Effect of types of placenta previa on maternal and neonatal outcomes: A 10-year retrospective cohort study

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Abstract

Purpose: Through this study, we aimed to evaluate the effects of different types of placenta previa (PP) on maternal and neonatal outcomes.

Methods: This study was conducted in The Third Affiliated Hospital of Guangzhou Medical University and Tongji Hospital between January 2009 and 2019. PP was traditionally classified into four types, namely low-lying placenta, marginal, partial, and complete PP. Previous studies have classified PP into two types, namely low-lying placenta and PP. Based on our clinical experience, we proposed the classification of PP into three types, for the first time, which included low-lying placenta, "marpartial" (marginal and partial) PP, and complete PP. Multivariate logistic regression analysis was performed to determine the effects of different types of PP on maternal and neonatal outcomes.

Results: In total, 4490 singleton pregnancies were complicated with PP. In the four-classification method, compared with women with low-lying placenta, women with complete PP had a risk of placenta accrete spectrum disorders, postpartum hemorrhage (PPH), hemorrhagic shock, severe PPH, blood transfusion, hysterectomy, puerperal infection, preterm labor, NICU admission, and low birth weight. There was no difference in maternal and neonatal outcomes between marginal and partial PP, except for increased chances of preterm labor and low birth weight in partial PP. In the two-classification method, PP was the risk factor for most of the adverse maternal and neonatal outcomes, compared with low-lying placenta.

Conclusion: Complete PP and low-lying placenta were associated with the highest and lowest risks of adverse pregnancy outcomes, respectively, whereas clinically similar outcomes were observed between marginal and partial PP. The three-classification of PP may be practical from the clinical perspective.

Introduction

The previously reported incidence of placenta previa (PP) was approximately 4.0 per 1000 births[1]. However, the incidence is increasing with the increasing rate of cesarean deliveries[2,3]. PP is a severe pregnancy complication that leads to life-threatening postpartum hemorrhage (PPH)[4], damages the surrounding organs, and endangers the lives of pregnant women[5]. The fetus may experience preterm delivery, or may have low birth weight or congenital defects[6,7].

PP is defined as the placenta overlying the endocervical os. The traditional classification of PP was complete PP (the placenta covers the internal os completely), partial PP (the placenta covers the internal os partially), marginal PP (the placental edge just reaches the margin of the internal os), and low-lying placenta (the placental edge is within 2 cm of the internal os)[8]. Advances in ultrasonography have enabled its use to evaluate suspected PP[9]. Currently, determining the location of the placenta using ultrasonography during mid-pregnancy is a routine practice[2].

Until recently, the traditional classification was used in clinical practice. The American Institute of Ultrasound in Medicine (AIUM) recommended eliminating the use of terms "partial" and "marginal," retaining the term "placenta previa"[10], as it is technically difficult to distinguish marginal and partial PP through ultrasound. In some studies[10] and guidelines[11], this two-classification method (low-lying placenta and placenta previa) was recommended. However, the traditional classification was still used in clinics in China.

Several studies have reported that the type of PP influences clinicians' management decisions, and maternal and neonatal outcomes. Compared with women with incomplete PP (including marginal and partial PP)[12,13], those with complete PP had a significantly higher frequency of PPH, hysterectomy, increased risk for placenta accrete, and more chances of preterm delivery. Dola *et al*. reported that compared with women with partial or marginal PP, those with complete PP experienced early onset of bleeding and antepartum hospitalization, and had a higher rate of hysterectomy. Women with partial and marginal PP did not show significant differences in this regard[14].

However, it is rational to revise the classification of PP from the clinical perspective. This study aimed to compare the maternal and neonatal outcomes in different types of PP and determine a better classification method of placenta previa in clinics.

Materials And Methods

Study population

This study was approved by the Research Ethics Board of The Third Affiliated Hospital of Guangzhou Medical University and Tongji Hospital, Tongji Medical College, Huazhong University of Science & Technology. Written informed consent for participation was obtained from participants and their legally authorized representatives. This was a 10-year retrospective cohort study conducted from January 2009 to January 2019 in two tertiary hospitals (The Third Affiliated Hospital of Guangzhou Medical University, Guangzhou Medical Center for Critical Pregnant Women, Guangzhou; Tongji Hospital, Tongji Medical College, Huazhong University of Science & Technology, Wuhan, China).

