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Correlative Evaluation of the Abnormal Invasion of Placenta in Placenta Previa Using Ultrasonography, Colour Doppler and MRI and Maternal and Fetal Outcome at a Tertiary Care Center

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Abstract

Aim: To evaluate the abnormal invasion of placenta in placenta previa using Ultrasonography, Colour Doppler and MRI and to study the maternal and fetal outcome.

Introduction: Placenta previa in which the placenta is implanted either near or over the internal cervical os, presenting ahead of the leading pole of the fetus is seen in 0.4-0.5% of all labours. Patients are at increased risk of abortions and premature deliveries, fetal mal-presentations, Caesarean sections, intrapartum haemorrhage, peripartum hysterectomy, birth asphyxia and maternal and perinatal morbidity and mortality. This study was conducted on 50 pregnant mothers who were diagnosed to have placenta previa.

Material and Methodology: A prospective study was done at Gandhi Hospital between October 2015 and 2016 on 50 pregnant women with diagnosed placenta previa after written informed consent. History of period of gestation, previous uterine manipulations and surgeries, complaints like bleeding per vaginum, complications during present and past pregnancy and particulars like post partum period, fetal outcomes like maturity, birthweight and perinatal morbidity and mortality were studied and entered in a Proforma.

Blood Investigations like CBP, Renal function tests, Ultrasonography, Colour Doppler and MRI were done.

The data of imaging techniques was compared to the intraoperative data using t-test.

Results: Three quarters were unbooked cases. 46% presented with bleeding per vaginum.

The incidence of placenta previa was highest in women with third pregnancy and in those with previous Caesarean section.

On Ultrasonography, 64% had major and 26% had minor Placenta previa.

On Colour Doppler, 76% did not have invasion of placenta which was confirmed with MRI.

Caesarean section was done in 58%, and Hysterectomy in 16%.

18% had adhesion between uterus and bladder in 18%. Placenta could not be separated in 14%.

B-Lynch sutures, Devascularization procedures like bilateral uterine artery ligation and bilateral internal Iliac artery ligation were needed. Bladder was repaired in 10%. Uterine wall was excised in 4% of the cases.

Complications included Hemorrhage in 20%, Hypovolaemic shock in 12%, bladder injury in 8%, and Renal failure in 2%. 8% required ventilatory support. The maternal mortality was 2%. Preterm babies constituted 58%. 26% of babies died.

Keywords: Placenta previa; Adherent placenta; Ultrasound; Colour Doppler; MRI; Haemorrhage; Maternal outcome; fetal outcome.

Introduction

Placenta previa is an obstetric condition in which the placenta is implanted somewhere in the lower segment of the uterus either near or over the

internal cervical os, presenting ahead of the leading pole of the fetus.[1] It usually occurs in the second or third trimesters and rarely in the later part of the first trimester and is a major cause of antepartum haemorrhage. It is seen in approximately 0.4-0.5% of all labours.

Ananth CV[2] reported the incidence of placenta previa to be approximately 1 in 200 deliveries. Taylor MV et. al.[3] reported that the frequency of placenta previa among women of Asian origin was 3.3 per 1000 live birth (0.33%).

The exact etiology of placenta previa is not known. It is hypothesized to be possibly due to abnormal vascularization of the endometrium caused by scarring or atrophy from previous trauma, surgery or infection, which may reduce differential growth of the lower segment, resulting in less upward shift in placental position as pregnancy advances.

