

Case Report

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Maternal Near Miss in The Maternity Center of a Central Tunisian University Hospital

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Abstract

Introduction: Maternal health is a global priority. The maternal mortality rate is reflected in socio-economic indicators as well as in the quality of health care offered.

Objectives: Identify patients who have experienced potentially life-threatening conditions and present cases of “near miss” according to the criteria of WHO 2009 within the Tunisian university maternity and assess the quality of care.

Material and Methods: A retrospective descriptive study conducted in the obstetrics gynecology department of Kairouan during the year 2023. A data collection grid based on the WHO “near miss” classification criteria had been designed.

Results: We had collected 165 cases having experienced potentially life-threatening conditions according to the 2009 WHO criteria. The age of the “near misses” was > 35 years in 55.6% of cases. Bleeding disorders were the most common event (72.2%). Maternal death was related to HELLP Syndrome. The calculation of the “near miss” indicators had revealed a near miss ratio = 2.7%/1000 live births (NV), a severe maternal outcome ratio = 2.9/1000 NV, a near miss/equal mortality ratio at 18 and a mortality index = 5.26%.

Conclusion: Emergency obstetric care requires qualified personnel and an adequate health care infrastructure. These actions should constitute important elements of the reproductive health program in Tunisia.

Keywords: maternal morbidity; near miss; maternal mortality; obstetric care; community medicine

Introduction

Maternal health is a global priority, it takes into account all aspects of a woman's health from pregnancy, delivery to postpartum [1]. Maternal loss is considered devastating to the family and society. The maternal mortality rate is reflected in socio-economic indicators as well as the quality of health care offered [2].

These women survived serious maternal complications or “life-threatening conditions” grouped into bleeding disorders, hypertensive disorders, other systemic disorders and management indicators. There are several life-threatening conditions recognized by clinical, laboratory or even management characteristics which support this classification established by the WHO in 2009 in order to unify the diagnostic criteria [2,3].

The Objectives of This Study Were: Identify patients who have experienced potentially life-threatening conditions and present cases of “near miss” according to WHO 2009 criteria within the university maternity ward during the year 2023.

Material and Methods

This was a retrospective descriptive study carried out at the obstetrics and gynecology department of Kairouan over a period of one year from January 1, 2023 to December 31, 2023, covering patients who were hospitalized in our department after pregnancy, childbirth or postpartum and who had experienced potentially life-threatening conditions according to WHO criteria such as “A pathological condition in a woman who is or has been pregnant, regardless of the duration and site of the pregnancy, from any cause related to or aggravated by pregnancy or its management; accidental or incidental causes being excluded” [3]. From these patients, we identified cases of “near miss” defined according to WHO 2009 as “A woman who almost died but survived a serious maternal complication during pregnancy, childbirth or within 42 days following the end of pregnancy” [2] and cases of maternal death defined according to the WHO as: “Any death occurring during pregnancy, childbirth or within 42 days following the end of

pregnancy, regardless of the duration and location are for any cause determined or aggravated by the pregnancy or the care it motivated, but neither accidental nor fortuitous [4].

Data were collected from the gynecology admission register, the operating room register, the admission register of women giving birth, the admission register to the intensive care unit and the transfusion register. Data collection was done by a resident of the specialty. The data analysis grid was inspired by the tested and validated WHO tool on “near misses”.

The Following Indicators Were Calculated

Near Miss Ratio (MNM Ratio): The number of near miss cases/1000 live births [2,3].

Severe Maternal Outcome Ratio (SMOR): This report expresses the number of women having experienced life-threatening conditions/1000 live births [2,3].

Near Miss/Mortality Ratio (MNM: Mortality Ratio): It expresses the relationship between cases of “near miss” and cases of maternal death [2,3].

Mortality Index: This is the ratio between the number of maternal deaths and the number of patients who experienced life-threatening conditions [2,3]. Data entry and analysis were carried out using the Statistical Package for Social Science SPSS version 20 software. Frequencies and percentages were calculated for qualitative variables as well as means, standard deviations (standard deviation) for quantitative variables.

