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Original Research Article

Study of maternal and fetal outcomes in abruptio placenta at a tertiary care institute

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ABSTRACT

Background: This study aimed to determine the maternal and fetal outcomes in cases of abruptio placentae at a tertiary care institute.
Methods: This prospective observational study was conducted from November 2022 to June 2024 at Lokmanya Tilak Municipal Medical College and Hospital, Sion, Mumbai. Out of 14,780 deliveries that occurred in this period, 143 were selected. The study included patients diagnosed with placental abruption, either clinically or radiologically, who presented to the ANC ward and consented to participate.
Results: The study found a 0.9% incidence of placental abruption, predominantly seen in multigravida (68.5%) and women aged 21-30 years (70%). More than two-thirds of babies were born prematurely. The most common symptoms were vaginal bleeding and abdominal pain (75.5%), and hypertensive disorders of pregnancy were the most common associated factor (55.9%). Around 91.6% required lower segment caesarean section. 58.7% required blood transfusion. Complications included shock (4.2%), DIC (14.7%), acute renal failure (4.9%), sepsis (2.1%), caesarean hysterectomy (0.7%), and maternal mortality (0.7%). Additionally, 28% of women required ICU admission. The study found that 74.8% of deliveries resulted in live births, while 25.2% were stillbirths. Among the live births, 67 babies required NICU admission, and 7 (6.54% of live births) resulted in neonatal mortality.
Conclusions: Abruptio placenta is a life-threatening complication of pregnancy and is associated with poor maternal and fetal outcomes if not managed appropriately. Hence, early diagnosis and prompt resuscitative measures would prevent both perinatal and maternal mortality and morbidity.

Keywords: Abruptio placenta, Antepartum hemorrhage, Maternal mortality, Pre-eclampsia

INTRODUCTION

Abruptio placenta refers to the premature separation of the placenta from the uterine wall, occurring in approximately 0.4-1% of pregnancies.[1)] Antepartum hemorrhage, which affects 2-5% of pregnancies, can be caused by several conditions, including placenta previa, placental abruption, placenta accreta spectrum disorders, vasa previa, cervical or vaginal lesions, trauma, and systemic disorders.[2] Abruptio placenta contributes to approximately 30% of cases of third-trimester bleeding and is a leading cause of antepartum hemorrhage.[3] The hemorrhage can be concealed, revealed, or mixed.

The exact cause of placental abruption is unknown, but various risk factors contribute to its development. Hypertension is a significant risk factor due to its effect on placental vessels, with women with chronic hypertension facing a 2.4 times increased risk, and those with preeclampsia having a 2.8 to 7.7 times higher risk.[4] xA previous history of placental abruption increases the risk of recurrence, with a recurrence rate of 4.4% and a 10-fold increased risk in subsequent pregnancies.[5,6] Trauma, multiple gestations, advanced maternal age, multiparity, polyhydramnios, premature rupture of membranes, inherited thrombophilia, retroplacental hematoma, uterine abnormalities, uterine leiomyoma, substance use, and

infections are also associated with an increased risk of placental abruption.

The development of abruption involves a combination of chronic and acute factors. Chronic processes, such as thrombosis, inflammation, infection, and vascular issues, can lead to placental hypoperfusion, defective spiral artery remodelling, and failure of the secondary invasion of the trophoblast. Acute triggers, including mechanical forces like abdominal trauma, amniotomy, or vaginal delivery of a first twin, can precipitate abruption. When maternal decidual vessels rupture, it causes bleeding at the interface between the decidua and placenta. As blood accumulates in this space, it can lead to the placenta detaching from the uterus, often accompanied by the vasoconstriction of small blood vessels. The resulting clinical consequences of abruption are thought to be mediated by thrombin, which plays a key role in inflammation and vascular response to endothelial injury.[7] Couvelaire uterus, also known as uteroplacental apoplexy, is a rare condition where bleeding from placental separation extends into the uterine myometrium. It occurs in approximately 5% of all cases of abruption and is characterized by a tense uterus with blue to purple ecchymoses (Figure 1).[8]

