

## Original study/Estudo original

# Episiotomy: early maternal and neonatal outcomes of selective versus routine use

## Episiotomia: resultados maternos e neonatais precoces do uso seletivo versus generalizado

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### Abstract

**Overview and aims:** Episiotomy is one of the most common procedures in Obstetrics, despite actual scientific evidence does not support its routine practice. The aim of this study was to determine the impact of selective and routine practice of episiotomy in early maternal and neonatal outcomes.

**Study design:** An observational, transversal, descriptive and analytic study was conducted in two public Hospitals in northern Portugal, with different policies for the practice of episiotomy: selective practice (Hospital A) and routine practice (Hospital B).

**Population:** A non-random sampling of convenience of the whole puerperal women whose deliveries was performed in these hospitals during months of July and August 2011 was utilized. A total of 397 women was analyzed, 200 in selective group and 197 in routine group.

**Methods:** Data was collected by consultation of medical records of the puerperal women. Comparison between hospitals was performed with the chi-square test.

**Results:** The groups were similar for the obstetric history, demographic, biometric, pregnancy and labor characteristics. However, gestational age, weight and head circumference of newborns as well as instrumentation rate were significantly higher in selective group. Episiotomy was performed in 72.5% cases of selective group and in 88.8% of routine group ( $p \leq 0.001$ ). There was less perineal suturing ( $p = 0.001$ ) and a greater number of intact perineum in selective group ( $p \leq 0.001$ ), without differences in lacerations type or degree. The routine group presented more frequent early perineal complications and higher pain levels in the first postpartum day ( $p \leq 0.001$ ). No differences were found between groups in Apgar scores, neonatal trauma and Neonatal Intensive Care Unit admissions number.

**Conclusions:** The selective use of episiotomy was associated with better early maternal outcomes, with no differences in neonatal morbidity. Thus, the routine practice of episiotomy showed no benefits.

**Keywords:** Episiotomy; Neonatal outcome; Perineal complications; Perineal trauma.

### INTRODUCTION

Episiotomy is one of the most common procedures in Obstetrics, despite actual scientific evidence does not support its routine practice<sup>1</sup>. Although episiotomy was originally defended by facility of correc-

tion, better healing and fewer perineal complications versus a spontaneous laceration, studies had failed to demonstrate this advantage<sup>2</sup>. Indeed, it has been associated with an increased risk of complications such as extension of episiotomy incision, unsatisfactory anatomic results, bruising, heavy bleeding, swelling and

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perineal pain, postpartum dyspareunia and rectovaginal fistulas<sup>2-4</sup>.

Multiple randomized clinical trials had analyzed the influence of two policies of episiotomy - selective versus routine use - in terms of early perineal results and late gynecological complications. Selective use of episiotomy was associated with a reduction in severe perineal trauma and need for suturing, despite an increase in anterior perineal trauma<sup>1,5-7</sup>. These two policies did not present differences for wound healing complications. However, in group that episiotomy was performed routinely perineal pain presented a higher intensity in the first days, but this difference disappears in the long term<sup>5,7</sup>. Regarding late gynecological complications, episiotomy did not demonstrated advantages in terms of urinary and fecal continence and function of the muscles of the floor pelvic, evaluated months or years after birth<sup>8-11</sup>. Concerning sexual dysfunction the results were similar in two policies of episiotomy, although there was a trend to resume sexual activity earlier in the groups where episiotomy was performed more selectively and greater dyspareunia in the first postpartum months in women undergoing episiotomy<sup>7,8,12</sup>.

Other aims outlined for episiotomy were related with reduction of shoulder dystocia, fetal cranial trauma and perinatal asphyxia. Nonetheless, there were no benefits of episiotomy in decreasing fetal distress, evaluated by Apgar score, umbilical artery pH or number of admissions to Neonatal Intensive Care Units (NICU)<sup>1,5</sup>.

