Mode of Delivery and Pregnancy Outcome in Women with Minor Placenta Previa

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Introduction: Severity of placenta previa is classified according to the distance between the placental edge and internal cervical os (PD). This study aimed to evaluate local women with placenta previa in terms of successful vaginal delivery following a trial of labour. Bleeding comorbidities were also investigated.
Methods: We retrospective reviewed a cohort of women with singleton pregnancy and minor placenta previa who delivered in a single unit between January 2012 and December 2015. PD, demographic data, obstetric, antenatal, and delivery outcome were analysed.
Results: Of 54 women included, 26 had PD ≤2 cm, and all except one delivered by Caesarean section. Subgroup analysis of 28 women with PD >2 cm was performed. Of them, 20 opted for trial of labour, and vaginal delivery was successful in 16 (80%). Vaginal delivery, especially vacuum extraction delivery, was associated with a greater decrease in haemoglobin, compared with Caesarean section ($p<0.04$).
Conclusion: In women with minor placenta praevia, the successful vaginal delivery rate was 80%, which is higher than that reported in previous studies. This encouraging results can aid clinicians in counselling women with minor placenta previa of PD >2 cm about the mode of delivery and chance of a successful vaginal delivery.
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Introduction

Placenta previa is a fairly common condition among Asian women, affecting 12.2 per 1000 deliveries a year[1]. It is conventionally classified as types I to IV; higher types indicate more severity. With the widespread use of obstetric ultrasonography, many current guidelines or protocols classify placenta previa as major or minor only. According to the Royal College of Obstetricians and Gynaecologists (RCOG) Green-top guideline no. 27, placenta previa is considered major when the placenta lies over the internal cervical os, and minor when the leading edge of the placenta is in the lower uterine segment but does not cover the cervical os[2]. Caesarean section is necessary in women with placenta that overlaps the internal os, whereas vaginal delivery is possible for minor placenta previa.

It is controversial about the factors associated with an increased chance of successful vaginal delivery in this group of women, particularly the distance between placental edge and internal cervical os (PD)[2-8]. In women with a PD of ≤2 and >2 cm, the Caesarean section rate is up to 87.5% and 28%, respectively[3]. A woman with a placental edge of ≤2 cm from the internal os in the third trimester is likely to require delivery by Caesarean section[2].

In 2009, Oppenheimer and Farine[4] proposed a new classification according to the PD measured with transvaginal scan within 28 days of term, as this better correlates with the likelihood of bleeding and need for Caesarean section. Placenta previa is classified as group 1 (PD >2.0 cm), group 2 (PD 1.1-2.0 cm), group 3 (PD 0-1.0 cm), and group 4 (placenta overlapping internal os)[4]. Caesarean section is unnecessary for group 1, but necessary for groups 2, 3, and 4[4]. Some studies proposed that women in group 2 can be offered vaginal delivery as well[6-8]. In our unit, for women with placenta previa of PD ≤2 cm, Caesarean section is recommended and a trial of labor (TOL) is not routinely offered; if PD is >2 cm, a TOL will be discussed. Nevertheless, some of patients with PD 1.1 to 2.0 cm were offered a TOL because of clinical considerations, e.g. patient's preference, clinically engaged head. There is no local study to address this issue on minor placenta previa and the evidence to support such recommendation is inadequate[1].

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We aimed to evaluate the percentage of successful vaginal delivery in women who opted for TOL with respect to their PD measured with transvaginal ultrasonography (TVS) within 28 days of delivery. Secondary outcomes included bleeding co-morbidities (blood loss, haemoglobin change, need for transfusion) and association with different planned mode of delivery and final mode of delivery.

