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Contribution of Carboprost in the Prevention of Postpartum Haemorrhage in Vaginal Delivery with Haemorrhagic Risk Factors: Experience of the Teaching Hospital of Angre, Abidjan, Côte D'ivoire

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ABSTRACT

Objective: To evaluate the contribution of carboprost in the prevention of postpartum haemorrhage in patients with haemorrhagic risk factors.

Patients and Method: We conducted an analytical study at the Teaching Hospital of Angré (January 1, 2020-December 31, 2022) on vaginal births with one or more of the following bleeding risk factors: age ≥ 35 years, multiparity, overdistension uterine. Group 1 consisted of postpartum patients who received only oxytocin. Those in group 2 received oxytocin and another uterotonic: carboprost. Blood loss was quantified postpartum. The chi 2 statistical test was used to compare the 2 groups at the threshold α = 5%.

Results: We identified 4,203 vaginal deliveries including 823 hemorrhagic risk factors meeting the study criteria. Blood loss was greater in patients who had received only oxytocin, particularly the risk factors for multiparity and uterine overdistension [age 35 years (17.46% versus 8.89% p=0.11); multiparous (14.15% against 5.56% p=0.003); patients with uterine overdistension (23.71% versus 9.67% p=0.00001)].

Conclusion: The synergy of 2 utero tonics, namely oxytocin and carboprost, in patients with hemorrhagic risk factors, in particular multiparity and uterine overdistension, contributes to reducing postpartum bleeding. Adding carboprost is a good alternative to preventing postpartum hemorrhage in parturients at higher risk.

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Introduction

Immediate postpartum haemorrhage is the leading cause of maternal death according to the World Health Organisation, particularly in developing countries [1]. Most often it is a delivery haemorrhage (DH) in 90% of cases [2]. This means that the origin of the bleeding is the placental insertion zone. To prevent it, active management of the third stage of labour (AMTSL) and the use of uterotonics are recommended [1]. Oxytocin is the most widely used postpartum uterotonic [3]. However, its short half-life of 10 minutes requires repeated and continuous dosing with the risk of ineffectiveness after saturation of its uterine receptors [4, 5]. Carboprost is a prostaglandin with a utero-tonic action, of longer duration than oxytocin. Some studies note the contribution of combined oxytocin and carboprost to the reduction of delivery haemorrhage, particularly in caesarean delivery [6, 7].

To this end, we conducted a study to evaluate the contribution of carboprost in the prevention of delivery haemorrhage in patients with haemorrhagic risk factors who had given birth by vaginal delivery in the obstetrical unit of the Teaching Hospital of Angre.

Patients and Method

We conducted an analytical study in the obstetrical unit of the Teaching Hospital of Angré from 1 January 2020 to 31 December 2022, a period of 36 months. This block contains the birth room. It should be noted that AMTSL is our current practice there. As a result, all the women who give birth receive 05 IU of oxytocin intramuscularly to facilitate delivery, as well as an infusion of 05 IU during the first 24 hours of post-partum.

The study population consisted of vaginal deliveries beyond 28 weeks of amenorrhoea with one or more of the haemorrhagic risk factors (HRF) previously identified on admission to the delivery room. For this study, these were age greater than or equal to 35

years, multiparity and uterine overdistention (large fetus, multiple pregnancy, hydramnios, myxomatous uterus). We have taken into account these 3 HRFs as they are the most frequent in our current practice. This population was divided into 2 groups:- the first group was made up of vaginal deliveries who received only oxytocin (5 IU at delivery and 5 IU infusion in 500 cc IMS) without any other uterotonics -the second group was made up of vaginal deliveries who received oxytocin and then carboprost.

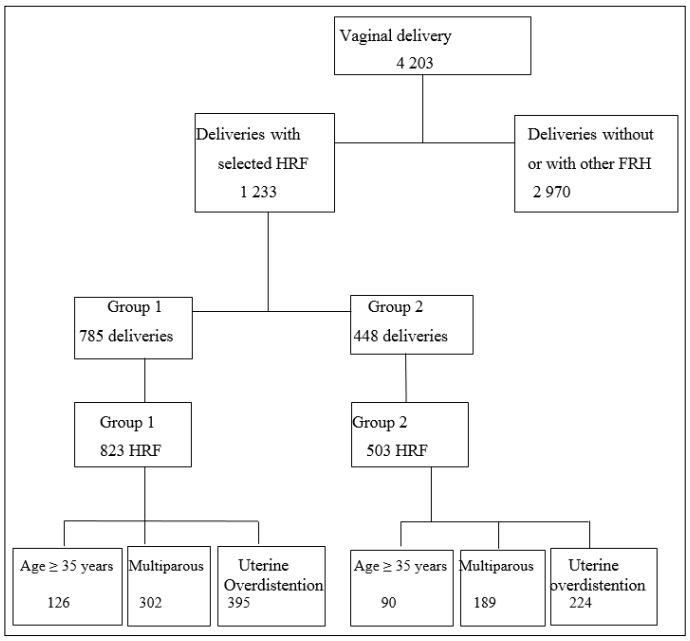
For each woman in the study, blood loss was quantified within 24 hours of delivery. Blood loss of more than 500cc was chosen as the threshold according to the WHO definition of postpartum haemorrhage [1]. These were blood losses related to DH. Patients with other RHFs, morbid associations (pre-eclampsia, coagulation disorder, Willebrand's disease) or haemorrhage related to a genital tract tear were not included in the study.

Epi info version 7 software was used to analyse the data. The chi-square statistical test was used to compare the 2 groups. The threshold $\alpha = 5\%$ was considered significant.

