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Postpartum Hemorrhage: Epidemiology and Management Issues in a Context of Limited Resources: Case of the Laquintinie Hospital in Douala, Cameroon

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Abstract

Introduction: Primary postpartum hemorrhage is blood loss greater than or equal to 500 ml occurring within 24 hours following delivery regardless of the route of delivery. It is the leading cause of maternal death worldwide. **Objective:** This work was to determine the epidemiological, clinical and therapeutic aspects of postpartum hemorrhage at Laquintinie Hospital in Douala. **Methodology:** We conducted a descriptive cross-sectional study for 5 months (December 1, 2017, to April 30, 2018). Our study population consisted of all external and internal births who presented with hemorrhage in the immediate or late postpartum period. The statistical analysis was carried out using the epi info software version 3.5.4; the chi square test and a 95% confidence interval were used. **Results:** The frequency of postpartum hemorrhage was 10.2%. The average age of the patients was 28.6 ± 5.7. They were mainly housewives (49.1%), married (45.5%), with secondary education (60.7%), residing in urban areas (97.3%) and primiparous or pauciparous (33.9%). Anemia in pregnancy was found in 52.7% of cases. The deliveries were at term (84.8%), cases by vaginal route in 83.9% of cases. In 37.5% of cases, utero tonics were used during labor.

Most patients were evacuated (83.2%). Primary postpartum hemorrhage (86.6%) was most frequently encountered and uterine atony represented the main etiology (36.6% of cases). In 50.9% of cases, blood loss was unclear. Surgical treatment was required in 34.8% of cases. Anemia was the main complication observed with a maternal mortality rate of 3.5%. **Conclusion:** Postpartum hemorrhage is common at Laquintinie Hospital in Douala. Uterine atony is the main etiology of hemorrhages. Anemia represents the most common complication.

Keywords

Hemorrhage, Postpartum, Atony, Anemia, Maternal Mortality

1. Introduction

Postpartum hemorrhage (PPH) is defined as blood loss of at least 500 ml occurring within 24 hours of delivery. It is the main cause of nearly one in four maternal deaths worldwide [1].

Postpartum hemorrhage (PPH) is the most common complication of childbirth and therefore a common practice issue in obstetrics [2]. Many techniques and protocols are available. They are scientifically validated for the prevention, diagnosis and treatment of postpartum hemorrhage [1] [3]. However, these international standards are sometimes not adapted to sub-Saharan Africa due not only to the insufficiency of the technical platform but also to the numerous organizational problems of the health system. In 2015, according to the World Health Organization (WHO), around 830 women died every day worldwide [2]. The majority of maternal deaths are caused by severe hemorrhage (27%) or infections (11%) during childbirth, by high blood pressure during pregnancy (14%) or complications during an abortion carried out in poor conditions (8%) [4]. Most deaths attributable to postpartum hemorrhage occur during the first 24 hours after delivery [1]. Postpartum hemorrhage includes delivery hemorrhage, originating from the placental insertion zone, and hemorrhage from the genital tract [2]. Despite marked progress in the management of postpartum hemorrhage, it remains an important factor in maternal morbidity and mortality, both in developing and developed countries [3]. The World Health Organization estimates that 150,000 people die annually in the Third World from postpartum hemorrhage [1].

In France, it represents 30% of the causes of direct obstetric deaths. In 80% of cases, death is considered avoidable and can be attributed to a diagnostic delay, an underestimation of the severity of the hemorrhage or inadequate medical and surgical treatment [5].

In Cameroon, according to the 2015 national Millennium Development Goals (MDG) report, the maternal mortality rate increased from 669 deaths per 100,000 live births in 2004 to 782 deaths per 100,000 live births in 2011 [6]. In 2013, a study conducted in Cameroon by Fomulu *et al.* showed that 56.4% of maternal deaths were linked to postpartum hemorrhage. According to the same data source, this

high rate could be attributed to patients, the community, the medical team and the technical platform made available to them [7]. Although some studies have been carried out in Africa on postpartum hemorrhage in several maternity hospitals [8] [9], few data specific to our environment concerning the epidemiological, clinical, therapeutic and evolutionary aspects of postpartum hemorrhage are available. Therefore, our work has the interest of establishing an epidemiological profile, of evaluating the diagnostic, therapeutic and prognostic criteria of births admitted to the maternity ward for postpartum hemorrhage at the Laquintinie Hospital in Douala.

2. Type of Study

We conducted a descriptive cross-sectional observational study with prospective data collection.

3. Study Location and Study Period

The study took place in the maternity ward of Laquintinie Hospital in Douala over a period of 05 (five) months from December 1, 2017, to April 30, 2018.

4. Study Population

The study focused on all births in the obstetrics department who presented with postpartum hemorrhage or received during the immediate or late postpartum period for postpartum hemorrhage during our study period.

