RESEARCH ARTICLE

"A RETROSPECTIVE STUDY OF MATERNAL AND FETAL OUTCOMES IN PLACENTAL ABRUPTION"

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Manuscript Info

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Abstract

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Introduction: Placental abruption (PA) is a critical obstetrical emergency characterized by the premature separation of a normally implanted placenta, leading to maternal and fetal complications. It is unpredictable, with a sudden onset, often associated with risk factors like advanced maternal age, multiparity, pre-eclampsia, and history of high-risk pregnancy (HRP). Clinically, PA presents with abdominal pain, vaginal bleeding, uterine tenderness, and fetal distress.Patho physiologically, PA occurs when maternal vessels tear away from the placenta, causing a hematoma that disrupts maternal-fetal circulation, leading to hemodynamic instability, coagulation abnormalities, and potential fetal demise. The severity of PA varies, classified from asymptomatic (Class 0) to severe (Class 3), based on clinical symptoms and the extent of placental separation. Management strategies depend on the severity and gestational age, ranging from conservative management in mild cases to urgent delivery in severe cases.PA is associated with significant maternal and fetal morbidity and mortality, including hemorrhage, fetal demise, and potential recurrence in future pregnancies. Prompt recognition and management are essential to improve outcomes.
Aim:To study the maternal and perinatal outcomes associated with placental abruption
Material and Methods: This retrospective study was conducted on 22 cases of placental abruption in the Department of Obstetrics and Gynecology at MRMC Kalaburagi, covering the period from January 2023 to December 2023. The study exclusively included women diagnosed with placental abruption. Cases involving placenta previa and other extraplacental causes of antepartum hemorrhage were excluded from the analysis.

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Results:In the retrospective study of 22 cases of placental abruption, the age distribution of patients varied: 2 were 19 years old, 17 were between 21 and 30 years old, and 3 were over 30 years old. Among the women, 45% were primigravida, and 54% were multigravida. Delivery methods were split, with 40.9% undergoing a lower segment caesarean section (LSCS) and 59% delivering vaginally; 7 patients required induction. Blood transfusion was necessary for 16 cases, which accounts for 72% of the sample. Couvelaire uterus was observed in 3 cases (13.6%). The study reported one maternal mortality, representing 4.5% of the cases.

Conclusion:This study highlights significant maternal and perinatal outcomes associated with placental abruption. The majority of the women were within the 21-30-year age group, with a notable percentage being multigravida. A substantial portion of deliveries required lower segment cesarean section, and many patients underwent blood transfusions, reflecting the severity of the condition. Couvelaire uterus was observed in a notable subset of cases, and maternal mortality was relatively low but significant. These findings underscore the critical need for vigilant management and monitoring of placental abruption cases to improve both maternal and fetal outcomes.

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Introduction:-

Placental abruption (PA) is a critical obstetric emergency that poses significant risks to both maternal and fetal health.[1,2], Placental abruption (PA) is frequently unpredictable and can occur suddenly without warning.

Placental abruption (PA) is frequently unpredictable and can occur suddenly without warning.[3] Placental abruption (PA) happens when the placenta prematurely detaches from its normal uterine position. This detachment causes a basal decidual hematoma, which disrupts the maternal-fetal blood flow, leading quickly to hemodynamic instability, coagulation issues, and acute fetal distress[3.] It is a paroxysmal pathology of the last months of pregnancy and of labor.

Patients often have one or more described risk factors for HRP, such as advanced maternal age, multiparity, pre-eclampsia, black race, vitamin deficiencies, or history of HRP [4]. Fetal complications are induced prematurity and perinatal mortality mainly attributable to in-uterofetal death (IUD) [4]

Data indicate that the most frequently observed symptoms of placental abruption include abdominal pain, which occurs in 70% of cases, vaginal bleeding seen in 35–80% of cases, uterine contractions or tenderness, and fetal heart rate abnormalities present in 75% of cases.[5678].Mei et al. found that placental abruption, particularly when associated with abdominal pain, was linked to notably worse maternal and fetal outcomes[9.]

