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Oxytocin Abuse and Postpartum Hemorrhage

Loutfi Guennoun Abdelmounaim[1*], Mohammed Khouchoua[2], Nouha Nhiri[3], Naouale Biougnache[3], Mohamed Adnane Rhaidouni[3], Ouassila Laouji[4], Fatima El Hadraoui[4], Safae Habib Rabbi[5], Omar El Ayoubi[6], Omar Alaoui[6], Samir Messnan[6], Said Lafkir[6]

[1]The Head of Pol, Mother and Child Department in Sidi Said Hospital, Meknes, Morocco
[2]Prefectorial Epidemiology Cell, Ministry of Health, Meknes, Morocco
[3]Gynecology and Obstetrics Department, Pagnon Hospital, Meknes, Morocco
[4]The Head Midwives of Two Teams in Pagnon Hospital, Meknes, Morocco
[5]Master in Communication, Moulay Ismail University, Meknes, Morocco
[6]Medical Administration and Epidemiological Services, Meknes, Morocco
Email: *loutfimounaim@hotmail.com

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Abstract

Among the most consolidated dogmas in obstetrics, we have the essential role of oxytocin during: labor by regulating, consolidating uterine contractions, by supporting the expulsive efforts of the patient during childbirth and after childbirth by preventing postpartum hemorrhage. But what challenged us to conduct our study is the large and increasing number of surgical operations for postpartum hemorrhage in patients who received oxytocin during labor. We assumed that the generalization use of oxytocin in all patients during labor is probably responsible of this increasing rate of incidents. To verify this assumption, we carried out a prospective randomized comparative study, involving 3990 pregnant patients admitted at the start of labor at term, with no contraindication for giving birth by normal ways, during a period of 10 months (January-October 2022). The patients have been divided into 2 groups. The first group comprises 1991 patients who were placed on admission on a glucose serum infusion with 4 ampoules of a non-anticholinergic musculotropic antispasmodic: "Hydrated phloroglucinol + trimethylphloroglucinol" (Each ampoule contains 40 mg of hydrated phloroglucinol and 0.04 mg of trimethylphloroglucinol) instead of receiving oxytocin during the active phase of their labor and a second group consisting of 1999 patients who received oxytocin during the active phase of their labor. The results were very surprising and contrary to the already consolidated evidence in our specialty. Indeed, the rate of postpartum hemorrhages was 10 patients (0.5%) in the 1st group vs 30 patients (1.5%) in the 2nd group, 9 patients (0.4%) presented fetal heart rate abnormalities in the 1st group vs 90 (4.5%) in the 2nd group, 8 cases (0.4%) of dynamic dystocia in the 1st group vs 132 cases (6.6%) in the 2nd group and 99 caesareans (5%) in the 1st group vs 299 (15%) in the

2nd group. Against all expectations the results were very surprising, with more details in the article.

Keywords

Oxytocin, Antispasmodic, Postpartum Hemorrhage, Uterine Inertia, Dynamic Dystocia, Cesarean Section, Abnormal Fetal Heart Rate

1. Introduction

Postpartum hemorrhage is by far the leading cause of maternal death in low-income countries and the leading cause of nearly one in four maternal deaths worldwide [1]. In Morocco, maternal mortality constitutes according to the latest statistics officially reported by the WHO: 70 per 100,000 live births (year 2017) [2], mainly caused by hemorrhage during delivery. For this, our research efforts have been directed against all the causes responsible for this scourge, with a view to improving its management and being able to reduce the frequency of its occurrence. We then retrospectively analyzed the files of all the cases having posed a problem during the peripartum over different periods, all circumstances combined, and we then noticed a major common point: all the patients had had directed labor under oxytocin. For the sake of nuance, we decided to verify the possibility of involvement of this medication in the saturation of oxytocin receptors in the uterus and therefore a share of responsibility in the occurrence of postpartum hemorrhage. To answer this hypothesis, we carried out a prospective randomized comparative study, involving 3990 pregnant patients admitted at the start of full-term labor, with no contraindication to giving birth vaginally.

2. Method and Means

Our study is a prospective randomized comparative study, involving 3990 pregnant patients who arrived at the start of labor at term, without contraindication of vaginal delivery. They have been divided into two groups. The first group includes 1991 patients who were placed on admission on a glucose serum infusion with 4 ampoules of a non-anticholinergic musculotropic antispasmodic: "Hydrated phloroglucinol + trimethylphloroglucinol" (Each ampoule contains 40 mg of hydrated phloroglucinol and 0.04 mg of trimethylphloroglucinol) during the active phase of their labor and a second group composed of 1999 patients who received oxytocin during the same phase.

The randomization was done at the entrance office of the admission department of the Mother and Child regional center Pagnon Hospital, under the supervision of a medical doctor specialized in the administration and management of hospital establishments.

