Original Study/Estudo Original DOI: 10.69729/aogp.v18i4a04

Is there a relation between operative birth and postpartum infection? – an observational longitudinal study

Existe uma relação entre o parto instrumentado e a infeção pós-parto? – um estudo observacional longitudinal

Maria Flores-Casteleiro[1], Rita Sarabando[1], Sara Forjaz[1], Rita Almendra[1], Raquel Rodrigues[1], Paulina Barbosa[1]
Mariana Coelho[2], Cristina Nogueira-Silva[3]
Serviço de Ginecologia e Obstetrícia do Hospital de Braga, Braga, Portugal

Abstract

Overview and Aims: In high-income countries, 5% of puerperal deaths are due to postpartum infections. Although there is clear evidence that antibiotic prophylaxis before caesarean section reduces the incidence of infection, there is less evidence in operative birth. The aim of this study was to compare the prevalence of puerperal infection between operative birth and spontaneous vaginal birth, finding independent risk factors for it.
Study design: A prospective observational study was carried out at the Obstetrics Department of a public hospital.
Population: Patients with a vaginal birth were enrolled in this study, and for each operative birth a spontaneous vaginal birth was recruited in a ratio of 1:1.
Methods: Data was collected in the first 24 hours after the birth and 6 weeks after birth, when a telephone survey was performed to assess the occurrence of infection.
Results: 385 postpartum women were included, 35 (9.1%) developed postpartum infection. The prevalence of infection in the operative birth group was higher (13.4% vs. 4.7%; p=0.003). In the same group most women were nulliparous (74.7% vs. 45.5%, p<0.001), the median duration of membrane rupture and active phase of labor was higher (5.5 hours, vs. 3.0 hours, p<0.001; 4.8 hours, vs. 3.0 hours, p<0.001), more episiotomies were performed (92.8% vs. 37.7%; p<0.001) and fewer grade I or II perineal lacerations occurred (6.2% vs. 25.1%; p<0.001). In the logistic regression, anemia was the only independent predictor of infection (p<0.001; correctly predicted cases=90.8%).
Conclusion: Although the prevalence of postpartum infection was higher after operative birth, it was not an independent risk factor. This reiterates the need to continue the investigation of operative birth contribution to postpartum infection. Before considering generalizing antibiotic prophylaxis, maybe each institution needs to analyze local data and think about how to control other possible risk factors for infection.

Keywords: Postpartum infection; Operative birth; Postpartum anemia.

Resumo

Introdução e Objetivo: Nos países desenvolvidos, 5% das mortes puerperais devem-se a infeções pós-parto. Embora haja evidência clara de que a profilaxia antibiótica da cesariana reduz a incidência de infeção, esta evidência é menor no parto

1. Department of Obstetrics and Gynecology, Hospital de Braga, Braga, Portugal
2. School of Medicine, University of Minho, Braga, Portugal
3. Department of Obstetrics and Gynecology, Hospital de Braga, Braga, Portugal; Life and Health Sciences Research Institute (ICVS), School of Medicine, University of Minho, Braga, Portugal; ICVS/3B's PT Government Associate Laboratory, Portugal.

instrumentado. O objetivo deste estudo foi comparar a prevalência de infeção puerperal entre o parto instrumentado e o parto eutócico, investigando fatores de risco independentes para a mesma.

Desenho do estudo: Estudo prospetivo observacional realizado no Serviço de Obstetrícia de um hospital público.

População: Foram incluídas as puérperas com parto vaginal. A cada parto instrumentado, juntou-se um parto eutócico numa proporção de 1:1.

Métodos: Os dados foram recolhidos 24 horas e 6 semanas após o parto, altura em que foi realizado um inquérito telefónico para avaliar a ocorrência de infeção.

Resultados: Foram incluídas 385 puérperas, 35 (9,1%) desenvolveram infeção no pós-parto. A prevalência de infeção no grupo de parto instrumentado foi maior (13,4% *vs.* 4,7%; p=0,003). No mesmo grupo a maioria das mulheres eram nulíparas (74,7% *vs.* 45,5%, p<0,001), a duração mediana da rotura de membranas e da fase ativa do trabalho de parto foi superior (5,5 horas, *vs.* 3,0 horas, p<0. 001; 4,8 horas, *vs.* 3,0 horas, p<0,001), foram realizadas mais episiotomias (92,8% *vs.* 37,7%; p<0,001) e ocorreram menos lacerações perineais grau I ou II (6,2% *vs.* 25,1%; p<0,001). Na regressão logística, a anemia foi o único preditor independente de infeção (p<0,001; casos corretamente previstos=90,8%).

Conclusões: Embora a prevalência de infeção pós-parto tenha sido superior no parto instrumentado, este não foi um fator de risco independente. Facto que reitera a necessidade de continuar a investigar a contribuição do parto instrumentado para a infeção pós-parto. Antes de generalizar a profilaxia antibiótica, talvez seja necessário que cada instituição analise os dados locais e pondere formas de controlar outros fatores de risco de infeção.