Placental abruption happens when the blood vessels supporting the placenta are compromised. Specifically, the vascular networks linking the uterine lining to the maternal side of the placenta become torn. These vessels are crucial for delivering oxygen and nutrients to the fetus. Such disruption may occur due to factors like hypertension, substance use, or conditions that stretch the uterus. Since the uterus is elastic and stretches more easily compared to the less elastic placenta, sudden stretching of the uterine tissue can lead to the tearing of the vascular structures connecting the uterine wall to the placenta[10 11]

Pathophysiology

Placental abruption happens when the maternal blood vessels detach from the placenta, leading to bleeding between the uterine lining and the maternal side of the placenta. As blood accumulates, it separates the uterine wall from the placenta. The placenta provides oxygen and nutrients to the fetus and facilitates waste removal. Proper diffusion between the maternal and fetal circulatory systems is crucial for these essential functions. When the accumulation of blood disrupts the placenta's connection to the maternal vascular network, its critical functions are compromised, which can result in fetal death if the fetus does not receive adequate oxygen and nutrients[12,13]

The clinical implications of placental abruption depend on the severity and location of the separation. Placental abruption can be categorized as complete or partial, and marginal or central. The classification of placental abruption is based on the following clinical criteria:

Class 0: Asymptomatic
1.   Blood clot discovered on the maternal side of a delivered placenta
2.   Diagnosis made retrospectively

Class 1: Mild
1.   Absence of or minimal vaginal bleeding
2.   Slight uterine tenderness
3.   Maternal blood pressure and heart rate within normal limits
4.   No signs of fetal distress

Class 2: Moderate
1.   Mild to moderate vaginal bleeding
2.   Significant uterine tenderness with tetanic contractions
3.   Changes in vital signs: maternal tachycardia, orthostatic blood pressure changes
4.   Evidence of fetal distress
5.   Altered clotting profile: hypofibrinogenemia

Class 3: Severe
1.   Heavy vaginal bleeding
2.   Tetanic uterus with board-like consistency on palpation
3.   Maternal shock
4.   Altered clotting profile: hypofibrinogenemia and coagulopathy
5.   Fetal death

Classes 0 and 1 are typically associated with partial or marginal separations, while Classes 2 and 3 generally indicate complete or central separations.

Assessment includes monitoring vital signs for tachycardia or hypotension, which may signal concealed hemorrhage. Blood tests, including a complete blood count (CBC), fibrinogen levels, clotting profile, and type and Rh factor, are collected to provide baseline data and monitor the patient's condition over time. Evaluation of fetal well-being involves auscultating fetal heart sounds, inquiring about recent changes in fetal movement, and initiating continuous electronic fetal monitoring to detect prolonged bradycardia, decreased variability, and late decelerations.[14.]

During the initial evaluation of placental abruption, most women will receive intravenous (IV) fluids, supplemental oxygen, and continuous monitoring of both maternal and fetal status. Treatment will then be customized based on the assessment results, gestational age, and the severity of distress affecting the mother and/or fetus. [15,16.]

Women with a Class 1 (mild) placental abruption, who show no signs of maternal or fetal distress and are less than 37 weeks gestation, may be managed conservatively. These patients are typically admitted to the obstetrical unit for close monitoring of both maternal and fetal status. The care plan includes establishing intravenous access and performing blood work for type and cross-match. Monitoring will continue until there are changes in the patient's condition or the fetus reaches maturity.

If the condition progresses to Class 2 (moderate) or Class 3 (severe) and the fetus is viable, delivery becomes necessary. Due to the risk of hypertonic contractions, a vaginal birth might occur quickly and may be less risky for the mother compared to cesarean delivery, especially given the potential for coagulopathy. However, if there are signs of fetal distress, an emergency cesarean section is required to ensure fetal safety. During the surgery, careful management of fluids and circulatory volume is crucial. Postoperatively, the patient should be monitored for postpartum hemorrhage and changes in the clotting profile. Additionally, a neonatal team should be present in the delivery room to manage the newborn.[14]

