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Beyond successful external cephalic version

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Summary

Chapter 1 contains a general introduction of breech presentation, external cephalic version (ECV) and developmental dysplasia of the hip (DDH). Furthermore, we present the rationale for this thesis.

Breech presentation occurs in 3% to 4% of all term pregnancies. Even in the absence of underlying fetal or maternal abnormalities, both mother and child face an increased risk of complicated delivery. External cephalic version (ECV) is a safe and effective procedure to reduce the number of breech presentations at term. The chance of successful ECV is influenced by multiple factors. Prediction models can help individualize this chance for women opting for ECV, which in turn can be used in the counselling of these women. Prediction models need external validation before they can be used in clinical practice. In this thesis we present the external validation of an already existing model to predict the chance of successful ECV.

The primary aim of ECV is to achieve a vaginal delivery in cephalic presentation. However, there are studies that report an increased incidence of caesarean delivery after successful ECV, while other studies have not found this association. We wanted to clarify this discrepancy by performing a meta-analysis of the studies published so far on this subject. Second, we wanted to explore whether it is possible to identify women at risk for operative delivery after successful ECV.

The precise aetiology of developmental dysplasia of the hip is unknown, but genetic and environmental factors may act as internal or external influences. Female gender, breech presentation and family history of DDH have been most consistently shown, in both case-control and observational cohort studies, to be associated with DDH. However, systematic knowledge about risk factors for DDH is lacking. Therefore, we performed a meta-analysis to identify and quantify the risk factors associated with DDH. A second meta-analysis was performed to examine whether different aspects of breech presentation had an impact on the risk for DDH.

Current screening for DDH is arranged by child health care service, with clinical examination of the hips of all infants and ultrasound evaluation in case of risk factors. One of these risk factors is breech presentation in the last trimester of pregnancy. Since neonates in breech presentation are born in the hospital, screening for DDH can be performed during hospital admission. Our national guideline for breech presentation does not incorporate recommendations for this screening. To inquire the current practice of screening for DDH among obstetrics professionals in the Netherlands, we performed a national survey.

Chapter 2 presents the external validation of a prognostic model for the prediction of successful ECV. At internal validation the model showed a fair discriminative capacity and good calibration. We tested the validity of this previously developed model at external validation, in a population of 320 women with a singleton fetus in breech presentation at term, who underwent an ECV attempt. A calibration plot was constructed with the predicted and the observed ECV success rate in five different categories based on their prognosis. Overall the model underestimated the success rate by 4 to 14%. Nevertheless, the model was able to make a good distinction between women with a poor probability of a successful ECV (less than 20%) and a good probability of a successful ECV (more than 50%).

Chapter 3 contains a systematic review and meta-analysis on the risk of caesarean and instrumental vaginal delivery in women with a cephalic presentation after successful ECV. 11 studies, reporting on 46,641 women, were included in this meta-analysis. The average caesarean delivery rate for women with a cephalic presenting fetus after successful ECV was 21%. Women after successful ECV were at increased risk for caesarean delivery compared to women with a spontaneous cephalic presenting fetus, (OR 2.2 (95% CI, 1.7-2.8)). There were significantly more caesarean deliveries for dystocia (OR 2.2 (95% CI 1.6-3.0)) as well as suspected fetal distress (OR 2.2 (95% CI 1.6-2.9)), in the group of

women with a cephalic presentation after successful ECV, compared to women with a spontaneous cephalic presenting fetus. We also found a significantly higher rate of instrumental vaginal deliveries in the group of women after successful ECV (OR 1.4 (95% CI 1.1-1.7)).

In Chapter 4 we tried to identify factors that predict cesarean section and instrumental vaginal delivery in women after successful ECV. For this study we used data from a large randomised controlled trial on the implementation of ECV, in 25 hospitals and their referring midwife practices in the Netherlands. We included 301 women with a singleton pregnancy in cephalic presentation after successful ECV who attempted vaginal delivery. The cesarean delivery rate was 13% and the instrumental vaginal delivery rate 3%. After multivariate analysis nulliparity was significantly associated with an increased risk for cesarean section (OR 2.7 (95% CI 1.2-6.1)) and operative delivery (OR 4.2 (95% CI 2.1-8.6)). Operative delivery was the combined outcome of cesarean delivery and instrumental vaginal delivery. No association was found between maternal age, gestational age at delivery, time interval between external cephalic version and delivery, birth weight and neonatal gender and failed spontaneous vaginal delivery.

