Evaluation of Hellp Syndrome Management

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Abstract

Introduction: HS (hemolysis, elevated liver enzymes, low platelet count) is an obstetric emergency with significant maternofetal morbidity and mortality. Its diagnosis is difficult, sometimes in a hyperacute manner in the form of a multi-visceral failure syndrome. The prognosis of this pathology depends on the quality of care. Fifty percent of HS-related deaths are due to delayed diagnosis and management. According to the formalized recommendations of common experts in 2009 SFAR / ICNGOF / SFMP / SFNN the improvement of HS care mainly concerns the information and training of the nursing staff and the patient and the organization of networked care. For this reason, a research was conducted in the ORAN EHUO gynéco-obstetrics department for patients with HS whose objective is to evaluate the effect of an intervention aimed at improving the human factor. Complications, maternal mortality, time to care, length of stay and patient satisfaction, and describe the factors associated with death in the HS.

Material: The study was conducted at the gynecological obstetrics department in two phases. A retrospective study during the period from January 2014 to the end of 2015 was performed on patients hospitalized for HS including clinical, biological, socio-epidemiological characteristics, complications, delays and duration of hospitalization, maternal deaths and...
Result: The analysis of the data concluded that there were 165 cases of HS, a frequency which increased significantly between the two phases from 0.35% in the first phase to 1.5% in the second phase. Maternal deaths had significantly decreased from 15.7% to 3.14% between the two phases (P = 0.01) and none of the patients had eclampsia postoperatively (2.6% vs. versus). The per and post op blood pressure imbalance increased from 78% to 7.1% with a (P ≤10^-3). The laparotomy for hemorrhage increased from 15.7 to 1.6%. After intervention on the human factor, perinatal mortality decreased from 31.5% to 16.5%. The duration of maternal hospitalization between delivery and discharge decreased between the two phases of 18 days and 45 hours in the first phase at 10 days and 7 hours (p <10-3). Regarding the satisfaction went from 34.4% to 74, 3%. All maternal deaths were class I as well as a low socioeconomic status, resulting from a late transfer. Complications associated with death include DIC (80%), eclampsia (70%), PAO (50%), hemorrhagic shock (30%), hepatic hemorrhage, and encephalopathy (10%).

Conclusion: The results of the research highlight the positive impact of the human factor namely reduction of maternal mortality, intraoperative complications and duration of hospitalization, satisfaction of the patient. This allows us to conclude that the role of the human factor in improving the care of the HS is unavoidable.

Keywords: Maternal Mortality; HS; Obstetric Emergency; Human Factor; Improved Care

1. Introduction

Described a quarter of a century ago by Weinstein [1, 2] from 29 observations of associated pre-eclampsia (PE); hemolysis (H for hemolysis), hepatic cytolysis (EL for elevation of liver enzymes), thrombocytopenia (LP for low platelet count). These combined observations made it possible to define a suggestive and catchy acronym [3], Hellp Syndrome (HS). This syndrome is characterized by a symptomatic, progressive and etiological polymorphism [4].

The Mississippi classification makes it possible to distinguish 3 classes of Hellp, [5, 6]; Class 1: the most serious, with: a platelet count less than or equal to 50, 000 / ml. ASAT or ALAT ≥70 IU / L. LDH ≥ 600 IU / L. Class 2: Platelet count between 500, 000 / ml and 100, 000 / ml. ASAT or ALAT ≥70 IU / L. LDH ≥ 600 IU / L. Class 3: a rate between 100, 000 / ml and 150, 000 / ml. ASAT or ALAT ≥ 70 IU / L. LDH ≥ 600 IU / L. Hellp syndrome remains a public health problem in Algeria, this syndrome is supported by a heavy maternal morbidity and mortality, all the more severe since the diagnosis is made late [7, 8]. Among these complications; eclampsia, retro placental hematoma, renal failure, subcapsular hematoma of the liver and acute edema of the lung, a syndrome of multi visceral failure.

Maternal mortality reaches 24%, perinatal mortality can go up to 60%. More than half of these deaths could be avoided, with an early diagnosis and an adequate multidisciplinary cost; which requires rigor and vigilance on the part of healthcare personnel involving the human factor and the organization of healthcare. The aim of this work is to improve the price charged for HS by acting on the human factors of the organization of care.
2. Equipment

2.1 Type of study
This is a descriptive, monocentric comparative study of maternal-fetal morbidity and mortality linked to the Hellp Syndrome between two periods; before and after the introduction of a protocol aimed at improving the practice of nursing staff in the management charge of the (HS), carried out at the obstetrics and gynecology service of the Oran EHU. The study was carried out in two periods:

- First retrospective, which was the subject of a preliminary study (N = 38 patients), during the period from "January 2015" to "December 2016". During this period, all the files of patients with Hellp syndrome were studied.
- Then prospective (N = 127 patients) from "January 2017" to "December 2018" by a protocol applied continuously (see the intervention protocol on the human factor). During this period all patients with Hellp Syndrome have been studied.

