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A study to determine maternal and fetal outcome in placenta previa in a tertiary care hospital

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Abstract
Background: Obstetrical haemorrhage, infections and hypertension are one of the "triad" of maternal deaths documented in both developed and developing countries. When the placenta is implanted partially or completely in the lower uterine segment it is called "Placenta previa".
Objective: To determine the incidence, obstetric risk factors, obstetric management, maternal mortality and morbidity, perinatal outcome in women presenting with placenta previa.
Materials and Methods: Total 75 pregnant women with placenta previa were analysed between November 2016 to December 2018. After applying the inclusion and exclusion criteria, these women were analysed with respect to their age, parity, gestational age and clinical features at presentation, history, duration of hospitalization, blood transfusion, period of gestation at delivery, management, route of delivery, operative complications and ICU admissions. For the new-born birth weight, need for NICU admission, still birth rate, neonatal morbidity and mortality rate are noted down.
Results: In this study 0.37% of the deliveries were complicated with placenta previa among them 41.3% women were among 21-25 years of age and 53.3% were multigravidas. 46.7% had complete placenta previa, 29.3% had prior caesarean deliveries, 29.3% had prior abortion, 48% presented with APH. 78.7% cases delivered by caesarean delivery, 34.7% cases had postpartum haemorrhage, 2.7% had placenta accrete, 25.3% required bilateral uterine artery ligation, 14.7% required peripartum hysterectomy. There were 22.7% ICU admissions, 1% had maternal mortality. 26.7% had NICU admission, perinatal mortality being 13.3%.
Conclusion: Multiparity, prior caesarean section and prior abortions are independent risk factors for placenta previa. Placenta previa remains a risk factor for adverse maternal and perinatal outcome. The detection of placenta previa should encourage a careful evaluation with timely delivery to reduce the associated maternal and perinatal complications.

Keywords: Placenta previa, prior caesarean delivery, adherent placenta, postpartum haemorrhage, maternal morbidity.

Introduction
Obstetrical haemorrhage continues along with hypertension and infections as one of the infamous "triad" of causes of maternal deaths in both developed and underdeveloped countries. It is a leading reason for admission of pregnant women to intensive care units [1, 2].
Haemorrhage is the single most important cause of maternal death worldwide. It is responsible for half of all postpartum deaths in developing countries [3]. Any bleeding from the genital tract during pregnancy after the period of viability until delivery of fetus is called Antepartum hemorrhage (APH). When placenta is implanted partially or completely over the lower uterine segment (over and adjacent to internal os) called as Placenta Previa [4].
Nowadays by all the expertise and care taken reduced maternal death of placenta previa from <1% or even to zero in some centres. It is very important to recognize placenta previa early and transport them to major referral hospital [4].
Incidences for placenta previa average 0.3 percent or 1 case per 300 to 400 deliveries [5]. There is higher incidence of perinatal mortality and morbidity due to preterm delivery and its related complications like low birth weight, birth asphyxia and neonatal sepsis.
The maternal and neonatal outcome can be definitely improved in placenta previa as it can be diagnosed by antenatal USG even before the first episode of bleeding. These cases are to be managed only in centres where there are facilities for blood transfusion, immediate operative intervention and NICU facilities round the clock to attend to the usually preterm babies.

Even better ANC and thorough screening of the patient with second trimester scan, better referral system, transport and more hospitals with 24 hours blood bank facility are the need of the hour. All these measures can probably bring down the maternal and perinatal mortality and morbidity rate and achieve the standards of developed countries [6].

Methodology

A cross sectional study conducted after obtaining clearance and approval from the Institutional Ethical committee, pregnant women consenting for the study who report to Vani Vilas hospital from November 2016 to May 2018 were selected after applying inclusion and exclusion criteria by Purposive Sampling technique till the sample size was achieved.

All women with placenta previa diagnosed during clinical examination/ ultrasound/ process of delivery/ Caesarean section after 28 weeks of gestation were enrolled in the study. Patients with abruptio placenta, local lesions of cervix, vagina and external genitalia were excluded from the study.