Palavras-chave: Infeção pós-parto, Parto instrumentado; Anemia pós-parto.

INTRODUCTION

Sepsis is responsible for about 11% of maternal mortality globally[1]. In high-income countries, 5% of puerperal deaths are due to postpartum infections[2]. Few studies have analyzed the role of antibiotic prophylaxis after operative birth[3]. It is known, however, that operative birth, without prophylactic antibiotic therapy, is associated with postpartum infections in about 16% of the cases[4]. Compared with spontaneous vaginal birth, operative birth can be associated with longer labor, more vaginal examinations, bladder catheterization before the procedure, more perineal lacerations, and use of episiotomy, all of which can increase the risk of infection[5].

After the publication of the ANODE trial, which demonstrated benefit in prophylactic antibiotic administration after an operative birth, there have been some changes in international recommendations on prophylactic antibiotic therapy[6-11]. However, it should be noted that women who underwent peripartum antibiotic therapy were included and that the study showed a high proportion of complications after operative birth, contrary to what is exposed in other studies[12].

Despite limited data and the limitations of the ANODE trial, many professional societies (World Health Organization (WHO), the Royal College of Obstetricians and Gynaecologists (RCOG) and the Royal Australian and New Zealand College of Obstetricians and Gynecologists (RANZCOG) have changed their recommendations to include antibiotic prophylaxis following operative vaginal delivery. However, further studies are needed to understand whether operative birth may be an independent risk factor for postpartum infection. The main goal of this study was to compare the prevalence of infection after operative birth with spontaneous vaginal birth in a public and tertiary care hospital and find independent risk factors for postpartum infection.

METHODS

This was a prospective longitudinal observational study at the Department of Obstetrics and Gynecology of a public tertiary hospital. Patients with a singleton vaginal birth at term were enrolled in this study from June 2020 until June 2021. Exclusion criteria for both groups were multiple gestations, preterm deliveries, breech birth, antibiotic therapy in the peripartum period, namely due to colonization by Streptococcus agalactiae (GBS), intrapartum fever, manual removal of the placenta, perineal lacerations of grade ≥ III or another non-obstetric indication for antibiotic therapy; Covid-19 positive patients were also excluded. A convenience sample in a 1:1 ratio (operative birth: spontaneous vaginal birth) was obtained, being collected the spontaneous vaginal birth that occurred immediately after an operative delivery included in the study. Sample size was calculated based on the incidence of puerperal infection described in the literature and from data of puerperal infection prevalence from our hospital, considering a drop rate of 15% (https://riskcalc.org/samplesize). As such, it was estimated that 376 patients were needed (188 operative births and 188 spontaneous vaginal births).

Study design and data collection

In the first 24 hours after birth, data were collected from direct interview and the clinical recordings containing sociodemographic data and relevant medical and obstetric history (including conditions related to immunosuppressive state), intrapartum parameters, neonatal data, and puerperal complications including anemia requiring correction with intravenous iron or transfusion. Labor related parameters were mainly duration of membrane rupture, duration of active labor (since 5-6 cm of dilation), spontaneous/induced labor, and perineal tears.

In a second phase, about 6 weeks after the birth, a brief telephone survey was carried out, questioning the occurrence of infection (perineal infection, endometritis, urinary tract infection or sepsis) requiring oral or intravenous antibiotic therapy and antibiotic prescription.

The primary outcome of this study was to determine the association of operative delivery and peripartum infection. Secondary outcomes were to find independent risk factors for postpartum infection.

Ethics and confidentiality of data

The present study was submitted and approved by the Hospital Ethics Committee for Research in Life and Health Sciences and the Data Protection Officer (Reference 20200054 _ Obstetricia 290420). All participants signed informed consent forms to participate in the study. A code was attributed to each participant to ensure data confidentiality and this code was used to compile the different survey replies at each time point. All procedures performed in this study were in accordance with the Declaration of Helsinki and its later amendments in Convention on Human Rights and Biomedicine, in the International Ethical Guidelines for Epidemiological Studies of the International Medical Science Organizations and the Guide to Good Clinical Practice (ICH, GCP).

