



Risk Factors of Genital Tract Lacerations at Yaoundé Central Hospital - Cameroon: A Case Control Study

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Authors' contributions

This work was carried out in collaboration between all authors. Authors FYF and FE conceived the study and participated in the study design, data collection as well as drafting and editing of the manuscript. Authors LTK, JHF and JTF participated in the study design, data collection and analyses, drafting and editing of the manuscript. Author REM supervised the study from conception to writing the manuscript. All aforementioned authors have read and approved the final manuscript.

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ABSTRACT

Background: Genital tract lacerations are lesions resulting from breakage of continuity of the lower genital tract during birth. This includes precisely the cervix, vagina, vulva and perineum. Genital tract lacerations are common causes of maternal morbidity and mortality. A good knowledge of risk factors can prevent complications.

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Aim: Our general objective was to determine the risk factors for genital tract lacerations.
Study Design: Case-control study.
Place and Duration of Study: Five months (from January 2015 to May 2015) at the Obstetrics and Gynecology Unit of Yaoundé Central Hospital.
Methodology: Once identified, women who had suffered genital tract lacerations were interviewed, after which they underwent physical examination aimed at identifying the laceration site and type. We paired these women to those of same age and parity who did not have genital tract laceration (control group). Data were collected using a questionnaire and analyzed with Epi info software version 3.5.1 with a significance level of $P < 0.05$.
Results: Out of 1250 deliveries, 150 women had genital tract laceration, giving the prevalence of 12%. But we excluded 14 and retained 136 women as cases. Perineal tears accounted for 92.6% of genital tract lacerations, cervical tears 8.8% and vaginal tears 7.4%. Maternal risk factors were: past history of perineal tear (OR=5.05; 95% CI :1.9-13.7; $p=0.00$), length of the perineum < 4 cm (OR=33.72; 95% CI:17.2-66.02; $p=0.00$), duration of expulsion < 30 minutes (OR=3.16; 95%CI:1.9-5.2; $p=0.00$) and duration of active phase of labor < 6 hours (OR=5.01; 95% CI:2.8-8.9; $p=0.00$). Iatrogenic risk factors were: induction of labor (OR=9.57; 95% CI: 2.1-42.1; $p=0.00$) and augmentation of labor (OR=3.79; 95%CI: 2.1-6.6; $p=0.00$). The only fetal risk factor was birth weight >4000 g (OR=7.32; 95% CI:1.8 - 60; $p=0.03$).
Conclusion: Prior to delivery and in order to prevent trauma to the genital tract, the following risk factors should be sought out for: past history of perineal tears, perineal lengths less than 4 cm, duration of the active phase of labour less than 6 hours, induction and augmentation of labor with newborn birthweights of more than 4000 g and expulsive phases lasting less than 30 minutes. Also, care providers are advised to perform episiotomies in women presenting these risk factors.

Keywords: Risk factor; laceration; genital tract; cervix; vagina; perineum; vaginal delivery.

1. INTRODUCTION

Childbirth is the set of processes that allow the expulsion of the fetus and its annexes out of maternal genital tract. Tears (or lacerations) of the genital tract are injuries resulting from the trauma during childbirth, and can involve the cervix, vagina, vulva and/or the perineum [1]. These common injuries during childbirth are responsible for maternal morbidity and mortality. [2].

A study in the United States of America revealed that the prevalence of soft tissue trauma during childbirth increased from 16.1% in 1984 to 40% in 1994 [3]. Risk factors found in a study in 2006 were: primiparity, the weight of the newborn, protraction disorders of the second stage of labour, posterior presentations and instrumental delivery [4]. Complications can occur in a short term period such as postpartum bleeding and infections [2]. Episiotomies and spontaneous tears account for 20% of postpartum hemorrhage [2]. At medium term, dyspareunia can be observed in 14.9% women after sutured tear and in 20.5% of them after non sutured tear. Anal incontinence complicating undiagnosed or poorly repaired lesions of the anal sphincter with a threefold high recurrence risk, has been identified as a late occurrence. [3].

In the literature few data are available on the risk factors of genital tract trauma in Cameroon. Nkwabong et al. found a prevalence of 13.5% [5]. In 2014, Fouelifack et al. found, 650 perineal tears out of 4336 deliveries (15.7%) at the Yaounde Central Hospital (YCH) [6]. To optimize prevention of trauma to the birth canal and reduce maternal morbidity, we undertook this study to investigate the risk factors of tears of the birth canal during childbirth, identified at the YCH.