The prognosis of placental abruption largely hinges on the promptness of medical intervention. Prolonged bleeding significantly elevates the risks for both the mother and fetus. Although partial placental separation usually results in a lower mortality rate compared to complete separation, the risk of fetal death remains high in both cases if an emergency cesarean section is not carried out. Currently, placental abruption accounts for 5% to 8% of maternal deaths.[14]

1. The necessity of a hysterectomy, or surgical removal of the uterus, may arise if the bleeding cannot be controlled or if there is damage to the uterus itself. This, of course, has significant implications for the woman's ability to have more children in the future.
2. If a cesarean section is performed to deliver the baby, it may set a precedent for future deliveries, which will also likely require cesarean sections due to the increased risk of uterine rupture during labor.
3. Recurrence of placental abruption is another concern, with studies indicating that it can occur in 4% to 12% of subsequent pregnancies. This recurrence can increase the anxiety and risk associated with future pregnancies.
4. Additionally, women who have experienced placental abruption are at an increased risk for adverse cardiac events, further complicating their health and requiring long-term monitoring and care.[14]

Materials and Methods:-
Study Design:
This is a retrospective study that investigates cases of placental abruption. It is based on reviewing historical patient records to analyze outcomes related to placental abruption.

Study Setting:
The study was conducted in the Department of Obstetrics and Gynecology at MRMC Kalaburagi. The study covers cases from April 2022 to December 2023.

Sample Size:
The study includes 22 cases of placental abruption.

Inclusion Criteria:
To be included in the study, patients must have had a diagnosis of placental abruption. This means that only women whose medical records indicate they experienced placental abruption are part of the study.

Exclusion Criteria:
The study excludes cases with:
1. **Placenta Previa:** A condition where the placenta is abnormally positioned in the lower part of the uterus, potentially covering the cervical opening.
2. **Other Extraplacental Causes of Antepartum Hemorrhage:** This includes conditions or factors leading to bleeding before labor that are not related to placental abruption.

By setting these criteria, the study aims to focus specifically on placental abruption and avoid confounding factors that could arise from other types of placental or bleeding disorders.

Results:-
☐ **Age Distribution:**
- 19 years old: 2 cases (9.1%)
- 21 to 30 years old: 17 cases (77.3%)
- Above 30 years old: 3 cases (13.6%)

 Gravida Status:
- Primigravida: 45%
- Multigravida: 54%
 Delivery Mode:
- LSCS: 40.9%
- Vaginal Delivery: 59% (7 patients underwent induction)
 Blood Transfusion:
- Total transfused: 72% (16 cases)
   o 1 pint PCV: 3 patients
   o FFP and PCV: 13 patients
 Intrauterine Growth Restriction (IUGR):
- 1 case (4.5%)
 Couvelaire Uterus:
- 3 cases (13.6%)

	Number of cases	percentage
19 years	2	9.1%
20 to 30 year	17	77.3%
Above 30 year old	3	13.6%