2.2 Eligibility criteria

2.2.1 Inclusion criteria: Any parturient admitted to the gynecology-obstetrics department of the Oran EHU, either by evacuation from another establishment, or a consultation presenting a (HS). The diagnostic criteria for HS used in our study are those stated by the classification of Mississippi class 2 and 3.

2.2.2 Exclusion criteria: Mississippi class 3. (Patients with HS class 3, are excluded from the study because they have a very low morbidity or even rare mortality). Thrombocytopenia due to another cause (congenital, thrombocytopenic purpura, Hemolytic uremic syndrome, fatty liver). A rise in ASAT and LDH due to another cause.

2.3 Description of the human factors intervention protocol

2.3.1 Purpose of the protocol:
- Early care. Multidisciplinary care.
- Codified medical treatment.

2.3.2 Protocol development: The development of an HS treatment protocol that is accessible in high-risk pregnancy units, in the operating room and in the post-intervention care room.

2.3.3. Line-up: The operation of this intervention concerned personnel made up of:

Medical staff: Resuscitating doctors (assistant master and specialists), obstetrician gynecologists; (lecturers, assistant teachers and specialists), pediatricians, nephrologists, internists, gastrologist, general practitioners, residents, internal and external in medicine.

Para medical staff: Midwives, nurses, technical anesthetists, childcare worker, psychologist, pharmacy manager, maternity coordinator.

2.3.4. Human factor intervention:

The nursing staff:
- at Staff redeployment: Resuscitation anesthesia residents are divided between the post-interventional care room and the high-risk pregnancy unit, the operating room and at the reception room level.
- Staff awareness: The sensitization of the nursing staff concerned the degree of severity of this Syndrome, the importance of the speed of the biological results, the interest of the availability of blood derivatives in emergency and the strict monitoring of the patients during transfers.
• vs. Staff training: The training of nursing staff focused on multidisciplinary and early management, the need for teamwork, and favored the orientation system after childbirth and stabilization. This practical hospital supervision concerned residents, interns, externs, and all paramedical staff, and was applied through seminars, staffs, daily medical visits. d. Information for patients and those around them with more communication and listening.

The organization of care: at. Organization of an adapted close monitoring structure: b. Installation of the emergency kit: It is set up in the post-interventional care room, and in the reception room in obstetric emergencies. The composition of the emergency obstetric kit is structured as follows: Drugs: adrenaline, corticosteroids, atropine, diazepam, intubation tray, intubation tray Materials: catheters, transfusor, urinary catheter, oxytocin, sterile compress box, adhesive plaster.

2.4 Definition of the human factor
2.4.1 Human factors fall into two categories: Human factors linked to individuals (attitudes, states of mind, values of project actors); those linked to relationships between individuals (exchanges, interactions between project actors [7-8]. (Interactions between project actors). The measurement of the human factor is subjective, for this we acted on the human factor by the aforementioned protocol, then we measured the impact of the improvement in the practice of care personnel on fetal maternal morbimortality and the length of hospital stay.

2.5 Factors studied
We first describe the characteristics of the overall population, including all the patients included in the study from "2013 to 2016", then we compared the two populations on the following factors:

2.5.1 Maternelle maternal lethality: The number of cases of HS who died out of the number of women with HS during the study period.

2.5.2 Maternelle HS maternal mortality: It is the number of deaths with HS over the number of live births during the same study period.

2.5.3 Intra intrauterine fetal mortality: It is the death in utero of fetuses occurring between 22 weeks of gestation and before any start of labor.

2.5.4 Précoce Early neonatal mortality: It is the mortality of children between birth and the end of the 7th day of life (mortality occurring during the first week of life).

2.5.5 Pér Perinatal mortality: It is the sum of early neonatal mortality and intrauterine fetal mortality.

2.5.6 Maternelle Perioperative maternal complications: All the complications that occur before, after and after surgery.

• The length of hospital stay.

2.6 Statistical study
The data were coded and entered using SPSS software version 21.0. A descriptive analysis using the calculation of percentages for qualitative variables and means for quantitative variables, was performed, followed by a bivariate analysis with Chi-square and Pearson correlation tests r. The significance threshold was set at p = 0.05.