2. METHODOLOGY

2.1 Study Design, Site and Duration

We conducted a case-control study in the Obstetrics and Gynecology Unit of the YCH from the 1st of January to the 31th of May 2015. This unit serves as a first-level referral as well as a university teaching center with 65 beds. The average number of deliveries is 250 per month.

2.2 Selection Criteria

Our study population consisted of all women who gave birth vaginally at or above 28 weeks of pregnancy. We included, women in immediate post-partum. The case group included women with trauma of the birth canal and the control

group consisted of those of the same age and having delivered the same number of children who did not have tears. We excluded women who underwent instrumental delivery, episiotomy and those who did not consent.

2.3 Sampling

The sampling was consecutive and the size of each group was calculated using Schlesselman's and Stolley's formula [7]. $N=1/(1-f)[2(z\alpha+z\beta)^2 P(1-P)/(P_0-P_1)^2]$ with: N= Minimal size of the sample in each group, f = number of lost to follow up in case group, P = proportion of subjects exposed in the 2 groups (case and control), α = type I risk, β = type II risk, P0 = Proportion of exposed controls. The chosen prevalence was P1=15.7%: Proportion exposed cases = 15.7% found in 2014 in the same hospital [6]. For a confidence interval of 95% there will be a risk α = 5%; $Z\alpha$ = constant = 1.96. β = constant. f = 0. The minimal size of our sample was 136 for each group.

2.4 Procedure

During the study period, recruitment was done in delivery and postpartum rooms. For each woman with a trauma of the genital tract (case group), we obtained a complete medical history, did physical examination and identified the site and type of tears. She was then compared with a woman of same age same parity, who did not have tear (control group). The perineal measurements were performed using metric tape measure after the suture for the case group and after childbirth for control group. After use, the measuring tapes were immediately washed with soap and water, decontaminated during 10 minutes in a solution of hypochlorite at 0.5%. Medical records and prenatal booklets were used to complete the obstetric history and to verify the information given by patients. We used the partogram to determine the duration of the second stage of labor (period from full dilatation to the expulsion of the fetus).

The following data were retrieved from delivery records and noted on a structured pre-tested anonymous collection sheet: Parturient's age (in years), marital status (single or married), gravidity (number of pregnancies), parity (number of deliveries), educational level, occupation, gynecologic-obstetric history, circumstances of birth, risk factors, the site and

the type of tear, the newborn's parameters, obstetric parameters (parity, history of tearing, history of episiotomy, duration of the active phase, duration of the second stage, labor induction, stimulation of labor), fetal variables (fetal presentation, birth weight), the state of perineum post-partum (intact, or torn), the site of trauma (cervical, vaginal, perineum), and the length of sutured perineum.

2.5 Data Analysis

Statistical analyses were done using Epi Info version 3.5.1 software. Prior to analyses, all continuous data was tested for normality using histogram plots to justify use of parametric statistical tests. Univariate analyses of continuous variables are presented as frequencies, means and standard deviations. Strength of associations between categorical variables was assessed as odds ratios, chi-squared tests (X^2) used to test for differences between proportions and T-tests for differences between means. All statistical tests are two-sided and considered statistically significant at $p < 0.05$. The interpretation of the OR was done as follows: OR = 1: no relationship between the risk factor and the laceration; OR > 1: increased risk of laceration (risk factors); OR < 1: reduced risk of laceration (protective).

2.6 Ethical Considerations

Ethical clearance for the study was obtained from the review board of the study site as well as from the University of Douala. Data collection and handling were done with strict confidentiality.

3. RESULTS

We recorded 1,250 deliveries. There were 150 cases with genital tract lacerations, giving a prevalence of 12%. But 136 cases were selected for analysis (14 cases could not be matched).

3.1 Sociodemographic Data

Ages (Fig. 1) vary from 16 to 44 years with an average of 26.12 ± 5.83 . The most represented age group was from 19 and 25 years.

The distribution of case and control groups according to the profession is presented in Table 1.

