International Journal of Gynecology and Obstetrics 135 (2016) S84–S88

Contents lists available at ScienceDirect

International Journal of Gynecology and Obstetrics

journal homepage: www.elsevier.com/locate/ijgo

Initial management of postpartum hemorrhage: A cohort study in Benin and Mali

Julie Tort [a,b,c,d,*], Mamadou Traoré [e], Benjamin Hounkpatin [f,g], Cécile Bodin [a,b], Patrick Rozenberg [h,i], Alexandre Dumont [a,b]

[a] IRD-UMR216-MERIT "Mother and Child face to tropical infections", Paris, France
[b] COMUE Sorbonne Paris Cité, Paris Descartes University, Paris, France
[c] Pierre and Marie Curie University, Paris, France
[d] Paris Diderot University, Paris, France
[e] URFOSAME, Referral Health Center of the Commune V, Bamako, Mali
[f] HOMEL, Cotonou, Benin
[g] Integrated Center for Research and Education in Reproductive Health, Health Sciences University, Cotonou, Benin
[h] Department of Obstetrics and Gynecology, Poissy Saint-Germain Hospital, Poissy, France
[i] EA7285, Clinical Risk and Safety in Women's Health and Perinatal Health, University of Versailles Saint-Quentin (UVSQ), France

ARTICLE INFO

Keywords:
Benin
Mali
Oxytocin
PPH management
Severe postpartum hemorrhage
West Africa

ABSTRACT

Objective: To determine the components of initial management associated with a decreased risk of severe postpartum hemorrhage (PPH) in Benin and Mali. *Methods:* A cohort study was conducted between May 2013 and September 2014 that included all women who delivered vaginally in seven participating centers and who presented excessive bleeding after birth. Severe PPH was defined as PPH that required surgical treatment (vascular ligature and/or hysterectomy), and/or blood transfusion, and/or transfer to an intensive care unit, and/or an outcome of maternal death. Logistic regression was used to identify the components of initial PPH management that were associated with severe PPH, adjusting for case mix. *Results:* A total of 223 women presented a primary PPH presumably caused by uterine atony. Among those, 88 (39.5%) had severe PPH. Nearly one-third of women (30.4%) had a late injection of oxytocin (>10 minutes) after PPH diagnosis or no injection. Oxytocin injection within 10 minutes after the PPH diagnosis was significantly associated with a decreased risk of severe PPH (adjusted OR = 0.3; 95% CI, 0.14–0.77). *Conclusion:* Decrease in the delays in oxytocin administration is a key determinant to improve maternal outcomes related to PPH in this context.

1. Background

Severe postpartum hemorrhage (PPH) is the leading cause of maternal mortality in Sub-Saharan Africa [1]. It is also responsible for severe maternal morbidity [2], including hemorrhagic shock, hysterectomy, and complications related to blood transfusion. Most cases of PPH are related to uterine atony, retained placenta, and genital lacerations [3].

Previous studies in various contexts identified maternal characteristics associated with severe PPH [4–9]. However, limited data are available on factors related to the structure and the process of care. The results of one previous study in Mali and Senegal suggested that in hospitals with less qualified healthcare professionals there was an increased risk of PPH-related maternal death [10]. Drug procurement, logistics problems, staff shortages, or lack of equipment or blood are also known to increase the risk of hospital-based maternal mortality [11,12].

To reduce the burden of maternal mortality related to PPH in this context, one needs to address the cause of the failures in the initial management of PPH to prevent maternal morbidity that requires invasive treatment and a high level of care. According to WHO guidelines, initial steps for PPH treatment should be offered in all healthcare facilities, including the first level of care [13,14]. These steps include noninvasive well-known medical treatment: uterotonic administration (oxytocin being the first choice) [15]; manual removal of the placenta if bleeding occurs when the placenta is retained; manual examination of the uterus; and uterine massage. However, the level of evidence for each component is low to moderate. To our knowledge, only one study has evaluated the association between components of first-line PPH management and severe PPH in a low-income country [4]. There is an urgent need to provide such information from Sub-Saharan countries.

* Corresponding author at: UMR 216-MERIT, Faculté de Pharmacie, Laboratoire de Parasitologie, 4 Avenue de l'Observatoire, 75270 Paris, Cedex 6, France. Tel.: +33 1 53 73 96 57.
E-mail address: Julie.tort@gmail.com (J. Tort).

http://dx.doi.org/10.1016/j.ijgo.2016.08.016
0020-7292/

The aim of the present cohort study was to determine the components of the initial noninvasive treatment of PPH associated with a decreased risk of severe PPH in Benin and Mali.

2. Materials and methods

A cohort study was conducted and included all women with PPH after vaginal birth in seven participating healthcare facilities in Benin and Mali between May 2013 and September 2014.

In Benin, participating healthcare facilities included one primary healthcare facility, two districts hospitals, and one academic hospital. In Mali, participating healthcare facilities included two primary healthcare facilities and one district hospital. Active management of the third stage of labor (AMTSL) was recommended and presumably systematically performed in all centers. This included injection of 10 IU oxytocin and controlled cord traction. First-line treatment of PPH was provided by a midwife or a physician and followed the recommendations of the African Society of Gynecology and Obstetrics (ASGO) [16]. Patients managed in primary healthcare facilities but who required more specialized care (i.e. blood transfusion, intensive care, or surgery) were referred to district or academic hospitals. In these referral hospitals a gynecologist/obstetrician and an anesthesiologist were on-call 24 hours a day.

