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RESEARCH ARTICLE

PREGNANCY-RELATED THROMBOTIC MICROANGIOPATHIES: CLINICAL CHARACTERISTICS, MANAGEMENT AND MATERNAL OUTCOMES IN A RETROSPECTIVE STUDY IN AN OBSTETRIC INTENSIVE CARE UNIT

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Abstract

Background: Pregnancy related thrombotic microangiopathies (TMA) are rare but life threatening obstetric complications characterized by microangiopathic hemolytic anemia, thrombocytopenia and organ dysfunction. They include HELLP syndrome, thrombotic thrombocytop enic purpura (TTP), atypical hemolytic uremic syndrome (aHUS) and acute fatty liver of pregnancy (AFLP).
Objective: To describe the epidemiological characteristics, clinical presentation, biological abnormalities, therapeutic management and maternal outcomes of pregnancy-related thrombotic microangiopathies admitted to an obstetric intensive care unit.
Methods: We conducted a retrospective descriptive study including 103 patients admitted to the obstetric intensive care unit of Lalla Meryem Hospital, Ibn Rochd University Hospital Center, Casablanca, Morocco, between January 2023 and July 2025.
Results: HELLP syndrome was the most frequent condition (79.6%). Most cases occurred during the third trimester. Hypertension was present in 83.5% of patients and proteinuria in 68%. Acute kidney injury was the most common complication (14.56%). Maternal mortality was 6.18%.
Conclusion: Pregnancy-related thrombotic microangiopathies remain severe obstetric emergencies associated with significant maternal morbidity and mortality. Early diagnosis and multidisciplinary manage ment are essential to improve maternal outcomes.

Introduction:-

Pregnancy-related thrombotic microangiopathies are characterized by endothelial injury leading to platelet aggregation and microvascular thrombosis. Although these conditions share common clinical features, they differ in pathophysiology, prognosis and management. HELLP syndrome is considered a severe form of preeclampsia, while thrombotic thrombocytopenic purpura is associated with severe ADAMTS13 deficiency and atypical hemolytic uremic syndrome is related to complement pathway dysregulation.(19-20)

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Methods:-

Study design:-
Retrospective descriptive study.

Inclusion criteria
Pregnant or postpartum women admitted to the obstetric ICU with a diagnosis of pregnancy-related thrombotic microangiopathy.

Exclusion criteria:-
Patients with thrombocytopenia or hemolysis unrelated to pregnancy-related thrombotic microangiopathies.

Diagnostic criteria:-
HELLP syndrome was diagnosed according to the Mississippi classification.

Thrombotic thrombocytopenic purpura was suspected in the presence of severe thrombocytopenia and microangiopathic hemolytic anemia associated with neurological manifestations and confirmed by reduced ADAMTS13 activity when available.

Atypical hemolytic uremic syndrome was considered in cases of persistent thrombotic microangiopathy with acute kidney injury after exclusion of other causes.

Acute fatty liver of pregnancy was diagnosed using the Swansea criteria**.**

Study setting:-
Obstetric intensive care unit
Lalla Meryem Hospital
Ibn Rochd University Hospital Center
Casablanca, Morocco.

Study period:-
January 2023 – July 2025.

Study population:-
A total of 103 patients admitted for pregnancy-related microangiopathies were included.

Diagnostic distribution:-

Diagnosis	Cases
HELLP syndrome	82
Acute fatty liver of pregnancy	9
Atypical hemolytic uremic syndrome	7
Thrombotic thrombocytopenic purpura	5

Data collection:-
Data were collected from medical records and included:

- epidemiological characteristics
- obstetric history
- clinical presentation
- biological findings
- imaging findings
- therapeutic management
- maternal outcomes

Statistical analysis:-
Data were analyzed using descriptive statistics.
Continuous variables were expressed as mean with ranges.
Categorical variables were expressed as percentages.

-Ethical approval for the study was obtained from the institutional ethics committee of Ibn Rochd University Hospital. Due to the retrospective nature of the study, informed consent was waived.

Results:-

Epidemiological characteristics
The mean maternal age was 31.44 years (17–47).

Obstetric history:-
- Primigravida: 33 patients (32%)
- Multigravida: 70 patients (68%)

Previous medical history included:
- gestational hypertension: 15.53%
- gestational diabetes: 6.8%

Previous miscarriage occurred in 5 patients and intrauterine fetal death in 10 patients.
Pregnancy characteristics

Microangiopathy occurred:-
- Prepartum: 92.23%
- Postpartum: 7.77%

Mean gestational age: 31 weeks + 5 days
(range 19–41 weeks)

Type of pregnancy:-
- Singleton pregnancy: 92.23%
- Twin pregnancy: 7.77%

Prenatal follow-up:-
- Followed pregnancy: 81 patients
- No prenatal follow-up: 22 patients

Clinical findings:-
The most frequent symptoms were: (28,29)

Symptom	Percentage
Headache	70.87%
Visual disturbances	48.54%
Tinnitus	48.54%
Asthenia	43.68%
Right hypochondrial pain	36.89%
Nausea	28.15%
Vomiting	20.38%
Jaundice	14.56%

Hypertension was present in 83.5% of patients.
Proteinuria ≥2+ was detected in 68% of cases.

