

# Perineal Trauma in a Low-risk Maternity with High Prevalence of Upright Position during the Second Stage of Labor

## *Trauma perineal em uma maternidade de baixo risco com alta prevalência de parto vertical durante o período expulsivo*

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### Abstract

**Objective** Perineal trauma is a negative outcome during labor, and until now it is unclear if the maternal position during the second stage of labor may influence the risk of acquiring severe perineal trauma. We have aimed to determine the prevalence of perineal trauma and its risk factors in a low-risk maternity with a high incidence of upright position during the second stage of labor.

**Methods** A retrospective cohort study of 264 singleton pregnancies during labor was performed at a low-risk pregnancy maternity during a 6-month period. Perineal trauma was classified according to the Royal College of Obstetricians and Gynecologists (RCOG), and perineal integrity was divided into three categories: no tears; first/second-degree tears + episiotomy; and third and fourth-degree tears. A multinomial analysis was performed to search for associated factors of perineal trauma.

**Results** From a total of 264 women, there were 2 cases (0.75%) of severe perineal trauma, which occurred in nulliparous women younger than 25 years old. Approximately 46% (121) of the women had no tears, and 7.95% (21) performed mediolateral episiotomies. Perineal trauma was not associated with maternal position ( $p = 0.285$ ), health professional (obstetricians or midwives;  $p = 0.231$ ), newborns with 4 kilos or more ( $p = 0.672$ ), and labor analgesia ( $p = 0.319$ ). The multinomial analysis showed that white and nulliparous presented, respectively, 3.90 and 2.90 times more risk of presenting perineal tears.

**Conclusion** The incidence of severe perineal trauma was low. The prevalence of upright position during the second stage of labor was 42%. White and nulliparous women were more prone to develop perineal tears.

### Keywords

- perineal trauma
- retrospective cohort study
- birth position
- obstetric anal sphincter injuries

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## Resumo

**Objetivo** O trauma perineal é um desfecho negativo durante o parto, e é incerto, até o momento, se a posição maternal durante o período expulsivo pode influenciar o risco de evoluir com trauma perineal severo. Nós objetivamos determinar a prevalência de trauma perineal e seus fatores de risco em uma maternidade de baixo risco com alta prevalência de posição vertical durante o período expulsivo.

**Métodos** Um estudo de coorte retrospectivo de 264 gestações únicas durante o trabalho de parto foi realizado durante 6 meses consecutivos. O trauma perineal foi classificado de acordo com o Royal College of Obstetricians and Gynecologists (RCOG). A integridade perineal foi dividida em três categorias: períneo íntegro; trauma perineal leve (primeiro e segundo graus + episiotomia); e trauma perineal severo (terceiro e quarto graus). Uma análise multinomial foi realizada para buscar variáveis associadas ao trauma perineal.

**Resultados** De um total de 264 mulheres, houve 2 casos (0,75%) de trauma perineal severo em nulíparas com menos de 25 anos. Aproximadamente 46% (121) das mulheres não tiveram trauma perineal e 7,95% (21) realizaram episiotomias mediolaterais. Não houve correlação do trauma perineal com a posição de parto ( $p = 0,285$ ), tipo de profissional que realizou o parto ( $p = 0,231$ ), recém-nascidos com 4.000 gramas ou mais ( $p = 0,672$ ), e presença de analgesia de parto ( $p = 0,319$ ). Uma análise multinomial evidenciou que mulheres brancas e nulíparas apresentaram, respectivamente, um risco 3,90 e 2,90 vezes maior de apresentar trauma perineal.

**Conclusão** A incidência de trauma perineal severo foi baixa. A prevalência de parto vertical durante o período expulsivo foi de 42%. Mulheres brancas e nulíparas foram mais suscetíveis a apresentar trauma perineal.

## Palavras-chave

- trauma perineal
- estudo retrospectivo de coorte
- posição vertical
- lesões obstétricas do esfíncter anal

## Introduction

Perineal trauma is an outcome that has received attention in the obstetric and urogynecological research field. It is prevalent among deliveries,<sup>1</sup> and severe perineal injuries, also called obstetric anal sphincter injuries (OASIs), are a potential complication of vaginal delivery.<sup>2</sup> Several risk factors are known, and one of the most controversial is the position of the patient during the second stage of labor.

