Management of preterm delivery in women with abnormal fetal presentation
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General Introduction

Preterm birth is a major contributor to perinatal morbidity and mortality[1]. It occurs in 7.7% of the pregnancies in the Netherlands and affects around 12,000 pregnancies per year. [2] Preterm birth is defined as a delivery before 37 weeks of gestation and further divided into moderate preterm birth (between 32-37 weeks) and very preterm birth (before 32 weeks). In preterm birth, fetal malpresentation occurs more frequently than in term births.

Breech presentation is defined as a fetus in longitudinal lie with the buttocks or feet closest to the cervix. The incidence decreases with advancing gestational age from 25% at 26 weeks, 15% at 32 weeks, to 3 to 4% in term pregnancy.[3] The optimal mode of delivery in breech presentation is subject of debate. The Term Breech Trial showed that an intended caesarean delivery is safer in terms of combined short term morbidity and mortality for term breech presentation.[4] The findings of the Term Breech Trial have led to a worldwide shift towards an intended caesarean delivery. In The Netherlands the overall caesarean section rate in term breech presentation increased from 50% to 80% within three months after publication of the trial.[5] Still, 40% of the women with a term breech presentation in The Netherlands attempt a vaginal birth. It is unclear whether the Dutch management of this clinical obstetric issue is justified, and how this relatively large proportion of women is being selected for a vaginal breech delivery. The question is whether there is a favourable profile based on patient characteristics such as parity, onset of labour, type of breech presentation that can identify women with a low risk of poor perinatal outcome during planned vaginal delivery as compared to planned caesarean delivery.

For women with a preterm delivery knowledge on the optimal mode of delivery in case of breech presentation is limited, while the incidence of breech presentation in these women is much higher [6-14]. In the past, several randomized controlled trials have been started on this subject, but they have all been preliminary stopped due to recruitment difficulties [15-19]. The difficulty in recruiting women in a study concerning this topic lies in the fact that women have to be recruited during labour, obstetricians may not feel skilled in performing preterm vaginal breech deliveries anymore and women tend to accept a chance of personal risk to herself in the hope it may help her infant [20]. Subsequently, randomized controlled trials on the mode of delivery of the preterm breech presentation were unable to include enough women to draw meaningful conclusions about the optimal intended mode of delivery. This was also the conclusion of the Cochrane review on this subject by Alfirevic et al. [21].
As the preterm fetus has a relative bigger size of the fetal head as compared to the rest of the body, one could argue that there might be an increased risk of mechanical problems during vaginal birth thus making a caesarean delivery a safer mode of delivery in case of preterm breech delivery. Arguments against a preterm caesarean section are the timing of the delivery and general objections such as an increased risk of maternal morbidity, risks for future pregnancies and costs. More women will have a scarred uterus in the subsequent pregnancy, which might lead to complications in the subsequent pregnancy. Moreover, neonatal respiratory distress syndrome occurs more frequently after caesarean section compared to vaginal delivery. [22] A final argument against a planned caesarean delivery is that in women with threatened preterm delivery the exact moment of delivery is sometimes difficult to predict, thus implicating that a caesarean section might sometimes be performed too early, an event that is not the case for vaginal delivery. A preterm vaginal delivery occurs only when further delay of pregnancy was either not indicated or not possible.

The same issue on the optimal mode of delivery as mentioned above occurs in women with a twin pregnancy. Twin pregnancy occurs in 1.7% of all pregnancies in the Netherlands [5].

The Twin Birth study, a large multicenter randomized controlled trial, showed that planned caesarean section did not reduce the risk of fetal or neonatal death or serious morbidity as compared with planned vaginal delivery in twin pregnancies with the first twin in cephalic position beyond 32 weeks gestation. The risk of adverse neonatal outcome was higher for the second twin than for the first twin, however planned caesarean section did not reduce this risk. There was no difference in adverse maternal outcome between women with a planned caesarean section and a planned vaginal delivery [25]. An important comment on this study by GC Smith was that almost 50% of the women delivered preterm (32-37 weeks of gestation). Many of the primary outcomes (fetal or neonatal death or serious neonatal morbidity) in both groups of the study would have been related to preterm birth and were unlikely to be preventable by caesarean delivery [26]. In a previous study of data from England, Northern Ireland, and Wales, an analysis of 10 years of data on women with a twin pregnancy concluded that the major determinant of neonatal death was the degree of prematurity, and that the small additional risk associated with vaginal delivery was observed only at term [27].

A recent study of Roberts et al on perinatal outcome in twin pregnancy at and near term (36 weeks of gestation) showed that compared with prelabour caesarean, twins born after labour (vaginal delivery and emergencys caesarean section) have an increased risk of hypoxia related complications (0.08% versus 0.75%, RR 0.10, 95% CI 0.04-0.26); furthermore, the second twin had a significantly increased mortality up to 5 years of age after an intended vaginal delivery (0.16% versus 0.14%, RR 0.41, 95% CI 0.20-0.83) [28]. However, the absolute mortality rate is low in term twin pregnancies and needs to be balanced against maternal morbidity.