Number of Cases by Age Group
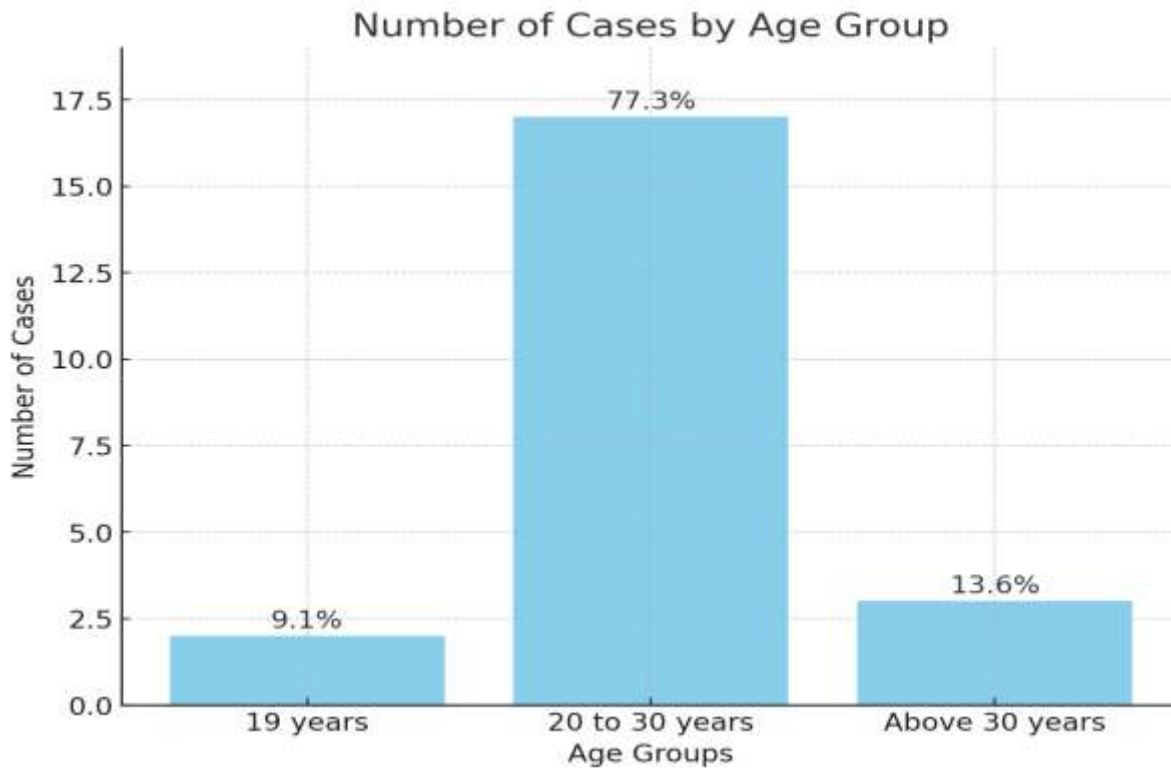
The bar graph represents the distribution of cases across different age groups in your study. The x-axis shows the three age groups: "19 years," "20 to 30 years," and "Above 30 years." The y-axis represents the number of cases within each age group.
1. **19 years:** There are 2 cases in this age group, making up 9.1% of the total cases.
2. **20 to 30 years:** This age group has the highest number of cases, with 17, representing 77.3% of the total cases.
3. **Above 30 years:** There are 3 cases in this age group, accounting for 13.6% of the total.

The graph visually emphasizes that the majority of cases fall within the "20 to 30 years" age group, highlighting this as the most common age range in your study. The percentages on top of each bar provide a clear indication of the proportion of total cases that each age group represents.

Parameter	Category	Number of Cases	Percentage
Hemoglobin	< 7 gm/dL	4	18%
	7.1 - 10.9 gm/dL	12	54%
	> 11 gm/dL	6	27%
Platelet Count	< 100,000/mm³	1	4.5%
	> 150,000/mm³	21	95%
Liver Function	Normal	21	95%
	Deranged	1	4.5%
Renal Function	Normal	21	95%
	Deranged	1	4.5%

The table summarizes key hematological and biochemical parameters among the study participants, including hemoglobin levels, platelet counts, liver function tests (LFT), and renal function tests (RFT). The data is presented as both absolute numbers and percentages.

Hemoglobin Levels:
1. **Severe Anemia (<7 gm/dL):** Observed in 4 participants (18%). This category reflects significant anemia requiring close monitoring and potential intervention.
2. **Mild to Moderate Anemia (7.1 - 10.9 gm/dL):** The majority of participants (12 cases, 54%) fall within this range, indicating a prevalent issue of suboptimal hemoglobin levels.
3. **Normal Hemoglobin (>11 gm/dL):** Found in 6 participants (27%), this category indicates those with adequate hemoglobin levels.

Platelet Counts:
1. **Thrombocytopenia (<100,000/mm³):** Present in only 1 participant (4.5%), suggesting that a minority of the cohort is at risk for bleeding complications.
2. **Normal Platelet Count (>150,000/mm³):** The vast majority of participants (21 cases, 95%) exhibit normal platelet levels, indicating stable hemostasis in most of the cohort.

Liver Function Tests (LFT):
1. **Normal LFT:** Seen in 21 participants (95%), this finding suggests that liver dysfunction is uncommon in this study population.
2. **Deranged LFT:** Only 1 participant (4.5%) shows abnormal liver function, warranting further investigation and management.