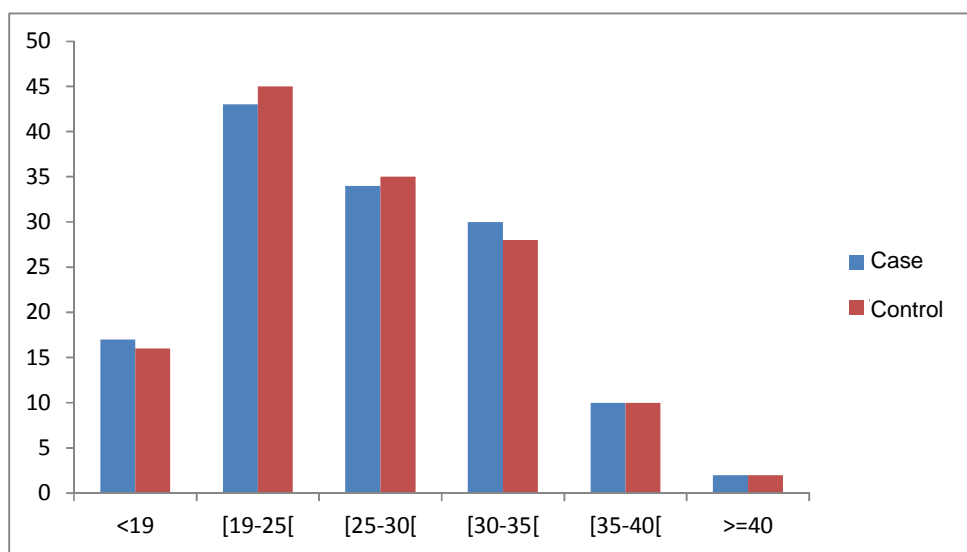


Fig. 1. Distribution of cases and controls according to age groups

Table 1. Distribution of case and control groups according to the profession, level of education and marital status

Variables	Case (n%)	Control (n%)	Total (n%)	OR (95%CI)	P value
Profession					
Private Sector	10(20.4)	39(79.6)	49(18)	0.19(0.09-0.4)	0.00
Public Sector	16(48.5)	17(51.5)	33(12.1)	0.93(0.4-1.9)	0.5
Housewife	33(63.5)	19(36.5)	52(19.1)	1.97(1-3.6)	0.02
Informal Sector	18(32.7)	37(67.3)	55(20.2)	0.40(0.2-0.7)	0.00
Trader	5(38.5)	8(61.5)	13(4.8)	0.61(0.1-1.9)	0.29
Student	54(77.1)	16(22.9)	70(25.7)	4.93(2.6-9.2)	0.00
Level of education					
Non Scolarised	1(8.3)	11(91.7)	12(4.4)	0.08(0.01-0.66)	0.00
Primary	6(20)	24(80)	30(11)	0.21(0.08-0.5)	0.00
Secondary	67(48.2)	72(51.8)	139(51.1)	0.86(0.5-1.3)	0.31
higher education	62(68.1)	29(31.9)	91(33.5)	3.09(1.8-5.2)	0.00
Marital Status					
Single	90(57.7)	66(42.3)	156(57.4)	2.07(0.72-3.38)	0.00
Married	46(39.7)	70(60.3)	116(42.6)		

OR: Odds Ratio; CI: Confidence Interval

Students represented 25.7% of our study population and they had 4.9 times the risk of genital tract trauma than the others. Women with higher level of education represented 33.5% of the population study. Higher education level was a significant risk factor: OR=3.09; 95% CI=1.8-5.2 and P value =0.00.

3.2 Location of Genital Tract Tears and their Degrees

Table 2 represents locations of genital tract tears and degrees of perineal tears.

Table 2. Locations and degrees of the genital tract tears

Variable	Frequency	Percentage (%)
Location of the genital tract tears		
Perineal	126	92.6
Vaginal	9	6.61
Cervical	1	0.73
Total	136	100
Degrees of perineal tears		
First degree	110	87.30
2 nd degree	15	11.90
3th degree	1	0.80
Total	126	100

Perineal tears accounted for 92.6% (126 perineal tears out of 136 lacerations of the genital tract) of tears in the general: 87.3% (110 out of 126) perineal tears were the first degree, 11.9% (15 out of 126) perineal tears were second degree, 0.8% (1 out of 126) perineal tears were third degree.

3.3 Maternal Risk Factors

Maternal risk factors are presented in Table 3. Women with history of perineal tears accounted for 9.9% in our study and were 5.05 times more likely to have tears in subsequent deliveries. The length of the expulsion phase < 30 min and that of an active phase < 6 hours were significantly associated with genital tract lacerations (OR=3.16; 95%CI: 1.9 - 5.2 and OR=5.01; 95%CI: 2.8 - 8.0 respectively). Women with perineum < 4 cm had at least 33 times more risk of perineal tear (OR = 33.72; 95% CI: 17.2 - 66.02).

