Severe Preeclampsia: Epidemiological, Diagnostic, Therapeutic and Prognostic Aspects at Aristide Le Dantec Hospital

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ABSTRACT

Introduction: Preeclampsia, defined as the association of arterial hypertension and proteinuria during gravidopuerperium, is a complex pathology specific to the human species and to gestation. It is responsible for high maternal and perinatal morbidity and mortality, particularly in developing countries such as Senegal. We therefore conducted a retrospective, descriptive and analytical study at the level III Maternity unit of Aristide Le Dantec Hospital during the period from 1 July 2018 to 31 December 2019. The general objective of this study was to determine the prevalence and epidemiological profile of patients but also to assess the management and prognosis of severe preeclampsia.

Results: A total of 192 patients with severe preeclampsia were identified, representing a prevalence rate of 6.3%. The majority (69.8%) of patients were from the Dakar suburbs. The mean age of the patients was 28.3 years. The mean gestational age was 1.6 and the mean parity 1.3. Fifty-two patients (27%) had at least one pathological obstetrical history. A cardiovascular risk factor was found in 66 (34.4%) of the patients. Personal medical history was dominated by obesity (23.4%). Medical evacuation (91.2%) was the most frequent mode of admission. Parturients had attended fewer than 4 antenatal consultations in 58.5% of cases. The average gestational age was 35.7 weeks of amenorrhoea. Pregnancy was carried to term in 50.8% of patients. Functional signs were dominated by headaches (35.4%). SAP was >160 mmHg in 76% of cases and DBP >110 mmHg in 49%. Proteinuria >3 crosses of albumin was found in 68.8% of cases. Complications were dominated by HRP (12.5%) and MFIU (12.5%). Calcium antagonists (80.7%) were the main antihypertensive agents used and magnesium sulphate was administered in 54.7% of patients. Antenatal corticosteroids were used in 22% of pregnant women. Caesarean section was the most frequent method of delivery, accounting for 67.2% of cases. The average hospital stay was 6.7 days. We recorded 3 cases of maternal death, i.e. a case-fatality rate of 1.6% and perinatal mortality of 155.8%.

Conclusion: Severe preeclampsia remains a major public health problem in developing countries. Reducing maternal and foetal morbidity and mortality will be achieved by raising awareness among parturients of the value of antenatal consultations and by adopting policies for access to quality care in terms of monitoring and management of pregnancy and childbirth.

Keywords

Severe preeclampsia, Maternal mortality, Neonatal morbidity and mortality, Prognosis, Aristide Le Dantec Hospital.

Introduction

Preeclampsia, defined as the association of arterial hypertension and proteinuria during gravidopuerperium, is a complex pathology specific to the human species and to gestation [1,2]. It manifests itself as a systemic disorder characterised by placental and maternal vascular dysfunction, responsible for high maternal and perinatal morbidity and mortality. It is therefore a major public health problem, particularly in developing countries [1]. Maternal and foetal prognosis depends essentially on early diagnosis and appropriate management by a multidisciplinary team. To date, the main treatment for preeclampsia remains delivery and removal of the placenta [3]. Because of its complexity and prognosis, preeclampsia has been the subject of much research worldwide, and Senegal is not an exception. It is in this context that this work was initiated at the Maternity Unit of Aristide Le Dantec Hospital, which is a referal hospital. The general aim of the study was to determine the prevalence and epidemiological profile of patients and also to assess the management and prognosis of severe preeclampsia.

Methodology

This was a retrospective, descriptive and analytical study conducted during the period from 1 July 2018 to 31 December 2019, i.e. a duration of 18 months. The level 3 maternity unit of Aristide Le Dantec Hospital (HALD) served as the setting for our study.

Our study population consisted of pregnant women admitted to the department during the study period. Pregnant women admitted for severe preeclampsia with a gestational age greater than 22 gestational weeks and who had given birth in the department were included in this study. Patients admitted to the department after delivery and those who had undergone a secondary in utero transfer were not included in our study.

The sociodemographic, clinical and paraclinical characteristics, and the maternal and foetal therapeutic and prognostic data collected from the patients' files and the operating theatre registers were studied.

Results were entered using Epi-info and Excel software. Statistical tests (fisher, chi 2) and Odds Ratio calculations were used to analyse the data.