Results

During the duration of our study, on²v had recorded 165 cases who experienced potentially life-threatening

conditions according to the WHO 2009 criteria. The age of the patients was 20 to 35 years in 64.2% of cases (n= 106) compared to 35.8% of cases (n=59) whose age was over 35 years. Fifty-four women, or 32.7%, had a history (ATCDs) of upper birth (Table 1). Admission for ectopic pregnancy (EUG) was recorded in 16.4% of cases. Hemorrhagic abortion was the reason for admission in 7.3% of patients. Regarding gestational age; 66.1% of women or 109 were admitted in the third trimester compared to 24.8% or 41 who were admitted in the first trimester. Only 6 women or 3.6% were admitted postpartum. Around a quarter or 42 women had no prenatal consultation. The pregnancies were single in 78.2% or 129 cases, multiple in 15.8% or 10 patients and ectopic in 6.1% or 26 cases. Less than half of the women (54 women or 32.7%) of the cases were toxemic, only 40 of whom were placed on antihypertensive treatment. Gestational diabetes was noted in 11 women, or in 6.7% of cases. An anomaly of insertion of the placenta such as placenta previa was found in 17 women or 10.3% of cases. During pregnancy, 53 of our women required hospitalization, or 32.1%. Approximately half (56.4%) of the population had given birth by C/S, the urgent nature of which was found in 78 patients (47.3%). Twenty-six women underwent emergency surgery to treat GEU. Potentially life-threatening conditions were defined according to the presence of at least one hemorrhagic, hypertensive, systemic disorder or at least one management criterion (Appendix 1). Bleeding disorders were the predominant etiology of potentially life-threatening conditions. Ectopic pregnancy with hemoperitoneum was the most common bleeding disorder in 15.8%.

Table 1: Distribution of Patients According to Personal History.

	N	%
Gynecological Intervention	5	3%
GEU	2	1.2%
Endo Uterine Maneuver	3	1.8%
Parity		
Nulliparous	36	21.8%
1-3	114	69.1%
>=4	15	9.1%
ATCDS Of Delivery By C/S	54	32.7%
Plain Scar	31	18.8%
Bi Scar	16	9.7%
Scar Sorting	7	4.2%
ATCDS Of Previous Abortion	37	22.4%
Pregnancy Complication ATCDS	16	9.7%

Hypertensive Disorder	14	8.5%
Breakup or Pre-Breakup	1	0.6%
Severe Anemia or Blood Transfusion	1	0.6%

Hypertensive disorders were the second etiology of potentially life-threatening conditions at 35.2%. Approximately 20.6% (n=34 patients) were classified according to the presence of at least one systemic disorder. Thrombocytopenia was the most common

systemic complication, accounting for 10.9%. For criteria based on the type of intervention, admission to ICU was the dominant criterion, i.e., 40.6% (Table 2).

Table 2: Distribution of Patients According to Clinical and Management Criteria.

	N	%
Bleeding Disorders	110	66.7
HRP	12	7.3
Placenta Previa	14	8.5
Placenta Accreted	5	3
Ectopic Pregnancy	26	15.8
HDD/HPP	18	10.9
Postabortion Hemorrhage	22	13.3
Uterine Rupture	6	3.6
Injury to the Genital Tract	7	4.2
Hypertensive Disorders	58	35.2
Severe Preeclampsia	44	26.7
Severe Hypertension	7	4.2
Eclampsia	4	2.4
HELLP Syndrome	3	1.8
Hypertensive Encephalopathy	0	0
Other Systemic Disorders	34	20.6
Endometritis	3	1.2
Pulmonary Edema	0	0
Respiratory Failure	6	3.6
Thyroid Crisis	0	0
Convulsion	5	3
Sepsis	7	4.2
State of Shock	12	7.3
Thrombocytopenia (< 100,000 PLQ/ml)	17	10.9
Criteria Based on the Type of Intervention	100	60.6
Blood Transfusion	63	38.2
VVC	17	10.3
Hysterectomy	10	6
Uterine Artery Embolization	0	0
Admission to ICU	67	40.6
Prolonged Hospitalization	24	14.5
Intubation Without GA	0	0
Back to the Block	8	4.8
Surgery	32	19.4