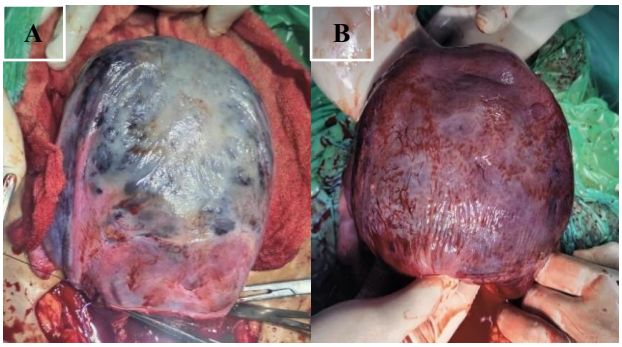

Figure 1: (A and B) Shows the intraoperative appearance of the couvelaire uterus.

Clinical features

Placental abruption can present with varying symptoms, often arising suddenly. Vaginal bleeding is the most common sign, occurring in 70-80% of patients, but the amount of bleeding can vary.[9] Abdominal pain is often sudden and severe, and the uterus may be tender to the touch and feel firm or rigid. Uterine contractions can be frequent and prolonged, and in severe cases, the uterus can be tonically contracted without relaxation. Decreased fetal movement and abnormal fetal heart rate patterns can indicate fetal distress. Severe cases can present with intrauterine fetal demise.

Placental abruption can be graded based on clinical and laboratory findings, ranging from asymptomatic (Grade 0) to severe (Grade 3). Grade 0 is asymptomatic and diagnosed postdelivery in the form of a retroplacental clot. Grade 1 is characterized by mild symptoms, while Grade 2 involves moderate symptoms with maternal tachycardia and fetal distress. Grade 3 is the most severe, with severe hemorrhage, shock, and coagulopathy, often resulting in fetal demise. The grading system helps guide management and predict outcomes.[10]

Diagnosis

The diagnosis of placental abruption is primarily clinical, based on a detailed history and physical examination. A thorough history should include presenting complaints, duration of symptoms, and any predisposing risk factors. Physical examination may reveal varying degrees of pallor, tachycardia, tachypnea, hypotension, and uterine tenderness. Continuous electronic fetal monitoring can detect signs of fetal distress. Various diagnostic tools can aid in confirming the diagnosis, including: Complete Blood Count (CBC) to assess for anemia and blood loss; Coagulation Profile to check for disseminated intravascular coagulation (DIC); liver function tests and renal function tests to evaluate for end-organ damage. Ultrasound to rule out other causes of bleeding, mainly placenta previa.

Management

The treatment of abruptio placenta involves a combination of medical management, surgical intervention, and supportive care, depending on the severity of the abruption, gestational age, maternal and fetal status, and the presence of complications. Once a diagnosis is made, a multidisciplinary approach should be initiated, which includes a team of obstetricians, nurses, neonatologists, anesthesiologists, and intensive care specialists. The primary goal is to stabilize the mother and fetus, and delivery is often recommended to minimize risks. Initial assessment and stabilization involve following the ABCD pathway, which includes assessing airway, breathing, circulation, fetal status, and delivery. Monitoring vital signs is crucial in cases of placental abruption. Fluid resuscitation is important, with crystalloids and colloids used as initial fluid to restore tissue perfusion, mainly to vital organs, and prevent cardiovascular collapse. Blood products, including packed red blood cells, platelets, and fresh frozen plasma, may be necessary to manage significant blood loss or coagulopathy. The optimal ratios of blood products remain debated, but commonly used ratios include 1:1 for PRBCs and FFP, and 1:1:1 for PRBC, FFP, and platelets (single donor).[11] Electronic fetal monitoring (EFM) and ultrasound evaluation are used to assess fetal well-being.