Total 75 pregnant women with placenta previa were analysed with respect to their age, parity, gestational age and clinical features at presentation, history of warning bleeding, duration of hospitalization, need for blood transfusion, period of gestation at delivery, management, route of delivery, intraoperative and post-operative complications and ICU admissions. For the new-born birth weight, need for NICU admission, still birth rate, neonatal morbidity and mortality rate are noted down.

Statistical analysis: Data was entered and compiled in Microsoft Excel sheet. Analysis was done using statistical software SPSS Version 23. Data was analysed using Descriptive statistics and presented in the form of percentages, tables, figures, graphs, diagrams wherever necessary. Chi-square test was applied for categorical variables if required. The Crosstabs procedure forms two-way and multi-way tables and provides a variety of tests and measures of association for two-way tables.

The structure of the table and whether categories are ordered determine what test or measure to use. Significance is assessed at 5% level of significance.

Results

Total 75 pregnant women with placenta previa who met the inclusion and exclusion criteria and gave written informed consent to participate were enrolled in the study.

Table 1 represents the distribution of study subjects included in the study.

Table 1: Distribution of study subjects

Total number of births	20,196
Total number of cases of placental previa	75
Incidence of placenta previa	0.37%
Total number of perinatal deaths due to placenta previa	10
General perinatal mortality rate	24/1000 (2.4%)
Perinatal mortality rate in placenta previa	13.3%
NICU admission	26.7%
Maternal death due to placenta previa	1 (1.33%)

Maternal Outcomes

Figure 1 depicts the distribution of study subjects according to age and the incidence of placenta previa was highest in the age group of 21-25 years i.e., 41.3% followed in descending order by women in the 26-30 years, <20 years, 31-35 years and >36 years age group, i.e., 32%, 16%, 5.3% and 5.3% respectively.

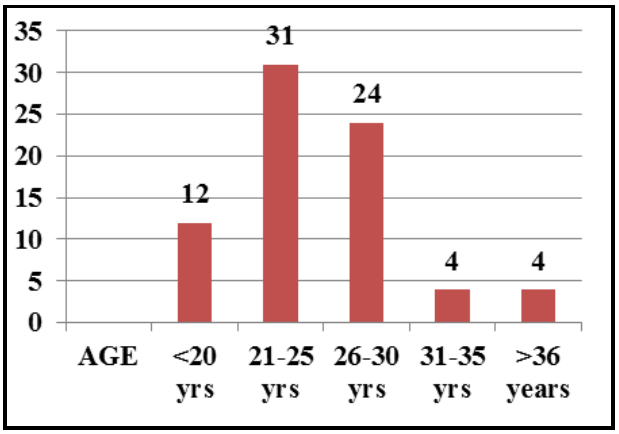

Fig 1: Distribution of study subjects according to age

By considering socio-economic status (SES) of study subjects. In the present study, most of them belonged to middle class 58.7%, followed by upper middle class 25.3%, lower middle class 16%.

Table 2: Distribution of socio-economic status of study subjects

SES	Frequency (N=75)	Percentage
Upper Class	00	00%
Upper Middle Class	19	25.3%
Middle Class	44	58.7%
Lower Middle Class	12	16%
Lower Class	00	00%
Total	75	100%

- Figure 2 depicts the antenatal registration of study group. In the present study, 64 cases were booked ANC's accounts for 85.3% and 11 were unbooked (14.7%).