During our study period, among the 165 cases of potentially life-threatening conditions, there were 18 patients who met the “near miss” criteria according to WHO 2009 and only one case of death whose cause was HELLP syndrome. in a patient followed for hypertensive disorders. Among the 18 cases of “near

miss”, 8 patients or 44.4% were aged between 20 and 35 years old and the 10 other patients were aged over 35 years old. The percentage of patients without a surgical medical history was 77.8%. The remaining 4 cases with a percentage of 22.2% had a history as follows: one anemic case (5.6%), one hypertensive

case (5.6%) and two diabetic cases (11.1%). Four women were primiparous and four women had ATCDs of previous C/S delivery; i.e., 22.2% and 2 other “near misses” had a history of pregnancy complicated by hypertensive disorders i.e., 11.1%. (Table 3).

Table 3: Distribution of “Near Miss” Cases According to Gyneco-Obstetric History.

	N	%
Gynecological Intervention	1	5.6
Tubalplasty	0	0
Myomectomy	0	0
GEU	0	0
Endometrial Maneuver	1	5.6
Parity		
Nulliparous	4	22.2
1-3	12	66.7
>=4	2	11.1
Cesarean Delivery ATCDS	4	22.2
Plain Scar	3	16.7
Bi Scar	1	5.6
Scar Sorting	0	0
ATCDS of Previous Abortion	4	22.2
ATCDS Pregnancy Complication	2	11.1
Hypertensive Disorder	2	11.1
Severe Hemorrhage	0	0
Sepsis or Infection	0	0
Breakup or Pre-Breakup	0	0
Severe Anemia or Transfusion	0	0

Admission of “near miss” cases was in the first trimester in 5 patients with a percentage of 27.8%. While 12 cases were admitted during the third trimester, a percentage of 66.7%. Only one case was admitted postpartum, i.e., 5.6%. A third of the patients had good follow-up of their pregnancies at a rate of 5 CPN. Thirteen patients had a singleton pregnancy, i.e., 72.2%. In 22.2% it was an ectopic pregnancy. A third of “near miss” cases were toxemic. Gestational diabetes was noted in 2 patients. Four cases of “near miss” or 22.2% were known to be anemic.

Seven cases had an emergency high birth. Vaginal delivery was noted in 4 cases, including one with instrumental extraction. Four cases of “near misses” had undergone laparotomy for ruptured GEU. Bleeding disorders were noted in 72.2% of cases (n=13). Hypertensive disorders were noted in 33.3% of “near miss” cases. Almost all cases were classified according to the presence of at least one systemic disorder. Hemorrhagic shock was marked in 66.7% of cases (Table 4).

Table 4: Distribution of “Near Miss” Cases According to Clinical and Management Criteria.

	N	%
Bleeding Disorders	13	72.2
HRP	1	5.6
Placenta Previa	0	0
Placenta Accreta/Increta/Percreta	0	0
Ectopic Pregnancy	4	22.2
HDD/HPP	4	22.2
Postabortion Hemorrhage	2	11.1
Uterine Rupture	1	5.6
Injury to the Genital Tract	1	5.6

Hypertensive Disorders	6	33.3
Severe Preeclampsia	1	5.6
Severe Hypertension	0	0
Eclampsia	4	22.2
HELLP Syndrome	1	5.6
Other Systemic Disorders	17	94.4
Endometritis	0	0
Pulmonary Edema	0	0
Respiratory Failure	3	16.7
Thyroid Crisis	0	0
Convulsion	4	22.2
Sepsis	2	11.1
State of Shock	12	66.7
Thrombocytopenia	4	22.2
Criteria Based on The Type of Intervention	18	100
Blood Transfusion	12	66.7
VVC	17	94.4
Hysterectomy	5	27.8
Embolization of Uterine Arteries	0	0
Admission to ICU	18	100
Prolonged Hospitalization	14	77.8
Intubation Without GA	0	0
Back to the Block	1	5.6
Surgery	12	66.7

All of these patients were admitted to the intensive care unit (ICU), 14 of whom required prolonged hospitalization, or 77.8%. Seventeen cases of “near miss” had benefited from a central venous line (CVV) and 66.7% were transfused with packed red blood cells (CG). The need for surgical intervention was

noted in 12 cases. A hemostasis hysterectomy was performed in 5 cases or 27.8%. The classification of “near misses” according to organ dysfunction showed a predominance of cardiac dysfunction and coagulation/hematological dysfunction, i.e., 66.7% for each (Table 5).