A Danish national cohort study[4] was associated with an increased risk of neonatal mortality, prematurity, low Apgar scores, low birth weight, and transfer to a neonatal intensive care unit. The traditional classification of placenta previa describes the degree to which the placenta encroaches upon the cervix in labor and is divided into low lying, marginal, partial or complete placenta previa, which is obsolete now. Recently, it has been classified by history, clinical examination and investigations like ultrasonography (transabdominal and transvaginal) and magnetic resonance imaging (MRI) as major previa if the placenta lies over the internal cervical os and minor or partial previa if the leading edge of the placenta is in the lower uterine segment but not covering the cervical os. Adherent placenta is further classified according to the depth of placental in growth into the uterine wall into placenta accreta (morbidly adherent placenta with superficial uterine attachment), increta (placental penetration into the myometrium), and percreta (the most severe form; placenta penetrates through the uterine wall and other pelvic organs, most commonly the bladder). Placental accreta syndromes thus include any placental implantation with abnormally firm adherence to myometrium because of partial or total absence of the decidua basalis and imperfect development of the fibrinoid or Nitabuch layer.[5] The risk factors for placenta previa and accreta syndromes include advanced maternal age, multiparity, multiple gestation, placenta previa in previous pregnancy (recurrence rate 4-8%), smoking, increased maternal serum alpha fetoprotein, previous uterine manipulations like abortions, dilatation and curettage, previous caesarean sections, myomectomy and placental pathology (velamentous insertion, succenturiate lobe, etc). A recent estimate of prevalence is approximately 1 in 533 pregnancies.[6] Patients with placenta previa and invasive placentation are at increased risk of spontaneous abortions, fetal mal-presentations, Caesarean sections, massive intrapartum haemorrhage, peripartum hysterectomy, prolonged hospitalization leading to increased maternal morbidity and mortality. The infants of these patients are also at increased risk of premature deliveries, birth asphyxia and increased perinatal morbidity and mortality than in general population. This study was conducted on 50 pregnant mothers who were diagnosed to have placenta previa admitted to Gandhi Hospital, a tertiary care center over a period of one year. They were evaluated for abnormal invasion of placenta by radiological investigations like Ultrasonography, Colour Doppler and MRI and the findings were correlated with the intraoperative observations and managed accordingly. The maternal and fetal outcome were observed during the hospital stay.

Aim

To evaluate the abnormal invasion of placenta in placenta previa using Ultrasonography, Colour Doppler and MRI and to study the maternal and fetal outcome at a tertiary care center.

Objectives

1. To prenatally detect the abnormal invasion of placenta in placenta previa using various imaging techniques.
2. To evaluate the sensitivity and specificity of the radiological methods used Ultrasonography, Colour Doppler and MRI.
3. To study the maternal and fetal outcomes in placenta previa and accreta syndromes at a tertiary care center.

Statistical Analysis

- Chi Squared test or Pearson's chi-squared test.
- T-test

Observations and Results

Table 1: Age Distribution Of Mothers With Placenta Previa.

Age in Years	No. of Mothers	Percentage
20-24	15	30%
25-29	28	56%
30-34	6	12%
35-39	1	2%
Total	50	100%

In our study, 56% of Pregnant ladies with Placenta previa, were in the age group between 25-29 years, followed by 30% incidence in the age group between 20-24 years. (Table 1)

Table 2: Distribution according to rural and urban areas.

	No. of Mothers	Percentage
Rural	20	40%
Urban	30	60%
Total	50	100%

The Urban pregnant females were found to have higher incidence of Placenta previa at 60%, compared to 40% amongst the rural. (Table 2)

Table 3: Booked and unbooked cases

	No of Cases	Percentage
Booked	13	26%
Unbooked	37	74%
Total	50	100%

Unbooked cases had higher incidence of Placenta previa at 74% as compared to 26% in the booked pregnancies. (Table 3)

Table 4: Referrals.

	No of Cases	Percentage
Referrals	24	48%
Non-referraks	26	52%
Total	50	100%

The pregnant females who were amongst Non-referral category had Placenta previa at 52%, as compared to 48% amongst the referred pregnant females. (Table 4)

Table 5: Distribution according to bleeding per vaginum at admission.