5. Sampling

5.1. Sample Type

Our sampling was consecutive and non-probabilistic.

5.2. Selection Criteria

- Inclusion criteria:

Any childbirth whose care was provided in the obstetrics department for immediate or late postpartum hemorrhage from December 1, 2017, to April 30, 2018, whether or not the delivery took place in the department.

- Exclusion criteria:

-Patients presenting other types of hemorrhage outside the genital area, hemorrhages during pregnancy, post-abortion hemorrhage.

5.3. Sample Size

We used the Lorenz formula to determine the minimum sample size

$$N = [T2 \times p\,(1 - p)]/m^2$$

where:

N = Minimum sample required

T = 95% confidence interval

P = prevalence of the pathology, *i.e.* 4.1% (Cameroon)

m = margin of error at 5% (standard value 0.05).

Digital application:

$$N = [1.96 \times 1.96 \times 0.041\ (1 - 0.041)]/0.05 \times 0.05 = 60$$

Hence the minimum required sample size of 60 births.

5.4. Procedure

Administrative arrangements

The preliminaries of the study consisted of the drafting of the research protocol, the request for authorization to conduct the study at the Laquintinie Hospital in Douala and the request for ethical clearance.

Data collection

The data was collected on pre-established and pre-tested forms using information collected in the delivery room registers, operating reports, medical files of those who gave birth, the partogram, and after careful clinical examination of those who gave birth admitted to the maternity ward for postpartum hemorrhage.

We previously requested the informed consent of every woman after explanation of the purpose of the study, and assurance of the preservation of anonymity and confidentiality.

5.5. Variables

The study variables were:

Sociodemographic: Age in years, profession, place of residence, level of education, marital status.

Clinical:

- History:

-Gynecological and obstetrical: gestation, parity, history of current pregnancy, voluntary termination of pregnancy, history of postpartum hemorrhage, childbirth and postpartum.

-Surgical: cesarean section, myomectomy

-Medical: high blood pressure, diabetes, HIV

-Lifestyle: consumption of alcohol, kaolin, herbal medicine

- Clinical data: origin, general condition, vital parameters, state of the conjunctiva, quantity of blood lost, diagnosis, etiologies
- Additional tests: complete blood count (hemoglobin level).

Therapeutics

- General measures: oxygen therapy, venous route.
- Medical treatment: drip (crystalloids, colloids), blood transfusion, antibiotic therapy/antibioprophylaxis, utero tonics, tranexamic acid.
- Obstetric treatment: uterine revision, artificial delivery + uterine revision, uterine massage, bladder catheterization.
- Surgical treatment: laparotomy for vascular ligation, hemostatic hysterectomy,

hysterorrhaphy, soft tissue sutures, arterial embolization, manual intrauterine curettage/aspiration, type of anesthesia used, technique used.

Complications

- Intraoperative or hospitalization complications: hemorrhagic shock, anemia, acute renal failure, nosocomial infection, death.
- Post-operative or post-hospitalization complications: anemia, hemorrhagic shock, acute renal failure, infection, death.
- Time to onset, duration of hospitalization.

Maternal prognosis: recovery without after-effects, recovery with after-effects, worsening, death.

5.6. Statistical Analysis of Data

The data obtained were analyzed using Epi-info statistical software version 3.5.4; Microsoft Excel and Microsoft Word 2013.

5.7. Ethical Considerations

This study was carried out after obtaining:

- Authorization from the director of Laquintinie Hospital in Douala;
- Informed consent;
- A clearance from the Institutional Ethics Committee;
- And in strict compliance with medical confidentiality.

6. Results

During our study, 1096 deliveries were carried out. 97 cases of primary postpartum hemorrhage were observed, including 25 cases of severe postpartum hemorrhage. 15 cases were secondary postpartum hemorrhage. A total of 112 cases of postpartum hemorrhage were recorded during our study, representing a frequency of 10.2%. The majority age group was 20 - 25 years (27.7%) with an average of 28.6 ± 5.77 and the extremes were 17 and 42 years old. In terms of occupation, education and marriage, they were in majority housewives (49.1%), had a secondary level of education (60.7%) and married in 45.5% of cases. 97.3% of the study population resided in urban areas (Table 1).

Description of the population

Epidemiological profile

Table 1. Distribution of patients according to sociodemographic profile.

