Twin Birth Considering the Current Results of the "Twin Birth Study"

Zwillingsgeburt angesichts der aktuellen Ergebnisse aus der „Twin Birth Study"

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Key words
- Twin Birth Study
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Abstract

The rate of caesarean sections in multiple births has grown sharply worldwide. The reason for this may be the results of large retrospective cohort studies from the 1990s, which displayed an increased risk of mortality and morbidity, especially for the second twin, in the case of vaginal births. Multiple monocentric analyses have not been able to confirm this. As a prospective, multicentre randomised study, the Twin Birth Study published in 2013, in which 105 clinics in 25 countries took part, showed that, under optimum conditions, there was no difference in neonatal and maternal mortality and morbidity if the birth was planned to be vaginal or via caesarean. Detailed analyses, which would be helpful in choosing the type of birth method and obstetric management in the event of vaginal birth, have not previously been published. Retrospective studies must be referred to for this.

Zusammenfassung

Die Sectiorate bei Geminigeburten ist weltweit steil angestiegen. Der Grund dafür dürften die Ergebnisse großer retrospektiver Kohortenstudien aus den 90er-Jahren sein, die ein erhöhtes Mortalitäts- und Morbiditätsrisiko, insbesondere für den 2. Zwilling bei vaginaler Geburt gezeigt haben. Mehrere monozentrische Analysen konnten dies nicht bestätigen. Als prospektive multizentrische randomisierte Studie zeigt nun die 2013 publizierte Twin Birth Study, an der 105 Kliniken in 25 Ländern teilnahmen, dass unter optimalen Bedingungen kein Unterschied in der neonatalen und mütterlichen Mortalität und Morbidität besteht, wenn die Geburt vaginal oder als Kaiserschnitt geplant war. Detaillierte Analysen, die hilfreich für die Wahl des Geburtsmodus und das geburtshilfliche Management bei vaginaler Geburtsleitung wären, sind bisher nicht veröffentlicht. Hier muss man sich weiter an retrospektiven Studien orientieren.

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Bibliography
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Introduction

The global increase in caesarean section rates is a result of not only elective C-sections, but also an increase in defensive behaviour on the part of obstetricians should birth pathology be indicated. These include anomalous presentations and twin births, whereby the increase in C-section rates is particularly evident. In case of breech births a negative position towards the vaginal mode of delivery is encouraged by the Term Breech Trial – better known as Hannah Study [1] – which reported an improved fetal outcome by means of planned cesarean section compared to planned vaginal delivery. Since then, the results of this study have been methodically called into question on multiple occasions or reduced to absurdity [2–4] and contested by many studies, leading to the ACOG reviving the vaginal method of delivery in 2006, under the requirement of careful risk selection and clarification [5]. Nevertheless, the C-section rate for breech presentations is still above 90%. A similar trend can be seen with twin pregnancies. In the USA, this has been reflected in an increase in the frequency of C-sections for twins from around 55% in 1995 to over 75% in 2008 [6]. In Germany, an analysis of perinatal surveys in Hesse from 1990 to 2012 displayed a considerable increase in caesarean rates in twins, which primarily affects multiple births after the 32nd week of pregnancy [7]. Between the 32nd and 36th weeks, around 60% of twins in 1990 were born through caesarean section, with this figure rising to 77% in 2012. For gestational ages over 36 weeks, the C-section rate increased from 40 to almost 70%. In a Dutch cohort, however,

the rate of elective caesarean sections more than doubled in twins from the 32nd week of pregnancy from 17.7 to 36.8% without neonatal morbidity having improved [8]. This study considers a large, recently published, multi-centre, prospective randomised study in the context of the literature and own experiences.

Previous Studies

The increasing preference for abdominal delivery was triggered or at least encouraged by retrospective cohort studies from the past decade, which attested an increased risk of mortality for the second child, primarily in connection with vaginal childbirth. Based on data from the 1980s and 1990s. Smith et al. 2005 [9] analysed a Scottish cohort of 8073 twin births from 1987 to 2001 with a gestational age of at least 36 weeks and counted six intranatal or neonatal cases of death for the first twin and 30 cases of death for the second twin. There was a lower risk of mortality for both twins in planned C-sections than with vaginal births (0.14% vs. 0.52%; p = 0.005, OR 0.26; 95% CI 0.03–1.03). In 2002, the same authors described 23 cases of death for the first twin and 23 cases of death for the second twin out of 1438 pairs of twins who were not born by planned C-section before the 36th complete week of pregnancy in Scotland between 1992 and 1997 [10]. In comparison, there were no cases of death for the first twin, but nine cases of death for the second twin in a cohort of 2436 pairs of twins after the 36th week of pregnancy. Five of these were a result of mechanical problems in the development of the second twin. A further retrospective cohort study by the same main authors from England, Northern Ireland and Wales on 1377 twin pregnancies between 1994 and 2003 with the intranatal and postnatal death of one twin displayed no association between birth order and mortality risk of the total collective, but did display an increased risk of mortality for the second twin compared to the first from the 36th week of pregnancy (p < 0.001, OR 2.3; 95% CI 1.7–3.2). The trend primarily displayed a higher risk of mortality due to anoxia for the second twin in vaginal births compared to caesarean section [11]. In comparison, a retrospective cohort study from the USA [12] based on data from 128219 twin pregnancies between 1995 and 1997 describes a rate of mortality for the second twin of 2.05% for vaginal delivery compared to 1.69% for C-section before the 36th week of pregnancy, with an OR of 1.84 (95% CI 1.58–2.13) and a mortality rate of 0.11% for vaginal delivery and 0.07% for C-section from the 36th week of pregnancy (OR 1.35; 95% CI 0.83–2.23). The risk of neonatal mortality due to asphyxia in the entire cohort totalled 0.06% for vaginal delivery compared to 0.04% for caesarean sections (OR 1.47; 95% CI 0.84–2.57) and at 0.29%, was the highest when the second twin was delivered via C-section after the first twin was born via vaginal birth (OR 7.75; 95% CI 4.0–14.9).