Renal Function Tests (RFT):
1. **Normal RFT:** Similar to LFT results, 21 participants (95%) have normal renal function, indicating that kidney function is largely preserved.
2. **Deranged RFT:** 1 participant (4.5%) exhibits abnormal renal function, potentially requiring additional clinical attention.

The data highlights that while most participants maintain normal platelet, liver, and renal function, a significant proportion suffers from anemia, with over half of the cohort displaying mild to moderate levels. These findings suggest the need for targeted interventions to address anemia and ensure ongoing liver and kidney function monitoring in a small subset of the population.

Gestational Age at Delivery, Mode of Delivery, and Perinatal Outcomes in Study Population

Parameter	Category	Number of Cases	Percentage
Gestational Age	< 32 weeks	6	28%
	32 to 36 weeks	12	54%
	> 36 weeks	4	18%
Mode of Delivery	Normal Vaginal Delivery (NVD)	13	59%
	Lower Segment Cesarean Section (LSCS)	9	40.9%
Perinatal Outcome	Live Birth	8	36%
	Perinatal Death	14	63%

The table provides a detailed summary of gestational age at delivery, mode of delivery, and perinatal outcomes among the study population. The data is presented as both the number of cases and corresponding percentages, offering a clear picture of the clinical outcomes observed.

Gestational Age at Delivery:
- **< 32 Weeks:** 6 cases (28%)
o This subset represents early preterm deliveries, accounting for over a quarter of the cases. These pregnancies ended before 32 weeks of gestation, which is often associated with higher risks of complications and adverse outcomes.
- **32 to 36 Weeks:** 12 cases (54%)
o The majority of deliveries occurred in the late preterm period (32 to 36 weeks), highlighting this as the most common gestational age range in the study. While still preterm, infants born in this range generally have better outcomes compared to earlier preterm births.
- **> 36 Weeks:** 4 cases (18%)
o A minority of pregnancies continued beyond 36 weeks, reaching or nearing term. Term deliveries typically carry the lowest risk for perinatal complications, but this was the least common category in the study.

Mode of Delivery:
- **Normal Vaginal Delivery (NVD):** 13 cases (59%)
o The majority of participants (59%) delivered vaginally, reflecting a preference or suitability for this mode of delivery in more than half of the cases. Normal vaginal delivery is often associated with fewer maternal and neonatal complications.
- **Lower Segment Cesarean Section (LSCS):** 9 cases (40.9%)
o Nearly 41% of the deliveries were via cesarean section, indicating a significant reliance on surgical intervention. The high rate of cesarean deliveries could suggest the presence of complications or other clinical indications necessitating this approach.

Perinatal Status:
- **Live Births:** 8 cases (36%)
o Only 36% of the cases resulted in live births, signaling a relatively low rate of successful perinatal outcomes. This finding emphasizes the challenges in managing the pregnancies included in the study.
- **Perinatal Deaths:** 14 cases (63%)

o   A substantial proportion of the cases (63%) resulted in perinatal deaths. This high mortality rate underscores the severity of the conditions managed in this study and suggests a need for improved clinical strategies to enhance perinatal survival.

This data reveals a significant prevalence of preterm deliveries, with the majority occurring between 32 and 36 weeks of gestation. While normal vaginal delivery was the most common mode, cesarean sections were also frequently performed, likely reflecting the complexity of the cases. The high perinatal mortality rate is particularly concerning, highlighting a critical area for future research and intervention to improve outcomes in this population.

Comparative Analysis:
- **Chi-Square Test:**
o   Use the Chi-Square test to compare the mode of delivery (NVD vs. LSCS) across different gestational age groups. This would help determine if the mode of delivery is significantly associated with gestational age.
o   Similarly, the Chi-Square test can be applied to assess the association between gestational age and perinatal outcomes (live birth vs. perinatal death).
- **Statistical Significance:**
o   Report p-values and confidence intervals (typically 95%) to determine if the observed associations are statistically significant.
- **Clinical Significance:**
o   Discuss whether statistically significant findings also have clinical relevance. For instance, even if a certain gestational age is associated with a higher risk of perinatal death, the clinical importance depends on the magnitude of that risk.