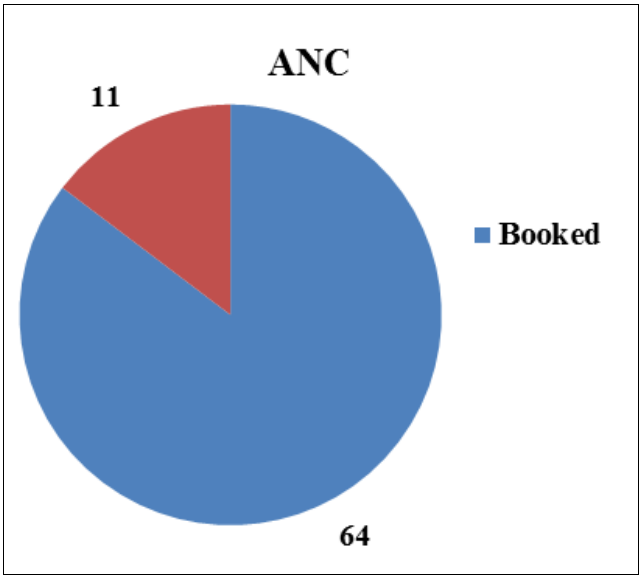

Fig 2: Distribution antenatal registration of study group

In representing the time of admission of study subjects in terms of period of gestation (POG). In the present study, majority around 54.7% were admitted at 36-40 weeks, followed by 17.3% at 32-36 weeks, 16% at >40 weeks, 12% at 28-32 weeks of gestation.

- Figure 3 depicts the distribution of study subjects according to Parity. In the present study, the incidence of placenta

previa was highest in among multigravidas (2-3 viable births) i.e, 53.3%, followed by in primigravida 33.3%, in grand multipara (>4) incidence being 13.3%.

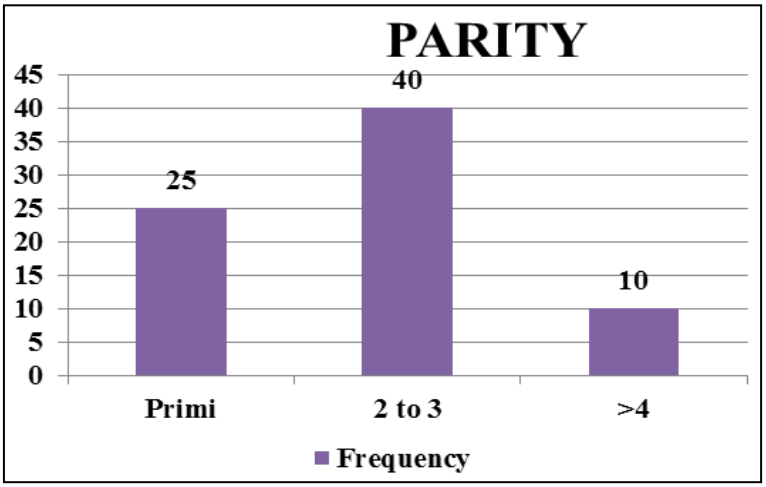

Fig 3: Distribution of study subjects according to parity

The time of diagnosis of placenta previa among study subjects. In the present study, 50.7% of cases of placenta previa was diagnosed at 31-35 weeks, 40% detected at <30 weeks, 6.7 % were detected at 36-40 weeks, 1.3% cases were identified at >40 weeks.

Delay in detection was most of them in unbooked cases.

The distribution of study subjects according to symptoms. In the present study, most of them presented with bleed per vagina accounts for 48%, followed by pain abdomen 25.3%, leak per vagina 8%, placenta previa was incidentally diagnosed for 2 cases (2.7%). 16% were asymptomatic.

- Figure 4 depicts the distribution of study subjects according to risk factors. In the present study, 34.7% didn't have any risk factors, 29.3% had previous LSCS and 29.3% had abortion, 6.7 % had previous hysterotomy as a risk factor.