Statistical analysis

Statistical analysis of data was performed using the Statistical Package for the Social Sciences® (SPSS) program, version 27.0. Statistical analysis included a descriptive and inferential analysis of the data by type of birth. Then, postpartum infection was analyzed to search for risk factors and predictors of it. Continuous variables with normal distribution were analyzed using the mean and standard deviation (SD), and variables without normal distribution were analyzed according to the median and the interquartile range (IQR); categorical variables were presented with frequencies and percentages. Chi-square and Fischer exact test were used for categorical variables, while independent sample t-test or the Mann-Whitney Test were used for continuous variables, when variables assumed a normal distribution or not, respectively. As measures of effect size, when Student's T and Mann-Whitney tests were used, the values of Cohen's d (d) and r (obtained from z) were analyzed, respectively. Regarding the Chi-Square tests or Fisher's Test, the phi coefficient (φ) was used for 2 x 2 tables, and Cramer's V (φc) for n x n tables. For all tests, the cohort points considered were low (0.1), moderate (0.3) and high (0.5), apart from Cohen's d, in which the cohort points were low (0.2), medium (0.5) and high (0.8). To assess the contribution of a set of predictors to the occurrence of postpartum infection, a binary logistic regression model was used. The predictors studied were those with a significant association in the bivariate analysis and the ones described in the literature. A p value <0.05 and a 95% confidence interval (CI) were considered statistically significant.

RESULTS

During the study period there were 432 operative births, of which 230 fulfilled the inclusion criteria and agreed to participate. As such, data were collected also from 230 spontaneous vaginal births. Of these, 36 operative births and 39 spontaneous vaginal births (15.6% and 16.9%) were lost because women did not answer the phone in the postpartum period. Therefore, a total of 385 postpartum women were included, 194 in the operative birth group and 191 in the spontaneous vaginal birth group (Figure 1).

Demographic and clinical characteristics of the participants are presented in Table I, stratified by type of delivery. No statistically significant differences were found between the two types of delivery regarding to sociodemographic characteristics and past medical history. Concerning obstetric history, there was a significant difference between the groups regarding parity, with the operative birth group including a larger proportion of primiparous (74.7% versus 45.5%; p<0.001) and the rate of previous caesarean section was also significantly higher in this group (42.9% versus 16.3%; p<0.001) (Table I).

Of the operative births, 122 were obstetric vacuum (Kiwi®), 14 were Simpson forceps and 58 were Thierry spatulas. Regarding the reasons for the operative births, the majority were carried out because of prolonged second stage of labor (85); followed by suspicion of immediate or potential fetal compromise (47), maternal exhaustion (42) and shorten the second stage of labor (20).

The two types of vaginal birth differed in some parameters related to labor (Table I). Parturients with operative birth had a median duration of ruptured membranes and labor longer than women with spontaneous vaginal birth (5.5 hours versus 3.0 hours, p<0.001; 4.8 hours versus 3.0 hours, p<0.001). There was also a higher rate of episiotomies in the operative birth group compared to the spontaneous vaginal birth group (92.8% versus 37.7%; p<0.001). In turn, the occurrence of grade I or II perineal lacerations was more frequent in spontaneous vaginal births (25.1% versus 6.2%; p<0.001). Even grouping episiotomy and perineum lacerations, to compare the occurrence of perineal tears or not, there was a statistical difference (operative birth 95.9% versus spontaneous vaginal birth 78.7%; p<0.001). Finally, there was a greater tendency towards continuous suturing in the spontaneous vaginal birth compared with operative birth (69.3% versus 49.4%; p<0.001). No differences were found regarding other labor parameters and newborn outcomes.

Even though both anemia and puerperal infection were rare, with only 8.3% anemia and 9.1% postpartum infection, both complications were more common in operative birth compared to spontaneous vaginal birth (11.3% versus 5.2%, p=0.03; and 13.4% versus 4.7%, p=0.003, respectively) (Table II). Urinary tract infection was the most prevalent infection in operative birth group (7.0%), followed by perineal infection (5.1%) and endometritis (4.4%), whereas in spontaneous vaginal birth group they were all present at a similar rate (1.9%) (p=0.026) (Table II).

To understand if puerperal infection, which showed a statistically significant difference between the two types of birth, was associated with other factors, a bivariate analysis was performed (Table III). Postpartum infection was significantly associated with first pregnancies (p=0.036), nulliparity (p=0.03), episiotomy (p=0.008) and postpartum anemia (p<0.001).

Finally, a regression model for the prediction of infection was created based on the variables with statistically significant results and the ones described in the literature, such as maternal age, education level, employment status, duration of labor and membrane rupture, obesity, and hypertension. The regression model was statistically significant (p<0.001; R2 Nagelkerke = 0.210; R2 Cox & Snell = 0.096; correctly predicted cases percentage = 90.8%). Anemia remained the only significant predictor, being associated with a 5.6-fold increase in the likelihood of postpartum infection (p<0.001).

DISCUSSION

Principal findings

Postpartum infection remains an important cause of mortality, globally[1,2]. In this study, postpartum infection occurred in 9.1% of cases; in the bivariate analyses it was more frequent in operative birth than spontaneous vaginal birth (13.4% vs. 4.7%), which comes along with the current discussion about the role of antibiotic prophylaxis[13].