This analysis will provide insights into the relationships between gestational age, mode of delivery, and perinatal outcomes. It will help to identify significant risk factors for adverse outcomes, which can inform clinical decision-making and potential interventions to improve maternal and neonatal health.

The table outlines maternal complications and interventions in the study population:
- **DIC**: 1 case (4.5%) with abnormal blood clotting.
- **HELLP Syndrome**: 1 case (4.5%) associated with preeclampsia.
- **Acute Renal Failure (ARF)**: 1 case (4.5%) requiring intervention.
- **Postpartum Eclampsia**: 0 cases (0%).
- **Severe Preeclampsia**: 9 cases (40.9%) with high blood pressure risks.
- **Severe Anemia**: 2 cases (9%) needing monitoring and treatment.
- **ICU Admissions**: 3 cases (13.6%) admitted for severe conditions.

Blood Transfusions:
- **Packed Cell Volume (PCV)**: 16 cases (72%).
- **Fresh Frozen Plasma (FFP)**: 9 cases (40.9%).
- **Random Donor Platelets (RDP)**: 4 cases (18.1%).

The table indicates that severe preeclampsia was the most common complication observed, affecting 40.9% of the study population. A significant number of patients required blood transfusions, particularly PCV, reflecting the critical nature of their conditions. ICU admissions and the presence of life-threatening conditions like HELLP syndrome, ARF, and DIC, though less common, underscore the serious maternal morbidity associated with the studied population.

Variable	Number of Cases	Percentage of Total Population
Disseminated Intravascular Coagulation (DIC)	1	4.5%
HELLP Syndrome	1	4.5%
Acute Renal Failure (ARF)	1	4.5%
Postpartum Eclampsia	0	0%
Severe Preeclampsia	9	40.9%
Severe Anemia	2	9%
ICU Admissions	3	13.6%