Bleeding per veginum	No of Women	Percentage
Absent	27	54.00%
Persent	23	46.00%
Total	50	100.00%

In this study, 54% pregnant females had no history of bleeding per vaginum, while 46% of pregnant females with Placenta previa, had history of bleeding per vaginum. (Table 5)

Table 6: Distribution According To Number of Pregnancies.

Gravida	No.of women	Percentage
G1	3	6.00%
G2	18	36.00%
G3	19	38.00%
G4	9	18.00%
G5	1	2.00%
Total	50	100.00%

Placenta previa was more frequently seen at 38% amongst those who were Gravida three, followed by those who were gravid two, where it was at 36%. (Table 6)

Table 7: Number of prior caesarean sections and placenta previa.

No. of Casesarean sections	No of Women	Percentage
0	18	36.00%
1	19	38.00%
2	11	22.00%
3	2	4.00%
Total	50	100.00%

Placenta previa, was more frequently seen in those who had previous caesarean section than those who did not have any previous caesarean section. (Table 7)

Table 8: Distribution according to gestational age at admission.

Gestational age in weeks	No of Women	Percentage
<28	2	4%
28-<32	11	22%
32-<37	26	52%
>=37	11	22%
Total	50	100%

Placenta previa was seen more frequently in those who were admitted beyond 28 weeks of pregnancy. (Table 8)

Table 9: Distribution according to haemoglobin percentage.

HB%	No. of Cases	Percentage
<8	0	0%
8 - 8.99	3	6%
9 - 9.99	5	10%
10 - 10.99	21	42%
11 - 11.99	14	28%
12 - 12.99	5	10%
>=13	2	4%
Total	50	100%

84% of Pregnant females with Placenta previa, had hemoglobin of 10 gm % or above it. (Table 9)

Table 10: Type of placenta previa based on usg.

Type	No. of Women	Percentage
Minor	13	26%
Major	37	74%
Total	50	100%

On Ultrasound, 74% of the pregnant females had major Placenta previa and 26% had minor variant of it. (Table 10)

Table 11: Location of placenta and invasion based on usg.

Location	No Invasion		Invasion		Total	
Placenta Anterior	21	81%	5	19%	26	52%
Placenta Posterior	18	86%	3	14%	21	42%
Placenta Central	1	33%	2	67%	3	6%
Total	40		10		50	100%

In 52% of the Pregnant females with Placenta previa, it was anterior on Ultrasound and it was posterior in 42%. (Table 11)

Table 12: Colour doppler findings.

Finding	No. of Cases	Percentage
No Invasion	38	76%
Placenta Accreta	8	16%
Placenta Increta	3	6%
Placenta percreta	1	2%
Total	50	100%

On colour Doppler, in 76%, there was no invasion, while in 16% of the cases, it was accreta, 6% had increta and in 2%, it was percreta. (Table 12)

Table 13: MRI findings.

No Invasion	38	76%
Placenta Accreta	8	16%
Placenta Increta	3	6%
Placenta percreta	1	2%
Total	50	100%

On MRI too, the same findings were noted as in Colour Doppler. (Table 13)

Table 14: Type of invasion of placenta.

Type of Invasion	No. of Cases	Percentage
No Invasion	38	76%
Placenta Accreta	8	16%
Placenta Increta	3	6%
Placenta Percreta	1	2%
Total	50	100%

Table 15: Mode of delivery in placenta previa.

Mode of Delivery	No. of Women	Percentage
Elective Caesarean Section	23	46%
Emergency Caesarean Section	19	38%
Elective Caesarean Section + Hysterectomy	6	12%
Emergency Caesarean Section + Hysterectomy	2	4%
Total	50	100%

Elective Caesarean section was done in 46% of those with Placenta previa, emergency Caesarean section was needed in 38%. In 12%, though it was elective Caesarean section, hysterectomy was needed and in another 4%, hysterectomy had to be done, along with emergency Caesarean section. (Table 15)

Table 16: Intra operative findings in placenta previa.