We tried to homogenize the two groups, taking into consideration all the confounding factors (age, parity, dilation, obesity and height), as well as the

medical team, with the same team of obstetrician gynecologists and only two teams of midwives.

All the data were recorded on the patient files as well as the delivery register at the level of the delivery room of this hospital. We used the same standards for both patient groups, concerning fetal heart rate major abnormalities (Fetal heart tracing category: III or IV), the dynamic dystocia abnormalities (hyperkinesia, hypertonia and dilation stagnation) and the notion of fetal engagement defect, considered in case of full uterine cervical dilatation And after a delay of three hours in the patients of the first group and two hours in the patients of the second group.

3. Results

The patients in our study were randomly assigned to the two groups upon admission. The main inclusion criterion was to be at the beginning of the active phase of labor: any patient with regular well-felt or painful uterine contractions and cervical dilation at 3 cm in the patient who has already given birth and 4 cm in the nulliparous patient as agreed in the literature [3]. We respected equity between the two groups on a set of criteria that could bias the data of our study such as age, height and parity. As for corpulence, we were unable to establish a selection on the basis of the Body Mass Index, because we did not have the weight at the start of pregnancy for all the patients, so we selected frankly obese patients on the basis of a criterion simple, namely: any patient whose adipose panicles during the measurement of the uterine height exceeded a bead of 10 cm. It should be noted that during the inclusion examination of the patients in the two groups, only patients with clinically normal pelvises (not suspicious) were taken, only patients with anterior cephalic fetal presentations were taken and suspected macrosomia were ruled out.

Table 1 shows the distribution of patients between the two groups according to these different criteria.

Table 1. Distribution of confounding factors between the two groups.

	1st Group	2nd Group
18 - 25	- 725	- 741
Age interval: 25 - 36	- 994	- 1002
37 - 42	- 272	- 256
- P: 0	- 536	- 548
Parity: - P: 1 - 4	- 1224	- 1236
- P: 5 - 8	- 231	- 215
- 150 cm - 160 cm	- 1281	- 1319
Size: - 161 cm - 170 cm	- 585	- 561
- T > 170 cm	- 125	- 119
Obesity:	- 632.	- 641.

At the end of our study we obtained the following results: For the first group, we have 09 patients (0.4%) who had fetal heart rate abnormalities, 8 patients (0.4%) who presented dynamic dystocia, 98 patients (4.9%) had a defect in fetal engagement, 10 patients (0.5%) had postpartum hemorrhage and 99 patients (5%) of this group gave birth by caesarean section.

For the second group, we have 90 patients (4.5%) who had fetal heart rate abnormalities, 132 patients (6.6%) who had dynamic dystocia, 102 patients (5%) had a defect of engagement, 62 patients (3%) had a postpartum hemorrhage and 303 patients (15%) gave birth by caesarean section. For better visibility we have reported the above results on Table 2.

Table 2. Breakdown of major incidents by group:

	1st Group	2nd Group
Abnormal fetal heart rate.	9 Patients (0.4%)	90 Patients (4.5%)
Dynamic dystocia.	8 Patients (0.4%)	132 Patients (6.6%)
Fetal engagement defect.	98 Patients (4.9%)	102 Patients (5%)
Postpartum hemorrhage .	10 Patients (0.5%)	62 Patients (3%)
Caesareans.	99 Patients (5%)	303 Patients (15%)

Some particularities were also observed and we deemed useful to report them, this concerns the duration of the active phase, the feeling of pain. The second one was estimated according to a subjective estimate by the patients who had to estimate their pain on a scale of 10. The results are reported respectively on Figure 1 and on Table 3.

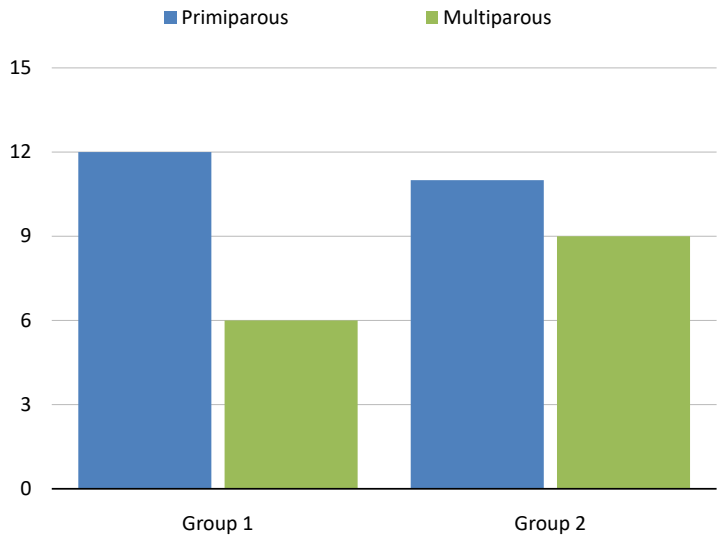

Figure 1. Average duration of the active phase in hours, according to the groups and according to the parity.

