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## **Beyond successful external cephalic version**

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# General introduction

Chapter ↵



## Breech presentation

Breech presentation is defined as a fetus in longitudinal position with the buttocks or feet closest to the cervix. The incidence of breech presentation in singleton pregnancies decreases with advancing gestational age, from 25% prior to 28 weeks of gestation, to 3-4% for pregnancies at term.<sup>1</sup> It is hypothesized that adjusting to cephalic presentation is the result of an active process whereby a normally proportioned active fetus in a normal amount of amniotic fluid adopts to the best fit in the available uterine space. Multiple factors may cause a fetus to present in breech, including placenta praevia, maternal hypotheroidy, multiple gestation, uterine anomalies, fetal anomalies including anencephaly, neurologic impairment and prematurity.<sup>2</sup> Nevertheless, in approximately 85% of all term breech presentations, no aetiological explanation can be found.<sup>2</sup> Even in the absence of underlying fetal or maternal abnormality, both mother and fetus face an increased risk of a complicated delivery.

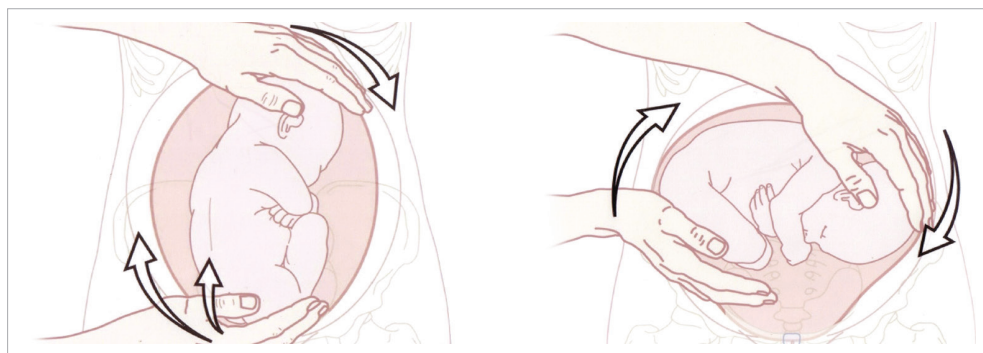
In 2000, the results of the Term Breech Trial were published. This study compared a planned vaginal delivery to a planned caesarean delivery, in women with a fetus in breech presentation.<sup>3</sup> The results of this study initially suggested that an elective caesarean section reduced morbidity and mortality among children in breech presentation, a result that fuelled a massive policy shift around the world. In the Netherlands, within months after publication the elective caesarean delivery rate in women with a fetus in breech presentation increased from 45% to 80%.<sup>4</sup> In other countries the elective caesarean rates increased even further, to a level up to 90% in the United Kingdom and Australia.<sup>5,6</sup> A follow-up study of the Term Breech Trial, after two years, showed no difference in risk of death or neurodevelopmental delay between children born after planned vaginal delivery and planned caesarean section. However, follow-up was incomplete as only 80% of neonatal outcome was known.<sup>7</sup>

## External cephalic version

External cephalic version (ECV) is a procedure aimed to manipulate the fetus, through the maternal abdomen, in such a way that it moves to cephalic presentation. It is an obstetric intervention that has proven to be successful in reducing the frequency of breech presentation at term.<sup>8</sup> It is thought that ECV has been practiced since the time of Aristotle (384 to 322 B.C.). The first publications on ECV appeared in 1807 by Justus Heinrich Wigand, a German gynaecologist, who practised the procedure during labour between contractions.<sup>9</sup> ECV became routine obstetrical practice and was mostly performed before term. During the mid-1970s the popularity of ECV declined, while there were concerns about the safety and effectiveness of the procedure, with high rates of spontaneous reversion.<sup>10</sup> ECV came back into favour in the early 1980s, after the first randomised controlled trials on the subject