Maternal Complications Associated with Placental Abruption
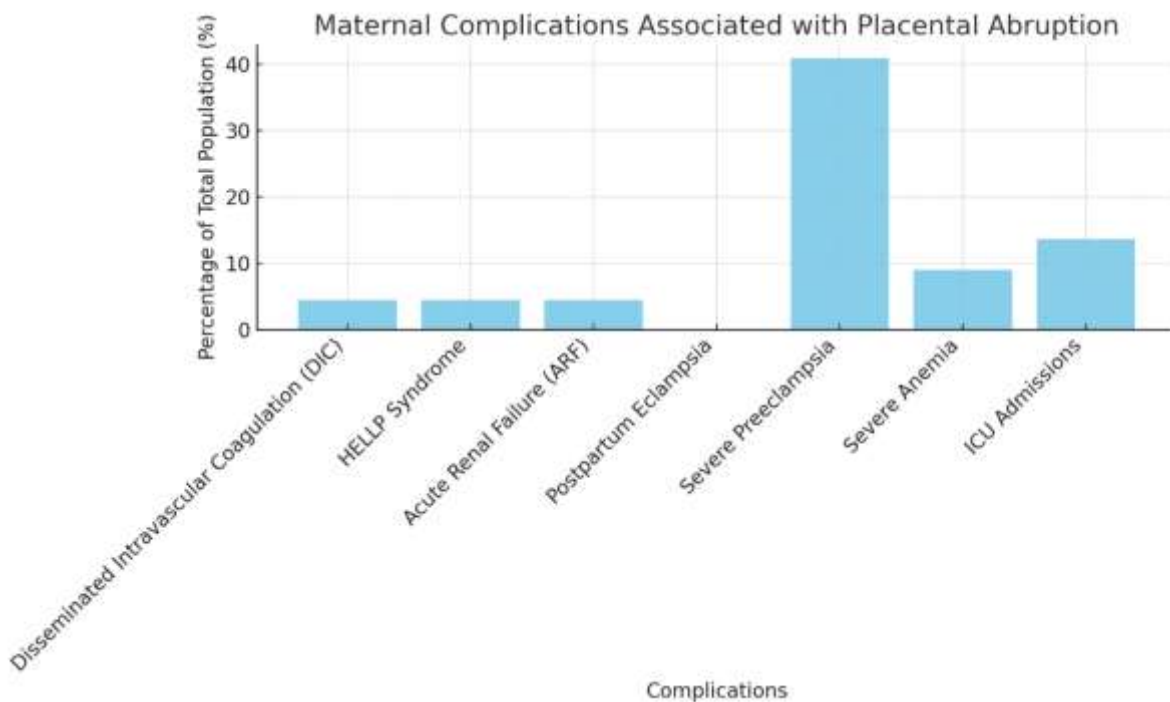
Transfusion Type	Number of Cases	Percentage of Total Population
Packed Cell Volume (PCV)	16	72%
Fresh Frozen Plasma (FFP)	9	40.9%
Random Donor Platelets (RDP)	4	18.1%
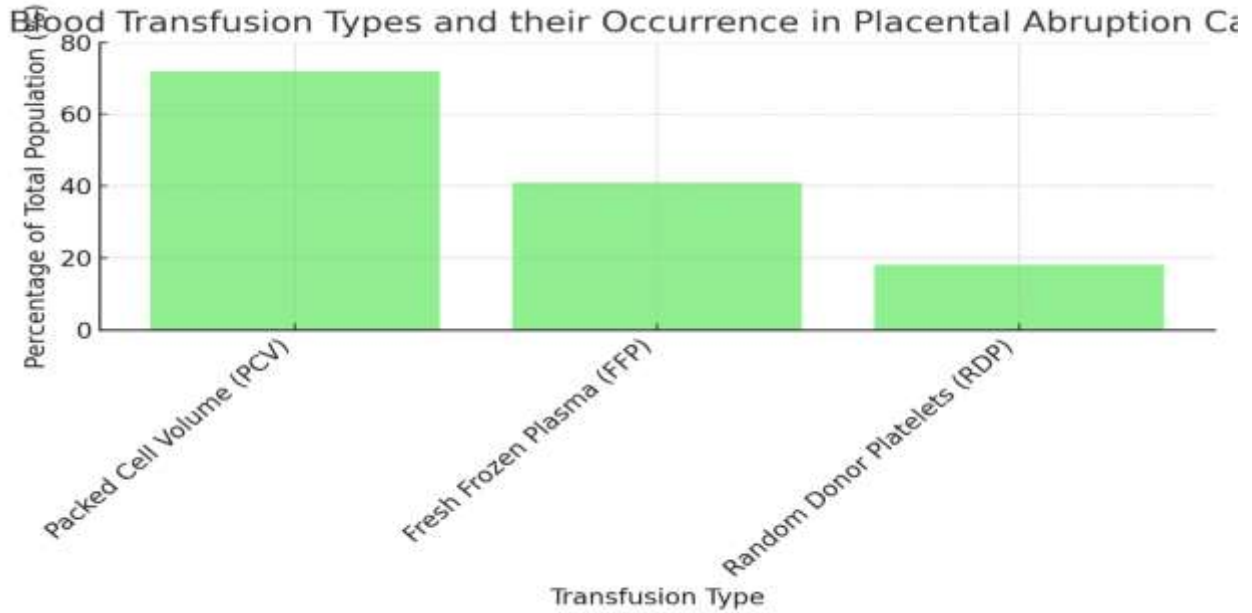
Here is the bar graph representing the different types of blood transfusions and their occurrence in cases of placental abruption. The graph shows the percentage of the total study population that received each type of transfusion.
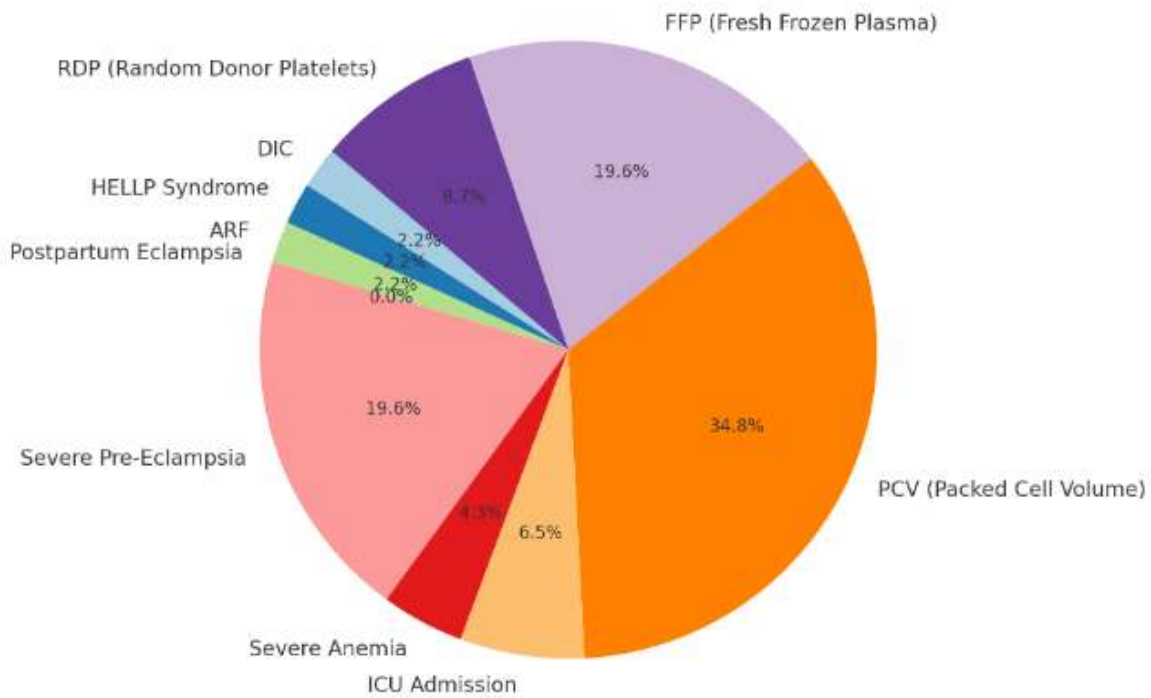
Here is the pie chart representing the distribution of maternal complications and blood transfusions in placental abruption cases, based on the data provided.This visualization highlights the relative frequencies of different complications and interventions observed in the study.