Variables	Number (N = 112)	Percentage (%)
Age range (years)		
[15 - 20]	5	4.5
[20 - 25]	31	**27.7**
[25 - 30]	27	24.1
[30 - 35]	29	25.9

Continued

[35 - 40]	17	15.2
[40 - 45]	3	2.6
Occupation		
Public sector employee	9	8.0
Private sector employee	10	9.0
Informal sector employee	22	19.6
Pupil or Student	16	14.3
Housewife	55	**49.1**
Educational level		
Non scolarised	2	1.8
Primary	19	17.0
Secondary	68	**60.7**
High school	23	20.5
Marital status		
Married	51	**45.5**
Single	43	38.4
Widow	1	0.9
Cohabitation	17	15.2
Place of residence		
City	109	97.3
Village	3	2.7

Clinical characteristics

Background

Only one woman had a history of postpartum hemorrhage; multiparous and grand multiparous women represented 32% of our sample (Table 2).

Table 2. Distribution of patients according to gyneco-obstetric history.

Gyneco-obstetric history	Number	Percentage (%)
Gravidity		
Primigravid (G1)	30	26.8
Paucigravid (G2 - G3)	33	29.5
Multigravid (G4 - G5)	37	33.0
Great multigravid (≥G6)	12	10.7
Parity		
Primiparous (P1)	38	34.0

Continued

Pauciparous (P2 - P3)	38	34.0
Multiparous (P4 - P5)	28	25.0
Grand multipara (≥P6)	8	7.0
Voluntary termination of pregnancy	11	9.8
Curettage	11	9.8
Myomas	2	1.8
History of post-partum hemorrhage	1	0.9

In our study population, 3 (2.7%) who gave birth had a history of hypertension and diabetes, and 14 (22.5%) had a history of surgery (Table 3).

Table 3. Distribution of patients according to medical and surgical history.

Variables	Number (N = 112)	Percentage (%)
Medical history		
Human immunodeficiency virus	7	6.3
High blood pressure	1	0.9
Diabetes	2	1.8
Surgical history		
Caesarean section	13	11.6
Myomectomy	1	0.9

Current pregnancy

Follow-up in antenatal consultations (ANC)

21 patients had less than four prenatal consultations (18.8%) (Table 4).

Table 4. Distribution of patients according to the number of antenatal consultations carried out.

Variables	Number (N = 112)	Percentage (%)
Number of antenatal consultations		
Performed		
0 - 3	21	18.8
≥4	91	81.2

Anemia during pregnancy

In 59 women who gave birth, *i.e.* in 52.7% of cases, anemia during pregnancy was found. The average hemoglobin level of those giving birth in the third tri-

mester of pregnancy was 10.3 g/dl with a minimum of 7.6 g/dl and a maximum of 13.5 g/dl (Table 5).

Table 5. Distribution of patients according to the occurrence of anemia in pregnancy.

Variables	Number (N = 112)	Percentage (%)
Anemia during pregnancy	59	52.7
Normal hemoglobin level	53	47.3

Author of the antenatal consultations

In 37.5% of prenatal consultations were carried out by a nurse (Table 6).

Table 6. Distribution of births according to the author of the antenatal consultations.

Variables	Number	Percentage (%)
gynecologist-obstetrician	19	16.9
general practitioner	21	18.8
midwife	29	25.9
Nurse	42	37.5
Not specified	1	0.9
TOTAL	112	100.0

Term of pregnancy

In 84.8% of cases the delivery took place at term (Table 7).

Table 7. Distribution of patients according to the term of pregnancy.

Variables	Number	Percentage(%)
Gestational weeks (WA)		
<37	11	9.8
[37 - 42]	95	84.8
≥42	6	5.4
TOTAL	112	100.0

Origin

91 births (81.2%) were evacuated from other health structures (Table 8).

Table 8. Distribution of patients according to origin.

Variables	Number	Percentage (%)
Origin		
Self-reference	21	18.8
Evacuation*	91	81.2
Total	112	100.0

Delivery route

In our study, 94 patients had given birth via vaginal delivery, *i.e.* in 83.9% of cases, delivery had taken place via instrumental vaginal delivery in 1 case and the cesarean section was performed in 15.2% of cases (Table 9).

Table 9. Distribution of patients according to route of delivery.

Variables	Number	Percentage (%)
Route of delivery		
Vaginal	94	83.9
Caesarean section	17	15.2
Instrumental vaginal	1	0.9
Total	112	100.0

Use of utero tonics during labor

In 37.5% of cases, uterotonics were used during labor (Table 10).

Table 10. Distribution of patients according to the use of utero tonics during labor.

Variables	Number	Percentage (%)
Use of utero tonics during Labor		
Yes	42	37.5
No	70	62.5
Total	112	100.0

Qualification of the midwife

In 80.4% of cases, the delivery was carried out by midwives or nurses and in 2.6% of cases the qualification of the midwife was not specified (Table 11).

Table 11. Distribution of patients according to the qualification of the midwife.