Finding	No. of Women	Percentage
Placenta Anterior	26	52%
Placenta Posterior	21	42%
Placenta Central	3	6%
Uterus Adherent to Bladder	9	18%
No Invasion of Placenta	38	76%
Focal Adherence of Placenta, Removed in Piecemeal	4	8%
Placenta Adherent, Could not be removed	7	14%
Placenta Invading the Bladder Wall	1	2%

52% had Anterior Placenta previa as an Intraoperative finding, while in 42% it was posterior and another 6% had it as central. In 76%, there was no invasion of the Placent. There was adherence to bladder in 18%. (Table 16)

Table 17: Intraoperative interventions done.

Intervention	No. of Cases	Percentage
B-Lynch Sutures Applied	1	2%
Bilateral Uterine Arteries Ligated	3	6%
Bilateral Internal Iliac Arteries Ligated	5	10%
Bladder Repaired	5	10%
Uterine Wall Excised	2	4%
Placental Bed Tier Sutures Applied	3	6%
Hysterectomy Done	8	16%

Hysterectomy had to be done in 16%, bladder repair was done in 10%. Bilateral Internal iliac artery ligation was needed in 10% and in another 6%, uterine arteries were ligated. (Table 17)

Table 18: Blood loss.

Blood Loss (in ml)	No. of Women	Percentage
500-1000	33	66%
1000 -1500	5	10%
1500-2000	2	4%
>2000	10	20%

The blood loss in 66% of the cases was less than 1000ml. In only 20% of the cases, it was above 2000ml. (Table 18)

Table 19: Complications.

Complication	Number	Percentage
Haemorrhage	20	40%
Bladder Injury	4	8%
Hysterectomy	8	16%
Hypovolemic Shock	6	12%
DIC	0	0%
Ventilatory Support	4	8%
Acute Rental Failure	1	2%
Infections	0	0%
Maternal Death	1	2%

Hemorrhage was the major complication at 40%. 16% had to undergo Hysterectomy. Bladder injury happened in 8% of the cases. 12% of the patients went into shock. 8% needed ventilator support. 2% of the cases developed acute renal failure and maternal mortality was seen in 2% of the cases. (Table 19)

Table 20: Maternal outcome.

Outcome	No. of Women	Percentage
Dischatrged Healthy	49	98%
Mortality	1	2%
Total	50	100%

98% of the patients were discharged and the mortality was at 2%. (Table 20)

Table 21: Distribution according to gestational age of babies at birth.

GA in weeks	No of Babies	Percentage
<28	0	0%
28-<32	9	18%
32-<37	20	40%
>=37	21	42%

Most of the babies were delivered after 37 weeks, followed by delivery between 32to 37 weeks. (Table 21)

Table 22: Baby outcome.

Outcome	No of Babies	Percentage
Discharged Healthy	37	74%
Mortality	13	26%
Total	50	100%

74% of the babies were discharged and 26% of the babies expired. (Table 22)

Table 23: Distribution according to baby weight at birth.

Weight in Kg	No of Babies	Percentage
<1	2	4%
1-1.49	5	10%
1.5-2.49	22	44%
>=2.5	21	42%
Total	50	100%

44% of the babies weighed between 1.5 and 2.49 kgs at birth followed by 42% of the babies who weighed 2.5 kgs or above at birth. (Table 23)

