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Original Research Article

Study of pregnancy with disseminated intravascular coagulation

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ABSTRACT

Background: At present time, obstetric bleeding remains to be the world's main cause of maternal mortality, early identification of factors leading to haemorrhage and early management of underlying pathological process is the key stone of the treatment. The most important pregnancy related condition leading to bleeding with high maternal mortality and morbidity rate is disseminated intravascular coagulation (DIC).
Methods: A prospective study of 50 cases of pregnancy with DIC was performed from May 2018 to November 2020 in our institute to detect the various aetiology and complications associated with DIC leading to maternal mortality and morbidity and study perinatal outcome in pregnant women with DIC.
Results: The prevalence of DIC in our institute is 0.22%. Common causes of DIC were abruption (36%), haemorrhage (34%), preeclampsia (18%), sepsis (6%) and acute hepatic failure (6%). The composite severe maternal morbidity outcome in haemorrhage (100%), abruption (63%), preeclampsia (58%), and AVH (33%).Out of the three most common causes (abruption, haemorrhage and preeclampsia), the composite maternal morbidity outcome was significantly more in women with haemorrhage than with abruption and preeclampsia.
Conclusions: DIC, as a marker of severe obstetrical complications, is associated with high levels of mortality and morbidity. Recognition of the antecedent causes and early investigation for and active management of DIC may help lower this morbidity.

Keywords: Disseminated intravascular coagulation in pregnancy, Maternal morbidity and mortality

INTRODUCTION

At present time, obstetric bleeding remain to be the world's main cause of maternal mortality, early identification of factors leading to haemorrhage and early management of underlying pathological process is the key stone of the treatment. The most important pregnancy related condition leading to bleeding with high maternal mortality and morbidity rate is disseminated intravascular coagulation.[1-3]

The danger surroundings obstetrical disseminated intravascular coagulation were recognized and described as early as 1901 by Joseph DeLee, in a fatal case of haemorrhagic diathesis with placental abruption.[4] As per definition of International society of Thrombosis and Haemostasis, DIC is defined as: An acquired syndrome characterised by intravascular activation of coagulation with loss of localization arising from different causes.[5,6]

It can originate from and cause damage to the microvasculature, which is sufficiently severe to produce organ dysfunction. DIC is estimated to be present in as many as 1% of hospitalised patients. DIC is always secondary phenomenon and ranging from obstetrical accidents to malignancy.[6]

Obstetrical condition associated with DIC include Abruption, placenta previa, severe preeclampsia/eclampsia, HELLP syndrome, PPH, retained dead fetus, delayed miscarriage, septicaemia , amniotic fluid embolism, and acute fatty liver of pregnancy.[7-9]

The pathophysiology of DIC involved a systemic activation of coagulation followed by widespread fibrin deposition, microvascular thrombosis and organ failure.[10]

Clinically, DIC can present anywhere along the spectrum from thrombosis and micro vascular damage to overt and uncontrolled bleeding. By identifying antecedents associated with obstetrics DIC clinicians may be better prepared to diagnose and initiate early management of this life threatening condition.[11]

DIC was reported to be the second most common severe maternal morbidity indicator. It was associated with nearly 1/4th of maternal death. Study done by Cunningham in 2015 causes for DIC were abruption 1:200, AFE 2:10000, acute fatty liver of pregnancy 1:10000, massive obstetric haemorrhage 23 to 30:1000 and sepsis.[12] Complications with DIC are bleeding, shock, acute renal failure, pleural effusion, pulmonary oedema, haematuria, hepatic encephalopathy, cardiac arrest, hypoxic brain damage etc.[13]

Here we performed a prospective study of 50 cases of pregnancy with DIC from May 2018 to November 2020 in our institute to detect the various aetiology and complications associated with DIC leading to maternal mortality and morbidity and study perinatal outcome in pregnant women with DIC.

The above study was compared with study done by Rattray et al.[14]

Aims and objectives

To study the prevalence of DIC in our institute and know aetiology and contributing factors responsible for DIC. To study maternal and perinatal morbidity and mortality.