Variables	Number	Percentage (%)
Qualification of the midwife		
Midwife/nurse	90	80.4
General practitioner	1	0.9
Obstetrician-gynecologist	18	16.1
Not specified	3	2.6
Total	112	100.0

Etiologies of postpartum hemorrhage

Uterine atony was the main cause of postpartum hemorrhage with a frequency of 36.6%, in second place we found trauma to the soft tissues with 30.3% and in third place retained placenta with a frequency of 26.8% (Table 12).

Table 12. Distribution of patients according to the etiology of the hemorrhage.

Variables	Number	Percentage (%)
Etiologies of postpartum hemorrhage		
Uterine atony	41	36.6
Placental retention	30	26.8
Cervicl tears	8	7.1
Perineal tears	15	13.4
Cervical amd vaginal tears	4	3.5
Uterine rupture	7	6.3
Endometritis	7	6.3
Total	112	100.0

Causes of uterine overdistension

Uterine overdistension is one of the contributing factors to the occurrence of uterine atony. The main cause of uterine overdistension was macrosomia with a rate of 54.5% (Table 13).

Table 13. Distribution of patients according to the cause of uterine overdistension.

Variables	Number	Percentage (%)
Causes of uterine overdistension		
Multiple pregnancy	8	36.4
Macrosomia	12	54.5
Myomas and pregnancy	2	9.1
Total	22	100.0

Postpartum hemorrhage clinic

During our study period, 1096 deliveries were carried out and 112 cases of postpartum hemorrhage recorded, *i.e.* a frequency of 10.2%. These cases were distributed as follows:

- 97 cases of primary postpartum hemorrhage, *i.e.* a frequency of 86.6% of the study population (8.8% of all deliveries), including 25 cases of severe postpartum hemorrhage, *i.e.* a frequency of 22.3% (2.2% of deliveries).
- 15 cases of secondary postpartum hemorrhage, *i.e.* 1.3% of deliveries and 13.4% of the study population.

Hemorrhage parameters

In 57 patients 50.8% of cases, blood loss was not quantified (Figure 1).

Blood count

In 57.1% of cases, the blood count was not performed (Figure 2).

The average hemoglobin level was 6.0 g/dl with a minimum of 2.8 g/dl and a maximum of 10.3 g/dl.

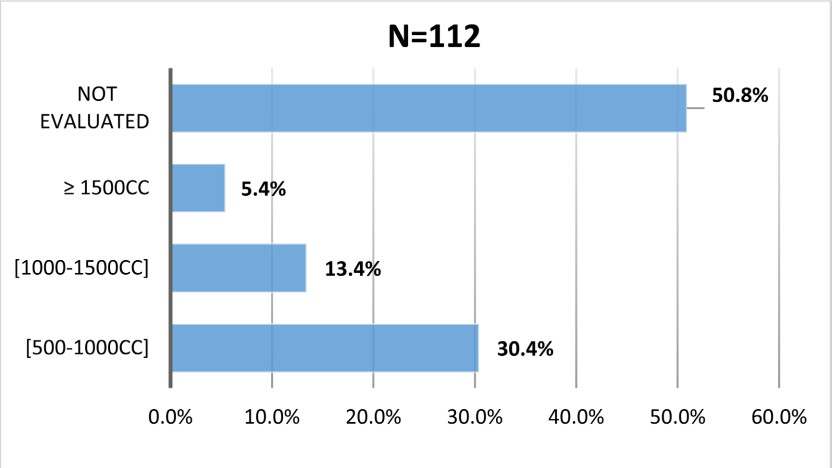

Figure 1. Distribution of patients according to the quantity of blood lost.

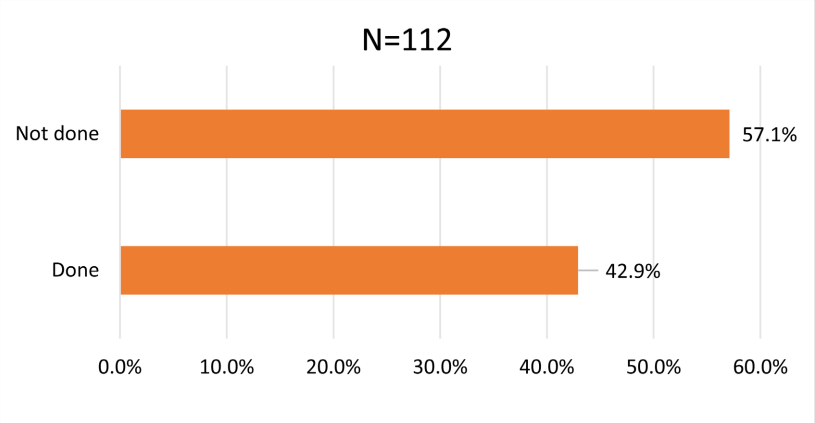

Figure 2. Distribution of patients according to complete blood count done.

