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Maternal-Fetal Prognosis of Cesarean Section after Induction of Labor by Misoprostol in the Gynecology-Obstetrics Department of the Ignace Deen University Hospital Center in Guinea

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Abstract

Introduction: The objective of this work was to evaluate the maternal and fetal prognosis of cesarean section after induction of labor with misoprostol at the University Hospital of Conakry during the study. **Material and Methods:** We conducted a descriptive and analytical study lasting 6 months on pregnant women admitted to the department who had undergone artificial induction and those who had spontaneous induction. **Results:** The frequency of induction was 3.61%. The age group 26 - 35 years (52.2%), married (89.1%), unschooled (52.2%), self-employed (45.7%), and nulliparous women (56.52%) were the most concerned. Severe preeclampsia (45.7%) and post-term pregnancy (26.1%) were the main indications for induction. Patients who had received 2 doses of misoprostol were the most frequent (58.7%). There was a significant association between artificial induction with misoprostol and parietal suppuration: OR: 95% CI: 0.047 (0.011 - 0.19), P = 0.00; postpartum hemorrhage: OR: 95% CI: 0.045 (0.011 - 0.19), P = 0.00; uterine rupture: OR: 95% CI: 0.011 (0.00011 - 0.18), P = 0.00; and maternal death: OR: 95% CI: 0.011 (0.0007 - 0.18), P = 0.000. As for neonatal prognosis, we recorded 2 cases of neonatal deaths (4.35% versus 2.17%). **Conclusion:** The majority of patients had received two doses of misoprostol. The study revealed a significant association between its use and the occurrence of maternal complications, notably uterine rupture, postpartum

hemorrhage, parietal suppuration, and maternal death. On the fetal level, a link was observed between a morbid Apgar score and fetal mortality. Further research is needed to define optimal and safe doses.

Keywords

Induction of Labor, Cesarean Section, Misoprostol, CHU Ignace Deen

1. Introduction

Artificial induction of labor is a medical decision aimed at inducing uterine contractions to achieve cervical effacement and dilation, followed by the birth of the child [1]. Cesarean section is artificial delivery after surgical opening of the uterus either by vaginal or abdominal route following laparotomy [2].

Labor induction has become a common obstetric practice. Alongside the classical technique, prostaglandins are increasingly used [3]. The incidence of induction varies from one place to another, ranging from 5% to 22% of all admissions to the labor ward and depends on the institutional protocol [4]. Misoprostol is the only analogue of prostaglandin E1 that is rapidly absorbed orally. The vaginal route has been the most successful because misoprostol has a much longer half-life when administered vaginally than orally [5].

The risks of induction include an increased rate of deliveries requiring cesarean section, uterine hyperstimulation, abnormal fetal heart rate, uterine rupture, maternal intoxication, preterm delivery due to dating errors, and cord prolapse associated with artificial rupture of membranes [6] [7].

In the United Kingdom, Canada, and the United States, about 20% of all deliveries are due to artificial induction of labor [8]. In France and Finland, their frequency was estimated in 2016 at 22% and 18.8% respectively [9]. In 2010 in Mali, in a study of 110 cases at the Point G Hospital in Bamako, the frequency was 2.49% [10]. In Abidjan, Côte d'Ivoire (2006) at CHU Cocody, their frequency was 2.3% [11]. In Guinea, Camara in 2014 at CHU Ignace Deen in his thesis found a frequency of 5.54% [12].

The failure of labor induction with misoprostol being a concern of health personnel, and the scarcity of previous studies in Guinea, motivated the realization of this work, whose objective was: to evaluate the maternal and fetal prognosis of artificial induction of labor with misoprostol among pregnant women admitted to the Gynecology-Obstetrics Department of the National Hospital Ignace Deen (HNID).

2. Methodology

2.1. Type and Duration of the Study

This was a prospective descriptive and analytical case-control study, carried out over a period of 6 months from 1/10/2022 to 31/3/2023.

2.2. Inclusion Criteria

Included were pregnant women who had undergone artificial induction of labor regardless of the mode of delivery, including those who had cesarean section (cases), and women who had cesarean section during labor after spontaneous onset of labor (controls) and who agreed to participate in the study.

2.3. Non-Inclusion Criteria

Not included were all pregnant women who did not agree to participate and those who had scheduled cesarean sections.

2.4. Sampling

We carried out exhaustive recruitment of cases for all pregnant women who underwent artificial induction of labor, regardless of the mode of delivery. As controls, all pregnant women who underwent cesarean section during labor after spontaneous onset of labor. Thus, for each case, we took two controls.