METHODS

It was a prospective cross sectional study conducted at Smt. SCL Hospital, Ahmedabad, Gujarat, India for a period of May 2018 to November 2020.

Inclusion criteria

Indoor pregnant women suffering from DIC admitted in Smt. SCL Hospital.

Exclusion criteria

Pregnant women with bleeding or coagulative disorders.

Procedure

The total number of antenatal indoor patient during this period was 23014. Out of which approximately 50 cases of DIC were diagnosed. Demographics of the affected woman collected including age, parity, education, socioeconomical status, address, gestational age at delivery, mode of delivery, days in hospital and maternal weight. The laboratory tests include routine test (complete blood count, blood group, blood sugar, urine routine microscopy and HIV/HBsAg status), DIC specific test are platelet count, PTINR, aPTT, PTINR/aPTT, serum fibrinogen, BTCT, FDP and D dimer. The presence of overt DIC was determining by using ISTH DIC scoring system, which assigns points on the basis of decreasing platelet count, prolonged prothrombin time, elevated fibrin related marker and fibrinogen level.

International society for Thrombosis and Haemostasis (ISTH) disseminated intravascular coagulation scoring system used only in patient with underlying condition known to be associated with DIC.[14,15] Overt DIC >5 points, non-overt DIC <5 points.

Table 1: ISTH DIC scoring system.

	0	1	2
Thrombocytopenia	>100,000/mm^3	≤100,000/mm^3	≤50,000/mm^3
D-dimer	Normal	≤10 times ULN	≥10 times ULN
PT prolongation	<3 seconds	3-6 seconds	6 seconds
Fibrinogen	>100 mg/dl	≤100 mg/dl	

Ethical approval was taken from the institutional ethics committee.

Statistical analysis

Data was analysed using Microsoft excel.

RESULTS

The prevalence of DIC in our institute was 0.22%. In present study, 18 (36%) were booked and 32 (64%) were emergency patients, incidence of DIC was higher in emergency patients. Maximum numbers of patients were found between the ages of 20 to 30 years (84%) which is the reproductive age group. DIC was developed in 1 (02%) antenatal and 49 (98%) postnatal patient. Common causes of DIC were abruption (36%), haemorrhage (34%), preeclampsia (18%), sepsis (6%) and acute hepatic failure (6%). Out of 49 patients, 13 (26%) were delivered vaginally and 36 (74%) undergone for caesarean section. In vaginal delivery DIC is mostly due to atonic PPH and septicaemia, while in caesarean section DIC due to

abruption, placenta previa and intrapartum haemorrhage. Most common indications of caesarean were abruption, placenta previa and severe preeclampsia/eclampsia. In all these cases caesarean was mandatory.

Table 2: DIC antecedents and maternal outcome in present study.

Antecedents	Abruption (18)	Haemorrhage (17)	Preeclampsia (09)	AHF (03)	Sepsis (03)	Total (50)
Ceserean section	15	12	07	02	00	36 (73%)
Vaginal delivery	03	05	02	01	02	13 (26%)
Massive transfusion	09	10	01	01	00	21 (42%)
Hystrectomy	00	09	00	00	00	09 (18%)
ICU admission	04	05	05	02	03	22 (44%)
Dialysis	01	01	01	01	00	04 (8%)
Maternal death	00	04	03	00	01	08 (16%)
Composite outcome	12 (63%)	18 (100%)	04 (58%)	01 (33%)	00 (00%)	30 (60%)

Table 3: Mode of treatment in DIC.