had appeared.<sup>11,12</sup> A Cochrane review on ECV in term pregnancies, first published in 1996, demonstrated a significant reduction in the risk of caesarean delivery (OR 0.55, 95% CI 0.33-0.91).<sup>8</sup> Nevertheless, safety of the procedure remained an issue until the first reviews on ECV related complications appeared.<sup>13,14</sup> These reviews showed a significantly lower complication rate than what had been reported in studies around 1970, with the risk of an emergency caesarean section of 0.43%.<sup>13,14</sup> Nowadays, international guidelines recommend that all women with an uncomplicated breech presentation at term should be offered an ECV.<sup>15-18</sup> It is considered a safe procedure with few contraindications and low reported complication rates.<sup>19,20</sup> The most recent meta-analysis on ECV related complications, reported a complication rate of 0.24% for serious complications as placental abruption and stillbirth, and 0.35% for emergency caesarean section.<sup>20</sup> One study calculated ECV to be cost-effective when the probability of successful ECV was greater than 32%.<sup>21</sup> The primary aim of ECV is to achieve a vaginal delivery in cephalic presentation. However, there are studies that have reported an increased risk for caesarean section after successful ECV.<sup>21-24</sup>

Despite the advice of national guidelines, still not all women with an uncomplicated breech pregnancy at term undergo an ECV attempt. A recent conducted cluster randomised controlled trial in the Netherlands showed the implementation rate of ECV to be 72%.<sup>25</sup> The same authors tried to identify barriers for ECV in pregnant women and professionals. Among professionals the main barriers for ECV were a lack of knowledge and perceived skills to fully inform and counsel women on ECV.<sup>26</sup> Among pregnant women the main barriers for ECV were fear, expected pain, incomplete information and the preference of a planned caesarean delivery.<sup>26,27</sup> The reported success rate of ECV varies from 35% to 85%, with an average of 50%.<sup>8</sup> A more precise and individualised prediction could be helpful in the counselling of women for an ECV attempt. Especially because one of the barriers for pregnant women to undergo an ECV attempt is not being fully informed about the procedure.<sup>26</sup> There are several prediction models developed to predict the chance of successful ECV, but thus far none of the models have been externally validated.<sup>28-32</sup> External validation is a crucial step before a model can be implemented in clinical practice.<sup>33</sup>



Source: <http://juno-verloskunde.nl/641/>

# Developmental dysplasia of the hip

Developmental dysplasia of the hip (DDH) represents a spectrum of anatomical abnormalities in the shape, size and orientation of the femoral head, acetabulum or both. Historically the term used for this condition was the acronym congenital dislocation of the hip.<sup>34</sup> Clinical screening for neonatal hip abnormalities began in the 1950s and it was recognised that this condition was not always congenital. Replacement of the term “congenital” for “developmental” did not happen until the mid 1990s.<sup>35</sup> Nowadays the term developmental dysplasia of the hip (DDH) is routinely used. The precise definition of DDH is not well established and it has been defined in both clinical and imaging context. DDH covers a wide range of severity, ranging from minor dysplasia to irreducible dislocation.<sup>35</sup> DDH is the most common musculoskeletal disorder in the newborn, with an estimated incidence ranging from 1.4 to 35 cases per 1,000 live births, depending on the definition and population being studied.<sup>36,37</sup> This large range in incidence has probably more to do with how the disorder is defined, the diagnostic method and timing of evaluation, than the true population variance.<sup>38</sup> There are several screening strategies for detecting DDH in infants. While in some countries they have a universal ultrasound screening programme, others use a targeted ultrasound programme in which only children with known risk factors for DDH are screened. Unfortunately neither of these strategies has shown to improve clinical outcomes.<sup>38</sup> The current Dutch screening programme involves physical examination of all infants and additional ultrasound screening in case of abnormalities at physical examination or risk factors for DDH. Risk factors considered are a positive family history of DDH in first or second-degree relatives, a breech presentation or congenital postural or foot deformities.<sup>39</sup>

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.<sup>40-42</sup> However systematic knowledge about risk factors for DDH is lacking.