In this study, PP was diagnosed using the last transabdominal or transvaginal ultrasonography performed before delivery; if the placenta was located in the posterior wall of the uterus, transvaginal ultrasonography was preferred. All ultrasound examinations were performed by trained physicians instructed to record their best assessment of the distance from the leading placental edge to the internal cervix os, which was rounded to the nearest millimeter[15]. For pregnancies with gestational age more than 16 weeks, low-lying placenta was defined when the placental edge was less than 20 mm from the internal os[10], marginal PP was defined when the lower edge just reached the internal os, partial PP was defined when the placenta partially covered the cervix, and complete PP was defined when the placenta completely covered the cervix[2]. Sometimes, when the placenta was located in the posterior wall of uterus and the internal os was not obviously open, it was difficult to differentiate between marginal and partial PP. In such circumstances, three experienced examiners would perform the transvaginal ultrasound examination. The three sonographers agreed on the final diagnosis after discussion based on the ultrasound images. The position of the placenta, anterior or posterior, was also noted.

Detailed data of 4490 pregnancies complicated with PP were recorded, including maternal age, gestational weeks, number of prior abortions, mode of delivery, requirement of cesarean section because of bleeding, mode of conception, level of education, smoking, drinking, mode of admission, type of PP, presence of diabetes mellitus or hypertension, and sex of the fetus.

In this study, we used different classification method of PP. The first one was the traditional four-classification method, including low-lying placenta, marginal, partial, and complete PP. The second one was the three-classification method, including low-lying placenta, “marpartial” (consisting of marginal and partial PP), and complete PP. The last one was the two-classification method according to AIUM, which included low-lying placenta and PP (consisting of marginal, partial, and complete PP).

Maternal and neonatal outcomes

Maternal outcome variables included placenta accrete spectrum (PAS) disorders, which consisted of placenta accreta, placenta increta, and placenta percreta diagnosed by surgeons or pathologists[16], postpartum hemorrhage (PPH [blood loss ≥500 mL during vaginal birth and ≥1000 mL during cesarean section within 24 h of delivery]), severe PPH (blood loss ≥1500 mL within 24 h of delivery), hemorrhagic shock[17], blood transfusion, hysterectomy, puerperal infection (including endometritis, mastitis, and wound infections), uterine rupture and bladder rupture caused by cesarean section, admission to the intensive care unit (ICU), hospital stay, and maternal death. Neonatal outcome variables included preterm labor (defined as delivery before 37 weeks of gestation), Apgar scores at 1 and 5 min, admission to neonatal intensive care unit (NICU), birth weight < 2500 g, and stillbirth (fetal death in the uterus after 20 weeks of gestation, including during childbirth).

Statistics

Statistical analysis was performed using SPSS v25.0 for Mac. Categorical variables were reported as frequency (percentage), and the differences between the groups were compared using the χ^2 test, or Fisher exact test in cases of small numbers, as appropriate. Multivariate logistic regression analysis was performed to determine the role of the type of PP in adverse maternal and neonatal outcomes. Adjusted odds ratios (aORs), along with their 95% confidence intervals (CIs), were calculated. Potential confounders considered were maternal age; gestational age; prior number of cesarean sections, abortions, and vaginal deliveries; level of education; mode of delivery; and location of placenta[1,18]. Differences with *P*-values < 0.05 were considered statistically significant.

Results

Out of the 4490 pregnant women recruited in this study, 2117 were from The Third Affiliated Hospital of Guangzhou Medical University, and the other 2373 were from Tongji Hospital, Tongji Medical College, Huazhong University of Science & Technology. In total, 466, 1233, 140, and 2651 women had low-lying placenta, marginal, partial, and complete PP. The incidence of low-lying placenta, marginal, partial, and complete PP was 5%, 31%, 4%, and 60% in Third Affiliated Hospital of Guangzhou Medical University and 16%, 24%, 2%, and 58% in Tongji Hospital, respectively (Fig. 1).

