


Relationship between antenatal vulvovaginitis and birth-related perineal tear

Relação entre vulvovaginite pré-natal e laceração perineal relacionada ao parto
Relación entre vulvovaginitis prenatal y desgarro perineal relacionado con el parto

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Abstract

Objective: To determine the relationship between antenatal vulvovaginitis and birth-related perineal tear.

Methods: An analytical cross-sectional study with 100 postpartum women, ≥ 18 years of age, who gave birth vaginally to a single, live, full-term baby in cephalic presentation at a midwife-led birth center. Data were collected from the antenatal and birth record and by structured interview of participants. Distribution of continuous and categorical variables according to perineal tear were compared by using the Student's T-test, Chi-square and Fisher Exact tests. For variables significantly associated with perineal tear, the Odds Ratio with logistic regression models was estimated. Multiple regression models were adjusted to evaluate the independent effect of variables. Statistical significance was considered at a level $p < 0.05$.

Results: mean of participants' age 23.1 years, 16% labor induced with misoprostol, 54% synthetic oxytocin infusion in labor, 83% lithotomy birth position, 98% "hands on" maneuver, 75% perineal tear, 54% antenatal vulvovaginitis, mean of newborn birth weight, head and thoracic circumference: 3.102g, 33.3cm and 32.2cm, respectively. Antenatal vulvovaginitis ($p=0.005$) and newborn birth weight ($p=0.006$) and head circumference (0,027) were associated with perineal tear. The multiple analysis showed that women who had antenatal vulvovaginitis had a 4.6 (IC 95%:1.712-14.125; $p=0.004$) chance of sustaining perineal tear compared to those without vulvovaginitis, regardless of newborn birth weight (OR:1.182 IC 95%:1.002-1.415; $p=0,056$) and head circumference (OR:1.160 IC 95%: 0.721-1.892; $p=0.544$). There was no association between treating antenatal vulvovaginitis and perineal tear ($p > 0,999$) or antenatal vulvovaginitis and perineal tear severity (OR: 1.061 IC 95%: 0.383-3.069; $p=0.911$).

Conclusion: This study demonstrates an associated risk between antenatal vulvovaginitis perineal injury. It is necessary to prevent and treat antenatal vulvovaginitis, and offer proper perineal care to women who have had antenatal vulvovaginitis during childbirth.

Resumo

Objetivo: Determinar a relação entre vulvovaginite pré-natal e laceração perineal relacionada ao parto.

Método: Estudo transversal analítico com 100 puérperas ≥ 18 anos de idade que deram à luz por parto normal a um bebê único, vivo, a termo, em apresentação cefálica, em um centro de parto liderado por enfermeiras obstetras. Os dados foram coletados a partir da ficha de pré-natal e nascimento e por entrevista estruturada dos participantes. A distribuição das variáveis contínuas e categóricas de acordo com a ruptura perineal foi comparada com o teste t de Student, qui-quadrado e teste exato de Fisher. Para as variáveis significativamente associadas à ruptura perineal, foi estimado o Odds Ratio com modelos de regressão logística. Modelos de regressão múltipla foram ajustados para avaliar o efeito independente das variáveis. A significância estatística foi considerada com $p < 0,05$.

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Resultado: A média de idade das participantes foi de 23,1 anos, 16% dos trabalhos de parto foram induzidos com misoprostol, em 54% dos trabalhos de parto houve infusão de ocitocina sintética, 83% dos partos foram em posição de litotomia, 98% de manobra *hands-on*, 75% de laceração perineal, 54% de vulvovaginite pré-natal, média de peso ao nascer, circunferência cefálica e torácica dos recém-nascidos: 3,102g, 33,3cm e 32,2cm, respectivamente. Vulvovaginite pré-natal ($p=0,005$), peso ao nascer do recém-nascido ($p=0,006$) e perímetro cefálico (0,027) tiveram associação com a ruptura perineal. A análise múltipla mostrou que mulheres com vulvovaginite pré-natal tiveram uma chance de 4,6 (IC 95%: 1,712-14,125; $p=0,004$) de sustentar laceração perineal em comparação com aquelas sem vulvovaginite, independentemente do peso do recém-nascido (OR:1,182, IC 95%: 1,002-1,415; $p=0,056$) e do perímetro cefálico (OR: 1,160, IC 95%: 0,721-1892; $p=0,544$). Não houve associação entre o tratamento de vulvovaginite pré-natal e laceração perineal ($p>0,999$) ou vulvovaginite pré-natal e gravidade da laceração perineal (OR:1,061, IC 95%: 0,383-3,069; $p=0,911$).