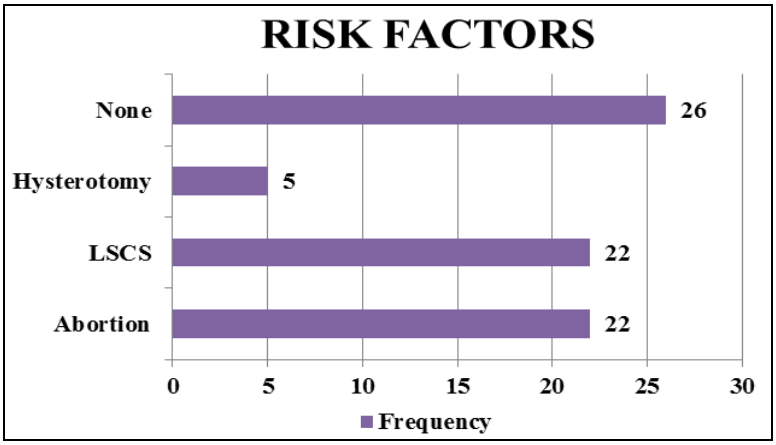

Fig 4: Distribution of study subjects according to risk factors

Representing the antenatal complications of study subjects. In the present study, 50.7% had 2nd trimester bleeding, 21.3% had PIH, 9.3% had GDM, 5.3% had abruption, 4% had severe anemia, 2.7% had chorioamnionitis, 1.3% had IUD, 5.3% didn't have any complications.

Table 3: Antenatal complications among study subjects

Antenatal complications	frequency	percentage
Nil	4	5.3
2nd trimester bleeding	38	50.7
Severe anemia	3	4.0
PIH	16	21.3
IUD	1	1.3
GDM	7	9.3
Abruption with placenta previa	4	5.3
Chorioamnionitis	2	2.7

The distribution of presentation pattern among study subjects. In the present study 72% had cephalic presentation, 25.3% had breech presentation, 2.7% had transverse lie.

Depicting the ultrasound findings of placenta previa among study subjects. In the present study, 46.7% had type 4 placenta previa, 33.3% had type 3 placenta previa, followed by type 2 and type 1 being 13.3%, 6.7% respectively.

The MRI findings of placenta previa among study subjects. In the present study, out of 75 cases MRI was done for only 18 cases, among them 12 cases had normal study, 4 cases had placenta accrete, 2 cases had placenta increta. Both the cases of placenta increta underwent hysterectomy.

- Figure 5 depicts the period of gestation at delivery of study subjects. In the present study, 54.7% delivered at 36-40 weeks, 20% delivered at more than 40 weeks, 13.3% delivered at 32-36 weeks and 12% delivered at 28-32 weeks.

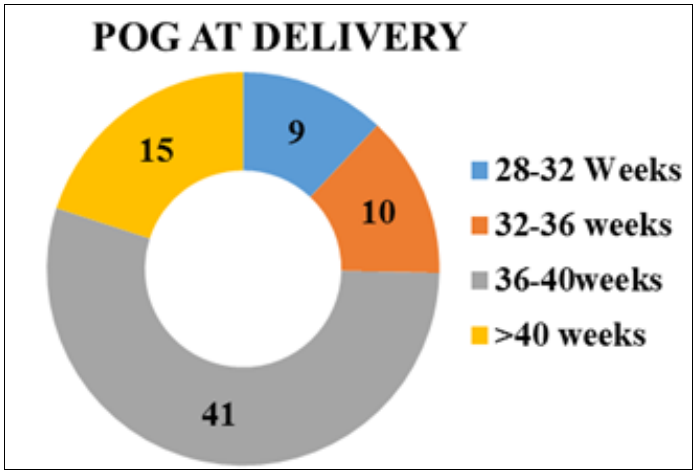

Fig 5: Period of gestation at delivery of study subjects

Representing the management protocol of placenta previa among study subjects. In the present study, among 75 cases expectant management done for 16 cases according to Macafee and Johnson's regimen, no perinatal mortality noted among them. Active management done for 59 cases.

