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Outcome of placenta previa: inpatient versus outpatient management

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Objective: To share our 10-year experience on outpatient care of patients with placenta previa with no antepartum haemorrhage (APH) prior to 34 weeks of pregnancy.
Methods: This was a retrospective observational study conducted at a regional obstetric unit in Hong Kong over a 10-year period. Patients with placenta previa with no vaginal bleeding before 34 weeks were included. Those with multiple pregnancy, preeclampsia, serious underlying medical disorders, morbidly adherent placenta, or vaginal delivery were excluded. Data analysed included maternal characteristics, delivery information, maternal morbidities (massive haemorrhage, intensive care unit admission, hysterectomy), and neonatal outcomes (delivery gestation, birth weight, Apgar scores, neonatal intensive care unit admission, perinatal mortality).
Results: A total of 419 women with minor (n=265) or major (n=154) placenta previa were evaluated. Of these cases, 149 (56%) cases of minor and 37 (24%) cases of major placenta previa (p<0.001) were managed as outpatients. For patients with major placenta previa, APH (62.2% vs 35%, p=0.004) and emergency Caesarean deliveries (70.3% vs 23.9%, p<0.001) were more common among outpatients than inpatients although APH >200 mL remained rare. Neonatal outcomes were similar between outpatients and inpatients except that patients with major placenta previa had more preterm deliveries in outpatients than inpatients (29.7% vs 10.3%, p=0.004). The maternal morbidity rate was higher in patients with major placenta previa than with minor placenta previa (31.8% vs 12.5%, p<0.001) but was similar between outpatients and inpatients.
Conclusion: Outpatient care of patients with placenta previa with no vaginal bleeding prior to 34 weeks of pregnancy was associated with more emergency deliveries, but there was no major adverse effect on maternal and neonatal outcomes.

Keywords: Outpatients; Placenta previa; Pregnancy outcome

Introduction

Placenta previa is a serious obstetric complication associated with risks of major haemorrhage and maternal and fetal morbidities and mortalities[1]. The annual incidence of placenta previa among Asian women is around 12.2 per 1000 deliveries[2]. In 2001, the Royal College of Obstetricians and Gynaecologists published the first edition of a guideline on the management of placenta previa, recommending inpatient management for women with major placenta previa in the third trimester[3]. This was based on a small randomised controlled trial, in which the only significant difference was a reduction in hospital stay and cost for outpatient management[4]. The guideline was updated in 2011, recommending care customised to the individual needs of the patient[5]. Currently, there is no conclusive evidence on whether outpatient management can be applied to women with placenta previa. There are limited international data[7,11,12] and no local data to the best of our knowledge.

The aim of this study was to compare outpatient with inpatient management for patients with placenta previa with no vaginal bleeding prior to 34 weeks of pregnancy in terms of maternal and neonatal outcomes.

Methods

This study was approved by the Kowloon West Cluster Research Ethics Committee (Reference: KW/EX-15-063(85-16)(3)). We reviewed records of all women with placenta previa who had delivery by Caesarean section at Princess Margaret Hospital, Hong Kong, between January 2006 and December 2015. Women with no vaginal bleeding prior to 34 weeks of gestation were included. Patients with multiple pregnancy, preeclampsia, or serious underlying medical disorders such as chronic hypertension, insulin-dependent diabetes mellitus, chronic renal failure were excluded, as were those with minor placenta previa with vaginal delivery or those with morbidly adherent placenta.

Relevant information was extracted, including demographics (age, parity, history of Caesarean section,

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history of miscarriage/termination of pregnancy), delivery information (type of placenta previa, mode of delivery, reason of delivery, and last antepartum haemorrhage [APH] to delivery interval), maternal outcomes (massive haemorrhage, intensive care unit (ICU) admission, hysterectomy, and maternal death; maternal morbidity was defined as admission to intensive care unit, blood loss ≥1500 mL, or hysterectomy), and perinatal outcomes (gestation at delivery, birth weight, Apgar scores, admission to neonatal intensive care unit, and perinatal mortality).

The diagnosis of placenta previa was established by transabdominal ultrasound scan after 34 weeks of gestation. Transvaginal sonography was used when the diagnosis was uncertain. Major placenta previa is defined as when the placenta lies over the internal cervical os, whereas minor placenta previa is defined as when the placental leading edge is in the lower segment but not covering the cervical os[5]. Indications for ultrasound include follow-up scan for known low-lying placenta, or admission with antepartum haemorrhage. For patients with the placenta edge >2 cm from cervical os, an option of vaginal delivery was given. Patients with vaginal delivery were excluded from analysis.