Methods

Ethics approval was obtained from the Kowloon West cluster Research Ethics Committee. This study retrospectively reviewed a cohort of women with singleton pregnancy who were diagnosed at delivery of minor placenta previa at a single unit between January 2012 and December 2015. Women with malpresentation, preterm delivery, or adherent placenta, or those with only transabdominal ultrasonography or TVS performed >28 days before delivery were excluded. Management was standardised and according to the departmental protocol. The details of the latest TVS were analysed. Indications for ultrasonography included follow-up scans for women with a low lying placenta on routine scan (around 20 -22 weeks), and those with antepartum haemorrhage or abnormal presentation in the third trimester. Most women with PD ≤2 cm (groups 2 and 3) were advised for elective Caesarean section, and those with PD >2 cm (group1) were offered options of TOL and elective Caesarean section according to the RCOG guideline.

Women who presented with antepartum haemorrhage were admitted for monitoring. TVS was repeated to determine PD, presence of retroplacental clot and fetal growth. Emergency Caesarean section was performed in the presence of significant antepartum haemorrhage, regardless of PD. Obstetric conditions that required earlier delivery were managed accordingly, e.g. pre-eclampsia, intrauterine growth restriction. For uncomplicated cases, elective Caesarean section was arranged between 38 and 40 weeks of gestation for women with PD ≤2 cm (groups 2 and 3) and those with PD >2 cm (group 1) who opted for elective Caesarean section.

Obstetric outcome was recorded from the antenatal and delivery records including demographic factors, antenatal medical or obstetric complications, occurrence of antepartum, intrapartum or postpartum haemorrhage, mode of delivery, types of intrapartum intervention, blood loss, change in haemoglobin, need for blood transfusion, and maternal and neonatal complications. Haemoglobin was checked after delivery. Change in haemoglobin was defined as the difference between the lowest haemoglobin measured postnatally and the most recent pre-delivery haemoglobin.

Statistical analysis was performed using SPSS software, version 22 (SPSS Inc., Chicago [IL], US). Differences between continuous variables were analysed by Student's *t* tests and analysis of variance (ANOVA), and those between categorical variables by Chi-square tests and 2 x 4 contingency tables as appropriate. A p value of <0.05 was considered statistically significant.

Results

Of 85 women diagnosed with minor placenta previa, 31 women were excluded and 54 women were included for analysis (Figures 1 and 2). TVS was performed in all 54 women within 28 days of delivery, with a mean of 13 (range, 0-27) days. The mean gestation during examination was 37 (range, 35-40) weeks. PD was measured by TVS; PD >2 cm was group 1 (n=28), PD 1.1-2.0 cm group 2 (n=23), and PD 0-1.0 cm group 3 (n=3).

Of 28 women in group 1, 4 were offered elective Caesarean section without discussion of TOL because of a clinically high head or presence of unstable lie. The remaining 24 women were offered TOL. Of whom 20 opted for TOL and 16 (80%) of them had a successful vaginal delivery. This group of women were subdivided according to their PD, i.e. 2-2.99 cm, 3-3.99 cm, and 4-5 cm; the rate of successful vaginal delivery between subgroups was comparable (Table 1). The remaining 4 women required emergency Caesarean section, because of antepartum haemorrhage (n=1) or failed induction (n=3, one for prelabour rupture of membrane and 2 for post-term).

Of 23 women in group 2, 15 were offered elective Caesarean section and 8 were discussed with TOL because of a clinically engaged head and/or the woman's preference and. For the 8 women, 6 opted for elective Caesarean section and 2 opted for TOL: one had normal spontaneous delivery (PD 2 cm) and the other (PD 1.5 cm) had induction of labour for prelabour rupture of membranes and ultimately required emergency lower segment Caesarean section because of poor progress. All 3 women in group 3 were offered elective lower segment Caesarean section.