Causes	Abruption (18)	Haemorrhage (17)	Preeclampsia (9)	AHF (3)	Sepsis (3)	Total (50)
Medical management						
Oxytocin	18	17	09	03	03	33 (100%)
Misoprostol	09	11	03	01	00	24 (48%)
Ergometrine	02	04	02	01	00	06 (18%)
15 methyl prostaglinds	05	07	05	00	00	17 (34%)
Inotropic support	05	08	03	02	02	20 (40%)
Antibiotics	18	17	9	3	3	50 (100%)
Surgical management						
Hysterectomy	00	09	00	00	00	09 (18%)
Uterine tamponade	02	03	01	00	00	06 (12%)
Uterine compression sutures	03	02	00	00	00	5 (10%)
Major vessel ligation	01	02	00	00	00	03 (6%)
Embolization	00	00	00	00	00	00 (00%)
Blood products						
Blood	70	74	20	08	05	177
Fresh frozen plasma	72	90	32	24	00	218
Cryoprecipitate	12	16	08	00	00	36
Platelets	108	81	36	08	00	233
Albumin	00	01	00	01	00	02

Table 4: DIC antecedents and perinatal outcome in present study.

Antecedents	Abruption (18)	Haemorrhage (19)	Preeclampsia (9)	AHF (3)	Sepsis (2)	Total (51)
Infant survived	09	19	07	03	02	39 (76%)
Neonatal death	00	04	02	01	00	07 (18%)
Intrauterine death	11	00	01	00	00	12 (24%)
Nicu admission	05	08	05	02	01	21 (42%)
Nbw	10	12	06	02	02	32 (54%)
Lbw	06	06	02	01	00	15 (29%)
Vlbw	02	01	01	00	00	04 (8%)

The DIC severity score (by ISTH DIC scoring system) for each cause were calculated and categorised into non overt and overt DIC. Percentage of non-overt DIC was 66% and overt DIC was 34%. Maternal outcome was worst in overt DIC. There was no statistical difference between the severity of DIC and obstetrical causes in our study.[14]

In present study, caesarean section done in 36 (73%) and vaginal delivery in 13 (26%)patients, ICU admission

required in 22 (44%) patients, massive blood transfusion was given in 21 (42%) patients, hysterectomy done in 8 (16%) patients and dialysis in 4 (8%) patients. Need of massive blood transfusion is higher in haemorrhage (85%) and abruption (56%) compared to other causes.

Total 9 (18%) hysterectomy were performed, 7 (78%) due to intrapartum haemorrhage and 2 (22%) rupture uterus, 4 (8%) dialysis required in cases of acute renal failure.

Medical treatment, surgical treatment and blood product replacement were used in majority of cases which is outlined in the Table 3.

Medical treatment is given in form of uterotonics {oxytocin (100%), misoprostol (48%), ergometrine (18%) and prostaglandins (34%)}, antibiotics (100%) and inotropic support (40%).

Surgical management include hysterectomy (18%), uterine tamponade (12%), uterine compression sutures (10%), major vessel ligation (06%).

Almost all the patients were given blood and blood products. Rate of blood and blood products transfusion were highest in haemorrhage followed by abruption.

(Total number of blood 177 unit and blood products 487 units were given in 50 patients so on an average 3.5 blood unit in one patient was required).

There were two twin pregnancy and total 51 infants were born by 49 mothers out of whom 37 (70%) infants survived, 13 (25%) died in utero. 21 (53%) required NICU admission.

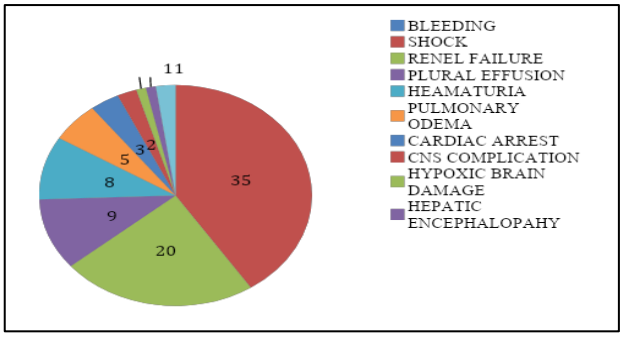

Figure 1: Complications in patients with DIC.