Conservative management plays a very limited role in management. Mild cases with localized retroplacental hematoma may be managed conservatively with observation, steroid administration, and expectant management. The use of tocolysis is controversial. They should be avoided if there is active bleeding or fetal distress. In moderate to severe placental abruption cases or with ongoing vaginal bleeding, immediate delivery is typically recommended, regardless of gestational age. In

cases of severe abruption, unstable maternal condition, fetal distress, or when vaginal delivery is not imminent, an emergency caesarean section is usually performed.[12] Management of complications, such as DIC and acute renal failure, is also crucial. An anaesthesia technique is chosen based on the severity of the condition and maternal stability. Regional anaesthesia is safer, but general anaesthesia is usually preferred in severe hemorrhage and unstable maternal conditions.[13] Post-delivery management involves continuous monitoring of maternal vital signs, hemodynamic stability, and management of coagulopathy. Neonatal care includes NICU admission, respiratory support, and surfactant administration to preterm neonates.

Complications

Maternal complications

Placental abruption can lead to severe maternal complications, including hemorrhagic shock, ICU admission, and mechanical ventilation. Severe blood loss can cause DIC, multi-organ failure, and organ damage affecting the kidneys, liver, and heart. Postpartum hemorrhage, often due to uterine atony or retained placental tissue, is another potential complication. In severe cases, hysterectomy may be necessary to control bleeding, and sepsis can occur. Massive transfusion can lead to circulatory overload, coagulopathy, and citrate toxicity. Placental abruption is a leading cause of maternal mortality worldwide.

Fetal complications

Placental abruption can have severe fetal consequences, including fetal hypoxia and asphyxia due to reduced blood flow and oxygen supply. Severe cases can result in fetal death, particularly if more than 50% of the placenta is affected, with a perinatal mortality rate ranging from 9-12% in developed countries.[14] Placental abruption often leads to preterm birth, low birth weight, and associated complications like respiratory distress syndrome and developmental delays. Premature and low birth weight infants are at higher risk for health issues, including respiratory problems, infections, and long-term developmental delays. Long-term outcomes may include neurodevelopmental issues, cerebral palsy, and chronic health problems due to prematurity.

METHODS

This prospective observational study of abruptio placenta and its maternal and fetal outcomes was conducted from November 2022 to June 2024 at Lokmanya Tilak Municipal Medical College and Hospital, Sion, Mumbai, involving a total of 143 patients out of 14,780 deliveries.

Inclusion criteria

All patients coming to the ANC ward and diagnosed with abruptio placenta, either clinically or radiologically were included. All patients who gave consent to participate were also included.

Exclusion criteria

All deliveries outside the hospital and admitted for postpartum complications, placenta previa, local trauma to genitals, and other causes of antepartum hemorrhage were excluded.

All patients presenting with abdominal pain and vaginal bleeding, which led to a diagnosis of antepartum hemorrhage, underwent comprehensive obstetric examinations, clinical workups, and detailed history taking to identify maternal high-risk factors. The diagnosis was based on clinical features like vaginal bleeding, pain in abdomen, uterine tenderness, and a hypertonic uterus, and confirmed by the presence of retroplacental clots. Once diagnosed, the decision to terminate the pregnancy was made, with the mode of delivery determined by the patient's vital condition, fetal parameters, and Bishop score. Management was tailored to fetal and maternal conditions. It included blood and blood product transfusions as needed, and post-delivery care involved transferring patients to the surgical ICU or ward based on their condition, with vigilant monitoring to prevent further complications. Maternal and fetal complications were analysed and included in the results. Patients and their relatives provided informed consent for participation in the study, and data were kept confidential, allowing patients to withdraw at any point.

RESULTS

This study analyzed fetal and maternal outcomes in 143 cases of placental abruption, including 4 twin pregnancies. The majority of cases (62.9%) were referred from peripheral hospitals, while 37.1% were registered at our center. The age range of the women was predominantly between 21- 30 years (70%), with 23.7% over 30 and 6.3% under 20. Most women (68.5%) were multigravida.

Table 1: Abruptio placenta and gestational age.