3. Results
In total, a sample of 165 parturients admitted for (HS):
of which 121 patients are evacuated from maternity wards of other peripheral wilayas. The average age in our patients is $32 \pm 6.33$, [extremes between 19 and 45], with a median of 32. We notice a predominance of multiparity in 45% of the cases, with an average parity of $2 \pm 1$ children. Clinical signs were present in 159 patients (96.3%). these signs are mainly represented by epigastric pain 68% of cases, vomiting in 67%, headache in 50% of cases, mucocutaneous jaundice in 32.7% of cases, oliguria in 32.1% of cases, edema of the Lower limbs in 73.3% of patients, dehydration in 21.2%, ascites in 16.4% of cases, and bruising in 9.7% of our patients. As for the impact of improving the practice of care personnel; We compared the two populations before and after the application of the protocol, with regard to general, clinical and biological parameters (see Table 1). In the light of the different results, we can establish that the two populations are comparable.

Maternal lethality decreased statistically significantly ($p = 0.01$). Ranging from 6 deaths in 38 cases (15.6%) in the first period to 4 deaths in 127 cases of (HS), (3.14%). during the second period. The HS maternal mortality rate decreased between the two periods from 6 deaths out of 10, 660 live births, or 0.56 %, in the first period to 4 deaths out of 9, 623 live births, in the second period, or 0.41 %. There was no significant difference in maternal morbidity before and after application of the protocol (see Table 2). As for intraoperative complications. After application of the protocol, there were no cases of postpartum eclampsia (2.6% / versus 0 after). We observed a marked improvement in hemodynamics with a P $\leq 10^{-3}$, and the use of laparotomy after postpartum hemorrhage decreased from “15.7% to 1.6%” with a ($p = 10^{-3}$), as did the rupture of the subcapsular hematoma of the liver slightly decreased (see Table 3). Neonatal mortality decreased from 36.8% to 7.1% significantly ($p < 10^{-3}$.). There is no significant difference in intrauterine fetal mortality (see Table 4). The average length of hospital stay is $12 \pm 5.12$, the length of maternal hospital stay between delivery and discharge decreased statistically significantly ($p < 10^{-3}$) from 19 days to 10 days.

Table 1:

| variable       | AVANT (38) | APRES (127) | P   |
|----------------|------------|-------------|-----|
| Age            | 32, 82     | 32, 47      | 0.22|
| Parité         | 3 ± 2      | 3 ± 2       | =   |
| Formes du HS   | complet    | 47, 4       | 35, 4| 1.18|
|                | incomplet  | 52, 6       | 64, 6|
| Classes du HS  | Classe I   | 55, 3       | 50, 4| 0.59|
|                | Classe II  | 44, 7       | 49, 6|
| Types du HS    | Pré partum | 92, 1       | 78, 7| 0.06|
|                | Post partum| 7, 9        | 21, 3|

Table 1: Study of the comparability of the two populations with regard to the general parameters.
### Table 2: Comparison of Maternal Complications

| Condition                              | Before (38) | After (127) | P   |
|----------------------------------------|-------------|-------------|-----|
|                                        | Nbr de cas  | %           | Nbr de cas | % |
| Pre-partum eclampsia                   | 9           | 23, 68      | 29         | 22, 83    | 0, 91 |
| Acute Lung Edema                       | 3           | 7, 9        | 7          | 5, 51     | 0, 87 |
| Sub-Capsular Hematoma of the Liver     | 3           | 7, 9        | 8          | 6, 3      | 0, 98 |
| Hrp Retro Placentary Hematoma          | 5           | 13, 15      | 15         | 11, 81    | 0, 95 |
| Disseminated Intra Vascular Coagulation| 5           | 13, 15      | 12         | 9, 44     | 0, 72 |
| Encephalopathy                         | 1           | 2, 63       | 2          | 1, 57     | 0, 79 |
| Renal Failure                          | 13          | 34, 2       | 50         | 39, 4     | 0, 69 |

### Table 3: Comparison between the two periods of maternal perioperative complications.

| Condition                              | 1ère période (N=38) | 2ème période (N=127) | P   |
|----------------------------------------|---------------------|----------------------|-----|
|                                        | Nombre de cas %     | Nombre de cas %     |     |
| Sub-Capsular Hematoma of the Liver     | 6                   | 15, 7                | 2   | 1, 6 | 0, 001 |
| Laparotomy after postpartum hemorrhage| 3                   | 7, 9                 | 2   | 1, 6 | 0, 14 |
| Failure of an                          |                      |                      |     |      |       |
| Perioperative tension imbalance        | 30                  | 78, 9                | 9   | 7, 1 | <0, 0001 |