Conclusão: Este estudo demonstrou associação entre laceração perineal no parto e vulvovaginite pré-natal. É necessário prevenir e tratar a vulvovaginite pré-natal e oferecer cuidados perineais adequados durante o parto às mulheres que tiveram vulvovaginite na gestação.

Resumen

Objetivo: Determinar la relación entre vulvovaginitis prenatal y desgarro perineal relacionado con el parto.

Método: Estudio transversal analítico con 100 puérperas de ≥ 18 años de edad que dieron a luz por parto vaginal a un bebé único, vivo, a término, en presentación cefálica, en un centro de parto liderado por enfermeras obstetras. Los datos se recopilaron a partir de la ficha de atención prenatal y nacimiento y mediante encuesta estructurada de las participantes. La distribución de las variables continuas y categóricas de acuerdo con la ruptura perineal fue comparada con el test-T de Student, la prueba χ^2 de Pearson y la prueba exacta de Fisher. Para las variables significativamente asociadas a la ruptura perineal, se estimó el Odds Ratio con modelos de regresión logística. Se adaptaron los modelos de regresión múltiple para evaluar el efecto independiente de las variables. La significación estadística fue considerada con $p<0,05$.

Resultado: El promedio de edad de las participantes fue de 23,1 años, el 16 % de los trabajos de parto fueron inducidos con misoprostol, en el 54 % de los trabajos de parto hubo infusión de oxitocina sintética, el 83 % de los partos fueron en posición de litotomía, el 98 % de maniobra *hands-on*, el 75 % de desgarro perineal, el 54 % de vulvovaginitis prenatal, el promedio de peso al nacer de 3,102 g, de circunferencia cefálica de 33,3 cm y de circunferencia torácica de 32,2 cm de los recién nacidos. La vulvovaginitis prenatal ($p=0,005$), el peso al nacer del recién nacido ($p=0,006$) y el perímetro cefálico (0,027) tuvieron relación con la ruptura perineal. El análisis múltiple demostró que mujeres con vulvovaginitis prenatal tuvieron una probabilidad de 4,6 (IC 95 %: 1,712-14,125; $p=0,004$) de tener desgarro perineal en comparación con aquellas sin vulvovaginitis, independientemente del peso del recién nacido (OR:1,182, IC 95 %: 1,002-1,415; $p=0,056$) y del perímetro cefálico (OR:1,160, IC 95 %: 0,721-1892; $p=0,544$). No se observó relación entre el tratamiento de vulvovaginitis prenatal y desgarro perineal ($p>0,999$) o entre la vulvovaginitis prenatal y la gravedad del desgarro perineal (OR:1,061, IC 95 %: 0,383-3,069; $p=0,911$).

Conclusión: Este estudio demostró que existe relación entre desgarro perineal en el parto y vulvovaginitis prenatal. Es necesario prevenir y tratar la vulvovaginitis prenatal y ofrecer cuidados perineales adecuados durante el parto a las mujeres que tuvieron vulvovaginitis en el embarazo.

Introduction

Birth-related perineal trauma commonly affects women who give birth vaginally. This is characterized by spontaneous tears, episiotomy or both and is associated with an increased risk for anal sphincter injuries, wound healing complications,⁽¹⁾ infection, pelvic floor disorders,⁽²⁾ dyspareunia and perineal pain,^(3,4) which adversely impact on postpartum health and wellbeing.⁽⁵⁾

Several risk factors for perineal injury are described in the literature and include parity, birth position, episiotomy, newborn birth weight, etc.^(6,7) Birth-related perineal trauma also appears to be very common among women with antenatal vulvovaginitis not treated effectively during pregnancy; however there is no robust evidence about any association.