Discussion

Placenta previa is one of the leading causes of obstetric haemorrhage leading to increased maternal mortality and morbidity. The present study with 50 women was undertaken at Gandhi Hospital in order to detect prenatally, the invasive placenta using various radiological modalities for diagnosis. A high index of suspicion is necessary in those with risk factors like previous Caessarean sections, abortions etc. This study was a prospective observational study. Out of 6026 deliveries conducted over a period of 1 year at Gandhi Hospital, 50 were cases of placenta previa, the incidence being 0.83%. Majority of women with placenta previa were in the age group of 25-29 years i.e., (56%) - 28 cases and minority group included those in the age group of 35-39 years i.e., 1 case (2%). The mean age of women with placenta previa was found to be 25.72 years in this study while that in the studies of Khashoggi T et. al., Brenner WE et. al. and Bhatt et. al. were 27.6 years, 28.3 years and 30.6 years, indicating that the incidence of placenta previa becomes more common in women as the age advances and is reported in literature to be the highest in women aged 35 years or older (0.8% of all deliveries) and the lowest in women aged < 25 years(0.07%). Das et. al. and Singh et. al. reported mean age in their studies as 28.6 and 26.2 years respectively.[7-9] 60% of the women in the study were from urban areas and 40% from rural areas. B.G.Prasad classification[10] was used to stratify these women into five socioeconomic classes into Upper, Upper middle, Middle, Lower and Lower classes. It was noted that about 50% women belonged to the middle socioeconomic class (25 cases). Lower middle and lower classes were 34%(17 cases) and 6%(3cases) respectively. Only 10% (5 cases) of the women were from upper middle class and there were no instances of placenta previa in the study group who belonged to the upper class; owing to better accessibility and affordability of this sector of people to health care facilities. Out of 50 cases in the study, 48%(24 cases) of the cases were referred to Gandhi hospital from other hospitals like the primary health centres, community health centers and private hospitals for better institutional management. Non-referrals were 52%(26 cases) and had prior antenatal visits at Gandhi Hospital. Unbooked cases accounted for almost three-quarters of the study group (74% - 36 cases) and booked cases who had prior antenatal visits at Gandhi hospital

remain at 26%. Antepartum haemorrhage was the most common presentation, seen in 46% of the cases who required transfusion of blood and blood products while 54% of the cases presented with no complaints and were admitted for safe institutional confinement. Multiparity appeared to increase the occurrence of Placenta Previa. Though placenta previa is more commonly seen in multi-gravidas, it is not so uncommon in primi-gravidas. In the present study, it was noted that multigravidae constituted 94% of the cases and primigravida constituted a significant share of 6% (3 cases). The incidence of placenta previa was highest in women with third pregnancy accounting to 38%, followed by those with second pregnancy (18%). It has been well established that women with previous uterine surgeries have an increased incidence of placenta previa.[11,12] Considering the gestational age at the time of admission, 22% were admitted at the term gestation and 78% are admitted before 37 weeks of gestation. Those admitted before 28 weeks were 4%, between 28 weeks and 32 weeks were 22% and those between 32 weeks and 37 weeks were 52%. It was observed that 42% of the women were not having Hemoglobin levels above 11gm%, those below 11gm% were 58%. Patients who presented in the emergency with hypovolaemic shock however were excluded from the study. Placenta previa is classified into 2 types - Major and Minor. 74% of the women had major placenta previa and 26% had minor placenta previa in the sample studied. Placenta was localized using ultrasonography and based its location, placenta previa is classified into anterior, posterior and central. 5 out of 26 women with anterior placenta previa had invasion accounting to 19%. Women with posterior placenta previa with placental invasion were 3(14%) of 21 cases and those with central placenta previa with placental invasion were 2 of 3(67%). It can be concluded that invasive placenta is more common with centrally located placenta. Therefore, ultrasonography alone could detect 10 cases of placental invasion out of 12 cases in the study. This shows that the sensitivity and specificity of USG are 83.33% and 100% respectively. Positive predictive value and negative predictive values using ultrasonography are 100% and 95% respectively. Colour doppler was done on all the 50 women in the study for evidence of features of placental invasion. Twelve cases had invasion and of them, eight cases (16%) had placenta accreta, three cases had placenta increta (6%) and one case had placenta perorate (2%). MRI is one of the best investigations for diagnosis placental invasion. It is used to detect the depth of invasion. MRI is used as an adjunct when there is suspicion of invasion which could not be detected by USG or Colour Doppler study. Out of twelve cases with invasive placenta, 8 cases (16%) had accreta, 3 cases (6%) had increta and one case (2%) had percreta. Colour Doppler and MRI gave similar results in prenatal diagnosis of abnormal invasion of placenta in this study. They showed sensitivity and specificity of 100% independently. The positive and negative predictive values are 100% each independently. In the present study, Colour doppler and MRI could detect all the twelve cases of placental invasion and the findings were consistent with the intraoperative clinical observations. The American College of Obstetrics and Gynecology (ACOG) currently recommends a Caesarean hysterectomy without attempting manual removal of the placenta when prenatal suspicion of placenta accreta is strong.[13] Caesarean section was the preferred mode of delivery in all the cases in the study. 84% of the women underwent CS without caesarean hysterectomy with 46% (23 cases) elective planned CS and 38% (19 cases) emergency CS. The most common aetiology of Caesarean Hysterectomy is haemorrhage. Caesarean Hysterectomy was performed to arrest bleeding in 16% (8 cases) - 12% (6 cases) with elective CS and 4% (2 cases) with emergency CS.