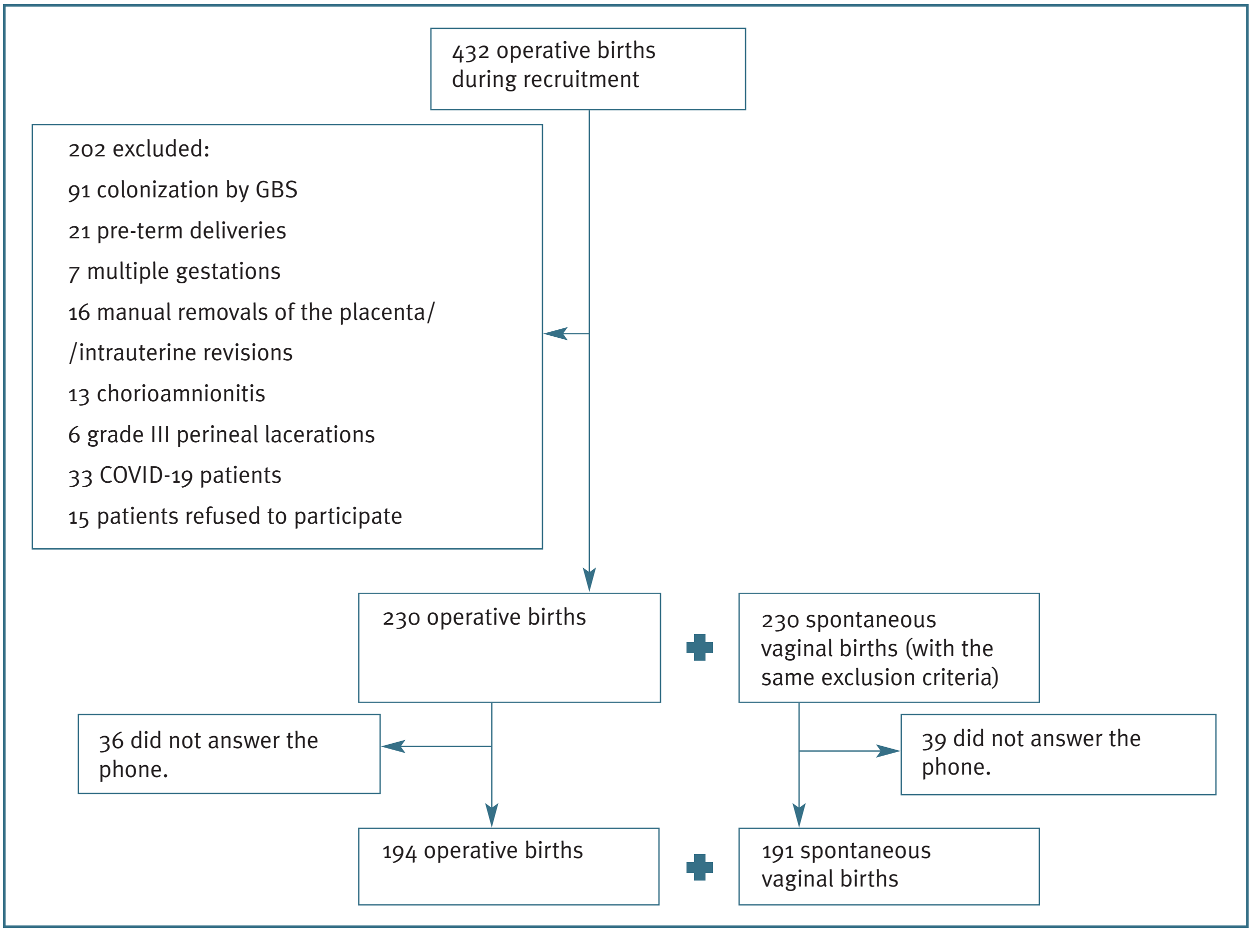

FIGURE 1. Study sample flowchart.

Results in the context of what is known

Operative birth is being described as a risk factor for the development of infectious complications in different studies[12,14-18]. Several studies point to age as a risk factor for postpartum infection, although there is controversy as to which age (older or younger) is associated with increased risk. In the present study no statistical difference was found[15,17,19]. Education level and employment status (indicators of socioeconomic status) did not show differences between groups, contrary to what was found by other authors, who report association of maternal sepsis with poor socioeconomic parameters[19]. There was a higher proportion of nulliparous women in the group with infection (77.1 % vs. 58.6%), which is in line with what is reported in the literature[14,19]. It is well established that prolonged labor and membrane rupture are related to an increased risk of infection, but in this study we did not find such association, maybe because of careful hospital surveillance and working in accordance with hospital infection control standards[20,21]. Also, it is important to recall that intrapartum fever cases and women to whom antibiotic was administrated were excluded. There was no relationship between the occurrence of infection and perineal lacerations, a situation that can be explained by the fact that one of the exclusion criteria was perineal lacerations of grade ≥ III, being these the ones most associated with infection[17,22]. Like in another study, type of suture did not differ between groups[23]. There was a higher proportion of episiotomies performed in the group that developed puerperal infections (85.7% vs. 63.4%), which is corroborated by what is described in the literature and could support ACOG guidelines[9,17,22,24]. On the other hand, this also may be related

TABLE I. SOCIODEMOGRAPHIC, MEDICAL, AND OBSTETRIC CHARACTERIZATION.