The general characteristics of women with PP as per the four-classification method are shown in Table 1. Older women (aged ≥35 years) were more likely to have complete PP, and their gestational age at delivery was 34–37 weeks. Meanwhile, the majority of women with low-lying placenta, marginal, and partial PP delivered at ≥37 weeks of gestation (76.2%, 56%, and 45%, respectively). The placental edge was lower and reached or even covered the cervix in women with more numbers of previous abortions, vaginal deliveries, or cesarean sections (≥2) (22.3%, 24.8%, 27.1%, 30.6%; 1.3%, 2.4%, 3.6%, 3.6%; and 2.1%, 3.5%, 6.4%, and 6.8%, in women with low-lying placenta, marginal, partial, and complete PP, respectively). The type of PP was found to be associated with educational level; more women with severe PP had not completed college education. Most pregnant women with low-lying placenta were undergoing treatment on an outpatient basis, whereas the majority of pregnant women with marginal, partial, or complete PP were admitted or transferred to the emergency department. More women with complete or partial PP than those with marginal PP or low-lying placenta underwent cesarean sections (99.3%, 95.7%, 91%, and 91.4%, respectively). The general characteristics of women with PP as per the three- and two-classification methods are shown in Supplementary Tables 1 and 2, respectively.

Tables 2 and 3 showed maternal and neonatal outcomes in different types of PP group compared with low-lying placenta group. When women with low-lying placenta was used as the reference group, both complete PP and placenta previa (including marginal, partial, and complete PP) were risk factors for PAS, PPH, severe PPH, hemorrhagic shock, blood transfusion, hysterectomy, and puerperal infection. Women with complete PP and PP required longer hospital stay and were more likely to require admission to the ICU. Complete PP and PP did not increase the risk of uterine rupture (Table 2).

Marginal, partial PP, and marpartial PP increased the risk of PPH and blood transfusion, compared with low-lying placenta. Compared with low-lying placenta, other types of PP increased the risks of preterm labor, admission to NICU, and low birth weight (Table 3).

Supplementary Tables 3 and 4 show maternal and neonatal outcomes in partial and complete PP groups, compared with the marginal PP group. When women with marginal PP were used as the reference group, the adverse maternal outcomes between women with marginal and partial PP were clinically similar. Complete PP was a risk factor for PAS, PPH, severe PPH, hemorrhagic shock, blood transfusion, hysterectomy, and admission to the ICU, compared with marginal PP (Supplementary Table 3). Compared with marginal PP, partial PP increased the risks of preterm delivery and low birth weight, and complete PP increased the risk of low 1-min and 5-min Apgar scores, preterm birth, and low birth weight (Supplementary Table 4).

Supplement Tables 5 and 6 show the maternal and neonatal outcomes in complete PP, compared with “marpartial” PP. Compared with “marpartial” PP, complete PP increased the risk of PAS, PPH, severe PPH, hemorrhagic shock, blood transfusion, hysterectomy, and admission to the ICU (Supplementary Table 5). In addition, complete PP increased the risk of low 1-min and 5-min Apgar scores, preterm, and low birth weight (Supplementary Table 6).

Discussion

We collected the data of 4490 pregnancies complicated with PP in two tertiary hospitals from two different provinces, and we observed a high association between adverse pregnancy outcomes and the types of PP. According to the traditional classification method, we found that complete PP and low-lying placenta were the most and least dangerous types, respectively. Moreover, there was not much difference between marginal and partial PP with regard to their effects on maternal and perinatal outcomes (Supplementary Tables 3 and 4). We found that the effects of the four-classification method and three-classification method of PP on maternal and neonatal outcomes were clinically similar (Tables 2 and 3). We also used the two-classification method from AIUM, which combined marginal, partial, and complete PP into PP. We found that PP increases the risk of PAS, PPH, hemorrhagic shock, severe PPH, blood transfusion, hysterectomy, puerperal infection, preterm labor, admission to NICU, and low birth weight (Tables 2 and 3). As per the two-classification method, PP conferred additional risks of marginal and partial PP on adverse pregnancy outcomes.

In line with our study, several studies have suggested that complete PP might be clinically different from incomplete PP, and that the former is associated with the highest risk of worsening maternal and perinatal complications[19,20]. Similar characteristics were observed between women with marginal and partial PP in the study by Dola *et al*., implying that they might be clinically similar to each other and different from complete PP[21]. However, Daskalakis *et al*. found that the type of PP did not influence the maternal and neonatal outcomes, except that neonates born to women with incomplete PP had lower Apgar scores than those of neonates born to women with complete PP[22]. Gorodeski and Bahari reported no difference between antepartum, intrapartum, or postpartum bleeding in different types of PP. They also noted that the gestational age, birth weight, and neonatal and perinatal mortality rates were similar among women with all types of PP[23].