Null Hypothesis:—The relationship between radiological findings and intra operative findings is not significant. The radiological features suggestive of placental invasion in the present sample of 50 women with placenta previa on ultrasonography, Colour Doppler and MRI have been correlated with the actual intra operative findings. Chi square test is used to obtain a correlation among the above variables. It can be inferred from the above findings that the p value is > 0.05 (and is equal to 1 in 2 cases - MRI and Colour doppler) in all the three cases which is not significant. Hence, we reject the null hypothesis, which means that there is a statistically significant relationship between the intra-operative findings and the radiological findings. In addition to the chi-squared test, t-test has also been applied to the outcomes of MRI, Colour doppler and USG findings and were compared to the intra-operative findings of the cases studied to find a correlation. For this test, the invasion as well as the position parameters of placenta have been considered. The p value is 1.88x10-13 for ultrasonography vs intra-operative findings. Colour doppler and MRI have p value of 1.54x10-25 with a confidence interval of 94%. It can be concluded that there is a positive correlation between the radiological findings and intraoperative findings in this study.

Location of Placenta

Placenta was located on the anterior wall, posterior wall and centrally covering the os in 52%, 42% and 6% respectively. Uterus was adherent to the urinary bladder in 18% of the cases. Focal adherence of placenta was noted in 8% and the placenta was removed in piecemeal. Adherent placenta where placenta could not be removed immediately was seen in 14% and in 2% of the cases, placenta invaded the urinary bladder. Intraoperative interventions included application of B-Lynch sutures (2%), devascularization procedures like ligation of bilateral uterine arteries (6%) and bilateral internal iliac arteries (10%). Urinary bladder was repaired in 10% of the cases and uterine wall was excised in 4%. Placental bed was sutured in tiers to arrest bleeding. Hysterectomy was required in 16%. Placenta previa and accreta syndromes constitute a huge part of obstetric haemorrhage. About two thirds of the women (66%) had a blood loss between 500ml to 1000ml. The blood loss was between 1000ml to 1500ml and 1500 - 2000ml in 10% and 4% of the cases respectively. Massive haemorrhage requiring multiple transfusions of blood and blood products occurred in 20% of the cases. Massive transfusion protocol was implemented and blood and blood products were transfused in 1:1 ratio. Haemorrhage was the most common complication in the study complicating 40% of the surgeries, necessitating interventions like compression sutures, arterial ligation and hysterectomies. Uterine artery catheterization to minimize the intraoperative blood loss was not done in any of the cases. Other complications include Bladder injury (8%), Hypovolaemic shock(12%), Acute renal failure (2%), Ventilator assistance and death (2%).