Within the same cohort, Yang et al. 2006 analysed the neonatal mortality and morbidity risks of 86041 pairs of twins – both in cephalic presentation – with regard to method of delivery and birth weight [13]. There was a significantly higher level of mortality for the second twin for birth weights of higher than 2500 g when they were delivered via C-section following the vaginal birth of the first twin (0.9 vs. 0.08% for the vaginal birth of both children and 0.03% in the case of caesarean section for both children [reference] OR 30.29, 95% CI 11.22–95.31). A lower Apgar Score (< 4 after five minutes) was also significantly more frequent (1.2 vs. 0.18 vs. 0.12%; OR 10.13; 95% CI 5.16–19.55). This was not of significance in weight classes under 2500 g. A Canadian retrospective study from 2006 [14] analysed a cohort in Nova Scotia comprising 1542 twin births from 1988 to 1992. There was a significantly higher overall morbidity for the second twin than the first twin. According to a retrospective Swedish analysis [15] based on 30047 twin births between 1980 and 2004, the rate of second twins with a 5′ Apgar Score < 7 and neonatal mortality after caesarean section delivery was significantly lower than following vaginal birth in a gestational age of under 34 weeks of pregnancy (5.4 vs. 12.2%; p < 0.001; OR 0.46; 95% CI 0.27–0.79 or 2.1 vs. 9%, p = 0.014; OR 0.40; 95% CI 0.17–0.95). After the 34th week of pregnancy, the neonatal mortality was the same for each mode of delivery: 0.1 vs. 0.2% OR 042 95% CI 0.10–1.79. 5′ Apgar Score under 7 was significantly lower after C-section at 1.4% than after vaginal birth at 2.6% (OR 0.5; 95% CI 0.34–0.73).

In comparison to these large cohorts, smaller studies at individual centres with defined obstetric management showed other results. In a mono-centric retrospective cohort in Paris of 758 twin births after the 35th week of pregnancy and with the first twin in the cephalic presentation, there was no difference in mortality and morbidity found between twins born through vaginal delivery (n = 657) or C-section (n = 101) as planned in advance (4.7 vs. 5%), neither for the second nor the first twin [16].

Based on our own data from St. Hedwig Clinic in Regensburg, the Institute of Gynaecology and Obstetrics of the University of Regensburg, we compared the pH difference in the cord blood between the first and second twin for vaginal births, elective and compelled C-section as well as vaginal-operative delivery in 698 births, and on average found twice as high a pH difference following vaginal birth as following caesarean section [17] (**Fig. 1**). pH values under 7.0 were found in seven cases overall and exclusively in the second twin, three of which were in the case of vaginal birth, three in compelled C-section and one case in elective C-section.

The most recent meta-analysis of the neonatal outcome of twins depending on the order, the birth presentation and the method of delivery comprised eighteen studies with a total of 39571 pairs of twins [18] and confirmed lower neonatal morbidity and mortality for the first compared to the second twin (3.0 vs. 4.6%; p < 0.001; OR 0.53; 95% CI 0.39–0,70 or 0.3 vs. 0.6%; p = 0.02; OR 0.55; 95% CI 0.38–0.81). There was no difference in morbidity found between twins in cephalic presentation and non-cephalic presentation, for the first nor the second twin, nor was there any difference between whether the planned method of delivery was vaginal or via C-section. Only in the case of caesarean section following the vaginal birth of the first twin was the neonatal morbidity of the second twin significantly higher compared to vaginal birth and planned C-section (19.8 vs. 9.5 vs. 9.8%, p < 0.0001).

The Twin Birth Study

The contradictory study results prompted the Canadian research group at the Sunnybrook Research Institute in Toronto to carry out a multi-centre, prospective, randomised study with the objective of comparing planned vaginal birth with planned C-section in terms of maternal and child mortality and morbidity. Between 2003 and 2011, at 106 centres in 25 countries, 2804 pregnant women between the 32nd and 39th weeks of pregnancy with diamnotic twin pregnancy and the first twin in cephalic presentation were recruited, with 1398 of these being randomised into a group with planned caesarean section and 1406 being randomised into a group with planned vaginal delivery. Primary