In our unit, there was no protocol for the management of women with placenta previa. The decision of inpatient versus outpatient management, the timing of admission, and timing of delivery were determined on an individual patient basis. For outpatient management, the patient was electively admitted one day before her scheduled Caesarean section, or emergency Caesarean delivery was performed shortly after emergency admission for various reasons. For inpatient management, the patient may be electively admitted a few weeks before delivery for rest, or urgently admitted owing to vaginal bleeding, and stayed as inpatient until elective delivery. Premature delivery was indicated in cases of heavy vaginal bleeding, premature labour, fetal distress, or other obstetric complications.

Each episode of bleeding was defined as one occurring after >24 hours free from bleeding. The amount of antepartum haemorrhage was estimated visually by the attending medical officer.

Statistical analysis was conducted using PASW Statistics (version 18.0, SPSS Inc., Chicago [IL], US). For continuous data with a highly skewed distribution, Mann-Whitney *U* test was used to compare the difference among groups. Pearson Chi-square test or Fisher's exact test was used to investigate relationships between two categorical variables. Statistical significance was set at $p<0.05$.

Results

Of 47 595 deliveries from 2006 to 2015 at Princess Margaret Hospital, 9157 (19.2%) were by Caesarean section. Of these, 528 were due to placenta previa in the third trimester, giving its overall incidence of 1.11%. Of these 528 women, 426 (80%) had no bleeding before 34 weeks. Seven women were excluded because of multiple pregnancy, preeclampsia, or serious underlying medical disorder.

Of 419 women included in the analysis, 265 had minor placenta previa and 154 had major placenta previa. 149 (56%) cases of minor placenta previa and 37 (24%) cases of major cases ($p<0.001$) were managed as outpatients. The inpatient and outpatient groups were comparable in terms of maternal characteristics, except that outpatients in the major placenta previa group had a higher rate of previous miscarriage/termination of pregnancy (73% vs 53.8%, $p=0.04$, Table 1).

78.4% and 76.1% of inpatients with minor and major placenta previa, respectively, had elective Caesarean delivery, but only 63.8% and 29.7% of outpatients in the respective groups had elective Caesarean delivery (Table 1). The most common reason for emergency Caesarean section was APH (46%).

Of 419 women, 280 (66.8%) had no APH during the whole course of the pregnancy, accounting for 76.7% and 65% of inpatients and 67.8% and 37.8% of outpatients with minor and major placenta previa, respectively (Table 1). 76 (17.9%) patients had APH on the day of delivery and required emergency delivery, with more outpatients encountering this than inpatients. None required transfusion before operation, but two outpatients required fluid resuscitation before operation: one with minor placenta previa and the other with major placenta previa. 80 (19.1%) women had blood loss of >1500 mL. 28 (6.7%) women required admission to the intensive care unit. There was no maternal death. The overall maternal morbidity rate was 19.6% (n=82); it was higher in patients with major placenta previa than with minor placenta previa (31.8% vs 12.5%, $p<0.001$) but was similar between outpatients and inpatients.

Among women with major placenta previa, more outpatients than inpatients had preterm delivery at 34 weeks to 36+6 weeks gestation (30% vs 10%, $p=0.004$, Table 1). The two groups were comparable in terms of birth weight, Apgar score, and neonatal intensive care unit admission. There was only one neonatal death in an inpatient with minor placenta previa secondary to pulmonary lymphangiectasia after elective Caesarean section at 37 weeks gestation with blood loss of 1300 mL.

Table 1. Inpatients versus outpatients with placenta previa in terms of demographics, delivery data, antepartum haemorrhage (APH), maternal outcomes, and baby outcomes