Most of studies performed until now comparing these two policies occurred in America and North Europe<sup>7</sup>. In Portugal, there are no known studies that compare routine use versus selective use of episiotomy. However, there are known genetic differences among different racial and ethnic groups in the composition of the pelvic floor and its resistance<sup>13,14</sup>. Therefore, it is relevant verify if the benefit pointed out by other studies to selective practice of episiotomy remains in this population.

## MATERIALS AND METHODS

An observational, transversal, descriptive and analytic study was conducted in two public Hospitals in northern Portugal, with different policies regarding practice of episiotomy. The Hospital A adopts a selective policy in which episiotomy is performed according maternal and fetal indications: prematurity, fetal

macrosomia, the need for instrumentation or for shorten the expulsive period by evidence of fetal distress and high risk of severe perineal trauma. On the other hand, the hospital B practices a routine use of episiotomy in order to prevent perineal lacerations and relaxation of the pelvic floor. It was decided to maintain the anonymity of the hospitals given that the aim of the study was to compare policies of use of episiotomy and did not the two Hospitals in particular. Study design and protocol were approved by the Ethics Committee of both hospitals.

The technical guidelines for episiotomy and its repair were similar between hospitals. All episiotomies were left mediolateral, starting in the midline and directs laterally at an angle of at least 60° from the midline towards the ischial tuberosity. The sutures were performed with an absorbable multifilament in layers, with continuous or interrupted suture.

A non-random sampling of convenience of the whole population was utilized and the sample size was calculated using the software G\*Power3.1\* (n= 355 puerperal women for both hospitals), considering an effect size of 0.2, a confidence level of 95%, a test power of 0.9 and 3 degrees of freedom for the chi-square test, based on contingency tables.

Inclusion criteria were maternal age greater than 16 years and not exceeding 40 years, live and singleton pregnancies, gestational age superior than 32 weeks and cephalic presentation that had a vaginal delivery. The only exclusion criterion was the presence of surgical history of the pelvic floor.

Data was collected during the months of July and August of 2011 at both hospitals by consulting the medical records of the puerperal women, until obtains approximately the needed sample size. It was collected data regarding demographic and biometric features of women, obstetrical history, characteristics of pregnancy (surveillance and complications) and labor (analgesia, induction and/or acceleration, rate and type of instrumentation, episiotomy and need of perineal suturing) and biometric parameters of newborns. Hemorrhage during delivery was recorded, considering the subjectively estimated amount of blood loss and it was classified as abundant when superior to 500 mL. The grade of perineal lacerations and type of perineal trauma (anterior or posterior) were also registered (when both types were present, the highest degree was considered). Perineal lacerations were classified in four degrees, based on classification described by Sultan<sup>15</sup>: first degree - injury to the perineal skin only; second

degree – injury to perineum involving perineal muscles but not the anal sphincter; third degree – injury to perineum involving the anal sphincter complex; and fourth degree – injury to perineum involving the anal sphincter complex and anal epithelium. The intensity level of perineal pain in first postpartum day was collected from nursing records, considering a qualitative scale of pain, with five degrees (no pain, mild pain, moderate pain, severe pain, or maximal pain). Early perineal complications (perineal inflammatory signs and healing complications) and neonatal outcomes (Apgar scores, neonatal trauma and NICU admissions number) were also recorded.

Statistical analysis was performed using the Statistical Package for the Social Sciences® (SPSS, version 19.0; IBM, Armonk, NY, USA). A descriptive analysis was performed with measures of central tendency and dispersion. The inferential analysis was then applied to the sample, divided into groups selective (Hospital A) and routine (Hospital B). *T*-test was used for independent samples to compare quantitative variables. A comparison between qualitative variables and defined intervals was performed with the chi-square ( $\chi^2$ ) test. Quantitative data are presented as mean  $\pm$  standard deviation. Statistical significance was confirmed at  $p < 0.05$ .

