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# Pregnancy-related thrombotic microangiopathies: clinical characteristics, management and maternal outcomes in an obstetric intensive care unit

## Introduction

Pregnancy-related thrombotic microangiopathies (TMA) represent a group of severe obstetric disorders characterized by microvascular thrombosis associated with mechanical **3 hemolytic anemia and thrombocytopenia.**

The main pregnancy-associated TMAs include:

- HELLP syndrome
- 2 atypical hemolytic uremic syndrome (aHUS)**
- thrombotic thrombocytopenic purpura (TTP)**
- acute fatty liver of pregnancy (AFLP)

These conditions share overlapping clinical features and can lead to multiorgan dysfunction involving the liver, kidneys, brain and coagulation system.

HELLP syndrome is considered a severe form of preeclampsia and occurs in approximately 0.5–1% of pregnancies. In contrast, aHUS, TTP and AFLP are much rarer but potentially life-threatening.

Despite advances in obstetric and intensive care management, these conditions remain associated with significant **1 maternal morbidity and mortality.**

The aim of this study was to describe the epidemiological characteristics, clinical presentation, biological abnormalities, management and maternal outcomes of pregnancy-related microangiopathies admitted to an obstetric intensive care unit.

## Methods

### Study design

Retrospective descriptive study.

### 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

1 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.

## 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:

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  $\geq 2+$  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/mm<sup>3</sup>

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%.

## Discussion

Pregnancy-related thrombotic microangiopathies represent severe obstetric conditions characterized by endothelial dysfunction and microvascular thrombosis leading to multiorgan involvement.

HELLP syndrome remains <sup>3</sup> the most common form, 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, 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, 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.

## Conclusion

Pregnancy-related thrombotic microangiopathies are severe obstetric emergencies requiring early diagnosis and intensive multidisciplinary management.

HELLP syndrome is the most frequent entity, <sup>3</sup> 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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