Gestational age (weeks)	No. of cases	Percentage (%)
<28	5	3.5
28 to 31.6	25	17.5
32 to 36.6	69	48.2
37 and above	44	30.8
Total	143	100

Around 48.2% of cases were between 32-36 weeks pregnant, 3.5% of <28 weeks, and 17.5% in between 28 to 32 weeks, resulting in more than two-thirds of babies being born prematurely. Table 1 shows cases of abruptio placenta seen according to gestational age.

Table 2: Distribution of cases based on presenting complaints.

Presenting complaints	No. of cases	Percentage (%)
PV bleeding	15	10.5
Pain in abdomen	13	9.1
Abdominal trauma	1	0.7
PV bleeding and pain in the abdomen	108	75.5
Pain in the abdomen and trauma	3	2.1
PV bleeding, pain, and trauma	3	2.1
Total	143	100

The most common symptoms were vaginal bleeding and abdominal pain (75.5%), and hypertensive disorders of pregnancy were the most common associated factor (55.9%). Tables 2 and 3 show presenting complaints and associated factors in detail.

While majority of cases, 91.6% required surgical intervention via lower segment caesarean section (LSCS), 8.4 % delivered vaginally. 58.7% required blood transfusion, and 41.3% did not need blood transfusion. This indicates that more than half of the cases required blood transfusion. Complications included shock (4.2%), DIC (14.7%), acute renal failure (4.9%), sepsis (2.1%), caesarean hysterectomy (0.7%), and maternal mortality (0.7%). Additionally, 28% of women required ICU admission and ventilatory support. Table 4 highlights the relationship between the amount of blood loss and complications.

Table 3: Associated factors with abruptio placentae.

Associated factors	No. of cases	Percentage (%)
Hypertensive disorders of pregnancy	80	55.9
Diabetes	7	4.9
Bleeding disorder	3	2.1
Abruption in previous pregnancy	4	2.8
Multifetal gestation	4	2.8
Abnormal presentation	7	4.9
Premature rupture of membranes	7	4.9
Addiction	1	0.7

Table 4: The relation between the amount of blood loss and complications.

	Amount of blood loss (ml)					
Complication	**<1000**	**1001-1500**	**1501-2000**	**2001-2500**	**>2500**	**Total**
No. of patients having blood loss	95	32	9	6	1	143
Shock	-	2	2	2	-	6
DIC	2	9	4	5	1	21
ARF	-	2	1	3	1	7
Sepsis	-	2	1	-	-	3
Obstetric hysterectomy	-	-	-	-	1	1
Maternal mortality	-	1	-	-	-	1

Table 5: Fetal outcomes related to blood loss.

Blood loss (ml)	No. of patients	Livebirth	Stillbirth	Neonatal mortality
<1000	95	85	10	2
1001-1500	32	18	14	4
1501-2000	9	2	7	0
2001-2500	6	2	4	1
>2500	1	0	1	0
Total	143	107	36	7

The study found that 74.8% of deliveries resulted in live births, while 25.2% were stillbirths. Among the live births, there were 7 neonatal deaths. The outcome was closely linked to the amount of blood loss, with the lowest blood loss (<1000ml) having the best outcomes (85 live births and 2 neonatal deaths). As blood loss increased, the outcomes worsened. Table 5 shows the association of fetal outcomes with blood loss.

The APGAR scores of the live births showed a correlation with neonatal outcomes. Overall, 67 babies required NICU admission, and 7 (6.54% of live births) resulted in neonatal

mortality. Table 6 shows the neonatal outcome as per the APGAR score.

Table 6: Neonatal outcome as per APGAR score.