Table 5: Criteria for identifying “Near Misses”.

	N	%
Acute Cardio-Circulatory Dysfunction	12	66.7
State of Shock	12	66.7
Continued Use of Vasoactive Drugs	2	11.1
Cardiac Arrest	0	0
Cardiopulmonary Resuscitation	0	0
Severe Hypo Perfusion	0	0
Severe Acidosis	0	0
Respiratory Dysfunction	3	16.7
Acute Cyanosis	0	0
Gaspings	0	0
Tachypnea (FR>40 /Min)	3	16.7
Bradypnea (FR<6/Min)	0	0
Severe Hypoxemia	3	16.7
Intubation Without General Anesthesia	0	0
Kidney Dysfunction	4	22.2
Oliguria Without Response to Fillers or Diuretics	4	22.2
Dialysis For AKI	4	22.2
Severe Azitemia (Creat >= 300 µ Mol/L Or >=3.5mg/Dl)	1	5.6

Coagulation /Hematologic Dysfunction	12	66.7
DIC	3	16.7
Massive Transfusion (≥ 5 CG)	11	61.1
Acute Thrombocytopenia ($< 50,000$ PLQ /ml)	4	22.2
Liver Dysfunction	0	0
Jaundice Associated With SEP	0	0
Severe Hyperbilirubinemia (BIL >100 μ Mol/L Or > 6 mg/Dl)	0	0
Uterine Dysfunction (Hysterectomy)	5	27.8
Neurological Dysfunction	3	16.7
Disturbance Of Consciousness or Prolonged Coma > 12 Hours	0	0
Uncontrolled Seizure	2	11.1
Status Epilepticus	1	5.6
Total Paralysis	0	0
Stroke	0	0

The NEAR MISS indicators were

- The Near Miss Ratio (MNM Ratio) was 2.7/1000NV.
- Severe Maternal Outcome Ratio (SMOR) was 2.9/1000 NV.
- Near Miss/Mortality Ratio (MNM: Mortality Ratio) was 18 “Near Miss”: 1 Death.
- Mortality Index (Mortality Index) was 5.26%.

Discussion

From the age of 40, we notice more consequences on pregnancy. This can be explained by the fact that these women sometimes suffer from chronic illnesses. These acquired conditions partly explain why pregnancies at older ages are sometimes more complicated [5,6]. In our study, 55.6% of “near miss” cases were aged over 35 years. In the literature this rate was 42.6% according to Norhayati et al in a study conducted in 2016 in Malaysia [7], 22.8% in Suriname in the south of America in 2019 [8], 18.52% in Namibia in the southwest of Africa during the year 2019 [9] and 23.8% in Ethiopia in 2020 [10]. According to the literature in a case-control study conducted in Ethiopia in 2020 [10], women who had at least one pre-existing medical condition had twice the risk of maternal near miss compared to their counterparts. Regarding the present study, 22.2% of near misses had ATCDs which were anemia, hypertension and diabetes. This rate is close to that of a cross-sectional study conducted in Malaysia in 2016 with a percentage of 19.1% [7]. Furthermore, in another cross-sectional study conducted in Namibia and published in 2020, 16.5% of “near misses” were anemic, 1% diabetic and 1.5% hypertensive [9].