Bleeding co-morbidities in women in group 1 was a secondary outcome. Women who opted for TOL and those who opted for elective Caesarean section were comparable in terms of blood loss, change in haemoglobin, and need for packed cell transfusion. Background characteristics of the two groups of women are similar except that women who

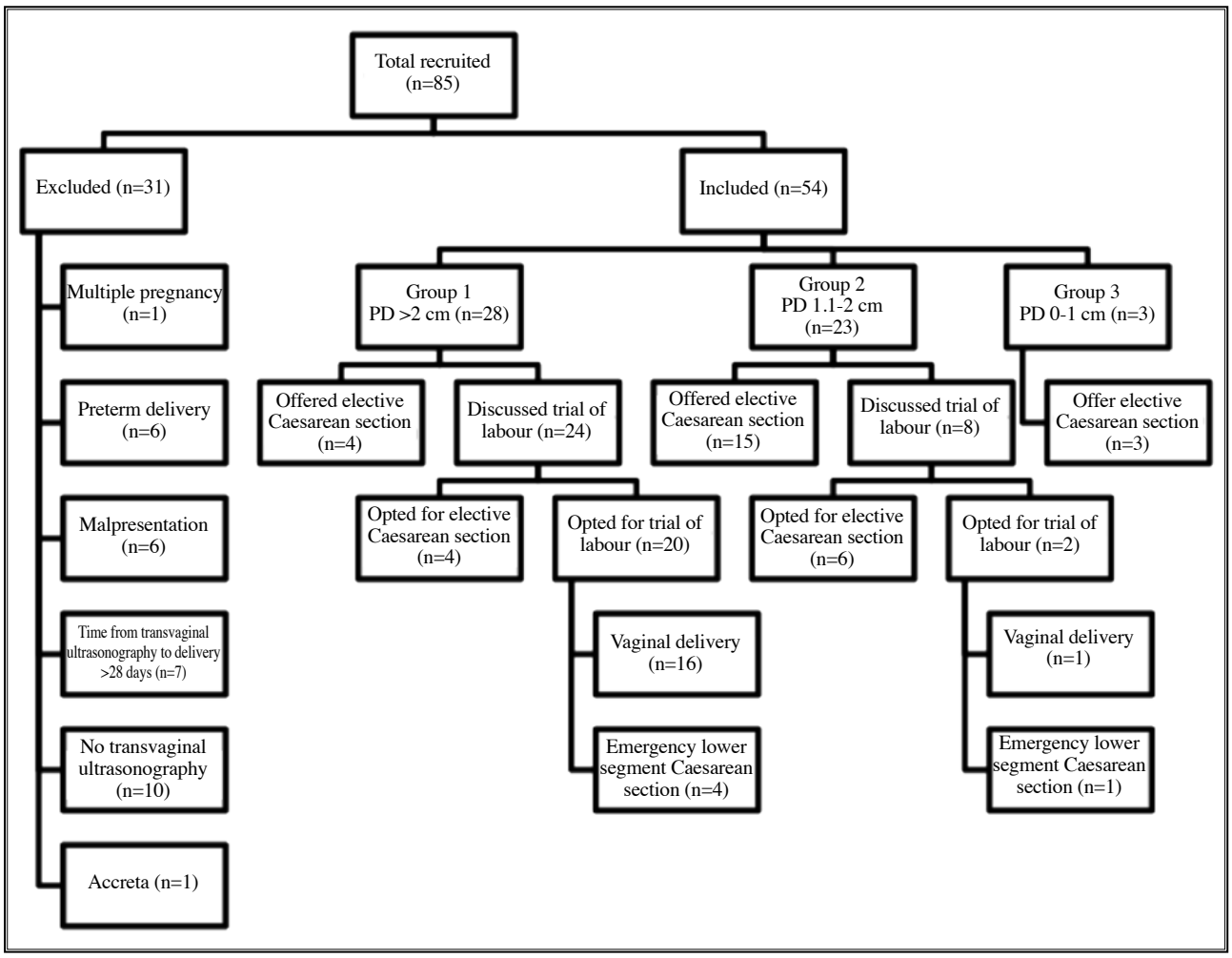

Figure 1. Flowchart of case inclusion and exclusion and outcome
Abbreviation: PD = distance from the leading placental edge to the cervical os