## RESULTS

During the defined period of study, in the two hospitals occurred 625 deliveries, of which 228 did not meet the criteria for inclusion in the sample (Figure 1). A total of 397 women was analyzed, 200 in selective group (Hospital A) and 197 in routine group (Hospital B). The groups were similar for demographic and biometric parameters as well as for obstetric history (Table I). The maternal age was  $29.78 \pm 5.23$  years in selective group and  $29.17 \pm 4.99$  years in routine group ( $p = 0.237$ ). In both groups the majority of women were Portuguese and caucasian. The groups were similar regarding weight gain during gestation, body mass index at delivery and parity (Table I).

The minimal gestational age was 34 weeks in both groups. The mean gestational age at delivery was significantly higher in selective group – 39 weeks and 2 days  $\pm$  1 week versus 38 weeks and 5 days  $\pm$  1 week in the routine group ( $p \leq 0.001$ ). The sample included 29 preterm infants, 11 (5.5%) in the selective group and 18 (9.1%) in routine group. Only weeks 37 and 40 contributed to the difference in mean gestational age (Figure 2), with more pregnancies of 40 weeks in selective group and more pregnancies of 37 weeks in routine group ( $p = 0.019$ ).

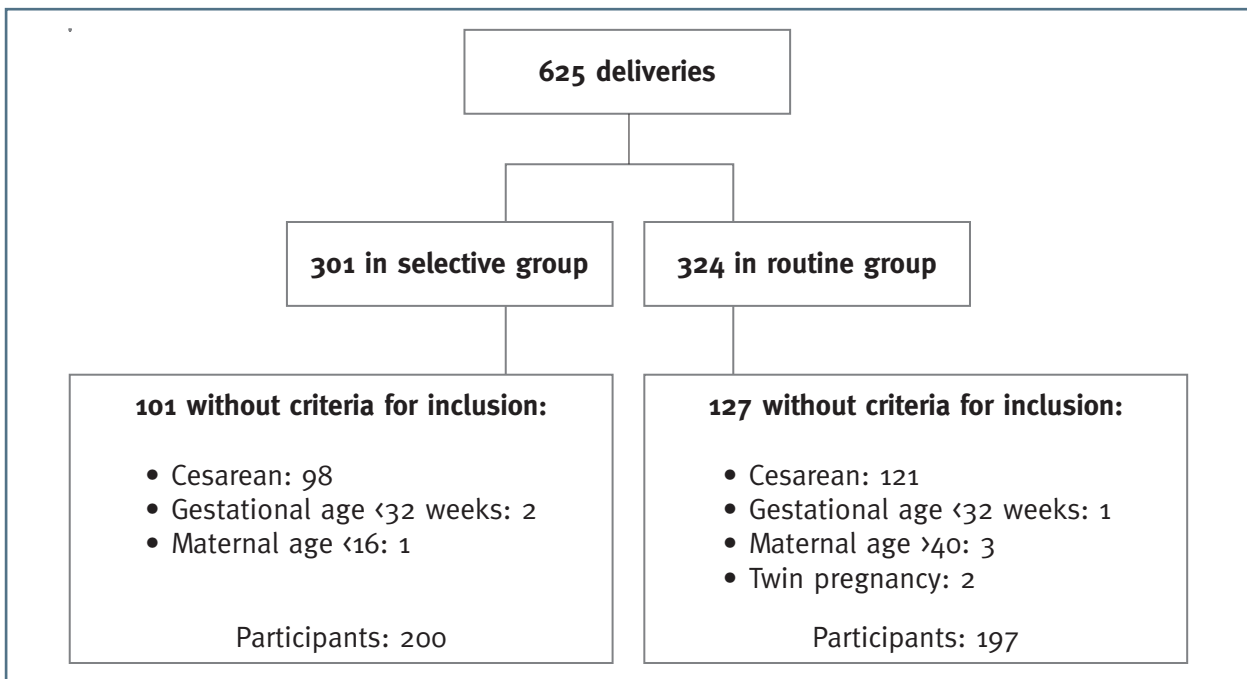


FIGURE 1. Flow diagram

TABLE I. DEMOGRAPHIC AND BIOMETRIC CHARACTERIZATION, AND OBSTETRIC HISTORY OF PUERPERAL WOMEN

	Selective Group (n=200)	Routine Group (n=197)	p value
Nationality, n (%)			
Portuguese	188 (94.0)	193 (98.0)	0.079
Other	12 (6.0)	4 (2.0)	
Race, n (%)			
Caucasian	195 (97.5)	197 (100)	0.075