- Figure 6 depicts the Intra-operative complications of study subjects. In the present study, 34.7% had PPH, 19.6 % had abruption placenta, 2.7% had accrete, 2.7% had increta, 2.7% had shock, 1.3% had rupture uterus and 36% had no intra- operative complications

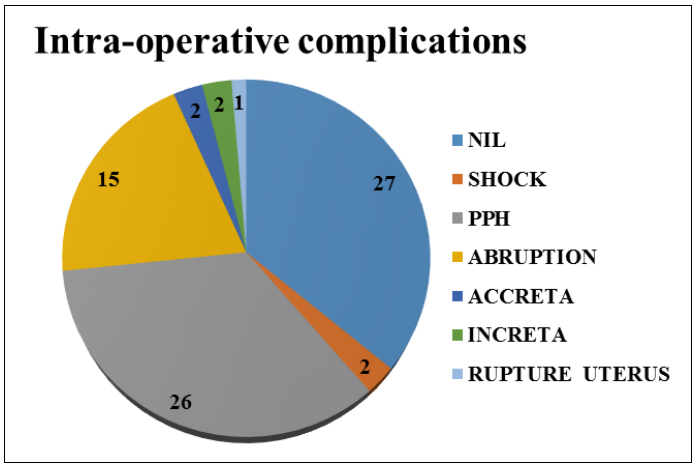

Fig 6: Intra-operative complications of study subjects

Representing extra surgical techniques to control PPH among study subjects. In the present study, out of 75 cases, 35 cases didn't have any complications during LSCS. 26 cases had intra-operative complications like PPH. All these techniques are followed after failure of medical management. 19 cases required bilateral uterine artery ligation (25.3%), 4 cases required B-Lynch sutures (5.3%),

- Figure 7 depicts the post-operative complications of study subjects. In the present study, out of 75 cases, 52 cases had post-operative period uneventful (69.3%). 17 cases (22.7%) had ICU admission, 4 cases had Disseminated intravascular coagulation accounts for 5.3%, one case had acute kidney injury 1.3% and maternal mortality being 1.3% in this study.

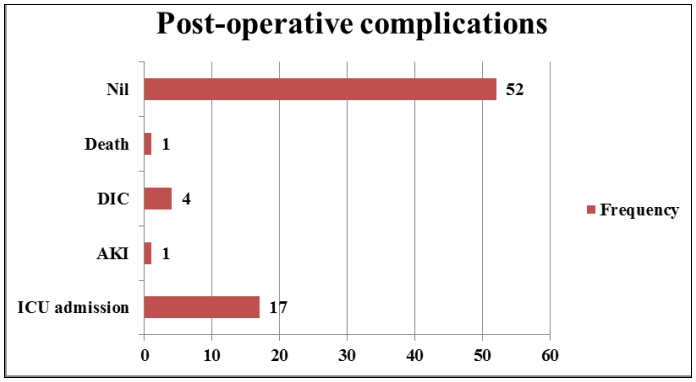

Fig 7: Post-operative complications of study subjects

Representing blood and its products transfusion details among study subjects. In the present study, out of 75 cases 34 cases didn't require any transfusion. 14 cases had abruption and 26 cases had PPH, among them 19 cases required packed red blood cell (PRBC) transfusion. 22 cases required packed cells with fresh frozen plasma transfusion (PRBC+FFP).

Perinatal outcomes

Representing's birth weight distribution. In the present study, out of 75 cases, 38 cases (50.7%) had birth weight of >2.5 kg, 25 cases (33.3%) had between 2-2.49 kg, 5 cases (6.7%) had between 1.5-1.99 kg, 6 cases had between 1-1.49 kg accounts for 8% and one case had <1 kg (1.3%).

By representing outcomes with NICU admission and its causes. In the present study, out of 75 cases, 55 cases didn't require NICU admission. 20 cases required NICU admission accounts for 26.7%. Causes for NICU admission being respiratory distress (26.7%) and prematurity (26.7%) and follow up was done. Representing association between the types of Placenta Previa and Intra-Operative complications. In the present study, based on the ultra sound findings the classification of placenta previa was done as follows: Minor degree- includes Type 1 and Type 2 anterior placenta previa = 15 cases, Major degree- includes Type 2 posterior, Type 3, Type 4 Placenta previa = 60 cases. In minor degree of placenta previa, 13.3% had abruptio placenta, 20% had PPH and 66.7% didn't have any complications. In major degree of placenta previa, 23 cases (38.3%) had post-partum haemorrhage, 12 cases (20%) had abruptio placenta, 2 cases (3.3%) had placenta accreta, 2 cases (3.3%) had placenta increta, 2 cases (3.3%) had shock, 1 case had rupture uterus (1.7%) and 17 cases (28.3%) didn't have any complications.