Variable	Total	Operative birth	Spontaneous vaginal birth	*p*-value	Effect size
Age (average ± SD)	31.6±5.0	31.4±5.1	31.8±4.9	0.571	d=0.06
Education level (n; %)				0.350	ΦC=0.09
Primary/Intermediate school	49 (12.7%)	22 (11.3%)	27 (14.1%)		
High school	154 (40.0%)	80 (41.2%)	74 (38.7%)		
Bachelor's Degree	134 (34.8%)	63 (32.5%)	71 (37.2%)		
Master's/PhD	48 (12.5%)	29 (14.9%)	19 (9.9%)		
Employment status (n; %)				0.963	ΦC=0.01
Employed	339 (88.1%)	170 (87.6%)	169 (88.5%)		
Unemployed	42 (10.9%)	22 (11.3%)	20 (10.5%)		
Student	4 (1.0%)	2 (1.0%)	2 (1.0%)		
Relevant medical conditions (n; %)				0.541	Φ=0.03
Yes	65 (16.9%)	35 (18.0%)	30 (15.7%)		
No	320 (83.1%)	159 (82.0%)	161 (84.3%)		
Obesity (n; %)	29 (7.5%)	14 (7.2%)	15 (7.9%)	0.813	Φ=0.01
Gestational Diabetes (n; %)	26 (6.8%)	16 (8.2%)	10 (5.2%)	0.239	Φ=0.06
Chronic Hypertension (n; %)	6 (1.6%)	5 (2.6%)	1 (0.5%)	0.104	Φ=0.08
Corticosteroid/Immunosuppressive/biological therapy (n; %)	8 (2.1%)	4 (2.1%)	4 (2.1%)	0.982	Φ=0.001
Previous deliveries (n; %)	153 (39.7%)	49 (25.3%)	104 (54.5%)	**<0.001**	Φ=0.298
Previous c-section (n; %)†	38 (24.8%)	21 (42.9%)	17 (16.3%)	**<0.001**	Φ=0.286

† only multiparous patients analyzed.

TABLE II. LABOR RELATED PARAMETERS.

Variable	Total	Operative birth	Spontaneous vaginal birth	*p*-value	Effect size
Membrane rupture duration (median; IQR)	4.4; 7.9	5.5; 8.3	3.0; 6.2	**<0.001**	r=-0.24
Labor duration (median; IQR)	3.8; 3.5	4.8; 3.0	3.0; 3.0	**<0.001**	r=-0.26
Spontaneous labor vs. Induced labor (n; %)	218 (56.6%) 167 (43.4%)	112 (57.7%) 82 (42.3%)	106 (55.5%) 85 (44.5%)	0.658	Φ=0.02
Episiotomy (yes) (n; %)	252 (65.5%)	180 (92.8%)	72 (37.7%)	**<0.001**	Φ=0.58
Grade I or II perineal laceration (yes) (n; %)	60 (15.6%)	12 (6.2%)	48 (25.1%)	**<0.001**	Φ=0.26
Episiotomy and/or grade I or II perineal laceration	303 (78.7%)	186 (95.9%)	117 (61.3%)	**<0.001**	Φ=0.42
Type of suture (n; %)				**<0.001**	Φ=20
Continuous subcuticular	175 (57.8%)	87 (49.4%)	88 (69.3%)		
Vertical mattress	128 (42.2%)	89 (50.6%)	39 (30.7%)		
Gestational age (median; IQR)	39.8; 1.6	39.7; 1.6	39.8; 1.7	0.818	r=0.23
Newborn weight (average ± SD)	3333±412	3307±401	3359±421	0.335	d=0.12
Postpartum anemia (n; %)	32 (8.3%)	22 (11.3%)	10 (5.2%)	**0.03**	Φ=0.261
Puerperal infection (n; %)	35 (9.1%)	26 (13.4%)	9 (4.7%)	**0.003**	Φ=0.151
Type of Infection (n; %)				**0.026**	ΦC=0.172
Perineal infection	11 (3.5%)	8 (5.1%)	3 (1.9%)		
Endometritis	10 (3.2%)	7 (4.4%)	3 (1.9%)		
Urinary tract infection	14 (4.5%)	11 (7.0%)	3 (1.9%)		

TABLE III. PUERPERAL INFECTION AND FACTORS ASSOCIATED WITH IT.

