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Labor interventions in low- and high-risk parturients in a university hospital

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SUMMARY

OBJECTIVE: The main aim of this study was to evaluate the impact of using interventions in low- and high-risk parturients on maternal and perinatal adverse outcomes during labor.

METHODS: This is a prospective study. The analyzed variables were obtained through a questionnaire with puerperal women (between 1- and 48-h postpartum) and through medical record searches. The study population was divided into two groups as follows: Group I included parturients who underwent at least one type of obstetric intervention and Group II included parturients who did not undergo any type of obstetric intervention.

RESULTS: Most parturients (75.3%) underwent at least one type of intervention, with oxytocin being the most prevalent intervention (49.5%), followed by misoprostol use (28.7%), elective cesarean section at the request of the patient (23.0%), amniotomy (21.2%), and episiotomy (21.0%). Regarding the adverse perinatal outcomes related to low-risk pregnancies, the prevalence of the second- or third-degree perineal tears (17.8% vs. 36.7%, p=0.001) was lower in Group I than in Group II. Moreover, in high-risk pregnancies, the prevalence of hospitalization in the neonatal intensive care unit (2.8% vs. 16.7%, p<0.001), adult intensive care unit admission (0.8% vs. 3.9%, p=0.004), and the need for oxygen therapy (26.8% vs. 40.4%, p<0.001) was lower in Group I than in Group II.

CONCLUSIONS: In low-risk parturients, the interventions performed were associated with lower prevalence of second- or third-degree perineal tears. There was a lower prevalence of neonatal and adult intensive care unit admissions, the need for oxygen therapy, intracranial hemorrhage, and neonatal infection among high-risk parturients.

KEYWORDS: First stage labor. Episiotomy. High-risk pregnancies. Morbidity.

INTRODUCTION

The advances in obstetrics contribute to the improvement of maternal and perinatal morbidity and mortality indicators; however, excessive interventions during labor no longer consider the emotional, human, and cultural aspects involved in childbirth. Therefore, the experiences had by the parturient women may leave indelible, positive, or negative marks for the rest of their lives[1].

Examples of obstetric interventions are as follows: elective cesarean section at the patient's request, Kristeller maneuver, amniotomy, episiotomy, epidural analgesia/labor analgesia, oxytocin, and misoprostol use. Regarding the cesarean section, the international medical community considers that the ideal rate would be between 10% and 15%, and there is no evidence that elective cesarean sections provide benefits; however, this intervention is becoming increasingly frequent in both developed and developing countries[2,3].

The Kristeller maneuver is used to shorten the second stage of labor. Although the literature does not show any benefits of this technique, it is still commonly used and can lead to potential complications, such as perineal tears, uterine rupture, uterine inversion, and increase in maternal and perinatal morbidity rates[4,5]. Early amniotomy may be associated with potential complications, such as fetal heart rate decelerations and infections. Episiotomy is recommended for use between 15% and 30% of cases to achieve progress when the perineum is rigid or when there is evidence of fetal or maternal distress. Routine episiotomy increases the need for suturing the perineum and risk of complications on the seventh postpartum day, leading to unnecessary pain and discomfort[6,7].

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Oxytocin is the most commonly used medication in obstetrics for the stimulation of labor because it increases uterine activity. However, oxytocin administration may present complications, such as increased rates of cesarean sections, use of epidural analgesia, intrapartum maternal fever, low pH values of umbilical cord blood, and postpartum hemorrhage[8,9].

This study aimed to evaluate the impact of using interventions in low- and high-risk parturients on maternal and perinatal adverse outcomes.

METHODS

This is a prospective, observational, and descriptive study, developed in the period between August 2019 and July 2021 in the Gynecology and Obstetrics sector of Mário Palmério University Hospital, Uberaba — MG, Brazil. The population under study was classified into two groups as follows: Group I included parturients who underwent at least one type of intervention during the labor and Group II included parturients who did not undergo any type of intervention. Following this, the parturients were subdivided into high- and low-risk pregnancies to evaluate the influence of obstetric risk in parturients who underwent or did not undergo interventions on maternal and perinatal adverse outcomes. The study was approved by the Research Ethics Committee of the University of Uberaba (UNIUBE) (CAAE: 96383118.7.0000.5145), and the consent form was obtained from all participants.

Pregnant women with single live fetus, age above 18 years, no prenatal diagnosis of fetal malformation, spontaneous or induced labor, and vaginal delivery or cesarean section were included during the study period. Women who refused to participate in the study and who were unable to complete the data collection instruments due to the difficulty in understanding it were excluded. The analyzed variables were obtained through a questionnaire applied to puerperal women (between 1- and 48-h postpartum) and through medical record searches.