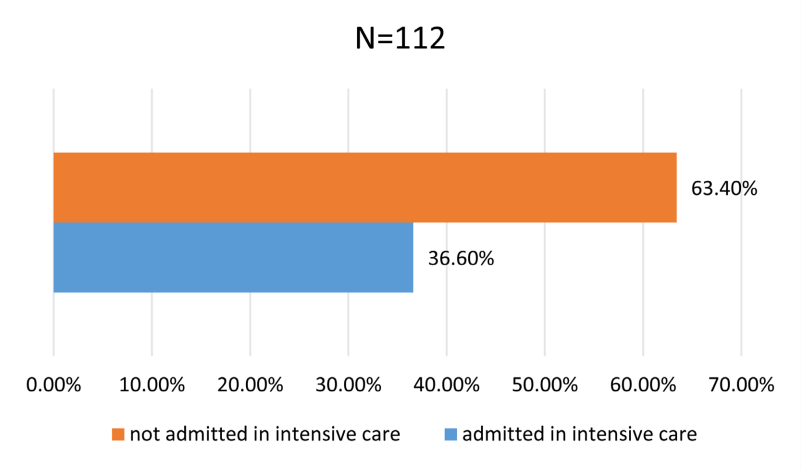

Figure 3. Distribution of patients according to admission to intensive care.

Therapeutic modalities

Resuscitation

In 71 patients, or in 63.4% of cases, admission to intensive care was not required

(Figure 3).

Blood transfusion

In 80 women who gave birth, or in 71.4% of cases, a blood transfusion was required (Table 14).

Table 14. Distribution of patients according to blood transfusion.

Blood transfusion	Number (N = 112)	Percentage (%)
Transfused	80	71.4
Not transfused	32	28.6
Quantity of blood transfused (ml)	**(N = 80)**	
500	31	38.8
1000	46	57.5
>1000	03	3.7

Obstetric treatment

All patients benefited from an obstetric procedure (Table 15).

Table 15. Distribution of patients according to the obstetric procedure performed.

Variables	Number (N = 112)	Percentage (%)
Uterine revision	95	85.2
Uterine revision + artificial delivery	17	15.2
Uterine massage	111	99.1
Bladder catheterization	112	100.0

Medical treatment

Crystalloids: ringer lactate, saline 9%, Colloids: geloplasma (fluid gelatin) Blood transfusion: fresh whole blood. Medical treatment was effective in 97.3% of cases (Table 16).

Table 16. Distribution of patients according to medical treatment received.

Variables	Number (N = 112)	Percentage (%)
Only oxytocin	28	25.0
Oxytocin + Misoprostol	81	72.3
Tranexamic acid	6	5.4
Crystalloid drip only	62	57.9
Crystalloid drip + colloids	45	42.1
Blood transfusion	80	71.4
Antibiotherapy/antibioprophylaxis	109	97.3

Surgical treatment

Surgical treatment was required in 34.8% of cases. 65.2% of patients did not

need surgical treatment and none of the cases of postpartum hemorrhage required hemostasis hysterectomy (Table 17).

Table 17. Distribution of patients according to surgical treatment received.

Variables	Number (N = 39)	Percentage (%)
Laparotomy	7	17.9
Vascular ligation	1	2.6
Soft tissue suture	27	69.2
Hysterorraphy	7	17.9
Curettage	5	12.8

Complications

In 83 deliveries (74.1% of cases) no complications were observed. The average time for complications to appear was 1.5 days with extremes of one and four days. 75.0% of deaths were observed in the first 24 hours following delivery (Table 18).

Table 18. Distribution of patients according to complications found.

Variables	Number (N = 29)	Percentage (%)
Hemorrhagic choc	2	6.9
Anemia	18	62.1
Nosocomial infection	5	17.2
Death	4	13.8

The average length of hospitalization was 4.7 days for a minimum of one day and a maximum of 10 days.

7. Discussion

Our study took place at the Laquintinie Hospital in Douala. Its aim was to determine the epidemiological, clinical and therapeutic aspects of postpartum hemorrhage.

Postpartum hemorrhage is an obstetric emergency. In its serious or neglected forms, it threatens maternal vital prognosis. It is currently the leading cause of maternal mortality in the world and specifically in Cameroon.

Its early diagnosis is based on rigorous monitoring of all women giving birth, particularly during the 2 hours following delivery.

In more than half of cases, no risk factors are found. Any woman who gives birth therefore presents a possible risk of hemorrhage during delivery. This is one of the reasons why we can never speak of "low-risk" childbirth. You must always keep in mind that it is a race against time.

The medical team tends to underestimate blood loss and the severity of postpartum hemorrhage, which can result in delay in treatment, suboptimal care and

death.