As specified in figure No. 1, we find that the average duration of the active phase in primiparous women in the 1st group is 12 hours vs. 11 hours in those of

the 2nd group and it is 6 hours in multiparous women in the 1st group vs. 9 in those of the 2nd group.

Table 3. Summary of the pain felt subjectively on a scale of 10.

	1st Group	2nd Group
- Primiparous	7 - 8	8 - 10
- Multiparous	5 - 6	7 - 8

4. Discussion of Results

After eliminating the factors that may be confusing (age, parity, obesity and height), we notice significant differences in a number of parameters that we will detail in the following paragraphs:

- The occurrence of **fetal heart rate abnormalities** measured by an electrocardiograph (as described in the literature [4] [5] and [6]) is (90/9) **10 times** greater in the second group vs the first, with 1/3 of abnormalities considered major, whereas for the 9 anomalies (0.4%) observed in the patients of the 1st group were all considered minor. Although the frequency of fetal heart rate abnormalities in the two groups combined in our series is much lower than what is described at the African level by the literature [7].

- **Dynamic dystocia** was observed in 132 patients in the 2nd group vs 8 patients in the 1st, which represents: **16.5 times** more in the 2nd group compared to the 1st, distributed as follows: Hypercinesias (90/6), hypertonia (22/0) and dilation stagnation (20/2). The rate of dynamic dystocia is representing 3.5% in our series out of all patients in the 2 groups, which remains much lower than what is described in the literature [8], this could be explained by the inclusion criteria who were very strict.

- **Fetal engagement defect**, **comparable** between the two groups: 98 (4.9%) at the level of the 1st group vs 102 (5%) in the 2nd group, this could be explained by the fact that the molecule used to optimize the labor does not play a role in the foeto-pelvic disproportion, since all these cases were due to narrow pelvises (the upper or middle strait), especially since the other causes that could be responsible for the disproportion were eliminated with the inclusion criteria.

- **Postpartum hemorrhage** was comparable to our rates already reported in the literature [9], at 62 (3%) patients in the 2nd group vs 10 (0.5) patients with a rate **6 times** higher significant in patients whose labor was managed with oxytocin with less efficacy of the uterine retraction when administered in the postpartum to compensate for uterine inertia in the 2nd group compared to the 1st. The explanations found after analysis of the various files case-by-case, are first of all the dynamic dystocia which was more frequent in the patients of the 2nd group, as well as the patients who were exposed to oxytocin for a longer time. The most interesting thing is that the cases of postpartum hemorrhage in the 1st group were all treated medically, unlike the 2nd group where we had to operate 34

(1.7%). Patients according to our own techniques already described in the literature [9]. Thanks to these techniques we did not need to perform hysterectomies, which we sincerely deplore, because this would have allowed us to establish by an anatomopathological and especially immuno-histochemical study the cause of these severe postpartum hemorrhages. They would most likely be due to a saturation of oxytocin receptors at the myometrial level.

- **The cesarean section** rate was higher **3 times** in the second group with 303 (15%) patients vs 99 (5%) patients in the first group, this difference is due to the large number of fetal heart rate abnormalities and the high number of dynamic dystocia.

- Concerning **the duration of the active labor phase** in the two groups, we note that for the primiparous the duration was pretty much comparable: 12 hours in the first group and 11 hours in the second group, compatible with the literature [10] [11]. On the other hand, in case of Multiparous the difference was significant with 6 hours in the first group vs. 9 hours in the second group, this could be explained by the myorelaxant action exerted on the cervix.

- Concerning, **pain**, we notice that it **was less felt** in the first group than in the second group, which suggests that oxytocin and because of its amplifying effect on uterine contractions [12] [13] [14] [15], increases the painful sensation of the uterine contractions. This represents an additional positive point in favor of the protocol used in the 1st group, especially after collecting the opinions of the patients, who were not traumatized by the experience of their childbirth, contrary to what is described in the literature [16] [17] and [18].

5. Conclusions

The observation that can be deduced from the results of our study is formal. Indeed, with more fetal heart rate abnormalities, more dynamic dystocia, more caesarean sections, more postpartum hemorrhages and more pain in patients in the group who received oxytocin in the active phase of their labor, we have decided to reduce the indication for its use to: labor induction, optimization of labor during its latency phase and of course it retains all its interest in directed deliverance and immediate postpartum. And we established a consensus to use an infusion of glucose serum with 4 ampoules of a non-anticholinergic musculotropic antispasmodic: "Hydrated phloroglucinol + trimethylphloroglucinol".

From the start of the active phase of labor as described in the article.

Conflicts of Interest

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

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