The lack of a consensus regarding birth position is still evident. A Swedish study found the lowest rates for OASIs among women giving birth in the standing position, and the highest rates among women in the lithotomy position.<sup>3</sup> Soong and Barnes<sup>4</sup> divided the birth positions into a variety of types, and the semi-recumbent position was associated with the need to suture perineal trauma, whereas the all-fours position was a protective factor to injury in the perineum. Meyvis et al<sup>5</sup> have found that the lateral position resulted in less perineal trauma, and that the lithotomy position was associated with more episiotomies than other positions. Moreover, a cohort study of planned home births in 4 Nordic countries found a low prevalence of OASIs (0.7%) and episiotomy (1%) with most women giving birth in flexible sacrum positions.<sup>6</sup> Finally, an updated Cochrane review about the position in the second stage of labor suggested that the upright posture without epidural anesthesia would increase the risk of second-degree tears and reduce the episiotomy rates.<sup>7</sup>

The need to encourage women to decide in which position they want to give birth is essential for a humanized approach, especially in a country like Brazil, known for presenting high rates of cesarean section.<sup>8</sup> Considering this, we have aimed to look for the prevalence of perineal trauma in a low-risk pregnancy facility that has a multidisciplinary team (midwife and obstetrician) assisting deliveries, as well as to search for risk factors.

## Methods

### Study Design, Inclusion/Exclusion Criteria

A retrospective cohort study of 264 singleton pregnancies during labor was performed at Maternidade Cidinha Bonini, a low-risk pregnancy facility at the Universidade de Ribeirão Preto (Unaerp, in the Portuguese acronym), Brazil. This maternity cares for any pregnant woman who has received her prenatal care at any Brazilian Public Unified Health System (SUS, in the Portuguese acronym) outpatient clinic and is referred to this hospital for labor. The Institutional Review Board approved the study (under CAAE 61392616.0.0000.5498). The exclusion criteria were women with preterm birth, with comorbidities, and patient records in which more than 50% of data were absent. The study followed the strengthening the reporting of observational studies in epidemiology (STROBE) checklist for observational studies.

## Variables

Perineal trauma (main outcome) was divided into three categories: no tears; first/second-degree tears with episiotomy; and third and fourth-degree tears. The classification of the Royal College of Obstetricians and Gynecologists (RCOG) was also used:<sup>9</sup> first and second degrees (mild perineal trauma), third and fourth degrees (severe perineal trauma). There was no standardized pattern about hands-on or hands-off at the second stage of labor. The independent variables were: age (divided into  $< 25$  or  $\geq 25$  years old), race, financial income, parity, marital status, intrapartum analgesia, birth weight, type of health professional (obstetrician or midwife), and birth position (lithotomy or upright). The upright or vertical position represents all possibilities of non-lithotomy, non-supine or non-lateral position (such as kneeling, all-fours, squatting and standing). Episiotomy was presented in two ways: it was categorized as a second-degree tear, and as a dummy variable (yes/no).

## Statistical Analysis

Data were tabulated in Microsoft Excel for Windows (Microsoft Corporation, Redmond, WA, USA). The Chi-squared test was utilized for the binomial variables. A multinomial logistic regression was performed; all variables were inserted simultaneously into the model, and variable dropout occurred for each variable with the highest  $p$ -value. The procedure was repeated so that only statistically significant variables remained in the final model. The significance level was stipulated at 5%. The statistical analysis was performed using the Intercooled Stata version 13.0 (StataCorp, College Station, TX, USA) and R version 3.0.1 (R Foundation for Statistical Computing, Vienna, Austria) statistical packages.

## Results

► **Table 1** displays the baseline characteristics of women who underwent labor according to the presence or absence of perineal trauma. The mean age of the sample was  $25.34 \pm 5.75$  years (range: 13–40), with  $\sim 10\%$  of gestations during adolescence, and 68.18% of women self-reporting as white (.). From a total of 264 women, there were 2 cases (0.75%) of severe perineal trauma, which occurred in nulliparous women younger than 25 years old. Approximately 46% (121) of the women had no tears, and 7.95% (21) underwent episiotomies (all of them mediolateral). About the birth position, 42.8% (113) of women preferred the vertical birth position, while 57.2% (151) preferred the semi-recumbent position, with no statistical association with perineal trauma ( $p = 0.285$ ). A total of 76% (200) of the deliveries were performed by obstetricians, and 23.44% (64) by midwives, with no statistical association with perineal trauma ( $p = 0.231$ ). Similarly, newborns weighing 4 kilos or more ( $p = 0.672$ ), the presence of a sexual partner ( $p = 0.319$ ), labor analgesia ( $p = 0.319$ ) and familiar income ( $p = 0.479$ ) were not associated with perineal trauma.