Out of 39 neonates, 7 (18%) neonates were died. Common causes of mortality were prematurity, LBW and septicaemia, 32 (54%) having normal birth weight, 15 (29%) having low birth weight and 04 (8%) having very low birth weight.

In our study, total 8 maternal deaths occur with case fatality of 16% which means out of 6 patients 1 was prone to death. Out of 8, only 2 (20%) were booked patient and 6 (80%) were emergency patients.

Case fatality rate was higher in emergency patient (10%) compared to booked patient (6%) suggesting that lack of antenatal care affect maternal outcome. Most common cause of death was haemorrhage (50%).

DISCUSSION

Prevalence of DIC in our institute during study period from May 2018 to November 2020 was 0.22%. Because of many definitions and variable degree of severity accurate incidence of DIC is not known but it ranges from 0.03% to 0.35%.[14]

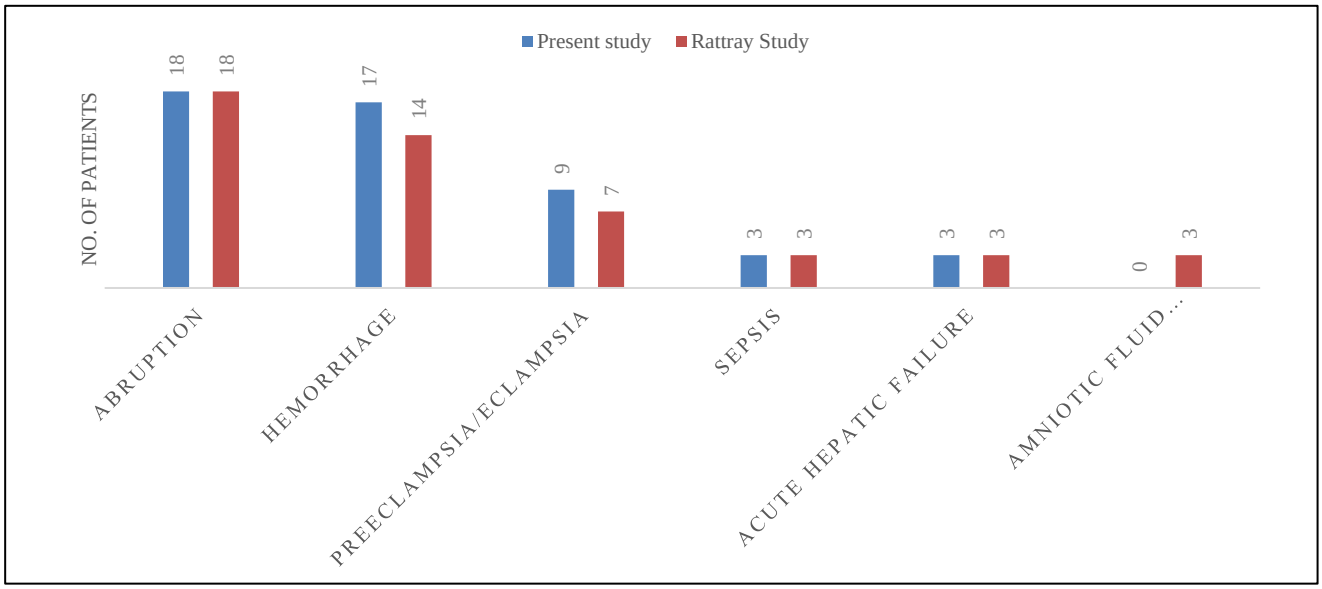

Figure 2: Comparison of causes of DIC.

