Original Article

Study of serious maternal complications after preterm delivery 28–36 weeks gestation

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Abstract

Aims and Objective: To study the prevalence of serious maternal complications after preterm birth by delivery route and type of cesarean incision. **Materials and Methods:** We at DMCH included detailed information on patient characteristics, intrapartum events, and pregnancy outcomes. Patients eligible for data collection were those who delivered within the institution, were at least 28 weeks of gestation, had a live fetus on admission and delivered during the 24-hour period of randomly selected days. Serious mat ernal complications were defined as the occurrence of one of the following: hemorrhage (blood loss ≥1500 mL, blood transfusion, or hysterectomy for hemorrhage); infection (endometritis, wound dehiscence, or wound infection requiring antibiotics, reopening or unexpected procedure); ICU admission; or death. **Study Design:** Data from maternal and neonatal charts for all deliveries on randomly selected days in DMCH. All women delivering non-anomalous singletons between 28 and 36 week's gestation were included. Women were excluded for antepartum stillbirth and highly morbid conditions for which route of delivery would not likely impact morbidity including non-reassuring fetal status, cord prolapse, placenta previa, placenta accreta, placental abruption, and severe, unstable maternal conditions (cardiopulmonary collapse, acute respiratory distress syndrome, seizures). Serious maternal complications were defined as: hemorrhage (blood loss ≥1500 mL, blood transfusion, or hysterectomy for hemorrhage); infection (endometritis, wound dehiscence, or wound infection requiring antibiotics, reopening or unexpected procedure); ICU admission; or death. Delivery route was categorized as classical cesarean delivery (CCD), low transverse cesarean delivery (LTCD), low vertical cesarean delivery (LVCD), and vaginal delivery (VD). Association of delivery route with complications was estimated using multivariable regression models yielding adjusted relative risks (aRR). **Results:** Of 886 women who met criteria for inclusion in this analysis, 8.6% of women experienced serious maternal complications. Complications were associated with GA and were highest between 28-30 weeks of gestation. The frequency of complications was associated with delivery route; compared with 3.5% of SVD, 23.0% of CCD (aRR 3.54, 95%CI 2.29–5.48), 12.1% of LTCD (aRR 2.59, 95%CI 1.77–3.77), and 10.3% of LVCD (aRR 2.27, 95%CI 0.68–7.55) experienced complications. There was no significant difference in complication rates between CCD and LTCD (aRR 1.37, 95% CI 0.95–1.97) or between CCD and LVCD (aRR 1.56, 95%CI 0.48–5.07). **Conclusion:** Preterm delivery is relatively more risky and troublesome than full term delivery. The outcome depends on factors like potential hemorrhage, infection and ICU admission for preterm births requiring cesarean delivery. The physician should always be alert regarding these conditions and subsequentialy be able to manage them.

Key Word: Maternal morbidity; early preterm delivery; classical cesarean delivery; hemorrhage; infection; ICU admission.

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INTRODUCTION

Improved neonatal survival has led to an increase in the number of cesarean deliveries being performed preterm, especially at the border of viability. Classical cesarean deliveries are usually performed for indications such as an inadequately formed or inaccessible lower segment and/or fetalmal presentation, conditions that occur more commonly in preterm pregnancies. The increased neonatal morbidity with preterm birth (28–36 weeks of gestation) is well described. Classical cesarean delivery has been associated with an increased risk of uterine rupture and uterine scar dehiscence in subsequent

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pregnancies and, in some studies, with an increased risk of acute complications such as hemorrhage and infection. Several mostly small studies have evaluated the relationship of preterm delivery and route of delivery to postpartum maternal morbidity. The objectives of this analysis were to determine the prevalence of serious maternal complications associated with early preterm delivery by gestational age (GA) and to determine rates of serious maternal complications by route of delivery (vaginal delivery (VD); classical cesarean delivery (CCD), low transverse cesarean delivery (LTCD) and low vertical cesarean delivery (LVCD) by using highly detailed data obtained by chart abstraction by trained research personnel.

MATERIAL AND METHODS

The delivery route was classified as vaginal delivery (VD), classical cesarean delivery (CCD), low transverse cesarean delivery (LTCD) and low vertical cesarean delivery (LVCD). All tests were two-tailed and p<.01 was used to define statistical significance to account for multiple univariate and multivariate analyses. No imputation for missing data was performed.

RESULTS

All 886 women had complete data to define the outcomes of infection, ICU admission, and death; however,. There were 91 women in the CCD 301women in the LTCD group and 10 women in the LVCD group. Overall, 8.6% of women experienced a serious maternal complication. The occurrence of serious maternal complications was associated with gestational age and highest in the earliest gestational age range (28-30 weeks of gestation). The rate of CCD also was associated with gestational age and highest in the earliest gestational age range. The frequency of complications was associated with route of delivery, with 23.0% of those undergoing classical CD, 12.1% of those undergoing LTCD and 10.3% of those undergoing LVCD experiencing serious maternal complications compared with 3.5% of women delivering vaginally (p<0.001,. Hemorrhage, infection, and ICU admission also were increased among women undergoing CCD or LTCD compared with VD (p<0.001).