It is thought that the mechanical strengths that are placed on the neonatal hip by its position in utero causes the increased risk of DDH in breech presentation. Prolonged flexion of the hip joint with an extension of the knee joint pulls the femoral head downward and stretches the hip joint capsule, predisposing to hip instability, acetabular dysplasia, or both. Which might also explain why DDH is more common in breech presentation with extended knees.<sup>43,44</sup> When a successful ECV is performed and the fetus is in cephalic presentation, the fetus will not be exposed to these mechanical forces during the last weeks of gestation and delivery. With this theory, it can be expected that neonates born in cephalic presentation after successful ECV have a lower incidence of DDH. One observational study found different

fetal leg position between breech and cephalic fetuses already early in the third trimester. In this phase of the pregnancy the breech will not be engaged in the maternal pelvis in the majority of cases and movement restrictions are thought not to be significant.<sup>45</sup> These observations could also lead to the hypothesis that DHH is one of the causes of breech presentation, in which malfunction of the hip is the reason for these fetuses to remain in breech presentation. If this were to be the case, neonates after successful ECV will still have an increased risk of DDH.

# Aim of the thesis

The aim of this thesis was to answer the following questions:

- Can the outcome of external cephalic version be predicted?
- Is there an increased risk for caesarean section after external cephalic version resulting in cephalic presentation?
- Can factors be determined that predict the risk for caesarean section after successful external cephalic version?
- Which factors are associated with the risk for developmental dysplasia of the hip?
- What is the effect of successful external cephalic version on the incidence of developmental dysplasia of the hip in breech presenting fetuses?
- Are all breech presenting fetuses at risk for developmental dysplasia of the hip or are there exceptions?
- What is the current practice of post partum screening for developmental dysplasia of the hip in neonates born in breech presentation in Dutch hospitals?



# Outline of the thesis

In **chapter 2** we present the external validation of a prediction model to predict successful ECV. We evaluated the performance of the model with calibration and discrimination and we developed a score chart to calculate the probability of a successful ECV.

In **chapter 3** we describe the results of a meta-analysis that was performed to identify and quantify the risk of caesarean section and instrumental vaginal delivery after successful ECV.

In **chapter 4** we explore whether risk factors could be identified that predict the risk for caesarean section and instrumental vaginal delivery after successful ECV.

In **chapter 5** we systematically review the literature reporting on potential risk factors for DDH. We performed a meta-analysis to identify and quantify factors that are related to DDH in neonates.

In **chapter 6** we examine what the influence of successful ECV is on the incidence of DDH in breech presenting fetuses.

In **chapter 7** we systematically review the literature reporting on different aspect of breech presentation in relation to DDH.

In **chapter 8** we describe the results of a national survey on screening for DDH in breech presentation, in hospitals in the Netherlands.

In **chapter 9** we discuss the results of the studies presented in this thesis and give clinical implications and implications for future research in this field.