Parturient women with at least one of the conditions presented in Table S1 were considered at high risk, whereas those without any condition as mentioned in Table S1 were considered at low risk. At least one of the following interventions was considered during the childbirth: episiotomy, amniotomy, Kristeller maneuver, epidural analgesia, oxytocin, and misoprostol use and elective cesarean section at the patient's request.

The maternal and perinatal adverse outcomes evaluated were as follows: 1-min Apgar score < 7, admission to the neonatal intensive care unit (ICU), admission to adult ICU, neonatal death < 72 h, maternal death, the need for oxygen therapy, neonatal hypotonia, intracranial hemorrhage, gastrointestinal hemorrhage, neonatal infection, tocotrauma, dehiscence and/or infection of the maternal surgical scar, second- or third-degree perineal tears, and puerperal hemorrhage. We considered a composite maternal/perinatal adverse outcome when at least one adverse perinatal outcome was present.

Data were entered into Microsoft Excel 2010 spreadsheet (Microsoft Corp., Redmond, WA, USA) and analyzed using SPSS version 20.0 and Prisma GraphPad version 7.0 (SPSS Inc., Chicago, IL, USA). Quantitative variables were initially submitted to the normality test (Kolmogorov-Smirmov) and presented in the form of median, minimum, and maximum values. Categorical variables were described as absolute frequencies and percentages and represented in table format. To study the difference between categorical variables and their proportions, the chi-square test was used, and to evaluate the difference between continuous variables, the Mann-Whitney U test was used. The significance level for all tests was $p<0.05$.

RESULTS

During the study period, data from 1064 parturients were obtained and divided into Group I (n=801) and Group II (n=263).

Group I presented a prevalence of public service (72.5% vs. 81.4%, p=0.011), tabagism (5.6% vs. 10.6%, p=0.005), high-risk pregnancies (61.4% vs. 77.2%, p<0.001), and nonelective cesarean section (12.2% vs. 60.1%, p<0.001), which was significantly lower than that in Group II. However, Group I presented a prevalence of health insurance (25.1% vs. 17.9%, p=0.011), third-trimester ultrasound (91.3% vs. 87%, p=0.044), adequate serology (87.1% vs. 80.6%, p=0.010), vaginal delivery (47.7% vs. 39.9%, p<0.001), elective cesarean section at the patient's request (38.2% vs. 0%, p<0.001), and forceps (1.9% vs. 0%, p<0.001) , which was higher than that in Group II. The median gestational age at admission (39.1 weeks vs. 38.4 weeks, p<0.001), number of prenatal care visits (9.0 vs. 8.0, p<0.001), weight gain (12 kg vs. 11 kg, p=0.038), and birth weight (3220 g vs. 2990 g, p<0.001) were significantly higher in Group I than that in Group II (Table S2).

Regarding the prevalence of interventions during labor, 49.5% (330/666) of the parturients used oxytocin, 28.7% (191/475) used misoprostol, 23.0% (171/666) had elective cesarean section, 21.2% (141/666) underwent amniotomy, 21.0% (140/666) underwent episiotomy, 11.9% (79/666) received analgesia epidural/analgesia, and 4.5% (30/666) received Kristeller maneuver (Figure S1).

The prevalence of admission to the neonatal ICU (2.2% vs. 13.3%, p<0.001), adult ICU admission (0.6% vs. 3.0%,

p=0.002), the need for oxygen therapy (23.6% vs. 34.2%, p<0.001), intracranial hemorrhage (0.0% vs. 1.1%, p=0.002), and neonatal infection (0.5% vs. 2.7%, p=0.003) was lower in Group I than that in Group II (Table 1).

Regarding the adverse perinatal outcomes related to low-risk pregnancies, the prevalence of second- or third-degree perineal tears (17.8% vs. 36.7%, p=0.001) was significantly lower in Group I than that in Group II (Table 2).

Table 1. Comparison of the prevalence of adverse perinatal ooutcomes among parturients who underwent interventions (Group I) and parturients who did not undergo intervention (Group II) during labor.