Results

Over the study period there are 4,203 vaginal deliveries in total. We counted 1,233 deliveries with the HRFs we selected. It should be noted that the same patient in the same group could have one or more HRF. Thus for group 1 (simple oxytocin) we counted 823 HRF (785 deliveries). In group 2 (oxytocin and carboprost) there were 503 HRF (448 deliveries). The flow chart shows these results (Figure 1).

Figure 1: The flow chart



Age and Blood Loss

According to the HRF of age ≥ 35 years, 216 HRFs were identified. These were 126 HRFs for group 1 and 90 for group 2. Table I shows the distribution of their results. The difference in blood loss in the 2 groups was not statistically significant (p=0.11).

Table I : Distribution according to HRF of age ≥ 35 years, blood loss and uterotonics used

Age ≥ 35 years	Oxytocin	Ocytocin + carboprost	Total
Blood loss < 500 cc	104(82,54%)	82(91,11%)	186
Blood loss ≥ 500 cc	22(17,46%)	8(8,89%)	30
Total	126	90	216

$\chi^2 = 2,54$ p=0,11 ddl=1

Multiparity and Blood Loss

We identified 491 HRFs related to multiparity. This included 311 in group 1 and 180 in group 2. The difference in blood loss between these 2 groups was statistically significant (p=0.003) (Table II).

Table II: Distribution according to HRF of multiparity, blood loss and uterotonics used

Multiparity	Ocytocin	Ocytocin+ carboprost	Total
Blood loss < 500 cc	267(85,85%)	170(94,44)	437
Blood loss ≥ 500 cc	44(14,15%)	10(5,56%)	54
Total	311	180	491

$\chi^2 = 8,59$ p=0,003 ddl=1

Uterine Overdistention and Blood Loss

For uterine overdistention HRF, 619 were identified. These were 464 HRF for group 1 and 155 HRF for group 2. The comparison of the 2 groups showed more blood loss in group 1 (p=0.00001) (Table III).

Table III: Distribution of deliveries according to uterine overdistention and blood loss

Uterine overdistention	Ocytocin	Ocytocin + carboprost	Total
Blood loss < 500 cc	354(76,29%)	140(90,32%)	494
Blood loss ≥ 500 cc	110(23,71%)	15(9,67%)	125
Total	464	155	619

$\chi^2 = 14,91$ p=0,00001 ddl=1

Discussion

HRFs are known from several studies: prolonged labour, uterine overdistention, uterine malformation, chorio amniotitis, ß-mimetic drugs, coagulopathy (Willebrand disease), fetal death in utero, age ≥ 35 years, obesity, scarred uterus [5-9]. However, in our current practice the most observed HRFs are age greater than or equal to 35 years, multiparity and uterine overdistension (large fetus, multiple pregnancy, hydramnios, myomatous uterus).

In our study, the comparison of the 2 groups concerning the HRF of age ≥ 35 years did not find a significant difference in blood loss. Yet Subtil in his review of the literature, finds maternal age ≥ 35 years as a major HRF responsible for post partum haemorrhage and maternal death [10].

Of the HRFs selected, the most common was uterine overdistension. Indeed, it includes a number of HRFs: large fetus, multiple pregnancies, hydramnios, myxomatous uterus. This study showed that the combination of oxytocin and carboprost was more effective in reducing postpartum blood loss. But also this combination is more effective in preventing delivery haemorrhage. This difference is clear in vaginal deliveries with multiparity and uterine overdistension as HRF. Kumar in his study showed that 21% of the deliveries initially given oxytocin required another uterotonic in contrast to those given carboprost (4% $p < 0.01$) [11].

Oxytocin is the treatment of choice for AMTSL and prevention of DH [1, 8, 12]. Oxytocin is a hormone that binds to receptors on uterine muscle cells. The number of oxytocin receptors on the uterus in late pregnancy is 200 times higher than in the non-pregnant uterus. Despite their large number, these receptors reach saturation and become desensitised to excessive doses of oxytocin [4]. This excess intake can lead to side effects. These include contraction of the coronary arteries, hypotension and fluid retention, but most importantly, the ineffectiveness of oxytocin [13].

In our study blood loss was lower with oxytocin followed by carboprost for the HRF of multiparity and uterine overdistension ($p=0.003$; $p=0.00001$). Carboprost helped to reduce postpartum blood loss as reported by Yue Chen in her study [4]. Carboprost is a synthetic analogue of prostaglandin F2 alpha with long-lasting uterotonic action [14]. It also acts on platelet function and increases oxytocin receptors, important roles in haemostasis and prevention of postpartum haemorrhage [15]. It has the advantage that it can be combined with other uterotonics such as oxytocin, whose effect it potentiates. This is all the more important in patients with a higher risk of haemorrhage. Both multiparity and uterine overdistension are recognised as major factors in DH [8, 12]. Multiparity contributes to the deterioration of the contractile quality of the myometrium. In this case the fast acting oxytocin but with a short half-life must be replaced by another uterotonic, in this case carboprost. Carboprost by decreasing postpartum bleeding helps to prevent DH and therefore the need for transfusion. This is important especially for developing countries that are often not self-sufficient in blood products [16]. The prognosis of DH is often severe due to both maternal mortality and maternal morbidity. In Côte d'Ivoire there are 385 maternal deaths per 100,000 live births [17]. This once again underlines the importance of reducing postpartum bleeding, especially in patients with HRF, through the use of carboprost.

Despite all these advantages for the prevention of DH, carboprost has side effects. These are mainly nausea, abdominal pain, diarrhoea and bronchospasm [18]. Its use should be cautious, reserved for indicated cases, i.e. HRF.

Conclusion

This study shows the value of combining oxytocin and carboprost in patients with HRF. This combination of a short-acting and a long-acting uterotonic helps to maintain uterine muscle tone. We therefore recommend the use of oxytocic and carboprost for the prevention of DH in patients at high risk of postpartum haemorrhage.

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