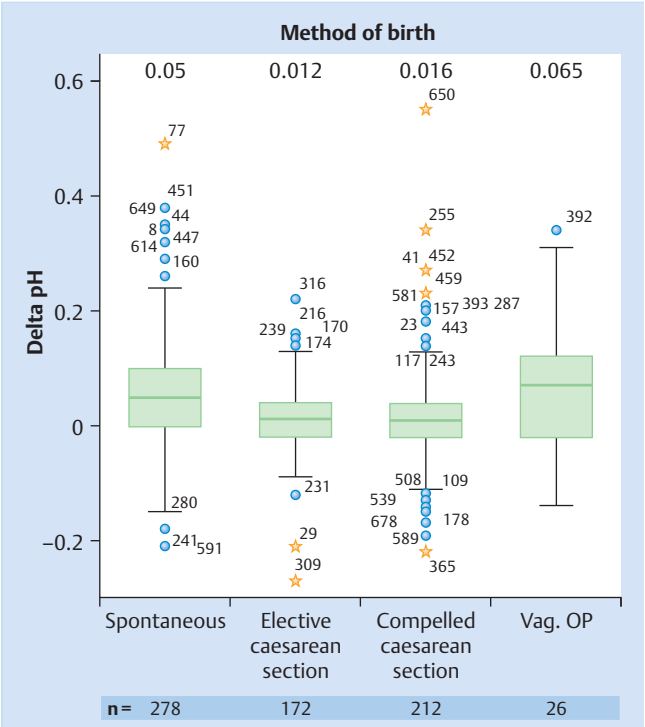

Fig. 1 Average Na pH difference between twin 1 and twin 2 in relation to method of birth: spontaneous vs. elective C-section: $p < 0.001$, spontaneous vs. compelled section: $p < 0.001$, section vs. vag. op.: $p < 0.001$, elective vs. compelled section: $p > 0.05$. The figures are outlier numbers. Data from St. Hedwig Clinic – Regensburg, Institute of Gynaecology and Obstetrics of the University of Regensburg, 2000–2008 [17].

Table 1 Morbidity criteria in the Twin Birth Study.

Children	Mother
Childbirth-related injuries:	Haemorrhaging
▸ Bone fractures, facial paresis	▸ Blood loss > 1 500 ml, transfusion
▸ Intracerebral haemorrhage	▸ Curettage
5 min Apgar Score < 4	▸ Laparotomy
Abnormal consciousness:	Genital injury
▸ Coma, stupor, pain reaction	3rd/4th grade perineal laceration
▸ Hypersensitivity, drowsiness, lethargy	Thrombosis
	Infection
Convulsions within 72 hours	Wound infection
Ventilation > 24 hours	Wound dehiscence
Sepsis within 72 hours	Serious illness
NEC	▸ Acute respiratory insufficiency, DIC, amniotic fluid embolism
PVL	▸ Constipation, paralytic ileus

Table 2 Caesarean section rates and maternal and child mortality/overall morbidity in the event of planned C-section and planned vaginal birth.

	Planned caesarean section	Planned vaginal birth
Mothers	1398	1406
C-section rate (both twins)	89.9%	39.6%
Caesarean section for the second twin following the vaginal birth of the first twin	0.8%	4.2%
Maternal mortality/overall morbidity	7.3%	7.8%
	p = 0.29	
Children	2783	2782
Child mortality/overall morbidity	2.2%	1.9%
	p = 0.49	

outcome criteria included neonatal mortality within the first 27 days as well as overall morbidity (**Table 1**). Overall morbidity and maternal mortality were assessed within 28 days following birth (**Table 1**). The results were published in the New England Journal of Medicine in 2013 [19].

Close to 90% of pregnant women from the planned C-section group delivered via caesarean section. In 9.3% of cases, both twins were delivered vaginally and in 0.8% (n = 11) of cases, the second twin was delivered via C-section following the vaginal birth of the first twin. The caesarean birth of the second twin following the spontaneous birth of the first child was defined in the records of the planned C-section group, when they were not logistically feasible. In the group of vaginally planned twin births, both twins were born via the birth canal in 56.2% of cases; in 39.6% of cases both were born by C-section and in 4.2%, the second twin was delivered via C-section after the vaginal birth of the first. There was no significant difference in the mortality and overall morbidity of mothers and children in both groups at 7.3 vs. 8.5% (p = 0.29; OR 0.86; 95% CI 0.65–1.13) and 2.2 vs. 1.9% (p = 0.45; OR 1.16; 95% CI 0.77–1.74) (**Table 2**). A stratification based on parity, gestational age in randomisation, presentation of the second twin and chorionicity also had no influence on this result. Regardless of the delivery method, the overall risk of morbidity was significantly higher for the second twin than the first ($p < 0.001$, OR 1.9; 95% CI 1.34–2.69). As a conclusion, it arises that, under optimum conditions, the vaginal delivery of twins with the second in cephalic presentation can proceed without increased risk. Based on the treatment protocol, the following requirements must be met for the study:

- Ultrasound examinations at least every four weeks,
- CTG controls or biophysical profile up to twice per week where necessary,
- C-section possible within 30 minutes,
- Anaesthesia, obstetricians and health care staff present in the clinic in the event of vaginal delivery,
- ongoing CTG.

In this study, particular importance was attached to childbirth being guided by an experienced obstetrician with proven expertise in vaginal twin birth obstetrics, a prerequisite which its critics felt was not sufficiently met in the Term Breech Trial from 2000 at the same Canadian research institute [3,4].