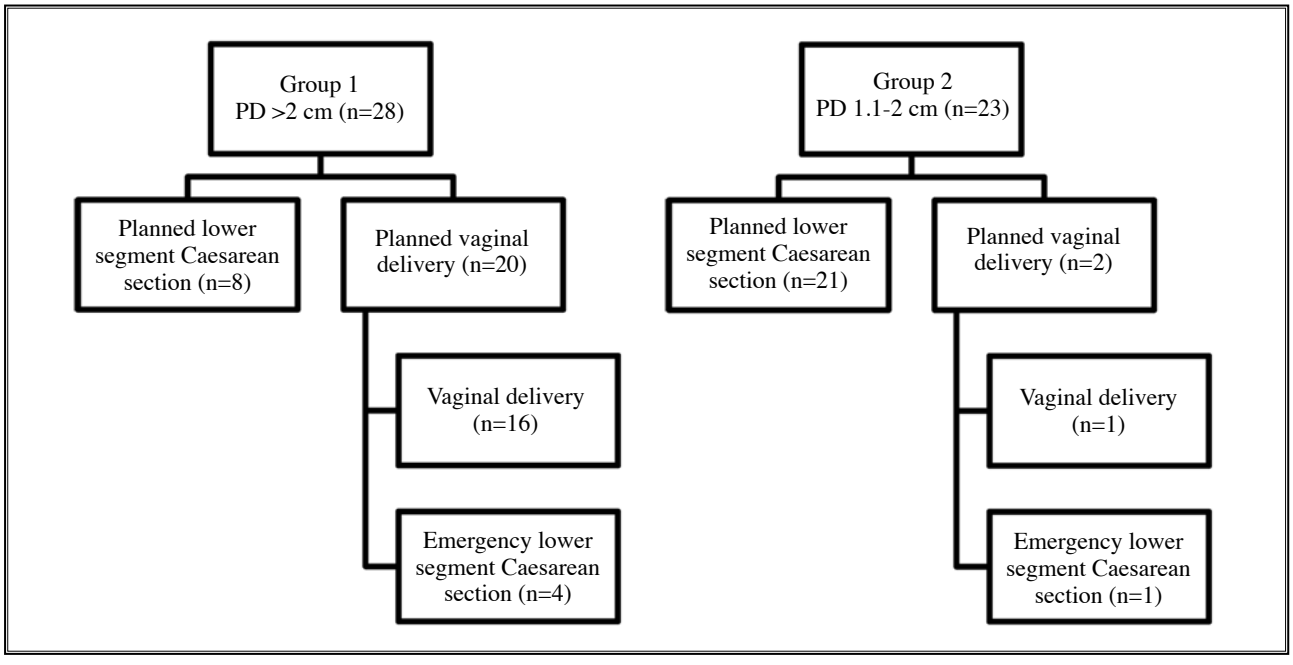

Figure 2. Flowchart of planned mode of delivery and outcome in groups 1 and 2
Abbreviation: PD = distance from the leading placental edge to the cervical os

Table 1. Successful rate of vaginal delivery in different subgroups of group 1 in women who opted for trial of labour

Characteristic	Distance from the leading placental edge to the cervical os			p Value
	2.01-3 cm	3.01-4 cm	4.01-5 cm	
No. of women	12	5	3	0.673
No. (%) of successful vaginal deliveries	9 (75)	5 (100)	2 (66.6)	

Table 2. Demographics of women in group 1 with respect to planned mode of delivery*