Only one research study involving 662 pregnant women, >37 weeks of gestational age, aged 15 to 45 years, who gave birth vaginally aimed to investigate an association between bacterial vaginosis

and birth-related perineal trauma. The researchers reported that bacterial vaginosis was tested using the Nugent gradient test, which is gold standard method for bacterial vaginosis diagnosis. The prevalence of 1st to 4th degree perineal tears was 35.8% and no association between these two variables was found.⁽⁸⁾

During pregnancy, the mother's body goes through various anatomical and physiological adjustments in their immune response, endocrine system, vaginal and cervical pH, vaginal flora leading to infections. Therefore, women are more susceptible to vulvovaginitis during pregnancy which is an inflammatory process or infection in the lower genital tract with varying degrees of signs and symptoms, such as pruritus, dyspareunia, burning and vulvar odor, changes in color and volume of vaginal secretion, vulvar hyperemia and edema. Many pregnant women, however, may be asymptomatic.⁽⁹⁾

Candidiasis, trichomoniasis and bacterial vaginosis are the most common vulvovaginitis con-

ditions. The two infections are caused by specific microorganisms: *Candida albicans* and *Trichomonas vaginalis*, respectively; while bacterial vaginosis is a clinical condition characterized by a shift in vaginal flora toward more diverse bacterial species, such as *Gardnerella vaginalis*.^(10,11) Interestingly, there is evidence to support an association between vulvovaginitis during pregnancy and spontaneous abortion, preterm labor, premature rupture of membranes, chorioamnionitis, intrauterine growth restriction, congenital infections and increased neonatal morbidity and mortality rates. Therefore, these infections should be detected early and treated during the antenatal period.⁽¹¹⁾ Nevertheless, if vulvovaginitis is not treated or inadequately treated, perineal tissue and mucosa can be at risk of injury as the baby passages through the birth canal.⁽⁸⁾

Therefore, there is justification to find out whether there is an association between antenatal vulvovaginitis and birth related perineal trauma to enhance antenatal and childbirth care.

To determine the relationship between vulvovaginitis and birth-related perineal tear.

Methods

An analytical cross-sectional study, conducted with all women ≥ 18 years of age, with no previous vaginal birth, who gave birth vaginally to a live, full-term single baby in cephalic presentation at a midwife-led in a hospital birth center from August to November 2018. This midwife-led birth center is a reference for high risk pregnant women who live in the southeast part of São Paulo city (Brazil) and it accounts for approximately 200-300 births/month. It has 5 birth suites where low to high risk pregnant women are cared for by nurse residents and nurse-midwives during labor, childbirth and early postpartum. Obstetricians and doctor residents are responsible for patient hospitalization and cesarean section. The routine of care during labor, childbirth and early postpartum includes: shared decision making choices, light diet, free water, being ambulant, use of birth ball, partograph and intravenous infusion of synthetic oxytocin for induction

or augmentation of labor. In January 2018, there were 213 normal births in this setting: 85 (39.9%) women with no previous vaginal birth, 42 (49.4%) women with perineal trauma, being 33 (78.6%) and 9 (21.4%) women with 1st and 2nd degree tears, respectively. No 3rd or 4th degree perineal tears were found.

Data collection

Data were collected on a daily basis, from Monday to Friday, by a trained nurse-midwife student, and extracted from the antenatal and birth records and from structured interviews with participants. Initially, all eligible participants were identified through the birth record book and after signing an informed consent form, they were interviewed and their antenatal record checked out.

Variables

- **Independent variable:** vulvovaginitis during pregnancy confirmed by being documented in antenatal care medical records and during structured interview with postpartum women.
- **Dependent variable:** perineal tear classified as 1st, 2nd, 3rd ou 4th degree laceration from documentation in medical records.
- **Other variables:** maternal age, misoprostol and oxytocin use in labor and/or second stage, maternal birth position, perineal maneuvers (hands on or hands off), perineal lubrication with petroleum jelly in second stage, baby's birth weight and head and thoracic circumference, antenatal vulvovaginitis treatment.

Data analysis

Normal distribution of continuous variables was tested using Shapiro Wilk test. Parametric and corresponding non-parametric tests were used for continuous variables with and without normal distribution, respectively. Continuous variables are described by means and standard deviations, and categorical variables using absolute and relative frequencies. To compare the distribution of continuous and categorical variables according to birth-related perineal tear the Student's T-test, Chi-square and Fisher Exact tests, were used. For variables sig-

nificantly associated with birth-related perineal tear ($p < 0.05$), the Odds Ratio with logistic regression models was estimated. Multiple regression models were adjusted to evaluate the independent effect of variables significantly associated with birth-related perineal tear in the univariate analyses ($p < 0.005$). Statistical significance was considered at a level - p -value of 5%.

Ethics

In compliance with the National Health Council resolution number 466/2012, this study was approved by the Research Ethics Committee (ID: 2.697.543). All mothers voluntarily participated in this study after signing an informed consent form.