3.4 Iatrogenic Risk Factors

The distribution of cases and controls based on iatrogenic risks factors is presented in Table 4.

Both augmentation and induction of labor significantly increased the risk of genital tract tears (OR=3.79; 95%CI: 2.1 – 6.6 and OR=9.57; 95%CI: 2.1-42.2).

3.5 Fetal Risk Factors

The distribution of cases and controls according to foetal factors is displayed in Table 5. Fetal weights > 4000 grams were associated with genital tract tears (OR=7.32; 95%CI: 1.8 - 60). No association was found between fetal presentation, head circumference and genital tract laceration.

3.6 Logistic Regression

After logistic regression (Table 6) the following factors were independently associated with genital tract lacerations: duration of the active phase < 6 hours, duration of expulsion < 30 minutes, perineal length < 4 cm (aOR=31.26; 95%CI: 13.9 - 70), as well as induction of labor (aOR=27.38; 95%CI: 3.77 - 198) and augmentation of labor (aOR=4.44; 95% CI (1.89 - 10.42).

Table 3. Distribution of maternal risk factors within the 2 groups

Variable	Case	Control	Total	OR (95%CI)	P value
History of perineal tear					
Yes	22(81.5)	5(18.5)	27(9.9)	5.05(1.9-13.7)	0.00
No	114(46.5)	131(53.5)	245(90.1)		
History of episiotomy					
Yes	3(60)	2(40)	5(1.8)	1.52(0.25-9.2)	0.49
No	132(49.6)	134(50.4)	266(98.2)		
Duration of the expulsion phase <30 minutes	91(63.2)	53(36.8)	144(52.9)	3.16(1.9-5.2)	0.00
>30 minutes	45(35.2)	83(64.8)	128(47.1)		
Duration of active phase < 6 hours	115(61.8)	71(38.2)	186(68.4)	5.01(2.8-8.0)	0.00
≥ 6 hours	21(24.4)	65(75.6)	86(31.6)		
Perineal length <4 centimeters	115(85.8)	19(14.2)	134(49.3)	33.72(17.2-66.02)	0.00
>4 cm	21(15.2)	117(84.8)	138(50.7)		

OR: Odds Ratio; CI: Confidence Interval

Table 4. Distribution of cases and controls based on the iatrogenic risks factors

Variable	Case	Control	Total	OR(95%CI)	P value
Augmentation of labor					
Yes	61(71.8)	24(28.2)	85(31.3)	3.79 (2.1-6.6)	0.00
No	75(40.1)	112(59.9)	187(68.8)		
Induction of labor					
Yes	17(89.5)	2(10.5)	19(7.0)	9.57(2.1-42.2)	0.00
No	119(47.0)	134(53.0)	253(93.0)		

OR: Odds Ratio; CI: Confidence Interval

Table 5. Distribution of cases and controls according to the fetal risk factors

Variable	Case	Control	Total	OR(95%CI)	P value
weight < 4000 g	127(48.5)	135(51.5)	262(94.9)	0.25(0.07-0.9)	0.03
weight > 4000 g	7(87.5)	1(12.5)	8(2.9)	7.32(1.8-60)	0.03
Presentation					
Cephalic Presentation	136(49.8)	137(50.2)	273(98.9)	0.49(0.04-5.5)	0.5
Breech Presentation	2(66.7)	1(33.3)	3(1.1)	2.01(0.18-22.4)	0.5
Head circumference					
< 34 centimeters	12(57.1)	9(42.9)	21(7.6)	1.36(0.5-3.3)	0.33
34-36 centimeters	123(48.8)	129(51.2)	252(91.3)	0.57(0.2-1.3)	0.14
> 36 centimeters	3(100)	0(0)	3(1.1)	NA	0.12

OR: Odds Ratio; CI: Confidence Interval; NA: Not Available

Table 6. Logistic regression

Case	Control	aOR(95%CI)	P value
Past history of tear	22	5 4.25(0.9-19)	0.06
Duration of the active phase < 6 hours	115	71 3.19(1.2-8.06)	0.01
Duration of expulsion < 30 minutes	91	53 3.54(1.61-7.7)	0.00
Induction of labour	17	2 27.38(3.77-198)	0.00
Perineal length < 4 centimeters	115	19 31.26(13.9-70)	0.00
Augmentation of labour	61	24 4.44(1.89-10.42)	0.00

aOR: adjusted Odds Ratio ; CI: Confidence Interval

4. DISCUSSION

The mean age in our study was 26.12 ± 5.83 years, with extremes of 16 and 44. The most represented age group was 19 - 25 years (36.6%). Our results were similar to those of Nkwabong et al. [5] who found a mean age of 26.4 ± 5.2 years and extremes of 17 and 44 years in a series of 230 patients at the Yaoundé University Teaching Hospital.