2.5. Data Analysis

Data were analyzed using the software R 2.4.0 and Microsoft Office 2016. For qualitative variables, we calculated proportions; for quantitative variables, we calculated the mean and the extremes.

2.6. Dosage Regimen

The protocol began with intravaginal administration in the posterior fornix or sublingual administration of a dose of 1/4 tablet, *i.e.*, 50 µg of misoprostol, repeated if necessary in both groups every six hours until a good uterine activity was obtained (3 contractions every 10 minutes) without exceeding 4 doses, *i.e.*, 200 µg. The absence of labor onset 6 hours after the fourth dose of misoprostol was considered a failure of induction.

Severe preeclampsia (SEP) is associated with systolic blood pressure ≥ 160 mmHg and/or diastolic blood pressure 110 mmHg associated with proteinuria ≥ 5 g/24 h and/or organ damage [13].

Postpartum hemorrhage: blood loss greater than 500 ml during vaginal delivery and 1000 ml in the case of cesarean section.

An Apgar score of 6/10 or less at the first or fifth minute was considered morbid, and 10/10 at the first or fifth minute was considered good.

2.7. Ethics

Informed consent of participants was obtained; anonymity and confidentiality were respected.

3. Results

Frequency: During our study period, we recorded 3600 deliveries, including 130 inductions of labor with misoprostol, *i.e.*, 3.61% of all deliveries.

During our study, 130 women underwent artificial induction of labor with misoprostol, among whom eighty-four (84, 64.6%) delivered vaginally and forty-six (46, 35.4%) by cesarean section. See Table 1.

Table 1. Distribution of patients induced by caesarean section according to their sociodemographic characteristics.

Characteristics	Numbers (n = 46)	Proportion (%)
Age (years)		
16 - 25	17	36.9
26 - 35	24	52.2
≥36	5	10.9
Marial status		
Single	5	10.9
Married	41	89.1
Occupation		
Employee	10	21.7
Self-employed	21	45.7
Student	6	13.0
Housewife	9	19.6
Educational level		
Not in school	24	52.2
in school	22	47.8
Parity		
Nulliparous	26	56.52
Primiparous	4	8.7
Pauciparous	7	15.2
Multiparou	8	17.4
Grand multiparous	1	2.2

Mean age: 27.17 ± 5.59 years; Extremes: 16 - 40 years.

1) **Age:** Twenty-four (24) out of 46 patients (52.2%) and seventeen (17) out of 46 patients (36.9%) were aged respectively 26 to 35 years, and 16 to 25 years. The mean age was 27.17 ± 5.59 years with extremes of 16 and 40 years.

2) **Marital status:** Forty-one (41) out of 46 patients (89.1%) were married versus single (10.9%).

3) **Occupation:** Twenty-one (21) out of 46 patients (45.7%) were self-employed and ten (10) out of 46 patients (21.7%) were salaried workers.

4) **Level of education:** Twenty-four (24) out of 46 patients (52.2%) and twenty-two (22) out of 46 patients (47.8%) were respectively unschooled and schooled.

5) **Parity:** Twenty-six (26) out of 46 patients (56.52%) were nulliparous and eight (8) out of 46 patients (17.4%) were multiparous.

Table 2. Distribution of patients induced by caesarean section according to the indication for induction of labor.

Trigger indication	Numbers (n = 46)	Proportion (%)
Preeclampsia severe	21	45.7
PPM	7	15.2
Post-term	12	26.1
Eclampsia	2	4.3
Oligohydramnios	4	8.7
Total	46	100.0

Table 3. Distribution of patients induced by caesarean section according to the time between the start of induction and the start of labor.

Time	Numbers (n = 46)	Proportion (%)
<1 h	15	33.0
1 - 3 h	29	63.0
>3 h	2	4.0
Total	46	100.0

Medium: 3 hours; Extremes: 30 minutes and 7 hours.

In Table 2, severe preeclampsia was the most represented indication with twenty-one (21) out of 46 patients (45.7%), followed by post-term pregnancy (12, 26.1%), then PROM (7, 15.2%), oligohydramnios (4, 8.7%) and eclampsia (2, 4.3%).

Table 4. Distribution of patients induced by caesarean section according to the duration of labor.

Labor duration	Numbers (n = 46)	Proportion (%)
<6 h	6	13.0
6 - 11 h	26	56.5
12 - 17 h	2	4.4
No labor	12	26.1
Total	46	100.0

Table 5. Distribution of caesarean patients according to the dose of misoprostol used.