In this study, the incidence of low-lying placenta, marginal, partial, and complete PP was 5%, 31%, 4%, and 60% in Third Affiliated Hospital of Guangzhou Medical University and 16%, 24%, 2%, and 58% in Tongji Hospital, respectively. Although the incidence rates of partial PP among the four types were the lowest, the composition ratios of different types of PP were similar in these two tertiary hospitals from two different provinces. The Third Affiliated Hospital of Guangzhou Medical University is the rescue center for major obstetric diseases in Guangdong Province. The proportion of relatively serious type of PP (marginal, partial, and complete PP) is higher than that in Tongji Hospital. In the study by Dola *et al*., a total of 179 patients had PP, out of whom 37 (21%), 21 (12%), and 117 (67%) patients had marginal, partial, and complete PP, respectively[14]. The relationship between the edge of the placenta and cervical os might change as the gestational age progresses. In our study, the diagnosis of PP was based on the last ultrasound before delivery. We inferred that during late pregnancy, some partial PP might shift to milder type, especially when the cervix begins to dilate.

Initially, PP was distinguished by visual inspection or gentle palpation of the placental edge in a partly dilated cervix during labor[24]. With the application of ultrasound, especially transvaginal ultrasound, PP was diagnosed mainly by ultrasound rather than by palpation. Determining the location of the placenta using ultrasonography during mid-pregnancy was now a routine practice. However, it was technically difficult to differentiate between marginal and partial PP by ultrasound examination, especially as the opposite side of the internal cervical os could not be visualized on ultrasound[10]. Dashe *et al*.[25] reported an inability to precisely classify partial PP, especially in the absence of complete cervical dilation. Thus, it is debatable whether the traditional classification is currently practical.

In the present study, we found that as per traditional classification, compared with low-lying placenta, both marginal and partial PP increased the risk of PPH, blood transfusion, preterm labor, admission to NICU, and low neonatal birth weight. To further confirm that there was no clinical difference in the adverse pregnancy outcomes of women with marginal and partial PP, we considered women with marginal PP as the reference group (Supplementary Tables 3 and 4). We observed that partial PP did not increase the risk of other adverse pregnancy outcomes, except for increased risks of preterm labor and low neonatal birth weight. Owing to the technical difficulty of ultrasound in distinguishing marginal and partial PP, we proposed the three-classification method, which combines partial and marginal PP into one type, namely “marpartial” PP. As shown in Tables 2, 3, and Supplementary Tables 5 and 6, the three-classification method was clinically similar to the four-classification method in investigating the effect of different types of PP on adverse pregnancy outcomes.

According to the two-classification method, both marginal and partial PP afford risks of PAS, severe PPH, hemorrhagic shock, and hysterectomy, compared with low-lying placenta, however, this is not true (Table 2); only complete PP was the risk factor of those adverse pregnancy outcomes. Adopting this method would lead to wastage of medical resources, and would require more experienced clinicians, more blood, and more women would have to undergo hysterectomy. This could increase anxiety and tension among pregnant women, which is detrimental to good pregnancy outcomes. Hence, the three-classification method is preferred to the two-classification method.

Strengths and limitations

Our study has several strengths. The relatively large sample size, including 4490 singleton pregnancies complicated with PP from two tertiary hospitals from two different provinces, enabled us to estimate the effect of different types of PP on adverse pregnancy outcomes. We first proposed the three-classification method to distinguish PP, and then used multivariate logistic regression analysis in three types of PP. Thus, the three-classification may be practical from the ultrasound and clinical perspective.

Nevertheless, our study has some limitations. This was a retrospective cohort; large and prospective studies in this regard are warranted. Just distinguishing the types of PP was insufficient for accurate prediction of adverse pregnancy outcomes.

Conclusions

Our results showed that complete PP was associated with the highest risk of adverse pregnancy outcomes. There was no clinical difference in maternal and neonatal outcomes between marginal and partial PP, except that partial PP had a greater risk of preterm labor and of delivering neonates with low birth

weights. The three-classification method of PP (low-lying placenta, “marpartial,” and complete PP) may be practical for use from the ultrasound and clinical perspective.

