more risk factors would be identified. We found five other studies that examined risk factors for CS and instrumental vaginal delivery after successful ECV, (Medline 1975-2014, search terms "external cephalic version and caesarean section").[6-10] Two studies examined the combined outcome of CS and instrumental vaginal delivery[7,9] while three studies used the outcome CS.[6,8,10] Four studies explored if there was a difference in parity between women with an instrumental delivery and a spontaneous vaginal delivery. Three studies found nulliparity to be a significant risk factor for CS and instrumental vaginal delivery after ECV.[6,7,9] In a fourth study by Lim et al. there were also more nulliparous women with a CS but this difference was not statistically significant, which might be explained by the small number of women

included in the study. Two studies found that a higher birthweight is associated with an increased risk for CS and instrumental vaginal delivery.[7,8] Other factors that were associated with an increased risk for caesarean and instrumental vaginal delivery, but only reported in single studies were a higher maternal age,[8] a higher gestational age,[8] epidural use,[8] a time interval below 96 hours between ECV and delivery,[6] induction of labour,[9] occiput posterior position of the fetal head during labour,[9] flexed breech position and an amniotic fluid index below 13cm prior to ECV.[10] One study found a more than doubled risk for CS in women with a delivery less than 96 hours after successful ECV.[6] In the other four studies this association was not found.[7-10] In our study, we did not find an association between the time interval from ECV to delivery and the risk of CS. Bivariate analyses of time interval from ECV to delivery (within or after 96 hours) also did not show a significant difference (data not shown). In our study there were also more women with an induced labour in both the CS and combined CS and instrumental vaginal delivery group, but this difference was not statistically significant. It might be that the answer for this increased risk should be searched in factors that are different prior to ECV. There is one previous study in which an attempt was made to develop a prediction model to predict the chance for ultimately a successful vaginal delivery in women undergoing ECV for breech term pregnancies.[11] The overall performance of the developed model was poor, thus denying its use in clinical practice.

The primary aim of ECV is to achieve a vaginal delivery in cephalic presentation. Unfortunately the risk of CS and instrumental vaginal delivery after successful ECV is increased compared to this risk for women with a primary cephalic presenting fetus. In 2013, 7.4% of all term pregnancies in the Netherlands ended in an intra-partum CS.[12] In our cohort we found an intra-partum CS rate of 13%. Therefore, it would be useful to be able to identify the women that are especially at increased risk for CS or instrumental vaginal delivery after a successful ECV, so that we can optimize the intra-partum care for these women. Unfortunately we could only identify one risk factor, which still makes it difficult to make a strong selection of the women who are especially at increased risk. And to select those women who might benefit from starting labour in a unit where facilities for emergency CS are available. Future research should focus on exploring more maternal and fetal characteristics, including characteristics prior to ECV, that are associated with an increased risk for operative delivery in women after successful ECV. With which we could optimize intra-partum care and counseling for women after successful ECV.

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