Recently, a study was published on the optimal mode of delivery in preterm twin pregnancy [29]. However, this study was limited to very preterm twins with the first child in cephalic presentation. Neonatal death for the first twin was 5.2% in the planned vaginal delivery group and 6.3% in the planned caesarean delivery group (aOR 0.78; 95% CI 0.71-3.68) and 3.2% versus 6.3% for the second twin (aOR 0.44, 95% CI 0.12-1.66). Composite severe neonatal morbidity for the first twin was 32% in planned vaginal delivery and 35% in planned caesarean delivery (aOR 0.71, 95% CI 0.36-1.44) and for the second twin 23% versus 29% respectively (aOR 0.56, 95% CI 0.16-1.98).

The conclusion of this study was that a policy of planned vaginal delivery of very preterm twins with the first twin in cephalic presentation does not increase neonatal mortality or severe neonatal morbidity, maternal morbidity was not reported in this study [30].

Triplet pregnancies occur in approximately 0.03% of all pregnancies in the Netherlands, thus concerning 45 to 50 women with a triplet pregnancy per year [5]. In women with a triplet pregnancy, the incidence of overall preterm deliveries is approximately 90%; with a risk of extreme preterm birth < 28 weeks and very preterm birth (28-32 weeks) 13-fold and almost 20-fold, respectively, when compared to singletons [31]. In women with a triplet pregnancy, the preferred mode of delivery has not yet been determined. In an effort to minimize intrapartum fetal complications, there has been a tendency to deliver triplets by the caesarean route [32].

The incidence of multiple pregnancies has increased over the past 20 years by approximately 80%, largely because of the growing use of assisted reproductive technologies and the increase in average maternal age at first childbirth [24]. This makes the issue on the optimal mode of delivery in multiple pregnancies an important topic.

In determining the optimal mode of delivery for women with a preterm breech, twin or triplet pregnancy we have to take into account possible future pregnancies, although this a difficult question in women who have a sudden preterm delivery. The responsible obstetrician has to counsel women on the mode of delivery of the preterm breech, twin or triplet pregnancy and also has to pay attention to a possible subsequent pregnancy.
Aim of the thesis

The aim of the thesis was to answer the following questions.

1. What is the optimal mode of delivery in preterm breech presentation?
2. Does an intended caesarean section reduce the risk of perinatal mortality and morbidity as compared to intended vaginal delivery in preterm breech presentation?
3. What is the effect of the mode of delivery in preterm breech presentation on perinatal and maternal outcomes in the subsequent pregnancy?
4. What is the effect of the increased elective caesarean delivery rates for term breech presentation on maternal and neonatal outcome?
5. Does a planned caesarean section improve perinatal outcome in women with twin pregnancy and a very preterm delivery as compared to planned vaginal delivery?
6. Does a caesarean section reduce the risk of adverse perinatal outcomes in women with a triplet pregnancy?

Outline of the thesis

For the majority of the studies described in this thesis we were allowed to use the data of the Netherlands Perinatal Registry (PRN). The PRN consists of population-based data containing information on pregnancies, deliveries and (re)admissions until 28 days after birth. The PRN database is obtained by a validated linkage of three different registries: the midwifery registry (LVR1), the obstetrics registry (LVR2) and the neonatology registry (LNR) of hospital admissions of newborns. [33] The coverage of the PRN registry is about 96% of all deliveries in the Netherlands.

Part I reports on studies concerning neonatal and maternal outcome related to the mode of delivery in (pre)term breech presentation.

In chapter 2 we describe the results of a systematic review and meta-analysis of the available cohort studies on preterm breech presentation according to the mode of delivery. We identified seven articles reporting on 3,557 women that met the eligibility criteria.

Chapter 3 contains the results of a nationwide cohort study in the Netherlands in which we compared perinatal morbidity and mortality according to the intended mode of delivery as well as the actual mode of delivery in women with a preterm breech delivery. We identified 8,356 women who delivered between 2000 and 2011 preterm (26-37 weeks of gestation) in breech presentation.

In chapter 4 we describe the results of a nationwide cohort study on the effect of the intended mode of delivery in preterm breech presentation on the subsequent pregnancy. We identified 1,543 women with a preterm breech delivery and a subsequent delivery in the years 1999-2007. We compared perinatal outcome in both pregnancies according to the intended mode of the index pregnancy (preterm breech delivery).

Chapter 5 describes the effect of the increased caesarean section rate on perinatal mortality and morbidity in women with a term breech delivery in a nationwide retrospective cohort study in the years 1999-2007. We studied 58,320 women with a term breech delivery. Furthermore this study describes whether a favourable profile for women with an intended vaginal delivery can be identified.

Part II contains studies that report on neonatal and maternal outcome related to the mode of delivery in preterm delivery of multiple pregnancies.

Chapter 6 contains the results of a nationwide cohort study on the mode of delivery in 1,655 women with a twin pregnancy and a very preterm delivery (<32 weeks of gestation) in terms of perinatal and maternal outcome in the years 2000-2010 in the Netherlands. Perinatal outcomes were paired taking into account the dependency between the children of the same twin pregnancy and were also analysed for each child separately.

In chapter 7 we study the effect of the mode of delivery on perinatal outcome in women with a triplet pregnancy. We identified therefore all women with a triplet pregnancy who delivered in the years 1998-2008 in the Netherlands, which resulted in a study on 386 women with a triplet pregnancy. We analysed perinatal outcome according to the intended mode of delivery as well as the actual mode of delivery.

In chapter 8 we summarise the results of the studies presented in this thesis and give clinical implications and implications for future research in this field.
References


3. NVOG guideline “term breech pregnancy” www.nvog.nl/nl/nl


5. LVR data (nationwide perinatal database in The Netherlands)