Women who delivered vaginally in one of the participating healthcare facilities with excessive bleeding were included in the cohort study. PPH was clinically assessed by the caregivers according to the visual estimation of excessive blood loss and patient status (hypotension and/or tachycardy). Women with PPH caused by a uterine rupture or placenta accreta were excluded because noninvasive medical treatment is not required in these cases.

The characteristics of the women, management of labor and delivery, and postpartum care were registered in a standard form by the birth attendant. The coordinator of the study controlled the data daily using different sources of information (registers, medical chart, interview with staff). Women were followed-up from the diagnosis of PPH until discharge from the maternity unit and were telephoned 15 days after hospital discharge to enquire about the status of their health. Any woman who was referred from a participating center to another hospital was tracked by the coordinator of the study.

Severe PPH was defined as PPH that required surgical treatment (vascular ligature and/or hysterectomy), and/or blood transfusion, and/or transfer to an intensive care unit, and/or an outcome of maternal death.

The main components of initial noninvasive medical treatment of PPH recommended by ASGO were considered: uterine massage; parenteral oxytocin administration; manual examination of the uterine cavity; visual inspection of the cervix; and intravenous crystalloid administration. Estimated blood loss volume at PPH diagnosis was classified as less than 1000 mL or greater than or equal to 1000 mL. Also included in the analysis was the delay between PPH diagnosis and oxytocin injection, which was classified by Driessen et al. [4] as less than 10 minutes, 10–20 minutes, greater than or equal to 20 minutes, or no administration.

Factors related to the characteristics of the women, and the management of labor, delivery, and postpartum care were considered as covariates. Well-known risk factors for severe PPH were selected from the relevant literature [4–9,17] and included: country of residence (Benin or Mali); the level of healthcare facility, classified as primary healthcare facility or referral hospital (district or academic hospital); maternal age (classified as <25 years, 25–30 years, ≥30 years); parity classified as primiparous, multiparous without previous cesarean delivery, multiparous with previous cesarean delivery; history of PPH; multiple pregnancy; anemia during pregnancy (hemoglobin <11 g/dL); pre-eclampsia; induction of labor; prolonged labor defined as an active phase greater than 12 hours; oxytocin during labor; instrumental vaginal delivery; preventive oxytocin during the third stage of labor; birth weight (classified as <2500 g, 2500–3000 g, 3000–3500 g, ≥3500 g); episiotomy and/or perineal laceration.

2.1. Analyses

The distribution of variables was compared between the women with or without criteria for PPH severity using the Fisher exact test or χ^2 test. Univariate and multivariate analyses were performed using logistic regression models to estimate crude and adjusted odds ratios for severe PPH and their 95% confidence intervals.

Factors related to the women's characteristics, labor, delivery, and postpartum care were selected in a multivariate model using a backward stepwise procedure that removed factors with $P<0.20$ at each stage. Factors with $P<0.05$ were considered significant and selected for the analysis of the next step. The association of each component of the initial noninvasive treatment of PPH with severe PPH was tested, adjusting for the variables that were selected in the previous step.

Factors with $P<0.05$ were considered significant determinants of outcome. The relevant interactions between two variables were tested with the Wald test. Cases with one or more missing values on PPH management or covariates were not included in the multivariate analyses (n = 14; 6.2 % of the sample). The data were analyzed with Stata version 12 (StataCorp LP, College Station, TX, USA).

The study protocol was approved by the Ethics Committees of The French Institute of Research and Development, and of the faculties of Medicine from Mali and Benin.

3. Results

Among 22 666 women who went through vaginal delivery during the study period, 223 (1.0%) presented excessive bleeding in the postpartum period. Among these, 88 (39.5%) had severe PPH (Fig. 1): 68 women had a blood transfusion; 44 women were admitted to an intensive care unit; 12 women had a vascular ligature and/or hysterectomy; and 8 women died.

After complete follow-up of women, uterine atony was associated with retained placenta in 133 cases (59.6%) and with genital laceration in 40 cases (17.9%). Fifty women (22.4%) presented genital laceration only. The mean volume of blood loss at diagnosis was 660 ± 362 mL.

Table 1 presents the sociodemographic characteristics of the women. Mean maternal age was 27 ± 6.5 years. Most women (n = 208; 93.3%) were administered oxytocin during the third stage of labor for PPH prophylaxis. Only one woman had an instrumental vaginal delivery.

Living in Benin, advanced maternal age, multiparous with previous cesarean delivery, anemia during pregnancy, induction of labor, oxytocin during labor, birth weight less than 2500 g, and giving birth in a referral hospital were associated with an increased risk of severe PPH in univariate analysis (Table 1). After multivariate analysis and backward stepwise selection procedure, the following covariates were significantly associated with severe PPH: maternal age, parity, induction of labor, and level of health care facility.

The components of the initial PPH management and the crude risks of severe PPH are presented in Table 2. Manual examination of the uterine cavity (n = 221), uterine massage (n = 216), intravenous crystalloid administration (n = 217), and oxytocin injection (n = 220) were carried out in more than 96% of cases. However, 69.6% of women (n = 153) had an oxytocin injection within 10 minutes after the PPH diagnosis. Visual inspection of the cervix was performed in two-thirds of cases (n = 150).

After adjustment for covariates, injection of oxytocin within 10 minutes after PPH diagnosis remained significantly associated with a decreased risk of severe PPH compared with late (>20 minutes) or no administration (adjusted OR = 0.3; 95% CI, 0.14–0.77). Visual inspection of the cervix was significantly associated with an increased risk of severe PPH (adjusted OR = 2.7; 95% CI, 1.28–5.82) (Table 3).