Results
Descriptive results

Our study shows a prevalence of severe preeclampsia of 6.3%, i.e. 192 cases out of a total of 3031 deliveries in the period from 1 July 2018 to 31 December 2019 inclusive. The mean age of the patients was 28.3 years with extremes of 16 and 46 years. Approximately one patient in two (52.6%) was aged between 24 and 34 years.

The epidemiological profile was that of a young, primigravida (40.6%), primiparous (46.9%) coming from Dakar's suburbs (69.8%) who had been evacuated (91.2%) to our referral hospital for better management of her severe preeclampsia.

Nearly three out of ten patients had at least one pathological obstetrical antecedent (29.7%) or a cardiovascular risk factor (34.4%), namely hypertension, diabetes or obesity, as shown in Table 1.

Table 1: Distribution of patients according to medical and obstetric history.

Obstetrical history	Number (n)	Frequency (%)
Miscarriage	37	19,3
Fetal death in utero	9	4,7
Preeclampsia	7	3,6
Retroplacental haematoma	2	1
Eclampsia	4	2,1
No pathological history	135	70,3
Medical history	Nombre (n)	Fréquence (%)
Obesity	45	23,4
Chronique HBP	27	14,1
Sickle cell disease	5	2,6
Diabetes	2	1
None	126	65,6

The pregnancy was poorly monitored for most patients (58.5%). However, arterial hypertension was detected during antenatal consultations in 16.7% of cases. On admission, the mean gestational age was 35.7 gestational weeks and the diagnosis of severe preeclampsia was made in the third trimester of pregnancy (96.3%), monofetal (96.4%) in almost all patients, as shown in Figure 1.

Figure 1: Distribution of patients according to gestational age.
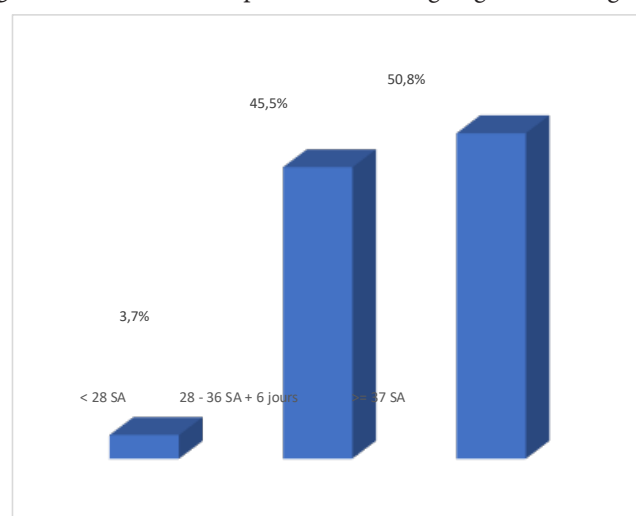
More than half the patients (55.2%) had functional signs: neurosensory signs (38.5%), epigastralgia (10.4%) or metrorrhagia (6.3%).

The initial physical examination revealed an average BP of 167/105 mmHg, with extremes of 110/40 and 240/150 mmHg. Table 2 shows the distribution of patients according to their initial blood pressure.

Table 2: Distribution of patients according to blood pressure value.

Blood pressure (mmHg)	Number (n = 192)	Frequency (%)
Systolic arterial Pressure		
< 160	46	24
160-180	113	58,8
>180	33	17,2
Diastolic Arterial Pressure		
< 110	98	51
110-120	79	41,2
>120	15	7,8

Two out of three patients (68.8%) had massive proteinuria (>3 crosses of albumin). Oedema was present in 47.6% of cases. Uterine height ranged from 16 to 47 cm, with an average of 30 cm. The majority of patients had a progressive pregnancy (88%) and had gone into labour (82.3%). Biology revealed abnormalities of varying severity in some patients, as shown in Table 3.

Table 3: Distribution of patients according to severity of biological signs.

	Number n = 192	Frequency (%)
Anaemia (haemoglobin < 11g/dl)		
Yes	68	35,4
No	117	61
Unspecified	7	3,6
Thrombocytopenia (≥100000/ mm³)		
Yes	18	9,4
No	167	87
Unspecified	7	3,6
Massive proteinuria (≥ 3 +++)		
Yes	132	68,8
No	60	31,2
Elevated transaminases (≥ 2N)		
Yes	40	20,8
No	101	52,6
Unspecified	51	26,6
Elevated creatinine (≥ 13mg/l)		
Yes	9	4,7
No	136	70,8
Unspecified	47	24,5
Hyperuricemia (≥ 60mg/l)		
Yes	7	3,6
No	11	5,8
Unspecified	174	90,6

Obstetrical ultrasound was only performed in 42.7% of patients. It revealed quantitative abnormalities of the amniotic fluid in 7.8% of cases (moderate oligoamnios 40%; severe oligoamnios 40% and anamnios 20%); 13.5% IUGR. Doppler velocimetry of the umbilical artery revealed a high resistance index (RI) in 7.3% of cases, with a mean value of 0.8.