Our study compared with study done by Rattray et al.[14] Major causes of DIC in present study abruption (36%), haemorrhage (34%), preeclampsia (18%), sepsis (6%), acute hepatic failure (6%). Here haemorrhage includes blood loss due to placenta previa, uterine atonicity or genital tract trauma. No case of AFE found in my study. In study done by Rattray et al causes of DIC were abruption (37%), PPH (29%), preeclampsia (14%), sepsis (6%), AVH (8%), which was matched with our study.[14]

In present study, caesarean section done in 36 (73%) and vaginal delivery in 13 (26%)patients, ICU admission required in 22 (44%) patients, massive blood transfusion was given in 21 (42%) patients, hysterectomy done in 8 (16%) patients and dialysis in 4 (8%) patients which was well compared with study done by Rattray et al in which caesarean done in 22 (44%) and vaginal delivery in 27 (66%) patients, ICU admission required in 20 (41%) patients massive blood transfusion was given in 29 (59%), hysterectomy done in 9 (18%) patients and dialysis in 3 (6%) patients. Need of massive blood transfusion is higher in haemorrhage (85%) and abruption (56%) compared to other cause. There was total 9 (18%) hysterectomy were performed, 7 (78%) due to intrapartum haemorrhage and 2 (22%) rupture uterus. The composite severe maternal morbidity outcome in haemorrhage (100%), abruption (63%), preeclampsia (58%), and AVH (33%) (composite severe maternal morbidity outcome calculated on the basis of one or more of hysterectomy, ICU admission, blood transfusion >5 unit and ATN requiring dialysis). Out of the three most common causes (abruption, haemorrhage and preeclampsia), the composite maternal morbidity outcome was significantly more in women with haemorrhage than with abruption and preeclampsia.[14]

There were two twin pregnancy and total 51 infants were born by 49 mothers out of whom 37 (70%) infants were survived, 13 (25%) were died in utero. Study by Rattray et al, there were four twin pregnancy and total 53 infants were born by 49 mothers out of whom 39 (76%) infants are survived, 12 (24%) were died in utero. 21 (53%) required NICU admission In present study out of 39 neonates, 7 (18%) neonates died.

Out of 51 infants 39 (76%) survived, while 12 (24%) died in utero.

NICU admission rate was 44%,

Almost all the patients were given blood and blood products (total number of blood 177 units and blood products 487 units). Rate of blood and blood products transfusion were highest in haemorrhage followed by abruption.

Our study highlights the high levels of maternal and perinatal mortality and morbidity associated with this obstetrical emergency. During the 3 years of this study there were 29 direct maternal deaths (deaths resulting from obstetric complications) in 15687 mothers delivered (a maternal mortality rate of 184 per 100 000), and 8 of these 29 deaths were associated with DIC. Thus, the mortality rate directly related to DIC is 8 in 15678 (1 in 1960). Despite the overall low prevalence of DIC, we found a case fatality rate of 16% which means every 6 cases of DIC 1 was prone to death.

In our study, total 8 maternal deaths occurs in which only 3 (25%) were booked patient and 5 (75%) were emergency patients. Causes of death were haemorrhage (50%), severe preeclampsia/eclampsia (25%) and septicaemia (25%) in my study indicating the blood loss remain leading cause of maternal morbidity and mortality.

The perinatal mortality rate was 38%, stillbirth rate 24% and neonatal death rate 17%. Placental abruption was associated with the worst perinatal outcome, with 11 of 18 (61.1%) infants stillborn.

Limitations of the study are present study was a single centric study having a small sample size. So the results may not be reflected in the whole country.

CONCLUSION

DIC, as a marker of severe obstetrical complications, is associated with high levels of mortality and morbidity. Recognition of the antecedent causes and early investigation for and active management of DIC may help lower this morbidity. Despite its rarity, systematically searching for DIC should be added in treatment algorithms in the management of known obstetrical antecedents, because treatment delay may significantly worsen the prognosis. We should emphasize the low socio-economical class and illiterate group for regular ANC and awareness about health care facilities to minimize the antecedent factors and complications of DIC. A timely referral to a physician or a haematologist will help sort out many of these adverse events and improve maternal outcome. For patients who are in less than tertiary care, a prompt transfer to a higher institution that has better facilities of specialist and blood bank could save lives. In particular the prompt management and arrest of postpartum haemorrhage before the need of massive transfusion and its attendant coagulopathy is one of the lessons from this study.

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