	Group I (n=801)	Group II (n=263)	p
Apgar score < 7 at the first min	6.7% (54/801)	8.9% (23/258)	0.242 ∫
Admission to the neonatal ICU	2.2% (18/801)	13.3% (35/263)	<0.001 ∫
Admission to the adult ICU	0.6% (5/801)	3.0% (8/263)	0.002 ∫
Need for oxygen therapy	23.6% (189/801)	34.2% (90/263)	<0,001 ∫
Neonatal hypotony	13.9% (111/801)	14.8% (39/263)	0.695 ∫
Intracranial hemorrhage	0% (0/801)	1.1% (3/263)	0.002 ∫
Gastrointestinal hemorrhage	0.1% (1/801)	0% (0/263)	0.566 ∫
Neonatal infection	0.5% (4/801)	2.7% (7/263)	0.003 ∫
Tocotrauma	1.5% (12/801)	1.5 (4/263)	0.979 ∫
Neonatal death within the first 72 h	0.1% (1/801)	0.8% (2/263)	0.092 ∫
Surgical scar dehiscence and/or infection	1.9% (15/801)	0.4% (1/263)	0.084 ∫
Second- or third-degree perineal tears	18.2% (146/801)	16% (42/263)	0.405 ∫
Puerperal hemorrhage	9.6% (77/801)	7.6% (20/263)	0.326 ∫
Maternal death	0% (0/801)	0% (0/263)	*
Composite adverse perinatal outcome	51.1% (409/801)	57.8% (152/263)	0.058 ∫

ICU: intensive care unit. Chi-square ∫: Percentage (absolute number/total number), p<0.05. * Statistical test was not applied.

Table 2. Comparison of the prevalence of composite perinatal adverse outcomes among parturients who underwent interventions (Group I) and who did not undergo (Group II) interventions in low-risk pregnancies.

	Group I (n=309)	Group II (n=60)	p
Apgar score < 7 at the first min	4.2% (13/309)	7.0% (4/57)	0.354 ∫
Admission to the neonatal ICU	1.3% (4/309)	1.7% (1/60)	0.820 ∫
Admission to the adult ICU	0.3% (1/309)	0% (0/60)	0.659 ∫
Need for oxygen therapy	18.4% (57/309)	13.3% (8/60)	0.341 ∫
Neonatal hypotony	10.0% (31/309)	11.7% (7/60)	0.703 ∫
Intracranial hemorrhage	0% (0/309)	0% (0/60)	*
Gastrointestinal hemorrhage	0.3% (1/309)	0% (0/60)	0.659 ∫
Neonatal infection	0% (0/309)	0% (0/60)	*
Tocotrauma	1.0% (3/309)	0% (0/60)	0.443 ∫
Neonatal death within the first 72 h	0% (0/309)	0% (0/60)	*
Surgical scar dehiscence and/or infection	2.6% (8/309)	1.7% (1/60)	0.672 ∫
Second- or third-degree perineal tears	17.8% (55/309)	36.7% (22/60)	0.001 ∫
Puerperal hemorrhage	7.1% (22/309)	13.3% (8/60)	0.107 ∫
Maternal death	0% (0/309)	0% (0/60)	*
Composite adverse perinatal outcome	45.3% (140/309)	56.7% (34/60)	0.107 ∫

ICU: intensive care unit. Chi-square ∫: Percentage (absolute number/total number), p<0.05. * Statistical test was not applied.

Regarding adverse perinatal outcomes related to high-risk pregnancies, the prevalence of hospitalization in the neonatal ICU (2.8% vs. 16.7%, p<0.001), adult admission to ICU (0.8% vs. 3.9%, p=0.004), the need for oxygen therapy (26.8% vs. 40.4%, p<0.001), intracranial hemorrhage (0.0% vs. 1.5%, p=0.007), and neonatal infection (0.8% vs. 3.4%, p=0.011) was significantly lower in Group I than that in Group II. The prevalence of second- or third-degree perineal tears (16.5% vs. 9.8%, p=0.025) and puerperal hemorrhage (11.2% vs. 5.9%, p=0.032) was higher in Group I than that in Group II (Table 3).

DISCUSSION

When evaluating the impact of obstetric interventions in low- and high-risk parturients on maternal and perinatal outcomes, this study divided the parturients into groups that underwent some intervention during labor (Group I) and parturients who did not undergo any intervention (Group II). Practical interventions, such as elective cesarean section; the use of medications to induce or conduct labor, such as misoprostol and oxytocin; amniotomy; epidural analgesia; episiotomy; and Kristeller maneuver were considered.

Despite what is recommended by the most recognized national and international societies, the rates of cesarean sections are increasing and, in Brazil, this rate exceeds the recommended limit, thereby making Brazil one of the countries with the highest cesarean section rates in the world[10]. This practice, which is more prevalent in private services and often disassociated with precise obstetric indications, is responsible for the increase in maternal and neonatal obstetric complications in short- and long-term follow-ups[11].

In this study, elective cesarean delivery was considered an intervention regardless of obstetric indication; therefore, patients were allocated to Group I, which represented 23% of the interventions studied and a total of 38.2% of the types of delivery. In Group I, 11.9% of the patients received epidural analgesia, which is known to be more accessible in the private or insurance health system[12,13]. This fact can be observed because 27.5% of Group I were attended at these two health systems, with only 18.5% in Group II, which may represent an important selection bias.