# References

- Hickok DE, Gorden DC, Milberg JA, Williams MA, Daling JR. The frequency of breech presentation by gestational age at birth: a large population based study. *Am J Obstet Gynecol* 1992;166:851-852.
- Rayl J, Gibson PJ, Hickok DE. A population-based case-control study of risk factors for breech presentation. *Am J Obstet Gynecol.* 1996 Jan;174(1 Pt1):28-32.
- Hannah ME, Hannah WJ, Hewson SA, Hodnett ED, Saigal S, Willan AR. Planned caesarean section versus planned vaginal birth for breech presentation at term: a randomised multicentre trial. Term Breech Trial Collaborative Group. *Lancet.* 2000;356:1375-83.
- Rietberg CC, Elferink-Stinkens PM, Visser GH. The effect of the Term Breech Trial on medical intervention behaviour and neonatal outcome in the Netherlands: an analysis of 35,453 term breech infants. *BJOG.* 2005;112:205-09.
- Bragg F, Cromwell DA, Edozien LC, GuroI-Urganci I, Mahmood TA, Templeton A, van der Meulen JH. Variation in rates of caesarean section among English NHS trusts after accounting for maternal and clinic risk: cross sectional study. *BMJ.* 2010 Oct 6;341.
- Sullivan EA, Moran K, Chapman M. Term breech singletons and caesarean section: a population study, Australia 1991-2005. *Aust N Z J Obstet Gynaecol.* 2009 Oct;49(5):456-60.
- Whyte H, Hannah ME, Saigal S, Hannah WJ, Hewson S, Amankwah K et al. Outcomes of children at 2 years after planned cesarean birth versus planned vaginal birth for breech presentation at term: the International Randomized Term Breech Trial. *Am J Obstet Gynecol.* 2004 Sep;191 (3):864-71.
- Hofmeyr GJ, Kulier R. External cephalic version for breech presentation at term. *Cochrane Database Syst Re.* 2012 Oct 17;10.
- McParland P, Farine D. External cephalic version. Does it have a role in modern obstetric practice? *Can Fam Physician* 1996 Apr;42:693-8.
- Bradley-Watson PJ. The decreasing value of external cephalic version in modern obstetric practice. *Am J Obstet Gynecol.* 1975 Oct 1;123(3):237-40.
- Hofmeyr GJ. Effect of external cephalic version in late pregnancy on breech presentation and caesarean section rate: A controlled trial. *Br J Obstet Gynaecol* 1983;392-99.
- Brocks V, Philipsen T, Secher NJ. A randomized trial of external cephalic version with tocolysis in late pregnancy. *Br J Obstet Gynecol* 1984;653-56.
- Zhang J, Bowes WA Jr, Fortney JA. Efficiency of external cephalic version: a review. *Obstet Gynecol.* 1993;82:306-12.
- Collaris RJ, Oei SG. External cephalic version: a safe procedure? A systematic review of version-related risks. *Acta Obstet Gynecol Scand.* 2004;511-18.
- ACOG Committee on Obstetric Practice. ACOG Committee opinion No. 340. Mode of term singleton breech delivery. *Obstet Gynecol.* 2006;108:235-7.
- Royal College of Obstetricians and Gynaecologists. Guidelines: External cephalic version and reducing the incidence of breech presentation (Guideline no.20a) dec 2006, update nov 2014.
- Royal Australian New Zealand Collage of Obstetricians and Gynaecologists. Management of term breech presentation. Guideline 2009.
- NVOG, Dutch Society of Obstetrics and Gynaecology. Richtlijn stuitligging. Guideline 2008.
- Rosman AN, Guijt A, Vlemmix F, Rijders M, Mol BW, Kok M. Contraindications for external cephalic version in breech position at term: a systematic review. *Acta Obstet Gynecol Scand.* 2013 Feb;92(2):137-42.
- Grootscholten K, Kok M, Oei SG, Mol BW, van der Post JA. External cephalic version-related risks: a meta-analysis. *Obstet Gynecol.* 2008 Nov;112(5):1143-51.
- Tan JM, Macario A, Carvalho B, Druzin ML, El-sayed YY. Cost-effectiveness of external cephalic version for term breech presentation. *BMC Pregnancy Childbirth.* 2010 Jan 21;10:3.
- Jain S, Mulligama C, Tagwira V, Guyer C, Cheong Y. Labour outcome of women with successful external cephalic version: a prospective study. *J Obstet Gynaecol.* 2010;30:12-6.