### Table 4: Comparison of in utero, neonatal, and perinatal mortality between the two.

| Condition                              | AVANT (38) | APRES (127) | P   |
|----------------------------------------|------------|-------------|-----|
|                                        | Nombre de cas % | Nombre de cas % |     |
| Neonatal mortality                     | 14         | 36, 8       | 9   | 7, 1 | <0, 0001 |
| in utero mortality                     | 10         | 26, 3       | 33  | 26, 0 | 0, 86 |
| périnatale mortality                   | 12         | 31, 5       | 21  | 16, 5 | 0, 07 |
| new born alive                         | 14         | 36, 8       | 85  | 66, 9 | 0, 001 |

### 4. Discussion

The results thus obtained could be compared with those of the literature dealing with the improvement of the practices of the nursing staff, where tests and studies have multiplied in recent years. Our study is particularly characterized by a decrease in mortality, maternal lethality and neonatal mortality between the two periods, while maternal morbidity has not changed. Thus, in the study by Menzies et al, who found a reduction in maternal risk significantly but the neonatal outcome did not change, [8]. The study by Mbola et al, found a significant decrease in mortality, lethality of maternal morbidity and neonatal mortality between the two periods (p> 10-6) [9]. Maternal mortality: In our series, the mortality rate was significantly lower (3.14%) after the initiation of the treatment protocol. Several similar results have been reported in the literature. Thus, in the study by Weinstein [10] this rate
was 3.5% [10], 5.8% in the study by Benletaifa [12] and 4% in the study by Manouni [13] (see Table 5).

4.1 Maternal morbidity
In our series Despite the improvement in the practice of nursing staff, there was no change in complications of (HS) between the two periods, this is attributed to the late diagnosis of HS, because most of these patients are transferred to the stage of complications.

4.2 Intraoperative maternal complications
In our series after application of the protocol, the use of laparotomy after postpartum hemorrhage was significantly lower at 1.6%. In the literature, we find several similar studies. Thus, in the study of Sibai et al, The use of laparotomy was 2% [11], and 1.8% in the study of vitalis et al [9]. This result is probably due to the real existence of the involvement of all care staff.

4.3 Perinatal mortality, Neonatal mortality
In the literature, we find several studies [6, 15], where we note fluctuations in perinatal mortality between 17 to 60%. And substantially identical to those recorded in our series (31.5%, 16.5%). In our series, neonatal mortality was significantly lower after application of the protocol, we find several similar studies, including the perinatal mortality rate ranges from 6 to 37% [1, 2, 17, 18]. This variation in mortalities between the two periods can have several explanations:
- Lack of information and awareness on the management of hellp syndrome
- The lack of visibility of the real existence of the practice of neonatal resuscitation
- The lack of involvement of the paramedical staff (childcare worker, nursing assistant) in monitoring the newborn in the neonatal unit.

4.4 Intra utero fetal mortality
Our study is particularly characterized by an intra uterine fetal mortality of 26%. More superior to the figures reported in the study by Sibai et al, which was 19% [11], and closer to the study by Manouni et al, which was 31% [8]. This difference could be explained by the late transfer of patients, whose diagnosis of (HS) was made at the stage of intrauterine fetal death, and the absence of prenatal follow-up.

4.5 Duration of hospitalization
Our study is particularly characterized by a duration of hospitalization during the first period, far superior to the figures reported in the literature. In the Hanibilal study, for example, the average length of hospital stay was 10.35 days [14], and Vitalis 6.17 days [15]. These results are close to the results of the second period. This is probably due to the patient referral system proposed in the protocol.

| Authors                  | country       | year  | Number of patients | Maternal death (%) |
|--------------------------|---------------|-------|--------------------|-------------------|
| Weinstein [10]           | Amérique      | 1985  | 57                 | 3.5               |
| Sibai [11]               | Amérique      | 1993  | 442                | 1, 1              |
| Benletaifa [12]          | Tunis         | 2000  | 17                 | 5, 8              |
| Mamouni[ 13]             | Maghreb       | 2012  | 61                 | 4                 |
| Hani bilal [14]          | Algérie       | 2016  | 25                 | 8                 |
| Our study after the protocol application | Algérie | 2016  | 127                | 3, 14             |

Table 5: Frequency of maternal mortality according to the authors.
4.6 Limit of the study
Our study has a number of limitations. Indeed, we encountered difficulties in collecting data retrospectively which can present an information bias.

5. Conclusion
This study highlighted the benefits of human factors in improving the management of HS, these factors include awareness, continuing education of caregivers, patient information and organization of care. This study demonstrated the reliability of appropriate and multidisciplinary early management, the gain of which was marked by the reduction in maternal and perinatal mortality, the reduction in intraoperative complications.
And the reduction of the stay at the gyneco-obstetric service. This should probably have an impact on the cost of patient care. The line of work to improve this care must be centered on human factors and meet objectives such as developing neonatal resuscitation, Worked so that the management of obstetric emergencies is consensual and multidisciplinary.

Conflict of Interest
No conflict of interest

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