*Data analyzed by Chi square test; Chi square=8.34, p=0.303

Representing association between the types of Placenta Previa and Extra surgical interventions. In the present study, among minor degree of placenta previa- 15 cases, 2 cases 13.3% required B-Lynch sutures, 1 case required internal iliac artery ligation (6.7%), 2 cases required hysterectomy (13.3%). In the major degree of placenta previa, 19 cases required bilateral uterine artery ligation (31.7%), 2 cases required B-lynch sutures 3.3%, 4 cases required Hayman's sutures (6.7%), 9 cases had undergone

Representing association between the types of Placenta Previa and Post-Operative complications. In the present study, among 15 cases of minor degree of placenta previa, ICU admission rate is 20%, maternal mortality rate among them is nil. 80% cases didn't have any complications.

In major degree of placenta previa, out of 60 cases, 23.3% had ICU admission, one case had Acute kidney injury (1.7%), 4 cases had Disseminated intravascular coagulation (6.7%), maternal mortality rate being 1.7%. 40 cases didn't have any complications (66.7%).
*Data analyzed by Chi square test; Chi-square=1.8, p=0.76
Representing correlation between Prematurity and NICU admission with Type of Placenta Previa. In the present study, among minor degree of placenta previa the incidence of prematurity was 20% and major degree of placenta previa was 28.3%.
Out of 15 cases of minor degree of placenta previa, 4 cases had NICU admission. 26.7%, among 60 cases of major degree of placenta previa, 16 cases had NICU admission accounts for 26.7%. *Data analyzed by Pearson's correlation; p>0.05 (not significant),

- Figure 8 depicts correlation of birth weight and perinatal mortality. In the present study, perinatal mortality was 12% among newborns of birth weight 2-2.49 kg, 20% among 1.5-1.99 kg, 83.3% among 1-1.49 kg, 100% perinatal mortality among birth weight <1 kg (Data analyzed by Chi square test; Chi-square= 38.01, p = 0.001).