Variable	Total	Puerperal infection	Without infection	*p*-value	Effect size
Age (media ± SD)	31.6 ± 5.0	31.3 ± 5.1	31.6 ± 5.0	0.766	d=0.07
Education level (n; %)				0.288	ΦC=0.09
Primary/Intermediate school	49 (12.7%)	1 (2.9%)	48 (13.7%)		
High school	154 (40.0%)	14 (40.0%)	140 (40.0%)		
Bachelor's Degree	134 (34.8%)	15 (42.9%)	119 (34.0%)		
Master's/PhD	48 (12.5%)	5 (14.3%)	43 (12.3%)		
Employment status (n; %)				0.218	ΦC=0.09
Employed	339 (88.1%)	34 (97.1%)	305 (87.1%)		
Unemployed	42 (10.9%)	1 (2.9%)	41 (11.7%)		
Student	4 (1.0%)	0 (0.0%)	4 (1.1%)		
Relevant medical conditions (n; %)				0.366	Φ=0.05
Yes	65 (16.9%)	4 (11.4%)	61 (17.4%)		
No	320 (83.1%)	31 (88.6%)	289 (82.6%)		
Obesity (n; %)	29 (7.5%)	0 (0.0%)	29 (8.3%)	0.08	Φ=0.09
Gestational Diabetes (n; %)	26 (6.8%)	3 (8.6%)	23 (6.6%)	0.653	Φ=0.02
Chronic Hypertension (n; %)	6 (1.6%)	0 (0.0%)	6 (1.7%)	0.435	Φ=0.04
Corticosteroid/Immunosuppressive/biological therapy (n; %)	8 (2.1%)	1 (2.9%)	7 (2.0%)	0.735	Φ=0.02
Previous pregnancies (n; %)	186 (48.3%)	11 (31.4%)	175 (50.0%)	0.036	Φ=0.11
Previous deliveries (n; %)	153 (39.7%)	8 (22.9%)	145 (41.4%)	0.03	Φ=0.11
Previous c-section (n; %)	38 (24.8%)	3 (8.6%)	35 (10.0%)	0.79	Φ=0.01
Membrane rupture duration (median; IQR)	4.4; 7.9	5.0; 6.1	4.2; 8.0	0.316	r=-0.04
Labor duration (median; IQR)	3.8; 3.5	4.0; 2.0	3.8; 3.6	0.399	r=-0.05
Spontaneous labor vs. Induced labor (n; %)	218 (56.6%) 167 (43.4%)	19 (54.3%) 16 (45.7%)	199 (56.9%) 151 (43.1%)	0.770	Φ=0.02
Episiotomy (yes) (n; %)	252 (65.5%)	30 (85.7%)	222 (63.4%)	0.008	Φ=0.14
Grade I or II perineal laceration (yes) (n; %)	60 (15.6%)	2 (5.7%)	58 (16.6%)	0.09	Φ=0.09
Episiotomy and/or grade I or II perineal laceration	303 (78.7%)	31 (88.6%)	272 (77.7%)	0.135	Φ=0.08
Type of suture (n; %)				0.855	Φ=0.01
Continuous subcuticular	175 (57.8%)	18 (56.3%)	157 (57.9%)		
Vertical mattress	128 (42.2%)	14 (43.8%)	114 (42.1%)		
Gestational age (median; IQR)	39.8; 1.6	40.0; 2.0	39.8; 1.5	0.696	r=0.02
Baby weight (media ± SD)	3333±412	3382±341	3328±418	0.114	d=0.13
Postpartum anemia (n; %)	32 (8.3%)	11 (31.4%)	21 (6.0%)	<0.001	Φ=0.265

to the bigger proportion of episiotomies performed in operative birth group and a confounding effect, as explained later, since both are associated with puerperal infection in bivariate analyses only. Postpartum anemia was significantly related to the occurrence of infection (31.4% vs. 6.0%). This result is also documented in the existing literature, although the mechanism of this association is not yet understood[15,17]. Several of the studied factors in this study may be interconnected, such as anemia, instrumental delivery and perineal tears.

There is no consensus in the literature regarding the impact of operative birth on the occurrence of infection, since it is presented as a risk factor in some studies, but not in others[12,14-19,25]. However, in most of these studies the statistical analyses are performed not considering major confounding factors, such as the occurrence of perineal laceration or episiotomy[13]. The present study found that the type of birth was not an independent risk factor when such factors were included in the multivariate analysis. Thus, despite the significant association of nulliparity, operative birth, episiotomy, and postpartum anemia with the existence of infection, when the binary logistic regression model was created, only anemia remained as an independent predictor. Even including other variables described in the literature (maternal age, education level, employment status, obesity, hypertension, duration of labor and rupture of membranes), only anemia remained an independent factor associated with postpartum infection[15,17]. Furthermore, the results of this study highlight the significance of peripartum anemia. Considering that the aim of this study was to find associations between different factors and postpartum infections, which may assist clinicians in identifying women at high risk for infection, reduction of this complication is of great importance in the prevention of postpartum infectious morbidity.