Parameter	Minor placenta previa			Major placenta previa		
	Inpatient (n=116)*	Outpatient (n=149)*	p Value	Inpatient (n=117)*	Outpatient (n=37)*	p Value
Age, y	33 (30-37)	34 (31-36)	0.374	35 (31-38)	33 (30.5-36)	0.149
Body mass index, kg/m^2	21 (19.3-22.8)	20.7 (19.2-23.4)	0.916	21.4 (19.4-23.6)	21.5 (19.5-24.65)	0.426
Parity			0.666			0.154
Nulliparous	46 (39.7)	63 (42.3)		60 (51.3)	14 (37.8)	
Multiparous	70 (60.3)	86 (57.7)		57 (48.7)	23 (62.2)	
Previous Caesarean section	18 (15.5)	27 (18.1)	0.575	19 (16.2)	3 (8.1)	0.218
Previous miscarriage / termination of pregnancy	62 (53.4)	76 (51)	0.693	63 (53.8)	27 (73)	0.04
Elective Caesarean section	91 (78.4)	95 (63.8)	0.01	89 (76.1)	11 (29.7)	<0.001
Emergency Caesarean section	25 (21.6)	54 (36.2)		28 (23.9)	26 (70.3)	
Term labour	10 (8.6)	23 (15.4)		10 (8.5)	5 (13.5)	
Preterm labour	4 (3.4)	6 (4)		2 (1.7)	4 (10.8)	
Fetal distress	1 (0.9)	0 (0)		3 (2.6)	0 (0)	
Antepartum haemorrhage	8 (6.9)	24 (16.1)		9 (7.7)	17 (45.9)	
Others (intrauterine growth restriction of the fetus or chorioamnionitis)	2 (1.7)	1 (0.7)		4 (3.4)	0 (0)	
No APH	89 (76.7)	101 (67.8)	0.13	76 (65)	14 (37.8)	0.004
APH on the day of delivery:	10 (8.6)	34 (22.8)	0.0025	13 (11.1)	19 (51.3)	<0.0001
APH <100 mL	8 (6.9)	23(15.4)		10 (8.5)	16 (43.2)	
APH 100-200 mL	0 (0)	7 (4.7)		2 (1.7)	1 (2.7)	
APH >200 mL	2 (1.7)	4 (2.7)		1 (0.9)	2 (5.4)	
APH 1-7 days before delivery	10 (8.6)	7 (4.7)		13 (11.1)	4 (10.8)	
APH 8-14 days before delivery	3 (2.6)	1 (0.7)		5 (4.3)	0 (0)	
APH 15-21 days before delivery	2 (1.7)	4 (2.7)		5 (4.3)	0 (0)	
APH >21 days before delivery	2 (1.7)	2 (1.3)		5 (4.3)	0 (0)	
Blood loss >1500 mL	16 (13.8)	16 (10.7)	0.449	37 (31.6)	11 (29.7)	0.828
Intra-operative transfusion	22 (19)	25 (16.9)	0.662	41 (35)	18 (48.6)	0.138
Postoperative transfusion	13 (11.4)	14 (9.4)	0.595	16 (13.7)	10 (27)	0.059
Hysterectomy	1 (0.9)	2 (1.3)	1	6 (5.1)	1 (2.7)	1
Intensive care unit admission	5 (4.3)	5 (3.4)	0.752	14 (12)	4 (10.8)	1
Maternal death	0 (0)	0 (0)	-	0 (0)	0 (0)	-
Maternal morbidity (intensive care unit admission / blood loss >1500 mL / hysterectomy)	17 (14.7)	16 (10.7)	0.338	38 (32.5)	11 (29.7)	0.754
Prematurity (<37 weeks)	9 (7.8)	11 (7.4)	0.908	12 (10.3)	11 (29.7)	0.004
Birth weight, g	3035 (2830-3310)	3100 (2845-3390)	0.497	3000 (2710-3310)	3010 (2630-3360)	0.764
1-minute Apgar score <4	0 (0)	0 (0)	-	0 (0)	1 (2.7)	0.24
1-minute Apgar score <7	3 (2.6)	12 (8.1)	0.056	18 (15.4)	4 (10.8)	0.488
5-minute Apgar score <7	1 (0.9)	0 (0)	0.438	0 (0)	2 (5.4)	0.057
Neonatal intensive care unit admission	4 (3.4)	3 (2)	0.703	2 (1.7)	3 (8.1)	0.09
Neonatal death	1 (0.9)	0 (0)	0.438	0 (0)	0 (0)	-

* Data are presented as median (interquartile range) or No. (%) of cases

Discussion

The incidence of placenta previa in Princess Margaret Hospital between 2006 and 2015 was 1.11%, which is comparable to that reported in other Asian countries[2]. However, the Caesarean section rate and incidence of placenta previa increased over time. This is a global trend; together with increasing maternal age, the rate of placenta previa will continue to rise[6]. In view of the increasing incidence of placenta previa, outpatient management has been investigated.

Placenta previa occurs when the placenta partially or totally covers the lower uterine segment. According to the distance from the internal cervical os, placenta previa is conventionally classified into types I to IV: types I and II are considered minor with the leading edge of the placenta in the lower uterine segment but does not cover the cervical os, whereas types III and IV are considered major when the placenta lies over the internal os[5].

Traditionally, women with placenta previa are offered prolonged hospital stay to minimise the risk of severe haemorrhage causing maternal and fetal morbidity and mortality. However, the necessity for this inpatient management is questionable.