23. Vezina Y, Bujold E, Varin J, Marquette GP, Boucher M. Cesarean delivery after successful external cephalic version of breech presentation at term: a comparative study. *Am J Obstet Gynecol.* 2004;190:763-8.
24. Chan LY, Leung TY, Fok WY, Chan LW, Lau TK. High incidence of obstetric interventions after successful external cephalic version. *BJOG* 2002;109:627-31.
25. Vlemmix F, Rosman AN, Rijnders ME, Beuckens A, Opmeer BC, Mol BW, Kok M, Fleuren MA. Implementation of client versus care-provider strategies to improve external cephalic version rates: a cluster randomized controlled trial. *Acta Obstet Gynecol Scand.* 2015 Feb 12.
26. Rosman AN, Vlemmix F, Fleuren MA, Rijnders ME, Beuckens A, Opmeer BC, Mol BW, van Zwieten MC, Kok M. Patients and professionals barriers and facilitators to external cephalic version for breech presentation at term, a qualitative analysis in the Netherlands. *Midwifery.* 2014 Mar;30(3):324-30
27. Vlemmix F, Kuitert M, Bais J, Opmeer B, van der Post J, Mol BW, Kok M. Patient's willingness to opt for external cephalic version. *J Psychosom Obstet Gynaecol.* 2013 Mar;34(1):15-21.
28. Burgos J, Cobos P, Rodriguez L, et al. Clinical score for the outcome of external cephalic version: a two-phase prospective study. *Aust N Z J Obstet Gynaecol.* 2012;52(1):59-61.
29. Kok M, van der Steeg JW, van der Post J a M, Mol BWJ. Prediction of success of external cephalic version after 36 weeks. *Am J Perinatol.* 2011;28(2):103-10.
30. Lau TK, Lo KW, Wan D, Rogers MS. Predictors of successful external cephalic version at term: a prospective study. *Br J Obstet Gynaecol.* 1997;104(7):798-802.
31. Newman R, Peacock B, VanDorsten P, Hunt H. Predicting success of external cephalic version. *Am J Obstet Gynecol.* 1993;169:245-249.
32. Wong WM, Lao T, Lai K. Predicting the Success of External Cephalic Version with a Scoring System. *J Reprod Med.* 2000;45:201-206.
33. Moons KG, Kengne AP, Grobbee DE, Royston P, Vergouwe Y, Altman DG, Woodward M. Risk prediction models: II External validation, model updating, and impact assessment. *Heart* 2012;98:691-698.
34. Klisic Pj. Congenital dislocation of the hip- a misleading term: brief report. *J Bone Joint Surg Br.* 1989;71:136.
35. Aronsson DD, Goldberg MJ, Kling TF Jr, Roy DR. Developmental dysplasia of the hip. *Pediatrics.* 1994 Aug;94(2 Pt 1):201-8.
36. Dezateux C, Rosendahl K. Developmental dysplasia of the hip. *Lancet* 2007;369(9572):1541-52.
37. Bialik V, Bialik GM, Blazer S, Sujov P, Wiener F, Berant M. Developmental dysplasia of the hip: a new approach to incidence. *Pediatrics* 1999;103(1):93-9.
38. Shorter DH, T. Osborn DA. Screening programmes for developmental dysplasia of the hip in newborn infants. *Evid Based Child Health.* 2013 Jan;8(1):11-54
39. Roovers EA, Boere-Boonekamp MM, Castelein RM, Zielhuis GA, Kerkhoff TH. Effectiveness of ultrasound screening for developmental dysplasia of the hip. *Arch Dis Child Fetal Neonatal Ed.* 2005 Jan;90(1):F25-30.
40. Lehmann HP, Hinton R, Morello P, Santoli J. Developmental dysplasia of the hip practice guideline: technical report. Committee on Quality Improvement, and Subcommittee on Developmental Dysplasia of the Hip. *Pediatrics* 2000;105:E57.
41. Shipman SA, Helfand M, Moyer VA, Yawn BP. Screening for developmental dysplasia of the hip: a systematic literature review for the US Preventive Services Task Force. *Pediatrics* 2006;117:e557-76.
42. Chan A, McCaul KA, Cundy PJ, Haan EA, Byron-Scott R. Perinatal risk factors for developmental dysplasia of the hip. *Archives of Disease in Childhood Fetal and Neonatal Edition* 1997;76:94-100.
43. Suzuki S, Yamamuro T. Correlation of fetal posture and congenital dislocation of the hip. *Acta Orthop Scand.* 1986;57:81-84.
44. Clausen I, Nielsen KT. Breech position, delivery route and congenital hip dislocation. *Acta Obstet Gynecol Scand.* 1988;67:595-597
45. Fong BF, Savelsbergh GJ, de Vries JJ. Fetal leg posture in uncomplicated breech and cephalic pregnancies. *Eur J Pediatr* 2009 Apr;168(4):443-7