► **Table 2** investigates the multinomial regression with two possible dependent variables (episiotomy and perineal trauma). When the variable perineal trauma was converted to a binomial fashion (yes/no), there was a statistical association

with women younger than 25 years old ( $p = 0.019$ ), those who were white ( $p \leq 0.005$ ), and nulliparous women ( $p < 0.005$ ). A multinomial analysis showed that white and nulliparous women were, respectively, 3.89 (range: 1.52–2.96) and 2.89 (range: 1.69–4.95) times more prone to present perineal tears. When we considered episiotomy as a dependent and dummy variable, nulliparous women were 4.81 (range: 1.65–14.07) times more prone to undergo episiotomy.

## Discussion

The present study has found that in a low-risk maternity with a high prevalence of upright position in the second stage of labor (42%), no differences were seen regarding the prevalence of severe perineal tears (one case in the lithotomy group versus one case in the upright position). Nulliparous women presented a risk factor for presenting OASIs or to undergo episiotomy, even though there was a low incidence of episiotomy in our facility. Younger women and white women were also factors that were associated with perineal trauma; age and birth weight  $> 4,000$  g did not remain significant after the multinomial analysis. These results are similar to those in the available literature.<sup>1,10–12</sup>

Risk factors are well documented in the literature. A retrospective hospital-based cohort study in Australia found a 5.4% incidence of severe perineal trauma for nulliparous women versus 1.7% for multipara in 10,408 singleton vaginal deliveries.<sup>10</sup> A prospective observational study in Southeast England found a 6.6% incidence of OASIs in nulliparous versus 2.7% in multiparous women.<sup>11</sup> Another Brazilian study has found a 2.5% incidence of severe perineal lacerations. The same study found that operative delivery, primiparity, epidural anesthesia and higher gestational ages were associated with OASIs.<sup>12</sup> A study performed in another low-risk maternity from the same municipality as our study (Ribeirão Preto, Brazil) found a 0.9% incidence of severe perineal trauma.<sup>1</sup>

The impact of the maternal position in perineal trauma is still controversial. In our sample, the upright position was not associated with severe perineal trauma. A recent pragmatic, multicenter randomized study with 3,093 nulliparous women comparing upright versus lying down position did not find differences in the prevalence of OASIs. However, women could modify their birth position during the second stage whenever they felt like doing so, and this could include some bias in the results.<sup>13</sup> A recent meta-analysis of the effect of upright positions during the second stage of labor without analgesia did not find an association with third-degree perineal laceration incidence.<sup>14</sup> It is known that women who give birth in the lithotomy position do not feel that this position is helpful, which differs from the opinion of the practitioners, and this may cause a false impression or correlation with negative intra/postpartum outcomes.<sup>15</sup> Moreover, a mixed method study investigating how the maternal birth position could influence the experience of fathers during childbirth has found that they were more likely to have a positive experience, or to feel comfortable or powerful.<sup>16</sup>

**Table 1** Baseline characteristics of women who underwent vaginal delivery concerning the presence or absence of perineal trauma