Results

Among 575 women who gave birth vaginally during the data collection period, 190 (33%) met the inclusion criteria; however, 100 (52%) women were included as 90 (48%) gave birth during the weekends and discharged home on/before monday morning.

Participants average age was 23.1 (DP=4.8) in years. Seventy five percent of mothers had birth-related perineal tears, 53 (70.7%) first degree and 22 (29.3%) second degree tear. It was recorded that 62.7% of participants had antenatal vulvovaginitis but of these 24 (51%) were treated during antenatal care. There was evidence to suggest that antenatal vulvovaginitis was significantly associated with birth-related perineal tears. However, there was no association between treating vulvovaginitis during antenatal care and having birth-related perineal tears.

Sixteen percent of participants had an induction of labor with misoprostol, 47 (47%) synthetic oxytocin infusion during labor and 11 (20.4%) in second stage only. No association between using misoprostol or oxytocin during labor or second stage and birth-related perineal trauma was found (Table 1).

The vast majority of participants in this study gave birth in lithotomy position while only a small

number opted for an upright, lateral or hands and knees position. Data on perineal maneuver and lubrication with petroleum jelly were obtained from only 50 participant's records because these interventions are rarely registered. Of these, nearly all midwives used "hands on" maneuver and avoided to apply petroleum jelly to the perineal region. There was no significant association between these variables and birth-related perineal tears (Table 1).

Table 1. Antenatal and birth variables between women with and without birth-related perineal tears

Perineal tears	No (n=25) n(%)	Yes (n=75) n(%)	p-value
Vulvovaginitis			
No	18(72)	28(37.3)	0.005
Yes	7(28)	47(62.7)	
Antenatal treatment (n=54)			
No	4(57.1)	23(48.9)	>0.999
Yes	3(42.8)	24(51.1)	
Misoprostol			
No	22(88)	62(82.7)	0.754
Yes	3(12)	13(17.3)	
Oxytocin in labour			
No	13(52)	40(53.3)	>0.999
Yes	12(48)	35(46.7)	
Oxytocin in the second stage			
No	13(52)	29(38.7)	0.349
Yes	12(48)	46(61.3)	
Birth position			
Lithotomy	18(72)	65(86.7)	0.119
Squatting	5(20)	4(5.3)	
Upright	0(0)	2(2.7)	
Others	2(8)	4(5.3)	
Perineal maneuver (n=49)			
No	0(0)	0(0)	>0.999
Yes	6(100)	43(100)	
Petroleum jelly in the second stage (n=50)			
No	2(28.6)	29(67.4)	0.089
Yes	5(71.4)	14(32.6)	

Newborn baby's birth weight, head and thoracic circumference were on average 3,102g (SD=387), 33.3 cm (SD=1.7) and 32.2 cm (SD=1.2), respectively. Women with birth-related perineal trauma gave birth to babies significantly heavier and with larger head circumference than those with no tears (Table 2).

Table 2. Comparison of baby's birth weight, head and thoracic circumference between women with or without birth-related perineal tears

Perineal tears	No (n=25)	Yes (n=75)	Total	p-value
	Mean (SD)	Mean (SD)	Mean (SD)	
Birth weight (g)	2921.20 (408.98)	3162.80 (362.57)	3102.40 (387.13)	0.006
Head circumference (cm)	32.78 (1.41)	33.42 (1.17)	33.26 (1.26)	0.027
Thoracic circumference (cm)	31.90 (1.93)	32.35 (1.63)	32.24 (1.71)	0.253

The multiple model analysis shows that women who had antenatal vulvovaginitis were 4.6 times more likely to have perineal tears compared to those without vulvovaginitis, regardless of baby's birth weight and head circumference (Table 3).

Table 3. Multiple model analysis for birth-related perineal tears

	Odds ratio [CI 95%]	p-value
Intercept	1 (Reference)	
Vulvovaginitis	4.674 [1.712; 14.125]	0.004
Birth weight	1.182 [1.002; 1.415]	0.056
Head circumference	1,160 [0,721; 1,892]	0,544

There was no significant association between antenatal vulvovaginitis (OR: 1.061 IC 95%: 0.383-3.069; p=0.911), baby's birth weight (OR: 1.045 IC 95%: 0.909-1.203; p=0.537) and head circumference (OR: 1.143 IC 95%: 0.743-1.791; p=0.546) and birth-related perineal tears severity.