	Planned vaginal delivery	Planned Caesarean section	p Value
No. of women	20	8	
Age (years)	33.9 ± 4.1	33.8 ± 5.3	0.937
Gestation at delivery (weeks)	39.7 ± 1.2	39.3 ± 0.5	0.351
Time from transvaginal ultrasonography to delivery (days)	14 ± 8.4	11.9 ± 7.7	0.669
Distance from the leading placental edge to the cervical os (cm)	3.04 ± 0.79	3.0 ± 0.6	0.905
Placenta location			
Anterior	1 (5)	1 (12.5)	0.486
Posterior	19 (95)	7 (87.5)	
Parity			
Nulliparous	8 (40)	5 (62.5)	0.281
Multiparous	12 (60)	3 (37.5)	
Previous vaginal delivery	8 (40)	1 (12.5)	0.072
Previous Caesarean section	0	2 (25)	0.020
Gestational diabetes mellitus	2 (10)	1 (12.5)	0.306
Antepartum haemorrhage	2 (10)	2 (20)	0.847
Birth weight (kg)	3.3 ± 0.4	3.2 ± 0.4	0.642

* Data are shown as mean ± standard deviation or No. (%) of women, unless otherwise specified

Table 3. Comparison of blood loss, change in haemoglobin, need for packed cell transfusion with respect to planned mode of delivery in women in group 1*

	Planned vaginal delivery	Planned Caesarean section	p Value
No. of women	20	8	
Estimated blood loss (ml)	465.0 ± 250.8	393.8 ± 214.5	0.487
Haemoglobin drop (g/dL)	1.6 ± 1.9	1.1 ± 0.9	0.519
Unit of pack cell transfusion	0.3 ± 1.0	0.0 ± 0.0	0.399

* Data are shown as mean ± standard deviation, unless otherwise specified

opted for TOL were more likely to have had a previous vaginal delivery (Tables 2 and 3). Regarding the final mode of delivery, vaginal delivery, especially vacuum extraction delivery, was associated with greater drop in haemoglobin, compared with Caesarean section ($p<0.04$) [Tables 4 and 5].

Discussion

Women with PD ≤2 cm are likely to need delivery by Caesarean section (98%[3] and 87.5%[5]). PD of 2 cm is considered the minimum distance required for a TOL. In a retrospective analysis of 52 women, ultrasonographic examination was performed at a mean of 5 weeks prior to

Table 4. Demographics of women in group 1 with respect to final mode of delivery*

	Normal vaginal delivery	Vacuum extraction delivery	Lower segment Caesarean section		p Value
			Elective	Emergency	
No. of women	14	2	8	4	
Age (years)	33.8 ± 3.7	30.0 ± 2.8	33.8 ± 5.3	36.3 ± 5.1	0.451
Gestation at delivery (weeks)	39.5 ± 1.1	40.6 ± 1.4	39.3 ± 5.1	39.9 ± 1.7	0.453
Time from transvaginal ultrasonography to delivery (days)	14.1 ± 8.8	14.0 ± 2.0	12.2 ± 7.9	12.0 ± 8.12	0.943
Distance from the leading placental edge to the cervical os (cm)	3.1 ± 0.8	3.0 ± 1.4	3.0 ± 0.6	3.00 ± 0.8	0.998
Placenta location					0.848
Anterior	1 (7.1)	0	1 (12.5)	0	
Posterior	13 (92.9)	2 (100)	7 (87.5)	4 (100)	
Parity					0.175
Nulliparous	4 (11.4)	2 (100)	5 (62.5)	2 (50)	
Multiparous	10 (88.6)	0	3 (37.5)	2 (50)	
Previous vaginal delivery	10 (88.6)	0	1 (12.5)	2 (50)	0.139
Previous Caesarean section	0	0	2 (25)	0	0.146
Gestational diabetes mellitus	2 (14.2)	0	2 (25)	0	0.626
Antepartum haemorrhage	1 (7.1)	0	1 (12.5)	1 (25)	0.728
Birth weight (kg)	3.3 ± 0.4	3.0± 0.0	3.2 ± 0.4	3.5 ± 0.3	0.555

* Data are shown as mean ± standard deviation or No. (%) of women, unless otherwise specified