One in three patients (31.8%) had a complication associated with preeclampsia, as shown in Table 4.

Table 4: Distribution of patients according to type of complication.

Complications		Number (n = 192)	Frequency (%)
Eclampsia		18	9,4
Retroplacental haematoma:	Grade 1	5	2,6
	Grade 2	9	4,7
	Grade 3a	6	3,1
	Grade 3b	4	2,1
Fetal death in utero		24	12,5
HELLP Syndrome		11	5,7
Acute lung oedema		2	1
None		131	68,2

Medical management consisted of antihypertensive treatment with calcium channel blockers (80.7%) in combination with magnesium sulphate in half of cases (55.5%). Lung maturation was performed in 22% of pregnant women. Blood transfusion was necessary in 7.3% of cases. Fourteen patients (7.3%) had spent an average of 3.2 days in the HALD intensive care unit, with extremes of 2 and 5 days.

As regards obstetric management, 67.2% of patients had given birth by caesarean section, including one after failure of artificial labour induction. The remaining parturients had given birth by vaginal delivery (spontaneous delivery: 31.8%; vacuum extraction: 1%) immediately or following artificial induction of labour (12.57%) within an average of 20 hours. The maternal prognosis was good, apart from the three cases of death recorded, representing a case-fatality rate of 1.6%. The causes of death identified in the patients were HELLP syndrome (2 cases) and acute lung oedema (1 case).

In our study, we recorded 199 births (7 cases of twin pregnancy) with 87.9% live births and 12.1% stillbirths. The perinatal mortality rate was 155.8‰. Neonatal asphyxia was found in 10.9% of newborns. Half of the newborns (51%) were at term with an average weight of 2268 grams (extremes of 510 and 4590 grams). Hypotrophy was noted in 13.1% of newborns.

Analytical results

Analysis of our results shows that there was no significant association between patient age, history of chronic hypertension and the occurrence of complications. However, certaines complications of severe preeclampsia were correlated with the presence of other risk factors: parity; quality of antenatal care; pathological obstetrical history; BP > 160/110 mmHg. Parity > 2 (p-value = 0.011) and BP > 160/110 mmHg (p-value = 0.04) were associated with the risk of HELLP syndrome. There was a significant association between the occurrence of RPH and poor antenatal follow-up (ANC < 4; p-value = 0.009) or a BP > 160/110 mmHg (p-value = 0.02). In the case of a pathological obstetric history (p-value = 0.028) or a number of antenatal consultations (ANC) of less than 4 (p = 0.0005), there was a higher risk of IUGR.

Analysis of the data also showed that perinatal outcome was closely correlated with the quality of antenatal follow-up (number of ANC) and the route of delivery, with p-values of 0.00005 and

0.0001 respectively. Perinatal mortality was higher in the group of women with less than 4 ANC and/or vaginal delivery.

Discussion

Socio-Demographic Characteristics

During our study period, preeclampsia affected 192 patients, i.e. a frequency of 6.3%. The frequency of preeclampsia varies according to the authors, with the highest rates reported in sub-Saharan Africa. The studies of Hind [9] in Morocco, Mayi-Tsonga [11] in Gabon and Tchaou [12] in Benin revealed low frequencies of 0.4%, 4.1% and 4.7% respectively. In developed countries such as France, the frequencies were around 1 to 2% [4]. Ananth [10] in the USA found a prevalence of 1.4%.

Our rate is comparable to those reported by Arnolu [5] in Nigeria (7.6%) and Samake [13] in Mali (7.8%). Sarr [6] (Senegal), Guerrier [8] (Nigeria) and Harioly [7] (Madagascar) reported much higher rates of 15.7%, 16% and 23% respectively.

This high incidence of severe preeclampsia in our serie, as in other African countries, could be explained by several reasons:
- The poor quality of antenatal care, which is reflected in poor screening for preeclampsia;
- The status of our department as a referral centre and the limited availability of SONUCs in peripheral health centres.