The result of the Twin Birth Study therefore was hardly surprising to those who deliver twins vaginally under the above conditions. However, important questions in this large-scale study, which was published in a high-ranking publication, have not yet been answered:

Influence of Presentation

A more recent Cochrane Review from 2011 [20] identified only one randomised study with a mere 60 twin pregnancies [21]. This had not reported any significant differences in morbidity in newborns based on planned C-section vs. planned vaginal birth, particularly with regard to the second twin being in breech pre-

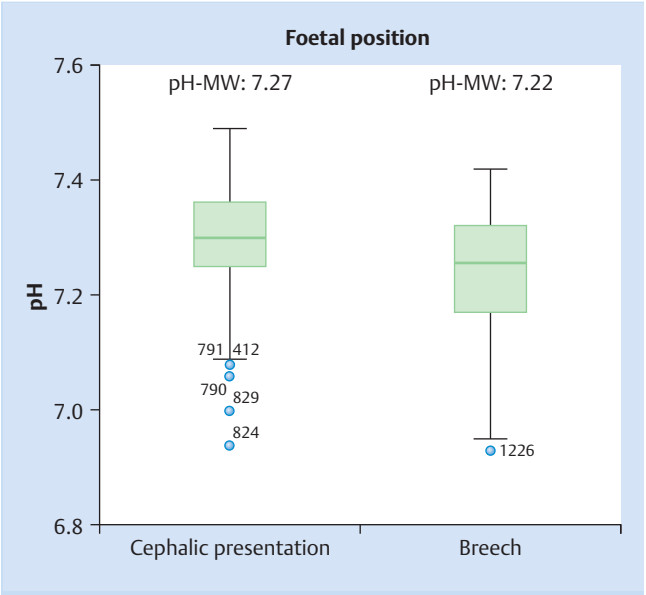

Fig. 2 Average Na pH of the second twin related to its position. Cephalic presentation n = 220, Breech n = 70, p < 0.0001 [17].

sentation. The most recent review from 2012 [22], which considered the same prospective study as well as sixteen observational studies with 3,167 pairs of twins, could not display any significant benefit of a C-section for twins not in cephalic presentation with regard to neonatal mortality and morbidity based on a lower Apgar Score. Most recent retrospective studies state there is no advantage to be found in elective C-section over vaginal delivery in the case of twin births in which the first twin is in cephalic presentation and the second is not in cephalic presentation [23–25]. According to an American and a Danish study, there is a two-fold [26] or four-fold [27] increase in risk for the second twin being born via C-section following the vaginal birth of the first child if it is not in cephalic presentation. In the Danish study, the neonatal risk of morbidity of these combined deliveries measured at an Apgar Score < 8 and a cord pH of under 7.1 was significantly higher compared to the vaginal delivery of the second twin not in cephalic position (OR 6.2; 95% CI 2.1–18).

A subgroup analysis based on presentation had no influence on results in the Twin Birth Study. The authors admit that sufficient statistical power was not achieved in their subgroup analyses. 39% of the 1,391 second twins in the planned C-section group were not in cephalic presentation and 36.4% of the 1,393 second twins in the planned vaginal birth group were not in cephalic presentation. The statistics presented do not state how many of the planned vaginal births resulted in a C-section being carried out for the second twin in breech or transverse presentation, or how many caesarean sections had to be performed for the second twin in cephalic presentation.

The statement that there is no difference between planned C-section vs. planned vaginal delivery independently from the presentation of the second twin, therefore must be qualified, as there is a lack of detailed information on this subgroup.

In our own analysis, the average cord artery pH (Na pH) of the second twin was significantly lower in the event of vaginal delivery from breech presentation than cephalic presentation (p = 0.0008) (**Fig. 2**) [17].

Significant requirements for the vaginal delivery of the second twin from breech or transverse presentation include the experience of the obstetrician in external and internal turning manoeuvres and vaginal breech presentation obstetrics including the entire extraction. Due to the publication of the TBT, this may have decreased significantly, as fewer and fewer vaginal breech presentation births are taking place and taught in fewer and fewer clinics. In the Netherlands, for example, the rate of C-sections for breech births increased dramatically from 57.4% in 2000 to over 80% in 2001 [28]. This results in fewer and fewer opportunities for training in obstetric manoeuvres to be provided to obstetricians in training, which must also be mastered for twin births. The lack of obstetric expertise is reflected in the initially described rise in caesarean section rates for twin births. A further increase is inevitable if manual obstetrics falls by the wayside.

It was astounding that there were 92 twin births in the Twin Birth Study where the first twin was not in cephalic presentation, with 51 in the group with planned C-section and 41 in the group with planned vaginal birth. Based on the protocol of the study, these should not have been included. The study does not provide any further information on this subgroup. We would have to refer to a few retrospective studies for the method of birth for the following twin in breech presentation, the majority of which were not able to evince any advantages for C-section over vaginal birth in terms of perinatal morbidity and mortality [29–34]. Only one study from Beirut [35], with 35 vaginal and 95 abdominal twin deliveries with the second twin in breech presentation, due to a traumatic growth of the first child with spinal fractures, and its immediate death, came to the conclusion that delivery via C-section is safer. The largest multi-centre study in terms of numbers by Blickstein from the year 2000 [30] analysed 613 twin deliveries with the second twin in breech position from 13 centres with vaginal (n = 239) vs. abdominal delivery (n = 374). For children under 1500 g, there was no difference in mortality and morbidity based on a 5′ Apgar Score under 5. Nonetheless, the proportion of nulliparae in the vaginal birth group was significantly lower than in the C-section group. For children under 1500 g, there were significantly more low 5′ Apgar Scores following vaginal birth than after C-section (36.8 vs. 19.6%; p = 0.006, OR 2.4; 95% CI 1.2–4.7) and a significantly higher level of neonatal mortality (44.7% vs. 7.8%; p < 0.001, OR 9.5 95% CI 4.0–23.4). A dual-centre French study compared 71 planned C-sections with 124 planned vaginal births in terms of perinatal mortality, cord pH values under 7.1, 5′ Apgar Score < 7, transfer to Intensive Care and birth trauma, and found no significant difference between the two groups [31].