Table 1: Based on chi square or Fischer's test exact

	Delivery route									
Characteristics n(%), or mean ± SD	**CCD n=91**	**LTCD n=301**	**LVCD n=10**	**VD n=484**	**P value ccdvsvd**	**P value ltcdvsvd**	**P value lvcdvsvd**	**P value ccdvdltcd**	**P value ccdvslvcd**	**P value ltcd vslvcd**
Gestational age at delivery	28.8 ±2.8	32.8 ± 2.5	31 ± 2.8	32.7 ±3	<.001	.30	<.002	<.001	.02	<.001
Birth weight grams	1000g ±4.3	1700g±5.6	1600±2.8	1650±3	<.001	<.001	<.001	<.001	.05	<.001
Size of gestational age					<.001	<.001	<.001	.34	.26	.12
Small	16	43	2	23						
Appropriate	74	254	8	45						
Large	1	4	0	6						

Table 2: Adjusted relative risk (95% CI) for association between route of delivery and serious maternal complication overall and by gestational age at delivery

	Delivery route			
	CCD n=91	**LTCD n=301**	**LVCD n=10**	**VD n=484**
Overall 28-36(week gestation)	3.54	2.59	2.27	1
28-30	3.22	2.86	4.20	1
31-33	2.69	1.86	1.16	1
34-36	8.16	3.48		1

Table 3: Based on Chi square or Fischer's exact test

	Delivery route				
Outcome n (%)	**CCD n=91**	**LTCD n=301**	**LVCD n=10**	**VD n=484**	**P value**
Composite serious maternal complication	21(23)	36(12.1)	1(10.3)	16(3.5)	<.001
Haemorrhage	13(14.4)	18(6.2)	2(6.9)	8(1.7)	<.001
Infection	5(5.2)	11(3.7)	1(3.5)	3(0.7)	<.001
ICU admission	6(6.6)	15(5.0)	0(0.0)	9(1.8)	<.001
Death	1(0.4)	1(0.1)	0(0.0)	0(0.0)	.10

DISCUSSION

In this study, using detailed recent data we found that 8.6% of women undergoing early preterm delivery experience serious maternal complications. The clinical implications of these findings are that the risk of maternal postpartum complications in early preterm delivery is substantial, particularly in women who undergo cesarean delivery. Of women undergoing classical cesarean delivery, 23.0% experienced serious maternal complications whereas the rate was 3.5% for women delivering vaginally. Given the effect on immediate maternal morbidity as well as increased risk associated with subsequent pregnancies, it is important that providers caring for women who deliver in the early preterm period be cognizant of these complications and be prepared to manage them. There were no maternal deaths; 49% and 19% were complicated by infection and hemorrhage, respectively, and 2 women required hysterectomy. Bethune *et al*. In contrast, there are studies that have shown a difference in maternal morbidity when comparing classical to low transverse cesarean delivery. Lao *et al*. compared 31 women delivered by classical CD in a retrospective case-control study to 31 women delivered by LTCD between 25 and 34 weeks of gestation. Excluded from the study were women who had antepartum hemorrhage or placenta previa. There was a significantly greater reduction in maternal hemoglobin and a higher incidence of severe bleeding in the CCD group compared to the LTCD group ($P < 0.05$). Although our study has a larger sample size than previous studies, there are a few limitations. With an even larger sample size in our study, the difference in serious maternal complications between classical and low transverse cesarean delivery was not statistically significant (aRR 1.37, 95% CI 0.95–1.97). This may be due to inadequate sample size. There are several strengths of this study. The use of trained chart abstractors to obtain detailed medical information, uniform and rigorous definitions used for outcomes, and the relatively large sample size of early preterm births compared with previous studies allowed for comparison of maternal morbidity by delivery route and gestational age. We excluded women with indications for early preterm delivery morbidity (egaccreta, abruption, cardiopulmonary collapse) which could be responsible for the increased complications seen after delivery to allow for better understanding of the association of delivery route itself with maternal morbidity. Furthermore, we were able to adjust for important covariates influencing maternal morbidity given the detailed medical record abstraction. In conclusion, women undergoing an early preterm delivery are at substantially increased risk of having a serious maternal complication, particularly in those who undergo cesarean delivery. Given the relatively high rates of maternal complications after early preterm delivery, obstetricians need to be prepared to manage potential hemorrhage, infection and ICU admission. There has been a substantial improvement in neonatal outcomes after early preterm delivery. It is time to focus on the concomitant improvement of maternal outcomes after early preterm delivery.

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