Variables	Perineal trauma (n/%)			p-value
	No tears	1 <sup>st</sup> and 2 <sup>nd</sup> degree tear/episiotomy	3 <sup>rd</sup> and 4 <sup>th</sup> degree tears	
Age				
< 25 years	51 (38.35)	80 (60.15)	2 (1.50)	0.019*
> 25 years	70 (53.44)	61 (46.56)	0 (0)	
Skin color (self-reported)				
White	71 (39.44)	107 (59.44)	2 (1.1)	< 0.005*
Non-white	50 (57.5)	34 (42.5)	0 (0)	
Marital status				
With partner	66 (51.56)	61 (47.65)	1 (0.78)	0.088*
Without partner	55 (40.44)	80 (58.82)	1 (0.73)	
Paid income				
No	74 (46.54)	83 (52.20)	2 (1.26)	0.887*
Yes	47 (44.76)	58 (55.24)	0 (0)	
Parity				
Nulliparous	43 (31.85)	90 (66.67)	2 (1.48)	0.005*
With previous vaginal delivery	73 (61.34)	46 (38.66)	0 (0)	
With previous cesarean	5 (50)	5 (50)	0 (0)	
Birth position				
Lithotomy	58 (51.33)	54 (47.79)	1 (0.88)	0.135*
Upright	63 (41.72)	87 (57.82)	1 (0.66)	
Health professional				
Physician	67 (41.88)	92 (57.50)	1 (0.63)	0.190*
Midwife	26 (53.06)	22 (44.90)	1 (2.04)	
Newborn birth weight				
< 3 kg	43 (51.19)	41 (48.81)	0 (0)	1.000*
3–4 kg	74 (43.27)	95 (55.56)	2 (1.17)	
> 4 kg	4 (44.44)	5 (55.56)	0 (0)	
Intrapartum analgesia				
No	70 (50)	70 (50)	0	0.173*
< 6 cm	29 (44.62)	35 (53.85)	1 (1.54)	
> 6 cm	22 (37.29)	36 (61.02)	1 (1.69)	

Note: \*Chi-squared test.

**Table 2** Multivariate analysis with two possible dependent variables (episiotomy and perineal trauma)

Variables	Adjusted OR (LL-UL)	p-value
White skin color x episiotomy (yes/no)	1.35 (0.34–5.33)	0.6676
White skin color x perineal trauma (yes/no)	3.89 (1.52–9.96)	0.0045
Non-white skin color x episiotomy (yes/no)	1.08 (0.21–5.58)	0.9255
Non-white skin color x perineal trauma (yes/no)	2.07 (0.71–6.03)	0.1787
No previous vaginal delivery x episiotomy (yes/no)	4.81 (1.65–14.07)	0.0041
No previous vaginal delivery x perineal trauma (yes/no)	2.89 (1.69–4.95)	0.0001

Abbreviations: LL, lower limit; OR, odds ratio; UL, upper limit.

We do not have regional data about the prevalence of maternal position during the second stage of labor, but our Western culture has assumed the lithotomic position as the traditional one, and it is the most taught birth position to obstetricians.<sup>17</sup> We believe that the strengths of the present study are the sample taken from a Brazilian public hospital, which comprised pregnant women choosing the upright position to give birth, and the continuous fashion of data collection: no cases were excluded from this hospital cohort. Nevertheless, there are some limitations in the present study: its retrospective fashion, the lack of other variables that could be analyzed as risk factors (second stage duration, fetal head position, head circumference), and the selection bias of a low-risk maternity, which excludes some other risk factors (such as maternal obesity) that could be associated with OASIs. Furthermore, performing a retrospective post-hoc analysis and using our sample ( $n = 264$ ) with a 13%

significance level between birth position and perineal integrity, we have calculated a study power of 46%, with the minimum required sample of 442 women to notice a difference (possible type 2 error).

It is essential to prevent OASIs because their impact on subsequent pregnancy outcomes is high; the risk is increased five-fold in women who had a severe perineal trauma in their first delivery.<sup>18</sup> To the best of our knowledge, the maternal position during labor does not have a significant role in preventing OASIs, but it may have positive effects in the childbirth experience itself. An online survey was mailed to postpartum women, and respondents who gave birth on the seat had answered that they were more likely to participate in the decision-making process during labor and to have the opportunity to choose their preferred birth position.<sup>19</sup> There are several perineal techniques that can be offered to women (such as warm compresses during the intrapartum period or perineal massage during the antenatal period) in order to reduce third and fourth-degree tears, and this educational step may empower these patients.<sup>20</sup> Finally, more prospective studies with different positions than the gynecological, with women spending most of the labor on their preferred position, avoiding the use of instrumental deliveries and with larger samples, will be necessary to answer this question.

## Conclusion

The present study has found that the incidence of severe perineal trauma was low, similar to the incidence in the available literature. The prevalence of upright position during the second stage of labor was 42%, a high percentage when compared with most of the birth positions found in epidemiological studies. White and nulliparous women were more prone to develop perineal tears.

### Contributions

All authors met the International Committee of Medical Journal Editors (ICJME) criteria: 1. substantial contributions to conception and design, data collection or analysis, and interpretation of data; 2. writing of the article or critical review of the intellectual content; and 3. final approval of the version to be published.

### Conflicts of Interest

The authors have no conflicts of interest to declare.

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