Black	5 (2.5)	0 (0.0)	
Maternal age (Mean $\pm$ SD; years)	29.78 $\pm$ 5.23	29.17 $\pm$ 4.99	0.237
Weight gain (Mean $\pm$ SD; Kg)	12.22 $\pm$ 4.90	12.31 $\pm$ 4.67	0.853
BMI at delivery (Mean $\pm$ SD; Kg/m <sup>2</sup> )	28.33 $\pm$ 4.02	28.73 $\pm$ 3.90	0.375
Parity, n (%)			
Primiparous	104 (52.0)	116 (58.9)	0.313
Multiparous	96 (48.0)	81 (41.1)	
Previous vaginal delivery	86 (43.0)	70 (35.5)	
Previous cesarean	10 (5.0)	11 (5.6)	

BMI: body mass index; %: relative frequency; n: absolute frequency; SD: standard deviation

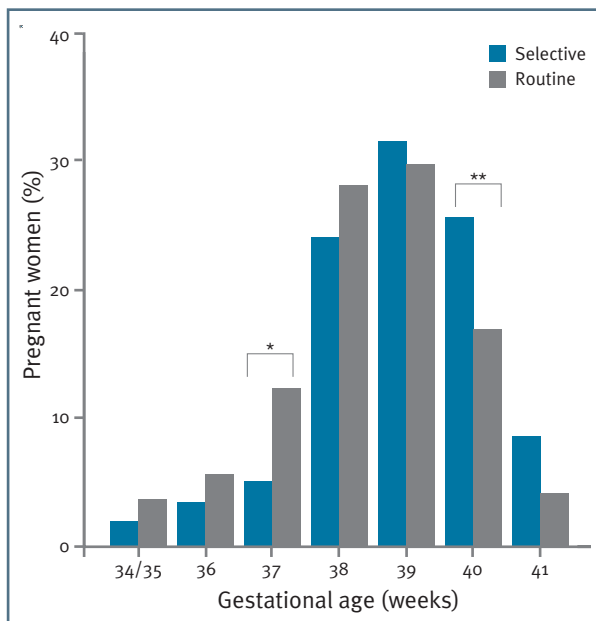


FIGURE 2. Gestational age at delivery in selective and routine groups. \* $p < 0.05$ , \*\* $p < 0.01$

The characteristics of the current gestation and labor were similar between groups, namely pregnancy surveillance, complications of pregnancy, hospital admission cause, need of induction and/or acceleration of labor, analgesia methods and estimated blood losses during the delivery (Table II). There were six

cases of shoulder dystocia, two in the selective group and four in the routine group ( $p = 0.667$ ), with no specific associated complications.

Regarding biometric parameters of newborns, weight ( $p = 0.005$ ) and head circumference ( $p \leq 0.001$ ) were significantly higher in selective group, with no differences in length (Table II). Selective group had 6 (3.0%) macrosomic newborns (birth weight  $> 4000$ g), whereas routine group had one (0.5%) ( $p = 0.132$ ). After excluding the macrosomic newborns, the birth weight remained significantly higher in the selective group ( $3205 \pm 376$  g versus  $3112 \pm 399$  g, respectively,  $p = 0.019$ ).