APGAR (out of 10)	No. of patients (live births)	Need for NICU admission	Neonatal mortality
0-3	8	8	5
4-6	20	20	1
7-10	79	39	1
Total	107	67	7

DISCUSSION

According to our study, which analyzed 14,780 deliveries between November 2022 and June 2024, the incidence of abruptio placentae was 0.9% (143 cases). This finding is consistent with the study by Mohapatra and Thanikkal, which reported an incidence of 0.66%.[15] Similarly, Naiknaware & Wasnik recorded an incidence of 0.4%.[16] However, Gandotra et al reported a significantly higher incidence of 2.33%.[17] Notably, the rate of abruptio placentae was almost double in referred cases from outside (62.1%) compared to registered cases at our center (37.1%). Disparity in incidence rates between registered and referred cases highlights the need for improved access to quality prenatal care, particularly at the primary health center level.

The majority of cases (70%) occurred in women aged 21-30 years. These findings are consistent with previous studies, such as Mohapatra and Thanikkal, which reported 72% of cases in the 21-30 years age group.[15] Similarly, Modi et al found 77% of patients in the 21-30 years age group, 10% over 30 years, and 13% below 20 years.[18] This age distribution is likely because 21-30 years is the most common childbearing age among women, as noted by Martin et al.[19]

Regarding parity, 68.5% of cases were multigravida, while 31.5% were primigravida. This finding is consistent with Modi et al, which reported a 73% incidence in multiparous women and 27% in primigravida.[18] However, Abhirami et al showed a contrasting result, with 54.1% primigravida and 45.9% multigravida.[20]

The study found that the incidence of placental abruption was highest between 32-36 weeks of gestation, accounting for 48.2% of cases, with more than two-thirds of babies born prematurely. This finding is consistent with Renuka et al, which reported the highest incidence between 28-32 weeks (41.21%), followed by 32-36 weeks (35.85%).[21] Modi et al also reported a maximum incidence among those between 33-36 weeks of gestation (43%).[18] These studies collectively suggest that placental abruption is more common in preterm pregnancies, particularly between 28-36 weeks of gestation.

The majority of cases (75.5%) presented with both vaginal bleeding and abdominal. In a study done by Li et al, the most common presenting complaints were abdominal pain (68%), blood-stained amniotic fluid (45%), fetal distress (45%), and vaginal bleeding (22.35%).[22] Similar findings were reported in other studies, including Tambawaala and Kale, who found vaginal bleeding in 78.33% of cases, and Gandotra et al, who reported vaginal bleeding in 72.1% of cases.[17,23]

The cases had various associated factors, with hypertensive disorders of pregnancy being the most common (55.9%), followed by diabetes (4.9%), bleeding disorders (2.1%), abruption in previous pregnancy (2.8%), multifetal gestation (2.8%), abnormal presentation (4.9%), and premature rupture of membranes (4.9%). In the study by Modi et al, the causative factors of abruptio placentae were examined, revealing that the majority (45%) were unknown. Among the known factors, hypertension was the most common (36%). Other contributing factors included hydramnios (9%), multiple pregnancy (5%), premature rupture of membranes (PROM) (4%), trauma (1%), short cord (1%), and previous abruption (3%).[18] In contrast, Mehta et al found different associations, with 70.8% of patients having pregnancy-induced hypertension (PIH), 22.9% having premature rupture of membranes, 8.3% having polyhydramnios, 4.1% having malpresentation, and 2% having multiple pregnancies.[24] A meta-analysis by Tikkanen, spanning 10 years, revealed that hypertension is the single most significant risk factor in the development of abruptio placentae, underscoring its critical role in the pathogenesis of this condition.[25]

The mode of delivery was predominantly via lower segment caesarean section (LSCS), accounting for 91.6% of cases. Abhirami et al reported a lower rate of caesarean sections, with 67.6% of women undergoing the procedure, while 32.4% had vaginal deliveries.[20] A study by Lokhande et al found an even lower rate, with only 50% of patients delivering via caesarean section.[26] However, it is essential to note that timely and early caesarean section in cases of abruptio placentae can significantly improve perinatal salvage rates. A review of the literature reveals variability in the mode of delivery, which can be attributed to factors such as maternal and fetal conditions at admission, institutional protocols, and availability of resources.