The majority of patients received came from other health structures; thus making data collection difficult in certain cases due to often incomplete birth records (absence of certain parameters: fundal height, mode of delivery, indication for cesarean section, condition of the newborn, active management of the third phase of childbirth, condition of the conjunctiva and vital parameters (at the time of diagnosis), reason for admission to the delivery room, partogram data, operative report, quantity of blood lost).

Biological and morphological explorations (blood count, fibrinogen level, prothrombin level, hemostasis assessments, renal assessment, pelvic ultrasound) were almost impossible due to the emergency context in which the majority of patients arrived on the one hand but also because of financial barriers.

The quantification of blood loss being visual and therefore subjective in several cases; which, in our opinion, underestimated blood loss.

All this has considerably reduced the number of variables studied.

During the period from December 1, 2017 to April 30, 2018, 1096 deliveries were carried out in the maternity ward of Laquintinie hospital and 112 cases of postpartum hemorrhage were recorded there; *i.e.* a hospital frequency of 10.2%.

This is close to Dembélé 10.3% [10] but eccentric to Mutarambirwa 13.9% [11] and Samaké 8.7% [12]. The pyramid and the health organization at the base explain, in our opinion, this disparity in frequencies.

The age group of 20 - 35 years was the majority with a frequency of 82.1%; it confirms the young profile of our sample as much as the usual modal class of human reproduction

The variances observed here and there with different authors from the same geographical and racial area seem to us to be essentially due to a lack of collection, and therefore, to a difference in sample size [13].

Our patients were mainly married housewives with a high level of education and mostly came from unfavorable socio-economic backgrounds.

The same profile is found among other authors sharing the same geographic and racial area despite the statistical dichotomy which, in our opinion, arises, as noted above, from basic non-convergence at the sample level [13]-[16].

Like Sango [13], primiparous and pauciparous were the majority (33.9%) in our series; on the other hand, only one patient had a history of postpartum hemorrhage (0.9%), which is lower than that found by Sango (4.2%) [13]

11 cases (9.8%) in our sample had a history of induced abortions; this data is reported in the literature as exposing a risk of postpartum hemorrhage like Mutarambirwa [11].

According to Mutarambirwa [11] infection with the human immunodeficiency virus during pregnancy would be a risk factor for postpartum hemorrhage and the anemia resulting from this infection would contribute to increasing the risk of occurrence of postpartum hemorrhage in this population.

In our series, human immunodeficiency virus infection was dominant with a

frequency of 6.3%, therefore constituting a group at risk of postpartum hemorrhage.

Caesarean section is identified as a risk factor for postpartum hemorrhage in the event of vicious insertion of the placenta into the hysterotomy scar.

In our series 11.6% of cases carried this risk due to a history of cesarean section without however prejudging the placental insertion (the latter must here be reported by an ultrasound).

Prenatal consultations carried out. The more regular and above all the quality of pregnancy monitoring, the better the screening for certain hemorrhagic risk factors should be. Hence the interest in finding strategies to improve the number and quality of prenatal consultations. In our study, 18.8% of our patients had not completed the number of prenatal consultations recommended by the World Health Organization (four according to old recommendations).

Anemia in pregnancy is a source of hypoxemia in the myometrium; and the latter provider of uterine atony in the immediate postpartum period.

Anemia during pregnancy was common, in around 52.7% of our patients with a statistical similarity to Mokri (53.7%) in whom a hemoglobin level below 10.0 g/dl was a risk factor for the occurrence of postpartum hemorrhages [17].

For Mutarambirwa, a birth weight of less than 2500 grams, therefore premature, was a protective factor in the occurrence of postpartum hemorrhages; anything that would explain the hemorrhages occurring more during full-term deliveries.

In our series, 84.8% of cases of delivery took place at term (between 37 and 41 weeks of amenorrhea + 6 days); finding superimposable to those of Nikiema and Maiga [14] [16].

Most of our patients (80.3%) were evacuated from other health structures in the city of Douala and only 18.7% had given birth at the Laquintinie Hospital in Douala. This seems logical to us insofar as every pregnant woman should give birth in the site of her prenatal follow-up; even if sometimes home proximity and financial constraints influence their choice of delivery site.

The majority mode of delivery was the vaginal route (83.9%) with 0.9% coupled with instrumental extraction; 15.2% were by cesarean section; similarities reported by Sango and Ongoiba [13].

According to Mokri, excessive use of oxytocics during labor is associated with the occurrence of postpartum hemorrhage [17].

In 42 patients in our series (*i.e.* in 37.5% of cases), utero tonics were used during labor; this frequency is higher than that found in Combs' study which was 27.8% and lower than the 55.3% reported by Mokri. In our study, 57.1% of cases of uterine rupture were associated with the administration of utero tonics during labor.