Biological findings:-
Mean laboratory parameters were:

Parameter	Mean value
ASAT	426.85 UI/L
ALAT	290.59 UI/L
Hemoglobin	11.12 g/dL
Platelets	90,689/mm³
Creatinine	15.6 mg/L
Urea	0.56 g/L

Hyperleukocytosis was observed in 75% of patients.
Thrombocytopenia occurred in 90% of cases, consistent with microangiopathic thrombosis.
Cytolysis was observed in 95% of cases.

Imaging findings:-
Obstetric ultrasound
Performed in all patients.

Findings included:
- intrauterine growth restriction: 19 cases
- retroplacental hematoma: 12 cases
- intrauterine fetal death: 9 cases

Abdominal ultrasound
Performed in 30 patients.

Findings included:
- ascites
- hepatic subcapsular hematoma
- hepatic abnormalities
- renal abnormalities

CT scan
Performed in 16 patients.

Findings included:-
- bilateral pneumonia
- pleural effusion
- hepatic ischemic lesions
- hemoperitoneum

One patient presented imaging compatible with posterior reversible encephalopathy syndrome (PRES).

Therapeutic management:-
Management included obstetric treatment and intensive care support.

Mode of delivery:-
- Cesarean section: 86.41%
- Vaginal delivery: 13.59%

Intensive care treatment:-
- Mechanical ventilation: 4.85%
- Albumin infusion: 7.8%

Blood transfusion:-
- Red blood cells: 22.5%
- Platelets: 19.43%
- Fresh frozen plasma: 4.7%

Medical therapy:-
- Antihypertensive treatment: 100%
- Corticosteroids: 76.7%
- Magnesium sulfate: 62.14%
- Antibiotics: 58.25%

Mean ICU stay was 5 days (1–23 days).

Maternal outcomes:-
Complications:-
The most frequent complication was acute kidney injury (14.56%).

Among these patients:
- 4.85% required hemodialysis

Other complications included:
- disseminated intravascular coagulation
- neurological complications
- acute respiratory distress syndrome
- pulmonary embolism
- pancreatitis

Ascites occurred in 11.65%, pulmonary edema in 5%, and fever in 8%.

Maternal mortality:-
-Six maternal deaths occurred, corresponding to a maternal mortality rate of 6.18%.
-Among the six maternal deaths, the main causes were multiorgan failure, severe hemorrhage and refractory shock.

Neonatal outcomes:-
Neonatal outcomes included birth weight, admission to the neonatal intensive care unit and perinatal mortality.

Discussion:-

Pregnancy-related thrombotic microangiopathies represent severe obstetric conditions characterized by endothelial dysfunction and microvascular thrombosis leading to multiorgan involvement.HELLP syndrome remains the most common form (23-24) ,accounting for nearly 80% of cases in our series, consistent with previous reports.The mean maternal age in our study was 31.44 years, comparable to international studies reporting a mean age between 26 and 35 years.

The mean gestational age at diagnosis was 31 weeks, consistent with literature indicating that most cases occur during the third trimester.Hypertension was present in 83.5% of patients(30), similar to the 80–90% prevalence reported in HELLP syndrome.Biological abnormalities such as thrombocytopenia and cytolysis were consistent with the pathophysiology of thrombotic microangiopathy.Acute kidney injury was the most frequent complication observed in our cohort(25) reflecting the renal vulnerability in severe microangiopathies.The maternal mortality rate of 6.18% reflects the severity of these conditions and remains comparable to rates reported in intensive care cohorts.Early diagnosis and multidisciplinary management involving obstetricians, intensivists, nephrologists and hematologists are essential to improve maternal outcomes.

Our findings are consistent with previous studies reporting HELLP syndrome as the most frequent pregnancy-related thrombotic microangiopathy. Similar results were reported by Fakhouri et al. and George et al., who described HELLP syndrome as the predominant form of TMA during pregnancy.

Conclusion:-

Pregnancy-related thrombotic microangiopathies are severe obstetric emergencies requiring early diagnosis and intensive multidisciplinary management.HELLP syndrome is the most frequent entity, and acute kidney injury represents the most common complication.Prompt recognition and optimal intensive care management are crucial to improve maternal prognosis.

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