Chapter 5 contains a systematic review and meta-analysis on risk factors for DDH. We identified 30 relevant studies reporting on 1,494,387 children. The risk of DDH was strongly increased in case of breech presentation (OR 5.7 (95% CI 4.4-7.4)), female gender (OR 3.8 (95% CI 3.0-4.6)), a positive family history of DDH (OR 4.8 (95% CI 2.8-8.2)) and clicking hips at clinical examination (OR 8.6 (95% CI 4.5-16.6)). This knowledge can be helpful in optimizing existing and developing new screening programmes for DDH.

In Chapter 6 we present the results of a cohort study on the incidence of DDH in neonates born from women with a singleton breech presentation of 34 weeks or more, who underwent an ECV attempt. We made a comparison between the incidence of DDH in neonates born in breech presentation and neonates born in cephalic presentation after successful ECV. There were 498 neonates included in the study and treatment for DDH was required in 35 (7.0%) neonates. The incidence of neonates treated for DDH born in cephalic presentation after successful ECV (2.8%) was significantly lower than the incidence of neonates treated for DDH born in breech presentation after unsuccessful ECV (9.3%). Multivariate analysis showed female gender (OR 2.8 (95% CI 1.2-6.4)) and successful external version (OR 0.29 (95% CI 0.09-0.95)) to be independently associated with the risk of DDH in breech presentation. Nevertheless, still a high percentage of neonates were treated for DDH after successful ECV. Based on these results we recommend the same screening policy for neonates born in cephalic position after successful ECV as for neonates born in breech position.

Chapter 7 presents a systematic review and meta-analysis on different aspects of breech presentation and its impact on the risk for DDH. We identified six studies that reported on three different aspects of breech presentation, breech presentation in premature neonates, breech presentation in multiple gestations and cephalic presentation after breech presentation with successful ECV. We included five cohort studies and one case-control study reporting on 38,604 neonates. One cohort study found the risk of DDH in premature breech neonates (2.3%) to be comparable to breech neonates born at term (1.8%), (OR 1.27, 95% CI 0.25-6.4). The incidence of DDH was significantly lower in neonates born in breech presentation from multiple gestation pregnancies compared to neonates born in breech presentation from singleton pregnancies (OR 0.08 (95% CI 0.01-0.57)). No significant difference was found in the incidence of DDH, for neonates born in breech presentation from multiple gestation pregnancies compared to neonates born in cephalic presentation from singleton pregnancies (OR 0.30 (95% CI 0.06-1.47)). No significant difference was found in the incidence of DDH between neonates born in cephalic presentation after successful ECV and neonates with persistent breech presentation (OR 0.81 (95% CI 0.08-8.7)).

In Chapter 8 we present a national survey in which we inquired the current practice for screening for DDH after

breech delivery or cephalic delivery after successful ECV in hospitals in the Netherlands. We sent an online questionnaire to one obstetric professional from all 92 hospitals in the Netherlands. A reminder was sent to non-responders after two and three months and the final response rate was 82%. ECV was performed in 100% of the responding hospitals and in 68% of the hospitals this was documented with a registration system. In 80% a paediatrician was consulted after breech delivery. In case of a cephalic delivery after successful ECV a paediatrician was consulted in 19% of the hospitals. In 87% of the hospitals neonates were referred for ultrasound examination of the hip after birth in breech presentation and in 27% of the hospitals this was done after birth in cephalic presentation after successful ECV. In this study we found a large practice variation in the screening for DDH in neonates born in breech presentation in hospitals in the Netherlands. This practice variation underlines the need for more knowledge on the subject, and the development of evidence based multidisciplinary national guidelines.

Chapter 9 contains a general discussion of the results described in this thesis, and implications for clinical practice and future research are given. ECV is an effective procedure to reduce the number of breech presentations at term. Our main finding was that, even if a fetus presents in cephalic presentation after successful ECV, the situation does not seem to be normalised. We found an increased risk of operative delivery in women after successful ECV, compared to women with a primary cephalic presenting fetus. Women should be counselled about the increased risk of operative delivery after successful ECV. Future research is necessary to be able to identify the women at risk, to guide us in the counselling and care for women after successful ECV. Breech presentation is strongly associated with DDH and the risk for DDH does not normalise after successful ECV. We advise that ultrasound screening should be offered to all neonates born after successful ECV. Currently, there is no evidence for the best screenings strategy for the detection of DDH. It is unclear whether clinical screening alone is sufficient, or in combination with selective or universal ultrasound assessment. With this thesis we provide evidence to help improve existing and develop new screening programmes for DDH. However, large randomized trials are necessary to evaluate the additional value of screening for DDH, and if so which screenings strategy is superior.