In selective group episiotomy was performed in 72.5% of the cases and in routine group it was done in 88.8% ( $p \leq 0.001$ ). The number of instrumented deliveries was significantly higher in selective group [31.0% (62/200) versus 15.7% (31/197);  $p = 0.001$ ]. In routine group all instrumented deliveries were performed with vacuum-system and there were no significant differences between groups in rate of vacuum use. In selective group beyond vacuum extraction, there were performed deliveries with forceps [9.0% (18/62)] and spatulas [11.0% (22/62)] (Figure 3). Since instrumentation is associated with a higher episiotomy rate and the number and type of instrumented deliveries was significantly different between the groups, the episiotomy rate excluding instrumented deliveries was calculated. It was 61.6% in selective group and

TABLE II. CHARACTERISTICS OF PREGNANCY, LABOR AND NEWBORNS.

	Selective Group (n=200)	Routine Group (n=197)	p value
Pregnancy surveillance			
Yes	190 (95.0)	190 (96.4)	0.643
Complications of pregnancy			
No	169 (84.5)	164 (83.2)	0.840
Gestational diabetes	10 (5.0)	4 (2.0)	0.183
Threatened preterm labor	4 (2.0)	8 (4.1)	0.365
Ultrasonographic intrauterine growth restriction diagnosis	3 (1.5)	5 (2.5)	0.705
Gestational hypertension	1 (0.5)	6 (3.0)	0.122
Thrombocytopenia	0 (0.0)	5 (2.5)	0.069
Threatened miscarriage	2 (1.0)	3 (1.5)	>0.99
Others	14 (7.0)	6 (3.0)	0.116
Hospital admission cause			
Labor onset	127 (63.5)	119 (60.4)	0.595
Premature rupture of membranes	42 (21.0)	39 (19.8)	0.863
Gestational age > 40 weeks	19 (9.5)	18 (9.1)	>0.99
Oligohydramnios	2 (1.0)	7 (3.6)	0.170
Second stage of labor	4 (2.0)	4 (2.0)	>0.99
Preeclampsia	5 (2.5)	2 (1.0)	0.458
Intrauterine growth restriction	0 (0.0)	2 (1.0)	0.472
Other	1 (0.5)	6 (3.0)	0.122
Induction and/or Acceleration of labor			
No	44 (22.0)	35 (17.8)	0.352
Analgesia			
Epidural	175 (87.5)	179 (90.9)	0.359
No/other	25 (12.5)	18 (9.1)	
Hemorrhage during delivery			
Normal	197 (98.5)	187 (95.4)	0.133
Abundant	3 (1.5)	9 (4.6)	
Newborns			
Mean gestacional age (Mean ± SD; weeks + days)	39w+2d ± 1w	38w+5d ± 1w	<0.001
Male, n (%)	105 (52.5)	92 (46.7)	0.291
Weight (Mean ± SD; g)	3234 ± 407	3118 ± 405	0.005
Length (Mean ± SD; cm)	48.49 ± 1.91	48.76 ± 1.88	0.160
Head circumference (Mean ± SD; cm)	34.49 ± 1.26	33.94 ± 1.36	<0.001

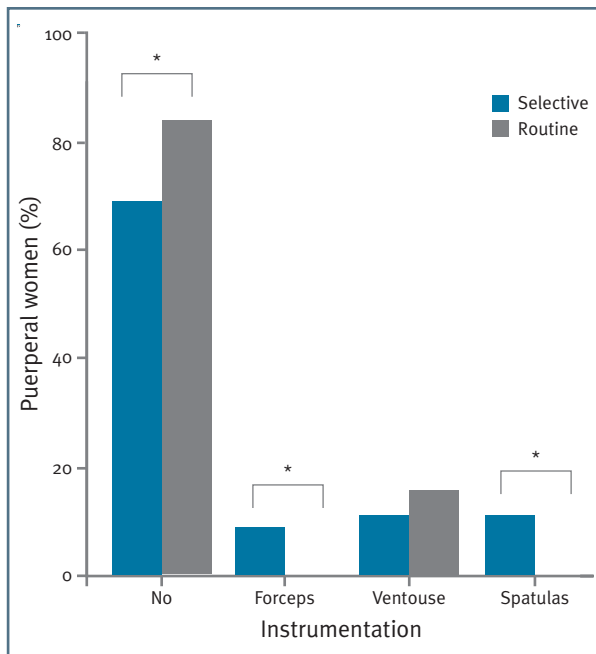
%: relative frequency; n: absolute frequency; SD: standard deviation. Others complications of pregnancy include anemia, pyelonephritis, biliary colic, gestational rhinitis and gingivitis, carpal tunnel syndrome, thrombophlebitis, toxoplasmosis seroconversion, placental hematoma.