Table 5. Comparison of blood loss, change in haemoglobin, and need for packed cell transfusion with respect to final mode of delivery in women with group 1*

	Normal vaginal delivery	Vacuum extraction delivery	Lower segment Caesarean section		p Value
			Elective	Emergency	
No. of women	14	2	8	4	
Estimated blood loss (ml)	392.9 ± 218.2	750.0 ± 70.7	393.8 ± 214.5	575.0 ± 309.6	0.137
Haemoglobin drop (g/dL)	1.657 ± 1.8	4.0 ± 1.1	1.125 ± 0.9	0.1 ± 1.2	0.034
Unit of pack cell transfusion	0.3 ± 1.1	1.0 ± 1.4	0.0 ± 0.0	0.0 ± 0.0	0.465

* Data are shown as mean ± standard deviation, unless otherwise specified

delivery[3], whereas the mean time interval was 2 weeks (but the range was not stated) in another study[5]. As the placenta continues to migrate throughout the third trimester[9], the time interval between ultrasonography and delivery can influence PD measurement and clinical decision making on planning mode of delivery. In our cohort, all 54 women underwent TVS within 28 days of delivery at term (mean, 12.91 days) to ensure an accurate PD. 80% of women could deliver vaginally if their PD was >2 cm when they opted for TOL. This was higher than the 72%[3] and 63%[5] reported in other studies. This encouraging result may aid clinicians in counselling women with minor placenta previa of PD >2 cm about the mode of delivery.

Caesarean section was offered to 4 women in group 1 and TOL was offered in women in group 2 based on clinical considerations. Such clinical selection might have introduced selection bias to our study. Nonetheless, PD alone should not replace clinical judgement[4], and TOL can also be an option for women in group 2, as reported in other studies[6-8]. Safety is the most important concern before offering TOL to women with PD ≤2 cm. It was reported that the percentage of massive intrapartum haemorrhage is similar between planned vaginal delivery and planned Caesarean delivery, but the intrapartum blood loss is significantly lower in the planned vaginal delivery group[7]. On the contrary, it was suggested that postpartum

haemorrhage can occur in 43% of women with minor placenta previa, but TOL is not contraindicated as the postpartum haemorrhage has no significant association with PD or mode of delivery[10]. In our study, both blood loss and more objective assessment of bleeding comorbidities (haemoglobin change and need for packed cell transfusion) were analysed; there was no significant difference in women with PD >2 cm who opted for vaginal delivery or Caesarean section. This is in agreement with findings from other studies[7,10] that TOL should be safe for women with minor praevia. Concerning the final mode of delivery, vaginal delivery, especially vacuum extraction delivery, was associated with a greater decrease in haemoglobin, compared with Caesarean section ($p<0.04$). We advise clinicians to take note of the potential risk of bleeding in this subgroup of women and to institute prompt management whenever there is a slight suspicion of postpartum haemorrhage. Nonetheless, the strength of this finding may be limited by the small sample size in each subgroup.

There are studies focusing on a subgroup of women with PD 1.1 to 2 cm (group 2)[6,8]. In a study of 14 such women who opted for TOL, 13 (92.9%) had a successful vaginal delivery, and 2 (14.3%) were complicated by postpartum haemorrhage[6]. In another study of 29 women, 69% delivered vaginally and 10% developed postpartum haemorrhage[8]. The high success rate of vaginal delivery suggests that TOL might be offered to women with PD 1.1 to 2cm. Nonetheless these studies were small and the obstetric and neonatal outcomes were not adequately assessed. In our study, we were unable to address this point owing to the small subgroup sample. A large-scale prospective study is needed to evaluate the successful vaginal delivery rate, and maternal and neonatal outcome in women with PD of 1.1 to 2 cm and PD >2 cm measured by TVS close to delivery at term.

Declaration

The authors have declared no conflict of interests in this study.

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