Discussion

This study explored an association between antenatal vulvovaginitis and birth-related perineal tears as there is an identified gap in the literature on this topic. The findings show that antenatal vulvovaginitis, baby's birth weight and head circumference are associated with perineal injuries. Women who had antenatal vulvovaginitis were almost 5 times more likely to have birth-related perineal tears when compared to those with no recorded vulvovaginitis, nevertheless due to the wide confidence interval this finding should be interpreted with caution. No association with perineal trauma severity was found. However, having antenatal vulvovaginitis increased

the chance of perineal tear, regardless of newborn characteristics.

Antenatal vaginal infections during the antenatal period have been shown in literature, to have a relationship with negative newborn outcomes, such as prematurity and low birth weight. Interestingly, a pap smear test of 1344 Brazilian pregnant women between 2005 and 2008 showed that 38.24% were infected by *Gardnerella vaginalis*, 33.75% by *Candida spp*, 5.92% by *Trichomonas vaginalis* and 21.54% by mixed flora (cocci and other bacilli).⁽¹²⁾ Strong evidence has shown that screening for early detection and treatment for vulvovaginitis (candidiasis, trichomoniasis, and bacterial vaginosis) by 20 weeks of gestation reduces the incidence of preterm and low birth weight infants.⁽¹³⁾

More than 60% of the participants in this current study had antenatal vulvovaginitis recorded, but not all were treated before giving birth. Birth-related perineal tear rate of 1st to 2nd degree laceration was 75%. This current study showed that having antenatal vulvovaginitis increased pregnant women risk of birth-related perineal tears. However, an association was not found between women who received antenatal treatment or not for vulvovaginitis. Conversely, a research study undertaken in France, involving 662 pregnant women at 37 weeks gestation diagnosed with bacterial vaginosis found no association between this condition and birth-related perineal tears. However, it is not clear whether these women were treated or not in the antenatal period, as this was not reported but perineal trauma rates of 1st to 4th degree lacerations was 35.8%⁽⁸⁾ which is consistent with previously reported rates of trauma.^(14,15)

In this current research study it was not possible to identify the microorganism that specifically led to the infection for each woman as this information was not available in the antenatal care register, also the guideline for treating antenatal vulvovaginitis in the city of São Paulo/Brazil is based on syndromic algorithms for women with signs and symptoms of vaginal discharge.⁽¹⁶⁾ A more definite or etiological diagnosis may be possible with sophisticated laboratory tests, but this is often problematic, as these tests require resources, add to cost of treatment,

may require women to make extra visits to the antenatal clinic and may result in delays of treatment. Therefore, although this study provide evidence that antenatal vulvovaginitis is associated with birth-related perineal tears, specific microorganisms were not identified.

This is the first observational study to demonstrate an association between antenatal vulvovaginitis with birth-related perineal tears in a population at risk of vulvovaginitis.

A limitation of this study was that women who gave birth on a weekend where not enrolled due to a lack of resources and limited funding. However, women who gave birth on a week day were recruited and the data did find an association between antenatal vulvovaginitis and risk of birth related perineal tears. A limitation of this research was to find other studies related to the topic to compare the results. Additionally, the lack of detailed information about treatment for vulvovaginitis in the antenatal record was identified as a limitation. This study was a pilot and therefore, can only provide limited data and evidence.

Conclusion

In conclusion, this study demonstrated an associated risk between antenatal vulvovaginitis, birth weight, head circumference and perineal injury but further research is required to confirm or refute these associations. Women with antenatal vulvovaginitis were 4.6 times more likely of having birth-related perineal tears when compared to those who did not have antenatal vulvovaginitis, regardless of baby's birth weight and head circumference. However, due to the wide confidence interval this finding should be interpreted with caution. Depending on the extent of damage, birth-related perineal tears may have a negative impact on women's sexuality and reproductive health. Therefore, it is important to consider the risk of association between antenatal vulvovaginitis and birth related perineal trauma. It is, vitally important to prevent and treat antenatal vulvovaginitis and improve antenatal approaches

to detect this condition. Further research is needed to more deeply understand the relationship between birth-related perineal tear and antenatal vulvovaginitis.

Colaborações

Francisco AA, Alves NO, Steen M, Andrade JRL, Barbieri M e Gabrielloni MC contributed to the project design, writing of the article, relevant critical review of the intellectual content and final approval of the version to be published.

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