Maternal Outcome

Placenta previa is one of the most important causes of maternal morbidity and mortality due to the complications associated with the condition. Maternal mortality with placenta accreta has been reported to be as high as 7%.[14] The present study which was conducted at a tertiary care center shows a good maternal outcome, with 98% of the women healthy at the time of discharge. This can be attributed to the advanced radiological imaging modalities available at the hospital for early diagnosis in addition to the accessibility to other facilities like blood bank. There was one death in the study, a case of placenta percreta with bladder invasion. The cause of death in this case was haemorrhage shock. The mean blood loss in the 50 cases was 1067ml with blood loss ranging from 500ml to 5000ml in a few cases. The transfusion of blood and blood products ranged between one and 18. The average duration of hospital stay was 22 days, ranging from 9 to 84 days. Among the 50 cases studied, 50% of the cases stayed in the hospital for a duration between 11-20 days. 32 % (16 cases) of the cases stayed in the hospital for a period of 21-30 days. 8% of the cases (4 cases) stayed in the hospital for a period of less than 10 days. Prolonged hospital stay of more than 50 days was reported in 4% (2 cases) was reported. This shows that placenta previa and abnormal placentation syndromes result in increased morbidity in women. Postoperative wound infections were also reported in a few cases. Infections, bladder injury, anaemia, ventilatory assistance, prolonged hospital stay contributed to the morbidity in these women.

Perinatal Outcome

Placenta previa is known to be associated with prematurity.[15,16] The overall perinatal mortality rate ranges between 4 –8%. The important causes are asphyxia, prematurity. The onset of bleeding before 20 weeks carries a poor fetal prognosis. Most of the neonatal mortality is attributed to prematurity with its associated risk, particularly respiratory distress syndrome and intracranial haemorrhage. 58% of the babies were born preterm and 43% were born after 37 weeks of gestation. Preterm babies are classified into extremely preterm (<28 weeks), very preterm (28weeks-<32 weeks) and moderately to late preterm (32-<37 weeks). There were no babies born extremely pre-term. Very preterm constituted 18%(9 babies), moderately to late preterm constituted 40%(20 babies) and term babies constituted 42%(21 babies). In the study done by Mc Shane et. al. 67 (1985) 22% of babies required resuscitation. The Mean+SD of Apgar at one and five minutes was 5.0+1.3 and 6.7+1.0 respectively. The mean APGAR at 1 and 5 minutes in the study were 6.41 and 8.45 respectively. Perinatal mortality in the present study is 14%, which is relatively high owing to prematurity and associated complications like respiratory distress. This rate is comparable to that of the studies by Yifru Berhan, Ananth-Smulian JCVintzileos and Anand D Bhatt-Aarti Meena-Malini R Desai which are 44.7%, 10.7% and 24.17% respectively. Out of 50 babies delivered, 58% were each of preterm deliveries and intrauterine growth restricted babies. There were 4 stillbirths (8%) and 18 babies (36%) were admitted to the neonatal intensive care unit. Of 18 babies admitted to NICU, 9 babies were discharged healthy (50%) and 9 babies died (50%) due to asphyxia, respiratory distress and prematurity. Iatrogenic prematurity is most common in women with placenta previa where delivery of the baby becomes mandatory to curb the source of bleeding and to prioritize mother's

health status. Administration of corticosteroids for fetal lung maturity has to be individualized in cases where the delivery is planned. A neonatal death is defined as a death during the first 28 days of life (0-27 days). Perinatal mortality is defined as the number of still births and deaths in the first week of life. Neonatal mortality rate in present study comes to about 195.6 per 1000 live births and perinatal mortality rate is 140 per 1000 total births, which is a significant number.

Conclusions

Placenta previa and placenta accreta syndromes are one of the major causes of maternal and fetal morbidity and mortality. Preoperative patient counseling should include discussion of the potential need for hysterectomy, the risks of profuse haemorrhage, and possible maternal and fetal morbidity and mortality.

The timing of delivery should be individualized, depending on patient circumstances. Combined maternal and neonatal outcome is optimized in stable patients with a planned delivery at 34 weeks of gestation.