Clinical implications

Although the ANODE study showed evidence of the benefit of prophylactic antibiotic therapy after operative birth, the high number of complications observed in that study must be considered[12]. Furthermore, the only infections that occurred in a significantly lower proportion in the group that received antibiotics, were those directly related to the surgical wound, for which the main risk factors are episiotomy and perineal lacerations and not the operative birth itself. Major international societies changed their recommendations based solely on ANODE study, but our local investigation showed different results[6-8]. This is relevant for clinical practice and local protocols, as defended in WHO recommendations, which stands by the establishment of local protocols, infection surveillance and clinical audit and feedback. As part of the global efforts to reduce antimicrobial resistance, antibiotics should be administered only when there is a clear medical indication and where the expected benefits outweigh the potential harms within the local context[8].

Research implications

Since this is still a debatable question, before considering the generalization of antibiotic prophylaxis, maybe each hospital needs to analyze their own data and think about how to control other risk factors.

Strengths and limitations

This prospective analysis reduces the occurrence of a memory bias typical of retrospective studies. About the limitations, since postpartum anemia was an independent predictor of puerperal infection, it would have been important to identify women with anemia prior to delivery and how this variable could or could not influence the infection rate. Additionally, sample size is one limitation of the study, although it was within the estimated necessary size for validated results, it can influence the low prevalence of postpartum infections and makes it difficult to generalize results.

Conclusions

The conclusions of the present study reiterate the need to continue the investigation of operative birth contribution to postpartum infection. There is an urgent need to clarify the risk factors for puerperal infection and then build decision algorithms that allow an individualized approach, based on the risk of each patient. It is also important to think about the burden of antibiotic resistance related to exaggerated antibiotic prescription. Considering all these factors, studying our local data is essential for making good decisions for our patients.

REFERENCES

1. Say L, Chou D, Gemmill A, Tunçalp Ö, Moller AB, Daniels J, et al. Global causes of maternal death: a WHO systematic analysis. Lancet Glob Health. 2014 Jun;2(6):e323-33. doi: 10.1016/S2214-109X(14)70227-X.

2. Creanga AA, Syverson C, Seed K, Callaghan WM. Pregnancy-related mortality in the United States, 2011-2013. Obstet Gynecol 2017;130:366-73. DOI: 10.1097/AOG.0000000000002114

3. Smail FM, Grivell RM. Antibiotic prophylaxis versus no prophylaxis for preventing infection after caesarean section. Cochrane Database Syst Rev 2014;10:CD007482. DOI: 10.1002/14651858.CD007482.pub3

4. Bonet M, Souza JP, Abalos E, Fawole B, Knight M, Kouanda S, et al. The global maternity sepsis study and awareness campaign (GLOSS): study protocol. Reprod. Health 2018;15(1):16. doi.org/10.1186/s12978-017-0437-8

5. Mohamed-Ahmed O, Hinshaw K, Knight M. Operative vaginal delivery and postpartum infection. Best Pract Res Clin Obstet Gynaecol 2018;56:93-106. DOI: 10.1016/j.bpobgyn.2018.09.005. Epub 2018 Sep 29.

6. Murphy DJ, Strachan BK, Bahl R, on behalf of the Royal College of Obstetricians Gynaecologists.Assisted Vaginal Birth. BJOG 2020;127:e70-112.

7. The Royal Australian and New Zealand College of Obstetricians and Gynaecologists. Instrumental Vaginal Birth; 2020. https://ranzcog.edu.au/RANZCOG_SITE/media/RANZCOG-MEDIA/Women%27s%20Health/Statement%20and%20guidelines/Clinical-Obstetrics/Instrumental-vaginal-birth-(C-Obs-16)-Review-March-2020.pdf?ext=.pdf

8. WHO recommendation on routine antibiotic prophylaxis for women undergoing operative vaginal birth. Geneva: World Health Organization; 2021. Licence: CC BY-NC-SA 3.0 IGO.

9. American College of Obstetricians and Gynecologists' Committee on Practice Bulletins – Obstetrics. Operative Vaginal Birth: ACOG Practice Bulletin, Number 219; Obstet Gynecol 2020; 135(4):e149-59. DOI: 10.1097/AOG.0000000000003764

10. Van Schalkwyk J, Van Eyk N. No. 247 – Antibiotic Prophylaxis in Obstetric Procedures. J Obstet Gynaecol Can 2017;39(9): e293-99. DOI: 10.1016/j.jogc.2017.06.007

11. Liabsuetrakul T, Choobun T, Peeyananjarassri K, Islam QM. Antibiotic prophylaxis for operative vaginal delivery. Cochrane Database Syst Rev 2020, Issue 3. Art. No.: CD004455. DOI: 10.1002/14651858.CD004455.pub5.