Deliveries were carried out respectively in 80.4% of cases by a midwife or a nurse, 16.1% of cases by obstetrician-gynecologists and in 2.7% of cases the qualification of the midwife was not specified. Our findings are different from those of other authors who have explored this issue; notably Maiga [16] where midwives/nurses represented 62.0% of birth attendants, obstetrician-gynecologists 1%

of birth attendants. Keita [15] 10.9% of deliveries were carried out by gynecologists, 36.9% were carried out by midwives and in 50.1% of cases, the author of the birth was not specified. This difference is mainly due to the health pyramid and the delivery sites of these studies.

In our study, however, there was no correlation between the person giving birth and the occurrence of postpartum hemorrhage.

Macrosomia is a risk factor for the occurrence of uterine atony linked to uterine overdistension.

In our study, 11.6% of newborns had a weight greater than or equal to 4000g. Sango, Keita respectively reported nearby rates including: 7.1%, 4.3%, 10.4% and 18.8% [13] [15].

Primary postpartum hemorrhage remains a real public health problem in Sub-Saharan Africa and more particularly in Cameroon where it represents the leading cause of maternal mortality. And according to Tebeu *et al* in 2015 it represented 29.2% of maternal deaths [18].

During our study, 112 cases of postpartum hemorrhage were recorded for a frequency of 10.2%; rate superimposable to that reported by Mutarambirwa in Yaoundé in 2014 (13.9%) [11].

97 cases of postpartum hemorrhage were primary (*i.e.* a frequency of 8.8%) and 25 patients presented severe hemorrhage (*i.e.* a frequency of 2.3%) opposite to that of Samake T [12] 5.4% but close to Dembele [10] 10.2%.

This high rate in our study demonstrates the extent of the problem that postpartum hemorrhage represents in our environment.

Secondary postpartum hemorrhage was observed in 1.4% of deliveries and represented 13.4% of our study population; this rate is three times higher than that reported by Keita (4.3%) [15]. Our frequency agrees with literature data (0.5%-2%); However, it only reflects the visible part of the problem and not the reality because several cases are undiagnosed due to the insufficient technical capacity of most reception health structures and all diagnosed cases are not always declared and documented.

Among the etiologies of postpartum hemorrhage, we found:

-Uterine atony as the main cause with a frequency of 36.6%, as also reported by Samake T 49.5%, Akpadza *et al.* 48.7%, Alihonou E. and Diallo B. 55.6% and 69.0% [12].

Factors of uterine overdistension were identified: Macrosomia (54.5%), multiple pregnancies: (36.4%), myomas and pregnancy (9.1%).

Retained placentas represented 26.8% cases of postpartum hemorrhage. Dembélé [10] reported a frequency of 82.0% and Samake [12] 24.2%. This data, although disparate, can be explained by the lack of control over the active management of the third phase of childbirth.

Soft tissue trauma was around 30.3%, higher than those obtained by Samaké T [12] and Dembele [10] 18.6% and 7.0%; but close to Keita's 37.6% [15]. The soft tissue lesions in our study could be linked to poor monitoring of labor and deliv-

ery.

Cases of hemorrhagic endometritis were also recorded in 6.3% of cases. Intermediate rates to those of S Keita and Dicko A respectively 4.3% and 12.4% [15].

The hemoglobin level was the only test requested in most cases with a completion rate of 42.9% in (48 patients). This rate is close to that found by Sanou in 2003 (47.4%) and lower than that found by Nikiema (70.0%) in Burkina Faso [14].

This rate of completion of paraclinical assessments found in our study remains low due to financial constraints on the one hand and on the other hand due to the emergency nature and context where the time factor is the epicenter of the management of postpartum hemorrhages. Our patients had a hemoglobin level between 2.8 g/dl and 10.3 g/dl. All this was dependent on the delay in diagnosis and especially in evacuation.

Uterine revision, uterine massage and bladder catheterization were routinely practiced in our patients in most cases.

Thus, uterine massage was performed in 99.1% of cases compared to 60.2%, 49.5%, 55.2%, rates obtained respectively by Sango [13], Samaké T [12] and Dembélé C [10].

Uterine revision was performed alone in around 85.5% of cases; our finding was higher than the respective rates of 28.3%, 24.2%, 60.1%, 62.1% reported by Sango [13], Samaké T [12], Nikiema [14], Dembélé C [10].

Uterine revision was associated with artificial delivery in 15.2% of patients. Samaké T, Sango, Nikiema and Dembélé C found respectively [10] [13] [14], 22.3%, 19.8%, 35.4%, 5.5%.

All these disparities testify to the non-uniformity of the samples, the organizational complexity of the different health units which housed these studies as well as the profiles of those involved in the provision of obstetric care with poor management of the third phase of childbirth as evidenced by the high rate of retained placenta found in the various studies.

In our series, all patients received emergency medical treatment. The latter consisted of:

Vascular filling with crystalloids in 57.9% of cases, compared to a rate of 83.3% reported by Nikiema [14].