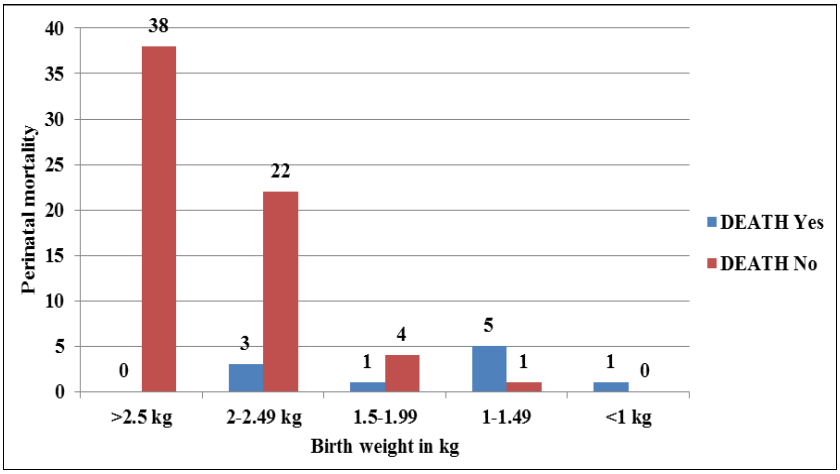

Fig 8: Correlation of birth weight and perinatal mortality

Discussion

In the present study the incidence of placenta previa was highest in the age group of 21-25 years i.e.,41.3%, followed in descending order by women in the 26-30 years age group, <20 years age group and 31-35 years, >36 years age group, i.e., 32%, 16%, 5.3%, 5.3% respectively. In the recent study in 2015 by Sarojini *et al.* [7] showed the incidence of placenta previa was highest in the age group of 25-29 years (36.8%), followed in descending order in the 20-24 years (30.2%), >30 years (23.6%), <20 years (9.4%).
In the present study the incidence of placenta previa was highest in among multigravidas (2-3 viable births) i.e., 53.3%, followed by in primigravida 33.3%, in grand multipara (>4) incidence being 13.3%.
In the present study, most of them presented with bleed per vagina accounts for 48%, followed by pain abdomen 25.3%, leak per vagina 8%, placenta previa was incidentally diagnosed for 2 cases (2.7%) and 16% were asymptomatic. When compared to the study done by Dewedi seema *et al.* [8] in 2017, out of 262 cases, 233 (88.9%) presented with bleeding per vagina, majority cases of 123 (46.9%) between 30-34 weeks of gestation. In the present study 34.7% didn't have any risk factors, 29.3% had previous LSCS and abortion (29.3%), 6.7 % had previous hysterotomy as a risk factor. In a study done by Milosevic J *et al.* [9] in 2009 was a retrospective study of 10-year period about the placental complication after a previous caesarean section. The incidence of placenta previa in control group was 0.33% opposite to 1.86% after 1 caesarean section, 5.49% after 2 caesarean sections and as high as 14.28% after 3 caesarean sections.
In the present study, antenatal complications were studied. 50.7% had 2nd trimester bleeding, 21.3% had PIH, 9.3% had GDM, 5.3% had abruption, 4% had severe anemia, 2.7% had chorioamnionitis, 1.3% had IUD, 5.3% didn't have any complications. According to Fishman, Shire *et al.* [10] in 2011 of 113 singleton pregnancies with placenta previa, 54 (48%) delivered at term and 59 (52%) delivered at preterm. 51 (45%) experienced antepartum bleeding at a median gestational age of 31 weeks (29-33 weeks) with a median interval of 20 days (11-33 days) between first bleeding episode and delivery.
In the present study 72% had cephalic presentation, 25.3% had breech presentation, 2.7% had transverse lie. Similar to the study done by P. Reddi Rani *et al.* [11] in 1999, the incidence of malpresentation was 20% and McShane *et al.* [12] in 1985, the incidence of malpresentation was 27%.
In the present study in USG, 46.7% had type 4 placenta previa, 33.3% had type 3 placenta previa, followed by type 2 and type 1 being 13.3%, 6.7% respectively. A study of Dewedi seema *et al.* [8] out of 262 cases, ultrasound could be done in only 133 (50.8%) of women. Low lying placenta constituted 75 (56.4%) of all placenta previa cases followed by marginal placenta previa in 34 (25.6%) and 11 (8.27%) had central placenta previa. Among these, 11 (8.27%) cases of placenta accrete were detected by USG. A study of Rangaswamy *et al.* [13] in 2015 out of 62 cases, Low lying placenta was the most common type of placenta previa in 23 (37.2%) cases, followed by type 2 in 19 (30.6%). Central placenta previa was found in 13 (20.9%) cases and type 3 in 7 (11.2%) cases.
In the present study, out of 75 study subjects 34.7% had PPH, 18.7 % had abruptio placenta, 2.7% had accreta, and 2.7% had increta, 2.7% had shock, 1.3% had rupture uterus and 36% had no intra-operative complications. In 2007, a study done by Zlatnik MG *et al.* [14] found that patient with placenta previa were more likely to be diagnosed with postpartum haemorrhage (59.7% vs. 17.3%; $p<0.001$) and to receive a blood transfusion (11.8% vs. 1.1%; $p<0.001$). Another study by Sarojini *et al.* [7] 13 (12.7%) cases had postpartum haemorrhage and 5 (4.7%) had adherent placenta. In the study done by Manohar Rangaswamy

et al. [13] out of 62 cases, 10 (16.1%) cases had Atonic PPH, 4 (6.4%) cases were minor degree PPH and 6 (9.6%) cases were of major degree of PPH, of which 4 cases went for haemorrhagic shock. In the study done in 2008 by Suk- Joo Choi *et al*. [15] concluded that women with placenta previa, history of abortion as well as prior caesarean section and total previa are strong antepartum risk factor for peripartum hysterectomy.