For gestational age, the majority, or 66.7%, of “near misses” occurred in the third trimester of gestation. This finding is in agreement with those reported in Indonesia, Pakistan, Tanzania and Turkey [11-14]. Antenatal consultations are the most favorable point of contact for mothers to obtain more information about pregnancy, as well as discussions with health professionals about the danger signs of pregnancy and childbirth. In the literature, several studies carried out in Bolivia, Morocco, Pakistan and Iraq concluded that the lack of ANC was the main factor associated with maternal near misses [12,15-19]. The study of the type of pregnancy is a fundamental element in view of the risks specific to each type of pregnancy. A multiple pregnancy presents more risks of complications for the mother and for the children than a single pregnancy, among these complications, we can cite: premature delivery, MFIU, IUGR, gestational diabetes, anemia, hypertension, the risk of HDD and uterine atony during delivery [20]. Gestational diabetes represents a public health problem worldwide, due to its increasing frequency and its maternal and fetal impact [21].

In our work, 44.5% of “near misses” had given birth by C/S. This rate agrees with studies carried out in Iraq in the city of Baghdad in 2013 with 60% of cesarean sections [22] and in Nigeria, compared to pregnancies without complications during the study period, “near misses” had a higher rate of cesarean sections significantly higher, i.e., 69.4% compared to 32.1% [15,23]. The WHO recommends cesarean section rates of 15% and identifies higher rates as both potentially dangerous and costly to mothers and health systems [24]. In our study among the 18 cases of near misses, the most frequent complications were serious obstetric hemorrhages, i.e., 72.2%. Among

the etiologies of hemorrhages, we can cite postpartum hemorrhage whose rate varies in the literature between 7.2% and 55.3% [7,15,25,27-32]. Ruptured GEU is one of the main causes of obstetric death of young women in several African countries, with mortality being 10 times higher than in industrialized countries.

In Tunisia, GEU was responsible for 1.3% of maternal deaths between 2005-2007 [33]. In our series, 22.2% of “near misses” had bleeding disorders related to a ruptured GEU. Hypertensive disorders during pregnancy are still among the main causes of maternal and perinatal morbidity and mortality [34]. In our series, 5.6% of the “near misses” presented with hypertensive disorders such as SEP. In the literature this rate varies from 2.3 to 46.1 %. [7,9,15,26-29,31,32]. In our study, 94.4% of “near misses” had presented at least one systemic disorder. EDC was the most common with a percentage of 66.7%. In Malaysia, systemic disorders presented 72.2% [7]. Maternal deaths are tragic events in obstetrics [35]. Hemorrhage was the leading cause of maternal death in Africa (33.9%) and Asia (30.8%) while in Latin America and the Caribbean, hypertensive disorders were responsible for 25% of deaths [36, 37].

Some maternal “near miss” indicators have been suggested to assess the quality of care, namely the near miss ratio. In our study this ratio was 2.7/1000 NV, considered slightly low compared to those found in the literature [38,39].

The Severe Maternal Outcome Ratio (SMOR) was 2.9/1000 NV and considered slightly low compared to those found in other studies [29,38]. The maternal mortality ratio reported in our study was relatively high (18 near misses:1 death) but consistent with a study carried out in China which was equal to 23 [40]. Higher ratios indicate lower maternal mortality and better quality of care [2]. The increase in the near-miss-to-mortality ratio over the period reflects an improvement in obstetric care. Therefore, instead of a single estimate, annual estimates can facilitate monitoring and improvement of the quality of care provided.

Conclusion

This retrospective study provided an overview of “near miss” cases. She explained that serious life-threatening maternal morbidity was due to both bleeding disorders and hypertensive disorders. To

counter it, curb it and prevent it from getting worse, a certain number of actions should be taken. Emergency obstetric care requires trained personnel and adequate health care infrastructure, including medications, supplies, and access to reliable and timely transportation. These actions should constitute important elements of the reproductive health program in Tunisia.

Declaration of Competing Interest

The authors have no conflicts of interest relevant to this article.

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Cite this article: Nadia M, Hadhemi A, Kouloud T, Aymen K, Amrou D, et al. (2024). Maternal Near Miss in The Maternity Center of a Central Tunisian University Hospital, *International Journal of Biomedical and Clinical Research*, BioRes Scientia Publishers. 1(5):1-9. DOI: 10.59657/2997-6103.brs.24.026

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Article History: Received: July 25, 2024 | Accepted: September 27, 2024 | Published: October 07, 2024