Abbreviations

PP: placenta previa; PAS: placenta accrete spectrum; PPH: postpartum hemorrhage; ICU: intensive care unit; NICU: neonatal intensive care unit; AIUM: American Institute of Ultrasound in Medicine; CI: confidence interval; aOR: adjusted odds ratios; ART: assisted reproductive technology; DM: diabetes mellitus

Declarations

Acknowledgments

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Conflicts of interest

The authors declare that they have no conflicts of interest.

Ethics approval and consent to participate

This study was approved by the Research Ethics Board of the Third Affiliated Hospital of Guangzhou Medical University and Tongji Hospital, Tongji Medical College, Huazhong University of Science & Technology.

Consent for publication

Not applicable

Availability of data and material

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Code availability

Not applicable

Authors’ contributions

LZ, SB, and ZW contributed to the study design, data analysis, and manuscript writing and revision. JC, JT, JG, SX, and LL contributed to the data analysis and manuscript revision. LR, SZ, and LH contributed to data collection and management, SW, LD, and DC contributed to the manuscript revision and project development. All authors read and approved the final manuscript.

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Tables

Table 1
General characteristics of pregnant women with placenta previa as per four-classification method

Variables	Low-lying (n = 466)	Marginal (n = 1233)	Partial (n = 140)	Complete (n = 2651)	P
Age (y)	31.54 ± 4.94	31.48 ± 5.24	30.49 ± 5.04	31.98 ± 4.97	< 0.05
< 35	348 (74.7%)	872 (70.7%)	108 (77.1%)	1809 (68.2%)	
≥ 35	118 (25.3%)	361 (29.3%)	32 (22.9%)	842 (31.8%)	
Gestational age (wks)	37.06 ± 2.54	36.14 ± 2.79	35.08 ± 3.11	35.91 ± 2.43	< 0.05
< 34	47 (10.1%)	202 (16.4%)	39 (27.9%)	343 (12.9%)	
34–37	64 (13.7%)	340 (27.6%)	38 (27.1%)	1355 (51.1%)	
≥ 37	355 (76.2%)	691 (56%)	63 (45%)	953 (35.9%)	
Prior cesarean sections	0.31 ± 0.51	0.34 ± 0.55	0.36 ± 0.6	0.57 ± 0.63	< 0.05
0	330 (70.8%)	857 (69.5%)	99 (70.7%)	1334 (50.3%)	
1	126 (27%)	333 (27%)	32 (22.9%)	1136 (42.9%)	
≥ 2	10 (2.1%)	434 (3.5%)	9 (6.4%)	181 (6.8%)	
Prior abortions	0.83 ± 1.06	0.92 ± 1.195	0.93 ± 1.104	1.12 ± 1.297	< 0.05
0	236 (50.6%)	600 (48.7%)	67 (47.9%)	1074 (40.5%)	
1	126 (27%)	328 (26.6%)	35 (25%)	768 (29%)	
2	104 (22.3%)	305 (24.8%)	38 (27.1%)	809 (30.6%)	
Prior deliveries	0.17 ± 0.42	0.25 ± 0.52	0.28 ± 0.52	0.27 ± 0.55	< 0.05
0	394 (84.5%)	965 (78.3%)	106 (75.7%)	2058 (77.6%)	
1	66 (14.2%)	238 (19.3%)	29 (20.7%)	500 (18.9%)	
≥ 2	6 (1.3%)	30 (2.4%)	5 (3.6%)	93 (3.6%)	
Level of education					< 0.05
Graduate	266 (57.1%)	538 (43.6%)	59 (42.1%)	939 (35.4%)	
Undergraduate	183 (39.3%)	663 (53.8%)	78 (55.7%)	1650 (62.2%)	
unknown	17 (3.6%)	32 (2.6%)	3 (2.1%)	62 (2.3%)	
Mode of admission					< 0.05
Clinic	411 (88.2%)	895 (72.6%)	88 (62.9%)	1943 (73.3%)	
Emergency	41 (8.8%)	225 (18.2%)	27 (19.3%)	374 (14.1%)	
Referral	14 (3%)	113 (9.2%)	25 (17.9%)	334 (12.6%)	
Smoking	0	2	0	3	
Drinking	0	0	0	2	
ART	48 (10.3%)	112 (9.1%)	15 (10.7%)	219 (8.3%)	0.386
DM	75 (16.1%)	193 (15.7%)	13 (9.3%)	390 (14.7%)	< 0.05
Hypertensive disorders	22 (4.7%)	58 (4.7%)	6 (4.3%)	58 (2.2%)	< 0.05
Cesarean	426 (91.4%)	1122 (91%)	134 (95.7%)	2633 (99.3%)	< 0.05
Sex					0.06
Male	241 (51.7%)	708 (57.4%)	79 (56.4%)	241 (51.7%)	
Female	222 (47.6%)	512 (41.5%)	60 (42.9%)	222 (47.6%)	
Unknown	3 (0.6%)	13 (1.1%)	1 (0.7%)	3 (0.6%)	