The need for blood transfusion was significant, with 58.7% of women requiring transfusions. The blood components transfused included Packed Red Blood Cells (PRBC) in 57.3% of cases, Fresh Frozen Plasma (FFP) in 23.8%, and Platelets in 21.7%. The requirement for PRBC varied widely, with 42.7% of cases not needing any transfusion, while others required one or more units. Massive transfusion was required in some cases, highlighting the diverse transfusion needs among cases.

The study found that the cases experienced various complications, with Disseminated Intravascular

Coagulation (DIC) being the most common (14.7%), followed by acute renal failure (4.9%), shock (4.2%), sepsis (2.1%), obstetric hysterectomy (0.7%), and maternal mortality (0.7%). Some cases had more than one complication, and the severity of the condition was directly correlated with the amount of blood loss. A study by Atta and Abdullahi found that 38.4% of cases experienced postpartum hemorrhage, 6.8% developed disseminated intravascular coagulopathy (DIC), and 1.4% suffered from acute kidney disease.[27] Lokhande et al found higher complication rates, with 29.6% of cases experiencing shock, 29.2% having postpartum hemorrhage, 12.9% requiring postpartum hysterectomy, and 5.5% developing acute renal failure, resulting in a 7.4% mortality rate.[26] Mohapatra and Thanikkal's study reported 35% of cases with postpartum hemorrhage, 15% complicated by shock, 12.86% with sepsis, 8.5% with DIC, 5% with acute renal failure, and a mortality rate of 5.71%.[15]

Approximately 28% of cases required ICU admission and ventilatory support, indicating a more severe level of illness. Similarly, Lokhande et al reported that 26% of cases required ICU admission and intensive monitoring.[26]

The delivery and neonatal outcomes showed a significant disparity, with 74.8% of deliveries resulting in live births and 25.2% being stillborn. The outcomes varied greatly depending on the amount of blood loss, with cases with minimal blood loss (<1000ml) having overwhelmingly positive outcomes. The APGAR scores effectively predicted neonatal outcomes, with lower scores indicating a higher risk of NICU admission and neonatal mortality. Overall, 67 patients required NICU admission, and 7 resulted in neonatal mortality (6.54% of total live births). Swetha and Radha's study reported a perinatal mortality rate of 68.2%, comprising 32 intrauterine deaths, 7 neonatal deaths, 2 stillbirths, and 1 anomalous baby, indicating a significant proportion of pregnancies resulted in adverse outcomes.[28] In contrast, Mishra and Misra's study found a live birth rate of 75% and a stillbirth rate of 25% but noted that 5 neonates died in the early neonatal period due to prematurity, highlighting the vulnerability of preterm infants.[29] The disparity in perinatal mortality rates between the two studies may be attributed to differences in study populations, sample sizes, or underlying health conditions, emphasizing the need to address perinatal mortality and improve maternal and neonatal healthcare outcomes.

CONCLUSION

Placental abruption is a severe and potentially life-threatening complication of pregnancy, posing significant risks to both the mother and the fetus. This study highlights that hypertension and multi-parity are independent risk factors for placental abruption. The unpredictable timing of placental abruption at different stages of pregnancy emphasizes the importance of identifying predisposing factors and actively managing them to reduce further complications.

Recommendations

To mitigate these risks, the following recommendations are suggested: 1) Early recognition and prompt delivery of the fetus, 2) Conservative management and timely referral to tertiary care centres, 3) Postnatal care of premature infants, 4) Prompt treatment of complications to decrease both fetal and maternal morbidity and mortality.

Regular antenatal check-ups and health education can help to reduce the incidence and complications due to abruption by early identification of risk factors, reduction of anaemia through iron-folic acid supplements, and improvement of the mother's nutritional status.

Effective management of abruptio placenta requires a multidisciplinary approach, involving immediate assessment and stabilization of the mother and fetus, followed by expedited delivery via the most appropriate mode, taking into account the severity of the condition and fetal well-being. The decision to perform a caesarean section or induce vaginal delivery must be made with careful consideration of the individual circumstances.

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