Influence of Chorionicity

During pregnancy, monochorionic-diamniotic twins had more than double the risk of intra-uterine foetal death than dichorionic twins due to specific risks such as fetofetal transfusion syndrome, with morbidity and the risk of CNS damage being significantly increased [36,37].

In the case of a monoamniotic twin pregnancy, due to the drastically increasing risk of IUFD from the 33rd week of pregnancy [38], there is a broad consensus that these pregnancies should be completed electively through caesarean section at this time due to the risk of cord complications. In the event of diamnotic twin pregnancies, based on a meta-analysis from 2005, the risk

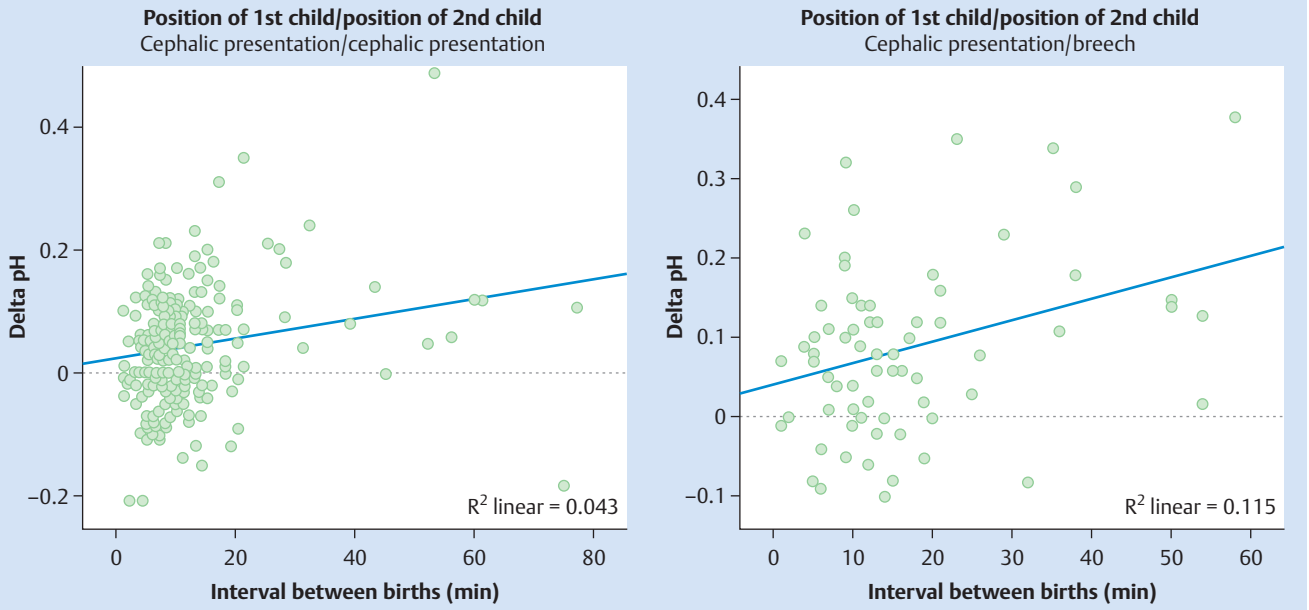

Fig. 3 Na pH difference depending on the birth interval in vaginal twin births with cephalic/cephalic (n = 220) vs. cephalic/breech (n = 70).

of intrauterine foetal death increases between the 36th and 38th weeks of pregnancy[39].

Intrapartal complications due to acute fetofetal transfusion [40] and premature placental abruption is discovered earlier in monochorial pregnancies than in dichorial pregnancies. The choice of birth method, especially for monochorial pregnancies, is subject to much discussion.

According to a subgroup analysis, the stratification based on chorionicity in the Twin Birth Study did not lead to a change in the core statement that there is "no difference in foetal outcome between the delivery groups with planned C-section and planned vaginal birth". In Sau 2006 [41], 60 births of monochorial twins and 218 births of dichorial twins were compared. The C-section rate was the same in both groups (56.6 vs. 53.6%). In vaginal births, there was a significantly higher prevalence of 5′ Apgar values < 7 in monochorial twins than in dichorial twins (12 vs. 3.5%, $p < 0.01$). Statistically, pH values under 7.2 were not significantly more frequent in the group of monochorial pregnancies (20 vs. 13%, $p > 0.05$).

In contrast, a Danish retrospective study [42] of 1175 twin births past the 36th week of pregnancy showed that, at 18.7%, planned vaginal deliveries (n = 689) of dichorial twins indicated a higher risk of neonatal morbidity (Na pH < 7.1, 5′ Apgar < 8, NICU, neonatal mortality) than caesarean deliveries (n = 371) at 13.2% (OR 1.45; 95% CI 1.02–2.13; $p = 0.037$), but not in the case of monochorial diamnotic twins (19 vs. 15.4%; OR 0.87; 95% CI 0.26–2.96). The results of a more recent Portuguese study [43] of 112 normal monochorial twin pregnancies past the 34th week of pregnancy indicated vaginal delivery as the method of birth of choice in the case of monochorial placentation. Our own comparison of 473 dichorial twin births with 103 monochorial twin births resulted in no difference in the rate of C-sections, the Na pH and base excess or the Apgar Score, neither following C-section nor vaginal delivery [17].