The majority of our patients (67.54%) came from the suburbs of Dakar. This proportion is close to that found in Danmadji's [14] and Sène's [15] studies, carried out in other hospital of Dakar. This high rate could be explained by the fact that there is only one functional level 3 hospital in the suburbs and that Aristide Le Dantec Hospital is often the facility of choice for inter-hospital referral.

The average age of our patients was 28.3 years. Our results were similar to those of Danmadji [14] in Senegal, Traoré [16] in Mali and Harioly [7] in Madagascar, who found 28.1, 26.8 and 28.3 years respectively. On the other hand, Koual [17] in France reported a higher mean age of 31.9 years. This advanced age of onset of severe preeclampsia could be explained by the fact that in France, most women marry late in life [18].

However, severe preeclampsia affected younger women in the series by Samaké [13] in Mali (mean age 17.5 years, with 47.7% of women aged between 15 and 19 years) and Guerrier [8] in Nigeria, who reported a mean age of 21 years, with 95% of patients aged between 21 and 23 years.

In the majority of studies, severe preeclampsia appeared more frequently in the 21-34 age group, a period of life when reproductive activity is higher. The latter is a determining factor, as it generally corresponds to the age of the first pregnancy, with maternal immune intolerance playing a role in the genesis of preeclampsia [6,19]. The frequency of severe preeclampsia was higher in primigravida women [20], who represented 40.6% of our sample, in accordance with the literature. Cissé [7], Sarr [6] and Hasnaoui [22] found respectively 50.3%, 43.6% and 40.9% of primigravida women with PES.

Antecedents

Like Danmadji [14] (20.1%), abortion was the most common obstetrical antecedent in our study (19.3%). However, there was no statistically significant association between this history and the occurrence of severe preeclampsia. In our series, the majority of patients (65.6%) had no known medical history. This was also the case in the series by Kartout [23] and Samaké [13] in which respectively 95.2% and 77.7% of patients had no particular medical history [13,23].

Obesity was the main risk factor for preeclampsia in our study, accounting for 23.4% of cases, followed by chronic hypertension (14.1%). Sène [15], Guerrier [8] and Koual [17] had made the same observation (obesity 34%, 31% and 46%; chronic hypertension 10.7%, 26% and 18%). Collange [24] also identified obesity as a factor associated with the onset of severe preeclampsia. Merveil [25] reported that a personal or family history of hypertension was significantly associated with an increased risk of severe preeclampsia.

On the other hand, Danmadji [14] in his study hypothesised that a history of chronic hypertension may have a" protective effect" against complicated forms of preeclampsia, namely eclampsia, RPH, HELLP syndrome and fetal death in utero. Analysis of our results does not allow us to support this hypothesis.

Diagnostic aspects

The mean gestational age in our study was 35.7 gestation's week with 50.8% of pregnancies at term. In the study by Sène [15], the mean gestational age was 36 amenorrhea weeks (AW), but a higher proportion of patients (85.5%) were admitted at a gestational age > 35 AW. These results confirm that severe preeclampsia is usually diagnosed in the third trimester of pregnancy.

All our pregnant women had had their blood pressure measured during antenatal follow-up and only 16.7% had blood pressure values above the normal range. In contrast, Danmadji [14] reported that 30.5% of patients were found to have hypertension during antenatal care. This shows the importance of early detection of preeclampsia during antenatal care by measuring blood pressure adequately at each ANC in order to initiate appropriate management quickly and avoid serious complications.

In our study, functional signs were dominated by headache (35.4%), followed by epigastric pain (10.4%), visual blur (3.1%) and dyspnea (2.6%). In the series by Hasnaoui [22] and Kartout [23], almost all patients presented with headaches, i.e. 70% and 96.6% of cases respectively. For Samaké [13], the combination of epigastric pain, nausea, vomiting and headache was at the forefront of the clinical situation (54.62%).

In our study, SAP was greater than 160 mmHg in 76% of cases and DBP greater than 110 mmHg in 49% of cases. These high blood pressure figures were also noted in numerous series, including those by Sarr [6] in Senegal, Samaké [13] in Mali and Moujahid [26] in Morocco. High blood pressure is one of the main symptoms of severe preeclampsia. It is in itself a serious factor, independently of the other clinical signs.

Proteinuria was greater than or equal to 3 crosses on urine dipstick in 68.8% of cases. In the studies by Danmadji [14], Koual [17] and Kartout [23], respectively 76.8%, 66% and 42.5% of patients had massive urine dipstick proteinuria greater than or equal to 3 crosses.