12. Knight M, Chiocchia V, Partlett C, Rivero-Arias O, Hua X, Hinshaw K, et al. ANODE collaborative group. Prophylactic antibiotics in the prevention of infection after operative vaginal delivery (ANODE): a multicentre randomised controlled trial. Lancet 2019;393(10189), 2395-403. DOI: 10.1016/S0140-6736(19)30773-1

13. Berhan Y, Kirba S, Gebre A. Still No Substantial Evidence to Use Prophylactic Antibiotic at Operative Vaginal Delivery: Systematic Review and Meta-Analysis. Obstet Gynecol Int 2020: 1582653. DOI: 10.1155/2020/1582653

14. Acosta CD, Kurinczuk JJ, Lucas DN, Tuffnell DJ, Sellers S, Knight M, & United Kingdom Obstetric Surveillance System. Severe maternal sepsis in the UK, 2011-2012: a national case-control study. PLoS Med 2014;11(7):e1001672. DOI: 10.1371/journal.pmed.1001672

15. Acosta CD, Bhattacharya S, Tuffnell D, Kurinczuk JJ, Knight M. Maternal sepsis: a Scottish population-based case-control study. BJOG 2012;119(4):474-83. DOI: 10.1111/j.1471-0528.2011.03239.x

16. Liu S, Heaman M, Joseph KS, Liston RM, Huang L, Sauve R, et al. Risk of maternal postpartum readmission associated with mode of delivery. Obstet Gynecol 2005:105(4):836-42. DOI: 10.1097/01.AOG.0000154153.31193.2c

17. Axelsson D, Brynhildsen J, Blomberg M. Postpartum infection in relation to maternal characteristics, obstetric interventions and complications. J Perinat Med 2018;46(3):271-78. DOI: 10.1515/jpm-2016-0389

18. Lydon-Rochelle M, Holt VL, Martin DP, Easterling TR. Association between method of delivery and maternal rehospitalization. JAMA 2000;283(18):2411-16. DOI: 10.1001/jama.283.18.2411

19. Acosta CD, Knight M, Lee HC, Kurinczuk JJ, Gould JB, Lyndon A. The continuum of maternal sepsis severity: incidence and risk factors in a population-based cohort study. PloS one 2013;8(7): e67175. DOI: 10.1371/journal.pone.0067175

20. Stephansson O, Sandström A, Petersson G, Wikström AK, Cnattingius S. Prolonged second stage of labour, maternal infectious disease, urinary retention and other complications in the early postpartum period. BJOG 2016;123(4):608-16. DOI: 10.1111/1471-0528.13287

21. Song H, Hu K, Du X, Zhang J, Zhao S. Risk factors, changes in serum inflammatory factors, and clinical prevention and control measures for puerperal infection. J Clin Lab Anal 2020. 34(3): e23047. DOI: 10.1002/jcla.23047

22. Gommesen D, Nohr EA, Drue HC, Qvist N, Rasch V. Obstetric perineal tears: risk factors, wound infection and dehiscence: a prospective cohort study. Arch Gynecol Obstet 2019;300(1):67-77. DOI: 10.1007/s00404-019-05165-1

23. Soliman LE, Ghareeb MA, Elhameid AA, Lashin ME. Interrupted Versus Continuous Suturing of Episiotomy: A Comparative Study. Zagazig University Medical Journal 2020;26(2):287-96. DOI: 10.21608/ZUMJ.2019.12551.1221

24. Macleod M, Strachan B, Bahl R, Howarth L, Goyder K, Van de Venne M, et al. A prospective cohort study of maternal and neonatal morbidity in relation to use of episiotomy at operative vaginal delivery. BJOG 2008;115(13):1688-94. DOI: 10.1111/j.1471-0528.2008.01961.x

25. Bailit JL, Grobman WA, Rice MM, Wapner RJ, Reddy UM, Varner MW, et al. Evaluation of delivery options for second-stage events. Am J Obstet Gynecol 2016;214(5):638.e1-10. DOI: 10.1016/j.ajog.2015.11.007

AUTHOR CONTRIBUTIONS

MFC, RS, MC e CNS contributed to the concept and study design. All authors contributed to data curation, analysis and interpretation of data. MFC and RS were responsible for the article draft. CNS supervised the team research and revised the article critically. All authors approved the final article as submitted and agreed to be accountable for all aspects of the work.

CONFLICT OF INTEREST

The authors report no conflict of interest.

CORRESPONDENCE TO:

Maria Flores-Casteleiro
E-mail: mariafcasteleiro@gmail.com
https://orcid.org/0009-0003-5077-0871

RECEIVED: 04/07/2024
ACCEPTED: 02/12/2024