Influence of Birth Interval

In the Twin Birth Study, the birth interval between twins was on average 3.6 ± 1.5 minutes in the group with planned C-sections and 10 ± 16.7 minutes in the group with planned vaginal delivery. It must be noted here that a caesarean was performed in 43.7% of cases in this group, meaning that there was a considerably longer birth interval when only the 56.2% of vaginal births are taken into consideration. Based on the previous analysis, no conclusions on the significance of the birth interval on child morbidity can be drawn from the Twin Birth Study. Based on the treatment protocol, obstetric management following the birth of the first child was left up to the obstetrician, as was the decision regarding proceeding watchfully or accelerating the birth of the second twin through active manoeuvre in order to keep the birth interval short. Studies on the influence of the birth interval on neonatal morbidity had contradictory results. Some of these came to the conclusion that the second twin should be born within 15–30 minutes following the birth of the first twin [44–48]; others, primarily somewhat older studies, only ascribed minor significance to the time interval [49–52].

Based on the perinatal surveys in Hesse between 1990 and 2014, neonatal morbidity was investigated based on the Na pH and base excess as well as the 1,5,10′ Apgar Scores of 4110 twin births following the vaginal birth of the first twin based on the birth interval between the second and first twin, and a lower cord artery pH was observed for longer birth intervals and more Apgar values under 7 were found for the second twin [48]. Similar correlations between Na pH, base excess and blood gases were also found in other small cohort studies [46, 47]. The analysis of our own data from 290 vaginal twin births showed a trend towards a positive correlation between the duration of the birth interval and the difference in cord artery pH (**Fig. 3**), and a base deficit between twin 1 and twin 2, whereby this was even more greatly defined in the constellation of cephalic presentation/breech presentation [17]. A similar trend was found in the study of a work-

ing group in Graz. In vaginal births with cephalic presentation/cephalic presentation, there was no correlation between the Na pH of the second twin with an increasing birth interval; with the birth of the second twin from breech or transverse presentation, the pH value of the second twin displayed an inverse, but not significant correlation between the duration of the birth interval [53]. Based on their results, the authors concluded that watchful care is justifiable in the birth of the second twin. A Canadian, monocentric study between 1994 and 2004 on 177 pairs of twins found a significantly lower pH value for the second twin from a birth interval of over 60 minutes. The incidence of severe acidosis (p/h < 7, BE below − 12 mmol/l) only increased significantly after 60 minutes [54]. In contrast, active birth management including internal turning and full extraction was advocated by other authors. In a monocentric study by Fox et al. [55], neonatal morbidity based on 5′ Apgar Score < 7 and Na pH < 7.20 with an active approach following the birth of the first twin in 130 vaginal twin births did not differ from those with planned C-section (n = 157).

Influence of Difference in Weight

An exclusion criterion in the Twin Birth Study was the second twin being estimated to be substantially larger that the first. According to the cohort study by Armson 2006 [14], the risk of increased overall morbidity for the second twin was more than three times as high than for the first if it weighed more than 20% more (p < 0.001; RR 3.75; 95% CI 1.62–8.68) compared to a relative risk of 1.67, 95% CI 1.34–2.07 in the case of a difference in weight of under 10% (p = 0.002). The aforementioned Swedish study [41]) found a correlation between weight difference and risk of morbidity. A difference in weight of 300 g or more increased neonatal morbidity by 500% in monochorial twins and by 50% for dichorial twins.

According to Stein et al. [48], in addition to the presentation of the second child in breech position or transverse position, there was a positive correlation between a difference in weight of more than 20% of the second twin and an increased birth interval.

The previously published results of the Twin Birth Study made only a small contribution to answering these remaining questions. We are dependent upon retrospective studies and hope that further specific analyses follow based on the huge Twin Birth Study database available that will assist us in the selection of birth method for twins and in intrapartal obstetric management.

Conclusion

The Twin Birth Study came to the main conclusion that, under optimum conditions, there were no differences in terms of maternal and child morbidity between planned vaginal delivery and C-section in twin births. This result confirms the opinion of many obstetricians that deliver twins vaginally. The secondary C-section rate of approx. 30% in the group of planned vaginal deliveries emphasises the significance of the infrastructure and personnel resources of the maternity clinic when it comes to the safety of the vaginal delivery method. The result of the Twin Birth Study is therefore not generally transferable, at least not here in Germany, where 70% of all departments have fewer than 1000 births and 30% even have fewer than 500 births per year, unless twins are transferred to large specialised centres with the necessary resources.

Apart from this, based on an analysis of the WHO Global Surveys on Maternal and Perinatal Health (WHOGS), which included 3238 twin pregnancies in randomised institutions with over 1000 births per year from 23 low to middle-income countries in Africa, South America and Asia, the requirements for safe vaginal twin births are not met in many third world countries [56]. The authors of this study therefore find timely access to a safe caesarean birth to be necessary in order to reduce the risks for both mother and child.

The results of the Twin Birth Study will probably change little in terms of obstetric management in German clinics: those that have the professional expertise required and the necessary infrastructure will continue to delivery twins vaginally, and those that do not have this will continue to perform C-sections in the case of twins.

Conflict of Interest

None.