The 2011 Royal College of Obstetricians and Gynaecologists guideline stated that those with major previa who have previously bled should be admitted from approximately 34 weeks of gestation, whereas outpatient care can be considered for those with minor previa or those asymptomatic, but evidence is lacking[3]. The most updated 2018 guideline stated that antenatal care should be tailored to individual needs for patients with recurrent APH,

Table 2. Comparison of studies on outpatient management of placenta previa

Study	Population area	Sample size	Study type	Inclusion criteria	Results
Wing et al[4], 1996	Los Angeles	53	Randomised controlled	Women with placenta previa from 24 to 36 weeks gestation who required hospitalisation	The only significant difference was a reduction in hospital stay and cost for outpatient management
Love et al[7], 2004	Edinburgh	161	Retrospective observational	Women with placenta praevia delivering between 1994 and 2000	Women with a major placenta praevia were not significantly more likely to experience bleeding. Women with antepartum haemorrhage were significantly more likely to be delivered early, by emergency Caesarean section, of lower birthweight babies who required neonatal admission, compared with women with no antepartum haemorrhage
Lam et al[8], 2000	Hong Kong	252	Retrospective observational	Women with placenta praevia delivering between 1991 and 1997	Increased risk of premature delivery in women with antepartum haemorrhage and placenta praevia. Women without antepartum haemorrhage can be managed on an outpatient basis.
Mouer[11], 1994	Arizona	238	Retrospective cohort	Women with placenta previa who delivered after 28 weeks between 1981 and 1992	No significant difference in outcome of the two groups
Droste and Keil[12], 1994	Wisconsin	72	Retrospective cohort	Women with placenta previa managed expectantly with either hospitalisation or outpatient bed rest from 1985 to 1990	No significant differences in maternal and fetal morbidity between groups. Outpatient management achieved a hospital cost reduction of 48.5% for mothers ($p<0.001$) and 39.4% for mother-infant pairs ($p<0.05$).
Present study, 2019	Hong Kong	419	Retrospective observational	Women with placenta previa with no vaginal bleeding prior to 34 weeks of gestation, delivering between 2006 and 2015	Outpatient care of patients with placenta previa with no vaginal bleeding prior to 34 weeks of pregnancy is associated with more emergency delivery, but there is no major adverse effect on maternal and neonatal outcomes.

whereas those with no APH can be cared for as outpatients with similar outcomes at a lower cost[9].

The present study only included patients without APH prior to 34 weeks of gestation for consideration of outpatient management. We excluded patients with APH prior to 34 weeks who may require antenatal steroids or tocolytics and have a higher risk of preterm delivery and poor outcome[8]. Of 419 patients with no APH prior to 34 weeks gestation, 280 (67%) had no APH throughout the pregnancy. Among the 139 patients with APH, 76 (55%) required emergency delivery on the same day owing to APH or labour or fetal distress. Two-thirds of them were managed as outpatients. The incidence of emergency delivery was higher in outpatients than inpatients, especially for those with major placenta previa (70.3% vs 23.9%). This may explain the higher incidence of APH in outpatients and higher incidence of preterm deliveries in outpatients with major placenta previa, compared with inpatients (29.7% vs 10.3%). Nonetheless, all other baby outcomes were similar between inpatients and outpatients. The maternal morbidity rate for those with minor placenta previa was 10.7% for outpatients and 14.7% for inpatients (p=0.449). For major placenta previa, it was 29.7% for outpatients and 32.5% for inpatients (p=0.828). The maternal morbidity rate was was higher in patients with major placenta previa than with minor placenta previa (31.8% vs 12.5%, p<0.001) but was similar between outpatients and inpatients.

The present study has the largest sample size among currently available studies on outpatient management of placenta previa (Table 2). It provides updated local data useful for patient counselling. It showed that inpatient and outpatient management achieve similar outcomes for placenta previa with no APH prior to 34 weeks. Outpatients, especially those with major placenta previa, have a higher incidence of emergency delivery.

This study is limited by its retrospective nature. The findings in local settings may not be generalised to other settings. Hong Kong is a compact city with an efficient transport system. Women with APH can be transferred to tertiary hospitals swiftly. Large-scale randomised controlled trials are warranted to address the safety of hospitalisation for patients with placenta previa.

Conclusion

Outpatient management for placenta previa without APH prior to 34 gestational weeks has no significant adverse impact on pregnancy outcomes, except for a higher rate of emergency delivery. Maternal morbidity is more likely to be associated with major placenta previa that cannot be prevented by inpatient management.

Declaration

The authors have no conflict of interests to disclose.

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