ART: assisted reproductive technology; DM: diabetes mellitus

Table 2

Maternal outcomes as per four-classification method of placenta previa

Variables	Low (n = 466)	Marginal (n = 1233)	Partial (n = 140)	Complete (n = 2651)	Low-lying as reference						Mar
					Marginal aOR	95% CI	Partial aOR	95% CI	Complete aOR	95%CI	Low
PAS	108 (23.2%)	308 (25%)	43 (30.7%)	1438 (54.2%)	1.04	0.8–1.36	1.37	0.89–2.13	3.12	2.46–3.97	0.95
PPH	39 (8.4%)	191 (15.5%)	28 (20%)	1175 (44.3%)	1.84	1.27–2.67	2.45	1.41–4.24	7.11	5–10.09	0.53
Severe PPH	8 (1.7%)	37 (3%)	5 (3.6%)	422 (15.9%)	1.64	0.75–3.58	1.84	0.58–5.86	8.12	3.97–16.61	0.6
Shock	20 (4.3%)	85 (6.9%)	10 (7.1%)	640 (24.1%)	1.48	0.89–2.45	1.46	0.66–3.23	5.48	3.45–8.71	0.66
Blood transfusion	27 (5.8%)	147 (11.9%)	24 (17.1%)	994 (37.5%)	1.93	1.25–2.99	2.67	1.45–4.92	7.09	4.72–10.66	0.51
Bladder rupture	0	5 (0.4%)	0	30 (1.1%)							
Uterine rupture	4 (0.9%)	5 (0.4%)	2 (1.4%)	17 (0.6%)	0.37	0.1–1.42	1.23	0.22–6.92	0.4	0.13–1.24	2.74
Hysterectomy	3 (0.6%)	26 (2.1%)	2 (1.4%)	205 (7.7%)	3	0.9–10	1.79	0.29–10.99	8.62	2.73–27.28	0.33
Puerperal infection	4 (0.9%)	35 (2.8%)	2 (1.4%)	118 (4.5%)	2.88	1.02–8.18	1.19	0.22–6.65	3.75	1.37–10.28	0.34
ICU	0	18 (1.5%)	2 (1.4%)	149 (5.6%)							
Hospital stay (d)	7.68 ± 4.4	8.75 ± 5.31	8.43 ± 4.2	10.36 ± 6							
Maternal death	0	0	0	1							

PAS: placenta accrete spectrum; PPH: postpartum hemorrhage; ICU: intensive care unit; CI: confidence interval; aOR: adjusted odds ratio

Table 3

Perinatal outcomes as per four-classification method of placenta previa

Variables	Low-lying (n = 466)	Marginal (n = 1233)	Partial (n = 140)	Complete (n = 2651)	Low-lying PP as reference					Marginal PP as reference				
					Marginal aOR	95% CI	Partial aOR	95% CI	Complete aOR	95% CI	Low aOR	95% CI	Partial aOR	95% CI
Apgar score 1 min ≤ 7	59 (12.7%)	203 (16.5%)	30 (21.4%)	626 (23.6%)	0.89	0.62–1.27	0.8	0.46–1.41	1.33	0.96–1.84	1.13	0.79–1.62	0.89	0.54–1.46
5 min ≤ 7	22 (4.7%)	70 (5.7%)	13 (9.3%)	163 (6.1%)	0.8	0.44–1.45	0.88	0.38–2.06	1.2	0.68–2.12	1.28	0.71–2.3	1.07	0.52–2.19
Preterm labor	111 (23.8%)	543 (44%)	77 (55%)	1695 (63.9%)	2.37	1.86–3.03	3.62	2.42–5.41	5.03	3.98–6.36	0.42	0.33–0.53	1.53	1.07–2.2
Neonatal death	3 (0.6%)	7 (0.6%)	3 (2.1%)	16 (0.6%)	0.95	0.22–4.17	3.68	0.59–23.04	2.27	0.51–10.13	1.34	0.3–5.9	3.95	0.88–17.72
NICU	46 (9.9%)	307 (24.9%)	46 (32.9%)	725 (27.3%)	2.6	1.78–3.8	2.6	1.79–3.79	2.49	1.73–3.57	0.39	0.26–0.56	0.99	0.64–1.54
Birth weight < 2500 g	64 (13.7%)	345 (28%)	60 (42.9%)	856 (32.3%)	2.3	1.71–3.09	4.46	2.89–6.88	2.94	2.21–3.91	0.44	0.32–0.59	1.95	1.35–2.8