References

1 *Hannah ME, Hannah WJ, Hewson SA et al.* Planned caesarean versus planned vaginal birth for breech presentation at term: a randomized multicentre trial. Lancet 2000; 21: 1375–1383
2 *Kotaska A.* Inappropriate use of randomised trials to evaluate complex phenomena: case study of vaginal breech delivery. BMJ 2004; 329: 1039–1042
3 *Krause M.* Der Term Breech Trial: Aufstieg und Fall einer internationalen, multizentrisch randomisierten, kontrollierten Studie – eine kritische Bilanz. Z Geburtsh Neonatol 2006; 210: 121–125
4 *Glezerman M.* Five years to the Term Breech Trial: The rise and fall of a randomized controllled trial. Am J Obstet Gynecol 2006; 194: 20–25
5 *ACOG Committee Opinion.* Mode of term singleton breech delivery. Obstet Gynecol 2006; 109: 235–237
6 *Lee HC, Gould JB, Boscardin WJ et al.* Trends in cesarean delivery for twin births in the United States. Obstet Gynecol 2011; 118: 1095–1101
7 *Kyvernitakis A, Kyvernitakis I, Karageorgiadis AS et al.* Rising cesarean rates of twin deliveries in Germany from 1990 to 2012. Z Geburtshilfe Neonatol 2013; 217: 177–182
8 *van der Garde M, Winkens B, Roumen FJ.* Increased elective caesarean section rate is not associated with a decreased serious morbidity rate for twins ≥ 32 weeks' gestation. J Obstet Gynaecol 2012; 32: 453–457
9 *Smith GCS, Sha I, White I et al.* Mode of delivery and the risk of delivery-related perinatal death among twins at term: a retrospective cohort study of 8073 births. Int J Obstet Gynecol 2005; 112: 1139–1144
10 *Smith GC, Pell JP, Dobbie R.* Birth order, gestational age, and risk of delivery related perinatal death in twins: retrospective cohort study. BMJ 2002; 325: 1004
11 *Smith GC, Fleming KM, White IR.* Birth order of twins and risk of perinatal death related to delivery in England, Northern Ireland, and Wales, 1994-2003: retrospective cohort study. BMJ 2007; 334: 576
12 *Wen SW, Fung Kee Fung K, Oppenheimer L et al.* Neonatal mortality in second twin according to cause of death, gestational age, and mode of delivery. Am J Obstet Gynecol 2004; 191: 778–783
13 *Yang Q, Wen SW, Chen Y et al.* Neonatal mortality and morbidity in vertex-vertex second twins according to mode of delivery and birth weight. J Perinatol 2006; 26: 3–10
14 *Armson A, O'Connell C, Persad V et al.* Determinants of perinatal mortality and serious neonatal morbidity in the second twin. Obstet Gynecol 2006; 108: 556–564
15 *Herbst A, Källen K.* Influence of mode of delivery on neonatal mortality in the second twin, at and before them. BJOG 2008; 115: 1512–1517
16 *Schmitz T, Carnavalet C, Azria E. et al.* Neonatal outcome of twin pregnancy according to the planned mode of delivery. Obstet Gynecol 2008; 111: 695–703