Ultrasonography is the basic investigation to detect the location of placenta with considerable sensitivity and specificity.

Colour doppler and MRI could detect the placental invasion by 100% sensitivity and specificity. Therefore, in low resource settings where there is no availability of MRI, colour doppler may be used to detect the placental invasion. However, large randomized trials are required to recommend colour doppler as the diagnostic tool of choice.

Tertiary care centers with multidisciplinary team that includes an obstetric surgeon, with other surgical specialists, such as urologists, general surgeons, and gynaecological oncologists along with a blood bank and good NICU have demonstrated good maternal and fetal outcomes.

Although a planned delivery is the goal, a contingency plan for emergency delivery should be developed for each patient, which may include following an institutional protocol for maternal haemorrhage management.

References

1. Cunningham FG,Leveno KJ,Bloom SL,Spong CY,Dashe JS,Hoffman BL, Sheffield JS eds. 41.Obstetrical Hemorrhage Williams Obstetrics. 2014; 24:799.
2. Ananth CV,Smulian JC,Vintzileos AM.The association of placenta previa with history of Caesarean delivery and abortion: a meta-analysis. Am J Oster Gynecol.1997;177(5)-8
3. Taylor VM,Kramer MD,VaughanTL et. al. Increased risk of placenta previa among women of Asian origin. Am J Obstet Gynecol. 1995; 86:805-8.
4. Norgaard LN, Pinborg A, Lidegaard O and Bergholt T. A Danish national cohort study on neonatal outcome in singleton pregnancies with placenta previa. Acta Obstetricia et Gynecologica Scandinavica‖.2012;91(5): 546-551.
5. Cunningham FG, Leveno KJ, Bloom SL, Spong CY, Dashe JS, Hoffman BL, Sheffield JS eds. 41.Obstetrical Hemorrhage Williams Obstetrics. New York. McGraw-Hill 2014;24:804.
6. Brenner WE, Edelman DA, Hendricks CH. Characteristics of patients with placenta previa and results of expectant management. Am J Obstet Gynecol. 1978; 132-180
7. Bhatt SM, Hamdi IM, Bhatt SK. Placenta previa in a referral hospital in Oman. Saudi Med J 2004; 25 (6): 728-31.
8. Khashoggi T. Maternal and neonatal outcome in major placentaprevia. Ann Saudi Med 1995:15
9. Government of India. Construction and Maintenance of Index numbers. Available form: search for : http://wwww.labourbureau.nic.in.
10. Clark SL, Koonings PP, Phelan JP. Placenta previa / accreta and prior caesarean section. Obstet Gynecol 1985;66:89–92.
11. Silver RM, Landon MB, Rouse DJ, Leveno KJ, Spong CY, Thom EA, et. al. Maternal morbidity associated with multiple repeat Caesarean deliveries. Obstet Gynecol 2006;107:1226–32.
12. B. K. Robinson and W. A. Grobman, — Effectiveness of timing strategies for delivery of individuals with placenta previa and accreta, Obstetrics and Gynecology, vol. 116, no. 4, pp. 835– 842, 2010.
13. Ramsey PS, Tamura T, Goldenberg RL, et. al. The preterm prediction study: elevated cervical ferritin levels at 22 to 24 weeks of gestation are associated with spontaneous preterm delivery in asymptomatic women. Am J Obstet Gynecol 2002;186:458–63
14. O'Brien JM, Barton JR, Donaldson ES. The management of placenta percreta: conservative and operative strategies. Am J Obstet Gynecol 1996;175:1632–8
15. McShane P, Heyl P. Maternal and perinatal morbidity resulting from placenta previa. Obstet Gynecol. 1985;65:176–182.
16. Frederiksen FC, Glassenberg R, Stika CS. Placenta previa: a 22-year analysis. Am J Obstet Gynecol. 1999;180:1432–1437.