In our series, 31.8% of patients had one complication (76.66%) or several complications (23.33%). These were, in order of frequency, RPH (12.5%), MFIU (12.5%), eclampsia (9.4%), HELLP syndrome (5.7%) and OAP (1%). The same complications have been described in the literature with varying incidences depending on the author. In his series, Tchaou [12] reported 31.1% seizures, 3.8% RPH, 2.9% OAP, 1.9% renal insufficiency and 0.9% HELLP syndrome. Koual [17] reported 15% HELLP syndrome and only 1% RPH.

Therapeutic aspects
In our study, antihypertensive treatment (calcium channel blockers) was administered in 80.7% of patients. This is comparable to the results of Kartout [23] (96.4%) and Sène [15] (87.5%). In contrast, in Hasnaoui's serie [22], only 38.4% of patients had received antihypertensive treatment. The choice of calcium antagonists, essentially nicardipine, is linked to their efficacy and safety, as demonstrated in Mpika's study [27].

As in the study by Sène [15], almost half the patients had received magnesium sulphate, unlike the study by Traoré [16], which found a slightly lower rate of 44%. The Magpie's trial demonstrated the value of preventing and treating eclampsia with magnesium sulphate [28].

Lung maturation was achieved in 22% of patients, a higher rate than that reported by Danmadji [14] (16.7%). The low rate can be explained by the fact that the gestational age was greater than 34 weeks' gestation on admission in the majority of our patients. In our study, only 7.3% of patients were admitted to an intensive care unit. This was also the case in the Tchaou series [12] (7.8%), in contrast to Danmadji [14] and Sène [15] who reported 35.9% and 33.1% respectively of transfers to intensive care. These low rates could be explained by insufficient capacity in the intensive care units of our hospitals and by the fact that most maternity hospitals do not have their own maternal intensive care unit.

Regarding obstetric management, fetal evacuation was performed by caesarean section in 67.2% of cases and 12.57% of patients had undergone artificial induction of labour. Fetal evacuation was also achieved by caesarean section in the series by Sarr [6], Mbombo [29] and Diakité [30] in 81.9 and 85.1 and 71.4% of cases respectively. On the other hand, in the series by Lèye [31],

the majority of patients (64%) had given birth vaginally. The high caesarean section rate and the relatively short time between admission and delivery were essentially due to the fact that severe pre-eclampsia is a medical and obstetric emergency whose only real treatment is uterine evacuation [14,32]. In our study, caesarean section was associated with lower perinatal mortality. Merveil [25] demonstrated in his study that rapid evacuation of the uterus is a factor with a better prognosis.

Prognostic Aspects
In our study, three maternal deaths were recorded, giving a case fatality rate of 1.6%. This result is nevertheless high if we refer to the quality indicators for emergency obstetric and neonatal care of the Senegalese Ministry of Health, for which the case fatality rate by complication must be less than 1% [33]. In Africa, the maternal mortality rate from severe preeclampsia remains high [12,23,34]. In the studies carried out by Zephir [35] in France, no maternal deaths were reported. This proves that maternal mortality due to severe preeclampsia is avoidable.

Fetal prognosis depends on the degree of prematurity, whether or not there is IUGR, and the quality of management of neonatal complications. Fetal losses are significant in preeclampsia. This poor foetal prognosis is the hallmark of severe forms of preeclampsia, described in most published series in Africa and Europe [16,21,23,35-36]. In our study perinatal mortality was 155.8‰ with 77.4% MFIU. This perinatal mortality rate was much lower than those found in previous studies conducted in Senegal (Danmadji [14] 254.5‰ and Sène [15] 200‰). This testifies to an improvement in screening, diagnosis but also management of severe preeclampsia in our country.

Conclusion
Preeclampsia, a major public health problem, is a major cause of maternal and perinatal mortality and morbidity in Sub-Saharan Africa and Senegal in particular. Its maternal and foetal prognosis remains bleak in our developing countries due to the low level of income of parturients, the absence of regular prenatal monitoring, delays in consultation, the seriousness of certaines complications, non-medical transfer and inadequate technical facilities for early and appropriate treatment. Prevention must be a priority in our countries in order to reduce its incidence and maternal and foetal morbidity and mortality by raising awareness among parturients and adopting policies to provide access to quality care in terms of screening high-risk pregnancies, and monitoring and managing pregnancy and childbirth.

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