17 *Dudakova A.* Geburtshilfliches Management und fetales Outcome bei Mehrlingsschwangerschaften in der Klinik St. Hedwig in Regensburg 2000–2008. Inauguraldissertation zur Erlangung des Doktorgrades der Medizin der Fakultät für Medizin der Universität Regensburg 2013
18 *Rossi AC, Mullin PM, Chmait RH.* Neonatal outcomes of twins according to birth order, presentation and mode of delivery: a systematic review and meta-analysis. BJOG 2011; 118: 523–532
19 *Barrett JFR, Hannah ME, Hutton EK et al.* A randomized trial of planned cesarean or vaginal delivery for twin pregnancy. N Engl J Med 2013; 369: 1295–1305
20 *Hofmeyer GJ, Barrett JF, Crowther CA.* Planned caesarean section for women with a twin pregnancy. Cochrane Database Syst Rev 2011; 12: CD006553
21 *Rabinovici J, Barkai G, Reichman B et al.* Randomized management of the second nonvertex twin: vaginal delivery or caesarean section. Am J Obstet Gynecol 1987; 156: 52–56
22 *Steins Bisschop CN, Vogelvang TE, May AM et al.* Mode of delivery in non-cephalic presenting twins: a systematic review. Arch Gynecol Obstet 2012; 286: 237–247
23 *Atis A, Aydin Y, Donmez M et al.* Apgar scores in assessing morbidity of the second neonate of cephalic/non-cephalic twins in different delivery modes. J Obstet Gynaecol 2011; 31: 43–47
24 *Winn HN, Cimino J, Powers J et al.* Intrapartum management of nonvertex second-born twins: a critical analysis. Obstet Gynecol 2001; 185: 1204–1208
25 *Sibony O, Touitou S, Luton D.* Modes of delivery of first and second twins as a function of their presentation. Study of 614 consecutive patients from 1992 to 2000. EJOG 2006; 126: 180–185
26 *Persad VL, Baskett TF, O'Connell C et al.* Combined vaginal-cesarean delivery of twin pregnancies. Obstet Gynecol 2001; 98: 1032–1037
27 *Engelbrechtsen L, Nielsen EH, Perin T et al.* Cesarean section for the second twin: a population-based study of occurrence and outcome. Birth 2013; 40: 10–16
28 *Molkenboer JF, Bouckaert PX, Roumen FJ.* Recent trends in breech delivery in the Netherlands. BJOG 2003; 110: 948–951
29 *Abu-Heija AT, Ziadeh S, Obeidat A.* Mode of delivery and perinatal results of the breech first twin. J Obstet Gynaecol 1998; 18: 47–49
30 *Blickstein I, Goldman RD, Kupferminc M.* Delivery of breech first twins: a multicenter retrospective study. Obstet Gynecol 2000; 95: 37–42
31 *Sentilhes L, Goffinet F, Talbot A et al.* Attempted vaginal versus planned caesarean delivery in 195 breech first twin pregnancies. Acta Obstet Gynecol 2007; 86: 55–60
32 *Oettinger M, Ophir E, Markovitz et al.* Is cesarean section necessary for delivery of a breech first twin? Gynecol Obstet Invest 1993; 35: 38–43
33 *Grisaru D, Fuchs S, Kupfermine MJ et al.* Outcome of 306 twin deliveries according to first twin presentation and method of delivery. Am J Perinatology 2000; 17: 303–307
34 *Roopnarinesingh AJ, Sirjusingh A, Baasaw B et al.* Vaginal breech delivery and perinatal mortality in twins. J Obstet Gynaecol 2002; 22: 291–293
35 *Nassar AH, Maarouf HH, Hobeika EM et al.* Breech presenting twin A: is vaginal delivery safe? J Perinat Med 2004; 129: 470–474
36 *Pharaoah PO, Adi Y.* Consequences of in utero death in a twin pregnancy. Lancet 2000; 355: 1597–1602
37 *Glinianaia SV, Obeysekera MA, Sturgiss S et al.* Stillbirth and neonatal mortality in monochorionic and dichorionic twins: a population based study. Hum Reprod 2011; 2549–2557
38 *Roqué H, Gillen-Goldstein J, Funai E et al.* Perinatal outcomes in monoamniotic gestations. J Matern Fetal Neonatal Med 2003; 13: 414–421
39 *Dodd JM, Crowther CA.* Should we deliver twins electively at 37 weeks' gestation? Curr Opin Obstet Gynecol 2005; 17: 579–583
40 *Lopriore E, Holtkamp N, Sueters M et al.* Acute peripartum twin-twin transfusion syndrome: incidence, risk factors, placental charateristics and neonatal outcome. J Obstet Gynaecol Res 2014; 40: 18–24
41 *Sau A, Chalmers S, Shennan AH et al.* Vaginal delivery can be considered in monochorionic and diamniotic twins. BJOG 2006; 113: 602–604
42 *Hoffmann E, Oldenburg A, Rode L et al.* Twin births: cesarean section or vaginal delivery? Acta Obstet Gynecol Scand 2012; 91: 463–469
43 *Pestana I, Loureiro T, Almeida A et al.* Effect of mode of delivery on neonatal outcome of monochorionic diamniotic twin pregnancies: a retrospective cohort study. J Reprod Med 2013; 58: 15–18
44 *Erdemoglu E, Mungan T, Tapisiz O et al.* Effect of inter-twin delivery time on Apgar scores of the second twin. Aust N Z J Obstet Gynaecol 2003; 43: 203–206
45 *Hartley RS, Hitti J.* Birth order and delivery interval: analysis of twin pair perinatal outcomes. J Matern Fetal Neonatal Med 2005; 17: 375–380
46 *Leung TY, Tam WH, Leung TN et al.* Effect of twin-to-twin delivery interval on umbilical cordblood gas in second twin. BJOG 2002; 109: 63–67
47 *McGrail CD, Bryant DR.* Intertwin time interval: How it affects the immediate neonatal outcome of the second twin. Am J Obstet Gynecol 2005; 192: 1420–1422
48 *Stein W, Misselwitz B, Schmidt S.* Twin-to-twin delivery time interval: influencing factors and effect on short-term outcome of the second twin. Acta Obstet Gynecol Scand 2008; 87: 346–353
49 *Bartnicki J, Meyenburg M, Saling E.* Time interval in twin delivery – the second twin need not always be born shortly after birth. Gynecol Obstet Invest 1992; 18: 19–20
50 *Rayburn WF, Lavin JP, Miodovnik JP et al.* Multiple gestation: time interval between delivery of the first and second twins. Obstet Gynecol 1984; 63: 502–506
51 *Rydhstrom H, Ingemarsson I.* Interval between birth of the first and the second twin and its impact on second twin perinatal mortality. J Perinat Med 1990; 18: 449–453
52 *Briese V, Falker U, Plesse R et al.* Analyse von 122 Gemini-Entbindungen unter besonderer Berücksichtigung des zweiten Zwillings. Zentralbl Gynäkol 1994; 116: 38–43
53 *Schneuber S, Magnet E, Haas J et al.* Twin-to-twin delivery time: neonatal outcome of the second twin. Twin Res Hum Genet 2011; 14: 573–579
54 *Edris F, Oppenheimer L, Yang Q et al.* Relationship between intertwin delivery interval and metabolic acidosis in the second twin. Am J Perinatol 2006; 23: 481–486
55 *Fox NS, Silverstein M, Bender S et al.* Active second-stage management in twin pregnancies undergoing planned vaginal delivery in a U.S. population. Obstet Gynecol 2010; 115: 229–233
56 *Vogel JP, Torloni MR, Seuc et al.* Maternal and perinatal outcomes of twin pregnancy in 23 low- and middle-income-countries. PLoS One 2013; 8: e70549