Oxytocin and misoprostol were used in combination in 72.3% of cases. Oxytocin was used alone in 28.5% of cases. Other African authors such as Dembele [10], Samake T and Sango [13] reported rates of oxytocin use alone in 55.2%, 77.5% and 11.3% of cases respectively. This difference seems to us to be attributable to the diversity of protocols which vary from one maternity ward to another depending on the experience of the practitioner and the technical platform made available.

Blood transfusion was carried out in 71.4% of cases, a rate higher than those of Samaké T [12], Dembélé C [10], Sango [13], Nikiema [14] which respectively reported rates of: 5.3%, 8.5%, 31.8%, 22.6%.

The health structures reported here in discussion did not have a blood bank as reported by the various authors; in contrast to the Laquintinie Hospital in Douala

which has a blood bank thus facilitating the management of cases of postpartum hemorrhage requiring a blood transfusion. It is therefore the inconsistent availability of blood in certain hospitals which explains this large difference in results.

Surgical treatment was conservative in our study. Thus, 34.8% of patients benefited from surgical treatment following soft tissue injuries. Rates of 46.8%, 50.7%, 18.6% were found by Sango, and Samaké T [12] [13].

Hysterorrhaphy represented 17.9% of surgical interventions, a rate lower than that of 24.7% reported by Nikiéma [14].

Triple arterial ligation was used in 2.6% of cases compared to 12.0% obtained by Samaké T [12]. This high rate of trauma to the genital tract is linked to poor monitoring of labor or poor practices during childbirth. The choice of the operating technique is strongly dependent on the background and experience of the practitioner as well as the technical operating platform.

In our study, we observed 24.9% complications, rates close to those recorded by Nikiema, Dao and Samaké T which were 26.8%, 25%, 30.6% [12] [14].

The complications frequently encountered were: anemia in 16.0% of cases, results lower than those obtained by Samake [12] and Nikiema [14] who reported rates of 24.2% and 26.6% of cases of secondary anemia. Infections occurred in 4.4% of cases, which was lower than the rate of 10.4% found by Nikiema [14] and similar to that of Samake [12] which was 3.4%. This complication rate can be explained by a delay in treatment, whether or not associated with inappropriate treatment. All this is favored by the financial constraints of patients on the one hand and on the other hand by a delay in the evacuation of patients which contributes to extending the time for the start of treatment, thus leading to the occurrence of complications.

Despite all the efforts made, we recorded four (4) deaths during our study, a rate of 3.5%. Primary postpartum hemorrhage was responsible for three deaths and the cause was cervical tears. One death was due to secondary postpartum hemorrhage related to endometritis. Nikiema reported a death rate from endometritis of 16.2%. Maternal death rates of 0.7%, 0.4%, 2%, 18.5% have been reported by Sango, Samaké, Dembélé and Nikiema [10] [12] [14]. These deaths recorded in our study are explained by the delay in the evacuation of patients, the insufficiency of the technical platform of the hospital structures from which the patients come, a lack of immediate care at the time of diagnosis, the lack of blood and blood products in the structures of origin.

Limitations of Our Study

Our study is limited to a single structure, the data reported here cannot reflect the extent of this national problem as much as its frequency, which, here, is essentially hospital-based.

8. Conclusions

At the end of our study which aimed to determine the epidemiological, clinical

and therapeutic aspects of postpartum hemorrhage at the Laquintinie Hospital in Douala, it emerges in a panoramic manner that:

Postpartum hemorrhage is common at Laquintinie Hospital in Douala. It was most often a woman aged between 20 - 35, married, housewife, with a secondary level of education.

They mostly had a history of ongoing pregnancy and most often presented with anemia during pregnancy. Utero tonics had often been used during labor and delivery had often taken place at term and vaginally. The newborn was eutrophic in most cases. In most cases, patients were evacuated from other health structures. Primary postpartum hemorrhage was the most frequently observed type with uterine atony as the main etiology.

The support consisted of:

- Obstetrically: carrying out uterine revision, bladder catheterization and uterine massage;
- Medically: administration of oxytocin and misoprostol;
- Surgically: wound sutures and/or hemostasis hysterectomy.

The most common complication was anemia with maternal mortality very often high.

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Contribution of Authors

Essome supervised the study and wrote the manuscript; Nack collected the data, Tocki and Essome Tocky provided the English translation as well as the formatting of the manuscript; Moustapha, Boten, Mangala, Tchounzou, Ngalame, Ngaha, Ndolo, Eyanga, Obono, Ofakem, Mounchikpou, Mwandje, Ekono, Koundo, Nana read and corrected the manuscript; Wafo and Foumane supervised the study.

All authors have read and approved the final manuscript.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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