Number of tablets	Numbers (n = 46)	Proportion (%)
1 dose [1/4 cp (50 µg)]	19	41.3
2 doses [(2/4 cp (100 µg)]	27	58.7
3 doses [3/4 cp (150 µg)]	00	00
Total	46	100

Table 6. Distribution of patients undergoing caesarean surgery after artificial induction with misoprostol versus spontaneous induction, according to maternal prognosis.

Maternal prognosis	Spontaneous induction caesarean (n = 46)	Artificial induction caesarean (n = 92)	(95% CI)	P-value
IPH				
Yes	3 (6.52%)	2 (2.17%)	0.045 (0.011 - 0.19)	0.00
No	43 (93.48%)	90 (97.83%)		
Suppuration				
Yes	4 (8.70%)	2 (2.17%)	0.047 (0.011 - 0.19)	0.00
No	42 (91.30%)	90 (97.83%)		
Uterine Rupture				
Yes	2 (4.35%)	0 (0.00%)	0.011 (0.00011 - 0.18)	0.00
No	44 (95.65%)	92 (100%)		
Death				
Yes	3 (6.52%)	0 (0.00%)	0.011 (0.0007 - 0.18)	0.00
No	43 (93.48%)	92 (100%)		

In Table 3, twenty-nine (29) out of 46 patients (63%) had a delay of 1 to 3 hours between induction and onset of labor, fifteen (15) out of 46 patients had less than one hour, and two others (4%) had more than 3 hours.

In Table 4, twenty-six (26) out of 46 patients (56.6%) had between six and eleven hours of labor, six (6) patients (13%) had less than six hours, two (2) patients (4.4%) had between twelve and seventeen hours, and twelve (12) patients did not enter labor.

In Table 5, twenty-seven (27) patients out of 46 (58.7%) had received two doses of a quarter of misoprostol, equivalent to 200 µg (2 × 1/4 tablet = 100 µg). Nineteen (19) out of 46 patients (41.3%) had received one dose of a quarter of misoprostol, equivalent to 50 µg.

In Table 6, the main maternal complications were: parietal suppuration (8.7% vs 2.17%), postpartum hemorrhage (6.52% vs 2.17%), and uterine rupture (4.35% vs 0.00%). We recorded 2 cases of maternal deaths (6.52% vs 0.00%).

In Table 7, eighteen (18) out of 46 (39.13%) newborns of mothers induced artificially and delivered by cesarean section had an Apgar score < 7/10 at the first minute (vs 36.96%).

Twenty-seven (27) out of 46 (58.70%) newborns of mothers induced artificially and delivered by cesarean section had an Apgar score < 10/10 at the fifth minute, vs 30 (34.58%).

Eighteen (18) out of 46 (39.13%) newborns of mothers induced artificially and delivered by cesarean section were transferred to INSE vs 34 (36.96%).

We recorded 2 deaths out of 46 (4.35%) in the group of mothers who underwent artificial induction and cesarean section vs 2.17%.

Table 7. Distribution of newborns born to patients undergoing caesarean surgery after artificial induction with misoprostol versus spontaneous induction, according to their condition at birth.

Pronostic fetal	Declenchement misoprostol caesarean (n = 46)	Declenchement spontaneous caesarean (n = 92)	OR (95% CI)	P-value
Apgar at 1 minute				
<7/10	18 (39.13%)	34 (36.96%)	1.21 (0.73 - 2.0)	0.26
≥7/10	28 (60.87%)	58 (63.04%)		
Apgar at 5 minutes				
<10/10	27 (58.70%)	32 (34.58%)	1.6 (0.95 - 2.97)	0.04
10/10	19 (41.30%)	60 (65.22%)		
Stillborn				
Yes	18 (39.13%)	34 (36.96%)	1.21 (0.73 - 2.00)	0.26
No	28 (60.87%)	58 (63.04%)		
Deceased	2 (4.35%)	2 (2.17%)	0.044 (0.010 - 0.18	0.00
Living	44 (95.65%)	90 (97.83%)		

4. Discussion

During our study, the main constraint was the refusal of some patients to accept the principle of induction, motivating their exclusion.

During our study period, we recorded 3600 deliveries, including 130 inductions of labor with misoprostol, *i.e.*, 3.61% of all deliveries. This result is higher than that of Koranzo in Mali in 2024 in his medical thesis, who found a frequency of 2.7% [14], and that of Traoré *et al.* in Bamako in 2022, who also reported a frequency of labor induction of 1.25% [15].