University level of education was associated with genital tract laceration. This could be explained by a rigid perineum linked to a late age at the first gestation [8]. Marital status had no influence on the occurrence of genital tract lacerations.

The incidence of spontaneous tearing of genital tract was 12% in our study.

Perineal tears accounted for 92.60% genital tract tears in our sample and had a prevalence of 10.08% among all deliveries. Turner et al. [9] in 1995 reported a frequency of 30.8% in Ireland. One of the shortcomings of retrospective studies, such as Turner's is that they do not always have all data and therefore rates may be underestimated. In our study, first degree tears, second degree and third degree represented respectively 87.30%, 11.30% and 0.8%. Fouelifack et al. in 2014 found 650 perineal tears out of 4336 deliveries (that's 15.7%) at the

Yaoundé Central Hospital: first degree tears represented the bulk of all tears (96.3%), followed by 2nd degree tears (3.5%) and 3rd degree tears the least (0.2%) [6]. Eko et al. [10] in 2015 in the same hospital reported 82 perineal tears after 1045 deliveries (7.84%), 82% were of first degree, 18% of second degree and none of third degree [10]. Nkwabong et al. [11] in 2009 found a prevalence of 13.5% at the Yaounde University Teaching Hospital of [11].

Vaginal and cervical tears represented 6.61% and 0.73% genital tract lacerations respectively.

In our study 85.8% of women in the case group had short perineum (< 4 centimeters) against 14.2% in the control group. This distribution was different from that reported by Rizk et al. [12] (12% of in the case group against 88% in the control group). This can be explained by differences in their study populations. We conducted our study in a black population while they studied an arabic population.

History of birth canal tear was significantly more frequent in cases than in controls. Indeed, a scar does not have the same ability like a normal tissue to withstand distension. Martin et al. [13] reported that the risk of tear on a single-scarred perineum is proportional to the severity of the previous tear.

A second stage of labor lasting less than 30 minutes significantly increased the risk of genital tract tears. Samuelsson et al. also found that a second stage of labor lasting < 30 minutes or > 60 minutes was a risk factor for genital tract tears [14]. Indeed precipitated labour does not allow for sufficient distension and compliance of the perineum while protracted labour favours genital oedema and prevents optimal distension and compliance.

Augmentation of labor with oxytocin multiplied by 3.7 the risk of the birth canal tears. Brohi et al. [15] had similar findings in Pakistan. Poen Ac et al. [16] have suggested a mechanism in which oxytocin increased the pressure in the perineum thereby favoring tears. The monitoring of parturients during labor induction or labor stimulation should therefore be more rigorous.

Birthweight \geq 4000 g significantly increased the risk of tearing of the birth canal. Several authors have also had similar findings [4,17,18]. These results differ from those reported of Combs et al. [19] who found no influence of fetal weight on the occurrence of tears on the birth canal. This could be explained by the fact that in their study, they considered as macrosomia babies weighing 3500 grams and above.

Independent risk factors after logistic regression were: the length of perineum under 4 centimeters, duration of the active phase less than 6 hours, duration of the expulsion phase less than 30 minutes, labor induction, augmentation of labor and fetal weight above 4000 grams. Similar findings were reported by Fouedjio et al. [20] in 2015 (Independent risk factors: past history of perineal tear, duration of second stage of labor shorter than 30 minutes, augmentation of labor, head circumferences above 36 centimeters).

5. LIMITATIONS OF THE STUDY

The measurement of the perineum length was made in postpartum. The perineum can become shorter immediately after suturing, compared to the intact perineum. It was not possible to have the length of the perineum before delivery.

6. CONCLUSION

The prevalence of the genital tract lacerations in our study was 12%. Perineal tears were more frequent than cervical and vaginal tears. Prevention of genital tract lacerations should be

active for parturients presenting with the following risk factors: Length of perineum under 4 centimeters, duration of the active phase less than 6 hours, duration of the expulsion phase less than 30 minutes, labor induction, augmentation of labor and fetal weight above 4000 g.

CONSENT

All authors declare that written informed consent was obtained from the patient for publication of this paper.

COMPETING INTERESTS

Authors have declared that no competing interest exists.

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