As per ACOG committee opinion, July 2012, the incidence of Placenta accreta has increased and seems to parallel the increasing caesarean delivery rate. Researchers have reported the incidence of placenta accreta as 1 in 533 pregnancies for the period [16]. There is limited evidence to support uterus preserving surgery in placenta percreta and women should be informed of the high risk of peripartum and secondary complications including the need for secondary hysterectomy according to RCOG New 2018 [17].

In the present study out of 75 cases, 35 cases didn't have any complications during LSCS. 26 cases had Intra-operative complications like PPH. All these techniques were followed after failure of medical management. 19 cases required bilateral uterine artery ligation (25.3%). 4 cases required B-Lynch sutures (5.3%), Hayman's sutures were applied for 4 cases (5.3%) 11 cases underwent peripartum hysterectomy (14.7%), internal iliac artery ligation was needed for one case (1.3%), hysterectomy with bladder repair was done for one case of placenta percreta invading into bladder (1.3%). In the study done by Sarojini *et al*. [7] additional surgical procedures / maneuvers carried out to control bleeding, cervico-isthmic sutures was needed for 5 cases (4.7%), B-lynch sutures was needed for 3 cases (2.8%), 1.9% required uterine artery ligation, Emergency peripartum hysterectomy done for 5 cases (4.7%), Emergency peripartum hysterectomy followed by internal artery ligation done for 1 case (0.9%).

In the present study, out of 75 cases 52 cases had post-operative period uneventful (69.3%). 17 cases (22.7%) had ICU admission, 4 cases had Disseminated intravascular coagulation accounts for 5.3%, one case had acute kidney injury 1.3%, maternal mortality being 1.3%. In the study done by Sarojini *et al*. [7] out of 106 cases there were 92 (86.8%) ICU admissions, 4 (3.8%) cases of acute kidney injury, 1 (0.9%) case of septicaemia and 1 (0.9%) maternal death in the present series.

In the present study out of 75 cases, 38 cases (50.7%) had birth weight of >2.5 kg, 25 cases (33.3%) between 2-2.49 kg, 5 cases (6.7%) between 1.5-1.99 kg, 6 cases between 1-1.49 kg accounts for 8%, one case had birth weight <1 kg (1.3%). 55 cases didn't require NICU admission, 20 cases required NICU admission accounts for 26.7%. cause for NICU admission being respiratory distress (26.7%), prematurity (26.7%) and follow up was done. In the study done by Zlatnik MG *et al*. [14] concluded that placenta previa is associated with preterm delivery prior to 28 weeks 3.5%, 32 weeks 11.7% and 34 weeks 16.1%. Out of 20 cases who had admitted for NICU, 5 cases developed neonatal sepsis (6.7%), the cause being prematurity, 10 cases had perinatal mortality accounts for 13.3%, cause being Neonatal sepsis, Respiratory distress, extreme prematurity, very low birth weight.

The increasing use of caesarean section will result in increase in the incidence of placenta previa and placenta accreta. Expectant antenatal management will reduce but not totally avoid perinatal mortality. Anticipation of the complications at caesarean section is an important factor in reducing maternal morbidity.

Conclusion

As the maternal and perinatal morbidity and mortality due to placenta previa is preventable, efforts should be made to bring down these rates. This can be achieved by spacing pregnancies, limitation of family size, antenatal registration of all pregnant women, and routine use of USG in pregnancy and early referral of high-risk pregnant women to tertiary care centres. Awareness should be brought about in the rural public to avail the facilities provided by the Government.

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