However, Bagory *et al.* in 2022 in France observed a higher frequency than ours, 13.5% of women in their study [16]. This difference in frequency could be explained not only by the fact that the site of our study constitutes the only level 3 referral maternity hospital in our country, where induction is only medical and obstetrical. In developed countries such as France, artificial induction is one of the most common obstetric procedures, often performed for convenience.

Regarding age, our study was comparable to those of Sangare [10] in Mali in 2010 and Bassety *et al.* [17] in 2017 in India, who reported that women aged 20 - 30 years were the most common, with respective frequencies of 74.50% and 82.08%.

Fatima *et al.* [18] in 2013 in Pakistan reported a mean age of 26.34 ± 5.28 years.

This criterion is less consensual: an age above 35 years is considered a risk factor for failure by some authors, while others do not; some report increased chances of vaginal delivery after induction of labor in women under 35 years [19].

Regarding occupation, our results differ from those of Kelly *et al.* [20], with 76%

housewives versus 16% salaried women.

Our women were unschooled in the majority of cases, which is related to the low level of female education.

The predominance of nulliparous women in our sample was comparable to that of Fatima *et al.* [18] in 2013 in Pakistan, who reported that nulliparous women were the majority with a frequency of 61%.

Multiparity is a controversial factor; several authors have shown that it is the most important variable for predicting vaginal delivery within 24 hours. For example, Tripathy *et al.* [4], in a retrospective study on induction of labor at post-term, found that parity seems to have an important influence on delivery outcome in induction policy and is more important than Bishop score elements [19].

The majority of induced women delivered vaginally; our data are comparable to those of Syed *et al.* [21] in Pakistan in 2010 and Bharati *et al.* [22] in 2013 in India, who found that vaginal delivery was predominant with respective proportions of 96% and 50%. Conversely, different from that of Verhoven *et al.* [23] in 2013 in Netherlands, who noted that most women underwent cesarean section with a frequency of 51%.

Regarding the time between induction and onset of labor, uterine contractions appeared within 1 - 3 hours following induction. This finding is shared by Hafzur *et al.* [24] in India in 2013.

This shows the effectiveness of misoprostol, which enabled us to reduce the rate of cesarean section, avoid and prevent postpartum hemorrhage.

The proportion of women who delivered within 6 - 11 hours was greater. This result is comparable to that found by Sima Ole *et al.* [25] in Gabon in 2011, who reported the same interval with proportions of 42% and 41.7%. The induction-to-delivery interval was faster when the Bishop score was favorable.

Regarding the dose, our study differed from that of Ouredine *et al.* [26] in Tunisia in 2016, who reported that patients receiving a single dose predominated with a proportion of 84%.

Our results highlight a statistically significant association between induction with misoprostol and the occurrence of major obstetric complications such as uterine rupture, postpartum hemorrhage, parietal suppuration, and maternal death. Regarding neonatal prognosis, an association was also observed between a morbid Apgar score at the 5th minute and fetal mortality.

It is nevertheless important to emphasize that misoprostol, in our context, also had a beneficial effect in promoting a high rate of vaginal delivery and in reducing certain complications. This dual observation demonstrates both the interest and the risks associated with its use and underlines the need for strict supervision of its use, particularly in terms of dosage and maternal-fetal monitoring.

Our observations differ from those reported by Verhoven *et al.* [23], who did not show a significant association between Apgar score (1st and 5th minute) and neonatal outcome. They also contrast with the results of Bharathi *et al.* [22], who did not find a significant association between management and obstetric outcome.

These divergences could be explained by methodological, contextual, or protocol-related differences.

Thus, our results reinforce the idea that while misoprostol remains a valuable tool for labor induction, its use must be adapted, standardized, and above all, evaluated through further studies to identify the most effective and safest therapeutic regimens.

5. Conclusion

In this study, patients who received two doses of misoprostol were the most numerous. There was a statistically significant association between the use of misoprostol for labor induction and the occurrence of maternal complications, in particular, uterine rupture, postpartum hemorrhage, parietal suppuration, and maternal death. Regarding neonatal prognosis, a correlation was also observed between a morbid Apgar score and fetal mortality. These data suggest an increased risk associated with the use of misoprostol, highlighting the need for further investigations to establish optimal and safe dosing regimens in the context of labor induction.

Conflicts of Interest

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

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