87.3% in routine group ( $p \leq 0.001$ ).

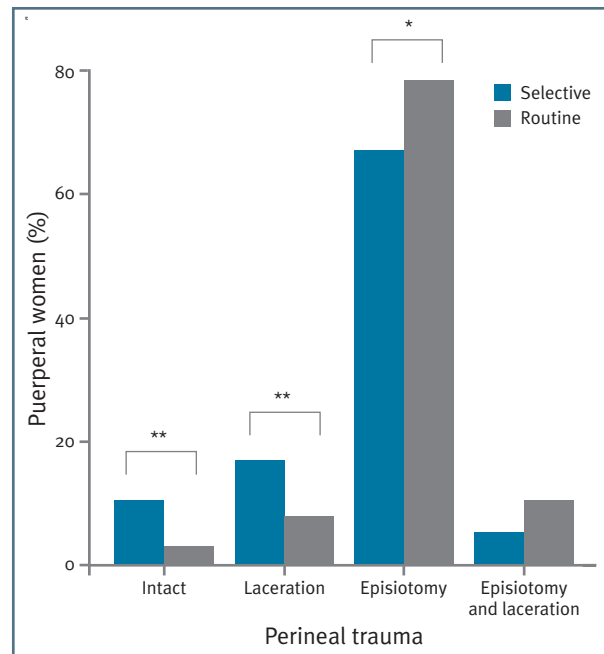
The need for perineal suturing (episiorrhaphy or correction of perineal laceration) was significantly higher in routine group (86.0% versus 95.9%;  $p = 0.001$ ). Regarding to the perineal trauma, the selective group had a higher number of intact perineum or perineum with only perineal lacerations, while in routine group there was a superior number of per-

ineum only with episiotomy and with episiotomy and laceration ( $p \leq 0.001$ ) (Figure 4). There were no significant differences in the number, type and degree of perineal lacerations between groups (Table III).

Concerning to early perineal complications (first postpartum day), women in routine group presented pain intensity levels significantly higher ( $p \leq 0.001$ ) when compared with selective group (Figure 5). The



**FIGURE 3.** Instrumentation rate and obstetric instrument type in selective and routine groups. \* $p < 0.01$



**FIGURE 4.** Perineal trauma in selective and routine groups. \* $p < 0.05$ , \*\* $p < 0.01$

presence of redness and heat was also significantly higher in routine group ( $p = 0.039$ ). There were not differences in suture dehiscence, perineum bruising or perineal edema between the groups (Table IV).

About neonatal outcome (Apgar score at fifth and tenth minute, Apgar score at first minute  $< 7$ , neonatal trauma and NICU admissions), there were no differences between groups (Table V).

## DISCUSSION

In this study early maternal and neonatal outcomes, in two public hospitals in the Northern Portugal, with distinct policies for the practice of episiotomy, were analyzed. Any benefits of routine practice of episiotomy during vaginal delivery were demonstrated. This is consistent with other studies that also evaluated the selective versus routine use of episiotomy<sup>1,5-8</sup>.

The two groups studied were similar in terms of demographic and biometric parameters, obstetric history as well as characteristics of pregnancy and labor. The mean gestational age at delivery was significantly higher in selective group with more gestations of 40 weeks in selective group and more gestations of 37 weeks in routine group. This difference was reflected in bio-

metric parameters of newborns. Indeed, weight and head circumference were superior in newborns of selective group. Since prematurity is sometimes considered an indication for episiotomy<sup>16</sup>, it is important to highlight that no differences between groups were observed in gestational ages below 37 weeks (Figure 2).