Discussion:-

The present study was undertaken in a tertiary care hospital. Our study found that abruptio placenta was common among multigravida and between the age group of 21 to 30 years. In contrast, Khan et al., in their study conducted in Karachi with 205 cases of placental abruption, found a significant association between abruption and advanced

maternal age, pregnancy-induced hypertension (PIH), gestational age, and parity[17]. This difference may be due to the different populations and characteristics of the study areas

In a study by Devabhaktuni P et al., involving 180 cases, 57% of the placental abruption cases were associated with preeclampsia.[18]. In contrast, our study showed that abruption and preeclampsia association was 40%. In another study involving 62 cases of placental abruption, an association was found in 39% of the cases[19]

And in a 2020 study by Saquib S et al., which examined 92 cases, the delivery mode was 78% cesarean section and 22% vaginal delivery.[20], whereas our study showed vaginal delivery at 50% and cesarean section at 49%.

A crucial finding of the study was the higher number of stillbirths in cases where the retroplacental clot weighed more than 100 grams. This correlation indicates that the severity of the placental separation, as evidenced by the size of the clot, directly impacts fetal outcomes, leading to an increased risk of stillbirth.

Additionally, the study found a significant association between placental abruption and factors such as maternal age, pregnancy-induced hypertension (PIH), gestational age, and parity. This suggests that older maternal age, the presence of PIH, advanced gestational age, and having had multiple pregnancies are key risk factors for developing placental abruption.

Understanding these associations is vital for early identification and management of at-risk pregnancies, aiming to prevent adverse outcomes for both the mother and the fetus.

Conclusion:-
To reduce perinatal mortality from placental abruption,early detection, and proactive management are crucial.enhanced prenatal monitoring and timely intervention including early delivery can reduce risk.addressing maternal conditions like hypertension can also help. These measures could significantly improve outcomes by enabling earlier,effective management.

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