PP: placenta previa; NICU: neonatal intensive care unit; CI: confidence interval; aOR: adjusted odds ratio

Figures

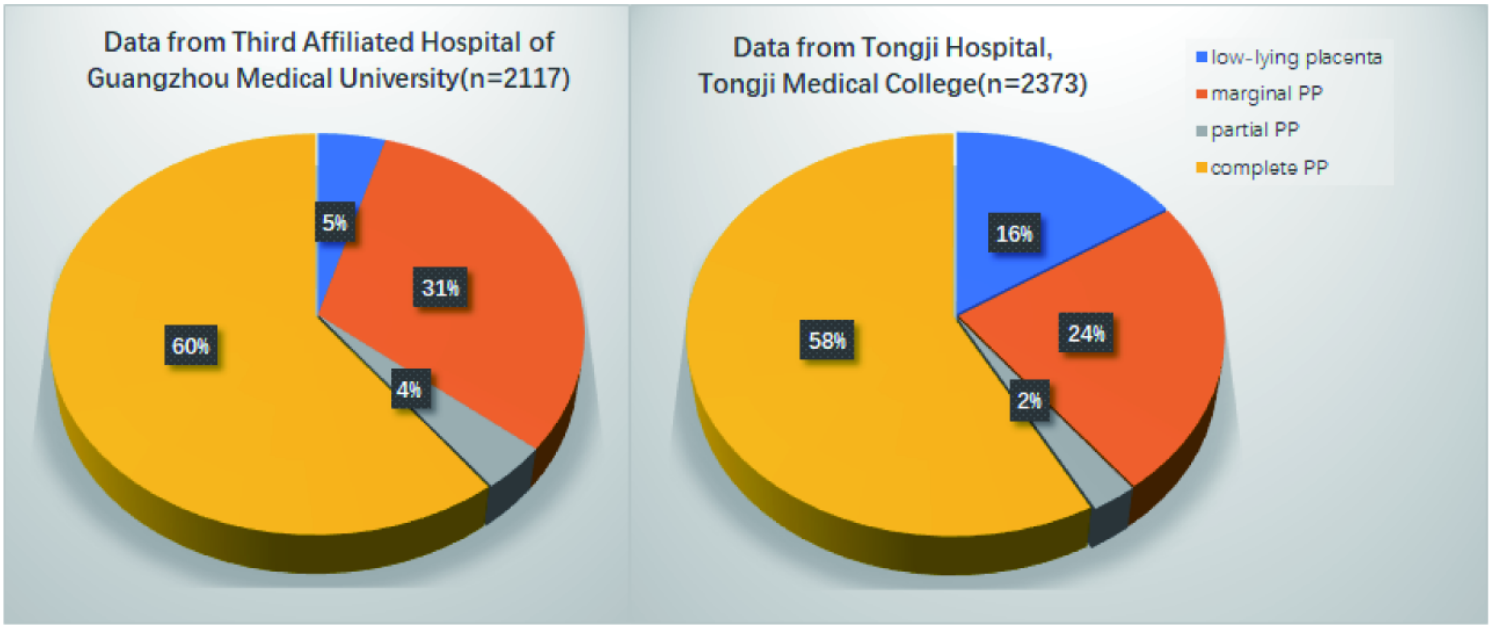

Figure 1

The composition ratios of different types of placenta previa in the two hospitals

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- SupplementTableS1.docx
- SupplementTableS2.docx
- SupplementTableS3.docx
- SupplementTableS4.docx
- SupplementTableS5.docx
- SupplementTableS6.docx