The number of instrumented deliveries significantly differed between the groups, being twice in selective group. Routine group only performed instrumented deliveries with vacuum-system whereas selective group also used forceps and spatulas. The instrumentation, and in particularly the forceps, are associated with a higher rate of episiotomy<sup>17</sup> as well as it is related with major perineal complications, such as high degree lacerations, postpartum hemorrhage, and perineal pain, compared to spontaneous vaginal delivery<sup>18</sup>. Spatulas are essential used in France and in certain Hispanic countries and, the few studies about this instrument, showed that it was less traumatic to the fetus, although it was more aggressive for perineum, when compared with forceps<sup>19</sup>. Most studies confronting selective versus routine use of episiotomy in operative vaginal delivery compare forceps and vacuum; there are no known studies that include use of spatulas. Despite selective group present a higher instrumentation rate and use instruments potentially more aggressive to the



TABLE III. PERINEAL LACERATIONS: NUMBER, TYPE AND DEGREE

	Selective Group (n=200)	Routine Group (n=197)	p value
Perineal laceration			
Yes	45 (22.5)	37 (18.8)	0.429
No	155 (77.5)	160 (81.2)	
Degree of laceration			
First	35 (77.8)	23 (63.9)	0.259
Second	7 (15.6)	11 (30.6)	0.179
Third/Fourth	3 (6.7)	2 (5.6)	>0.99
No data	0	1	
Type of laceration			
Posterior	40 (93.0)	26 (83.9)	0.383
Anterior	3 (7.0)	5 (16.1)	
No data	2	6	

%; relative frequency; n: absolute frequency

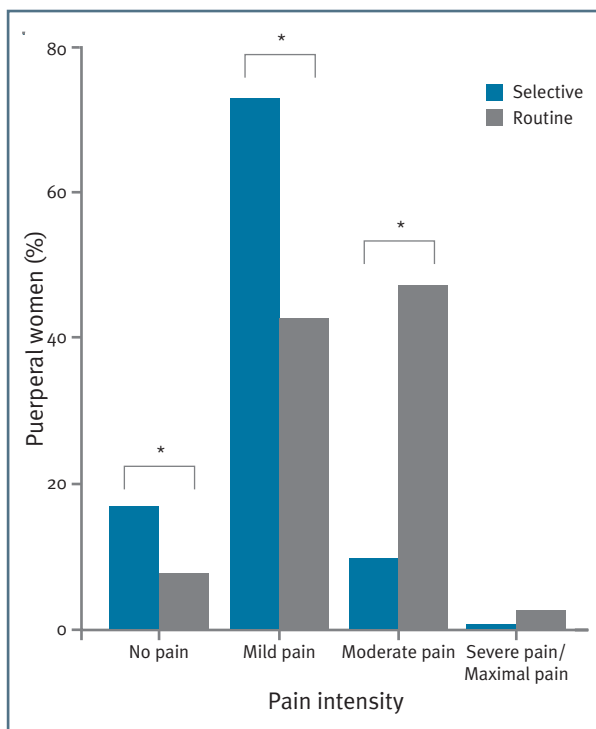


FIGURE 5. Perineal pain intensity in first postpartum day in selective and routine groups. \* $p < 0.01$

perineum, this fact did not affect adversely perineal results (trauma and early perineal complications), who were significantly better in selective group.

In the present work, the episiotomy rate was 72.5% in selective group and 88.8% in routine group. After

excluding the instrumented deliveries, because the large difference in frequency and type of instrumentation between the groups, these rates were 61.6% and 87.3%, respectively. Episiotomy rates are widely divergent in different studies. According to literature, in selective groups the episiotomy rates can vary between 7.6% and 53%, while in routine groups these numbers range from 44.9% to 93.7%<sup>7</sup>. In the several clinical trials that compare these two approaches there is lack of uniformity in definition of policies of episiotomy use. This disparity in the definition of the groups, associated with different institutional rules and individual clinical practice, explains the variation in episiotomy rates.