Among the patients in Group II, who did not undergo interventions, nonelective cesarean section represented 60.1% compared to 12.2% of Group I, which could indicate an increase in the possibilities of vaginal delivery if interventions were performed because they were performed according to good obstetric practices. The obstetric history of cesarean section was not heterogeneous between the groups and was not statistically significant.

The most common interventions were the use of the misoprostol and oxytocin medications to stimulate labor. Such interventions are often indicated at more advanced gestational ages[14-16], which were confirmed with significance at the median of

Table 3. Comparison of the prevalence of composite perinatal adverse outcomes among parturients who underwent interventions (Group I) and who did not undergo interventions (Group II) in high-risk obstetric pregnancies.

	Group I (n=492)	Group II (n=203)	p
Apgar score < 7 at the first min	8.3% (41/492)	9.5% (19/201)	0.634 [f]
Admission to the neonatal ICU	2.8% (14/492)	16.7% (34/203)	<0.001 [f]
Admission to the adult ICU	0.8% (4/492)	3.9% (8/203)	0.004 [f]
Need for oxygen therapy	26.8% (132/492)	40.4% (82/203)	<0.001 [f]
Neonatal hypotony	16.3% (80/492)	15.8% (32/203)	0.871 [f]
Intracranial hemorrhage	0% (0/492)	1.5% (3/203)	0.007 [f]
Gastrointestinal hemorrhage	0% (0/492)	0% (0/203)	*
Neonatal infection	0.8% (4/492)	3.4% (7/203)	0.011 [f]
Tocotrauma	1.8% (9/492)	2.0% (4/203)	0.901 [f]
Neonatal death within the first 72 h	0.2% (1/492)	1.0% (2/203)	0.153 [f]
Surgical scar dehiscence and/or infection	1.4% (7/492)	0.0% (0/203)	0.088 [f]
Second- or third-degree perineal tears	16.5% (81/492)	9.8% (20/203)	0.025 [f]
Puerperal hemorrhage	11.2% (55/492)	5.9% (12/203)	0.032 [f]
Maternal death	0% (0/492)	0% (0/203)	*
Composite adverse perinatal outcome	54.7% (269/492)	58.1% (118/203)	0.405 [f]

ICU: intensive care unit. Chi-square [f]: Percentage (absolute number/total number), p<0.05. * Statistical test was not applied.

39.1 weeks in Group I compared to 38.4 weeks in Group II. Contrary to expectations, these patients made up to 77.2% of Group II and only 61.4% of Group I, owing to the high-risk pregnancy that frequently necessitates early pregnancy resolution and, as a result, the use of medications to induce labor.

Furthermore, prophylactic oxytocin during the third trimester of pregnancy and misoprostol medication are effective treatments for controlling postpartum hemorrhage, reducing rates of hospitalization in adult ICU (as seen in this study), and reducing maternal mortality, as well as are strongly recommended by international medical societies[17,18]. Such use corroborates and may eventually distort the datum that the use of these medications accounted for 78.2% of the interventions studied in this study.

Regarding perinatal outcomes analyzed among low- and high-risk patients, a significant reduction was also found in neonatal ICU admission rates, the need for oxygen therapy, rates of intracranial hemorrhage, and neonatal infection, facts that may be related to factors not studied in this article, such as the decrease in the total time of the active phase and second stage of labor.

Regarding episiotomy and Kristeller maneuver practices, it was impossible to establish a beneficial relationship between their performance and perinatal outcomes. Therefore, according to the recommendations of global obstetric societies, good obstetric practice prescribes the Kristeller maneuver due to maternal and fetal risks. Episiotomy would be reserved for some cases, in which there would be strong suspicion or evidence of fetal or maternal distress[19-21].

CONCLUSIONS

This study does not aim to encourage routine obstetric interventions during labor. Moreover, the limitation of this study is recognized, considering the fact that it was a single-center study done in Brazil's Southeast region, which has higher socioeconomic power as a country with significant regional inequities and difficulty in accessing health services. However, it is important to evaluate the profile of patients who received more obstetric interventions and highlight the need for further studies that individually correlate these interventions with maternal and perinatal outcomes.

AUTHORS' CONTRIBUTIONS

KMDR: Data curation, Visualization. **CBOS**: Data curation, Visualization. **CZ**: Investigation, Visualization. **LMO**: Methodology, Visualization. **EFMS**: Visualization, Writing – original draft. **MFMC**: Formal analysis, Visualization. **EAJ**: Validation, Visualization, Writing – review & editing. **ABP**: Conceptualization, Project administration, Supervision, Visualization.

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