Despite selective group presented higher gestational age at delivery, weight and head circumference of newborns and rate of instrumentation, the occurrence of perineal trauma was significantly lower. Indeed, with selective practice of episiotomy there was less need for perineal suturing, greater number of intact perineum and perineum only with lacerations. On the other hand, with routine policy there was an increased number of perineum with episiotomy and with episiotomy and perineal laceration simultaneously. A recent meta-analysis had shown that the selective use of episiotomy was associated with a set of benefits versus routine use, such as reduction of the high degree perineal lacerations and perineal suturing, although this policy was related with an increased risk of anterior perineal trauma<sup>1</sup>. The present study had not shown a decrease in severe perineal trauma or an increase in an-

TABLE IV. PERINEAL COMPLICATIONS IN FIRST POSTPARTUM DAY

	Selective Group (n=200)	Routine Group (n=197)	p value
Suture dehiscence	0 (0.0)	1 (0.5)	>0.99
Perineum bruising	7 (3.5)	12 (6.1)	0.336
Perineal edema	28 (14.0)	40 (20.3)	0.131
Others inflammatory signs of the perineum (redness and heat)	0 (0.0)	6 (3.0)	<b>0.039</b>

%; relative frequency; n: absolute frequency

TABLE V. NEONATAL OUTCOME: APGAR SCORE, NEONATAL TRAUMA, NICU ADMISSIONS

	Selective Group (n=200)	Routine Group (n=197)	p value
Apgar score (Mean $\pm$ SD)			
5th minute	9.65 $\pm$ 0.48	9.58 $\pm$ 0.49	0.197
10th minute	9.85 $\pm$ 0.16	9.78 $\pm$ 0.23	0.686
Apgar score at 1st minute < 7, n (%)	7 (3.5)	5 (2.5)	0.790
Neonatal trauma*, n (%)	8 (4.0)	12 (6.1)	0.470
NICU admissions number, n (%)	6 (3.0)	5 (2.5)	>0.99

\*Neonatal trauma includes skin lacerations, bruising and cephalhematoma; NICU: Neonatal Intensive Care Unit; %: relative frequency; n: absolute frequency; SD: standard deviation

terior perineal lacerations in selective group, since there were no differences in the type or degree of lacerations. Nevertheless, only five high degree lacerations were recorded, so conclusions regarding policies use of episiotomy and severe perineal trauma are limited.

The selective group presented less early perineal complications compared to routine group, with significant differences with regard to redness and heat of perineum. No differences were found in terms of suture dehiscence, brushing or perineal edema, although all these complications have been more frequent in routine group. Studies comparing selective and routine use of episiotomy reveal no differences between the groups concerning the early perineal complications, although when comparing an episiotomy with a spontaneous laceration, the surgical incision of perineum did not shown benefits for these parameters<sup>7</sup>. The perineal pain during the first postpartum day was more frequent and more intense in routine group. The results obtained in this study were consistent with clinical trials that associated the routine use of episiotomy with more intense perineal pain in the first days after delivery<sup>5,20,21</sup>.

Regarding to neonatal outcomes, no differences were found between the groups in fifth and tenth

minute Apgar score, in number of newborns with Apgar score at first minute <7, in frequency of neonatal trauma or in number of NICU admissions in the early postpartum. These results were concordant with other studies that disproved the routinely use of episiotomy as an approach to prevent perinatal injuries secondary to fetal distress and to reduce neonatal morbidity<sup>5,22</sup>.

The present work presents some limitations, namely with respect to the adopted methodology. First, all data were obtained by medical records consulting, which is dependent on clear and complete registration information. Moreover, this was an observational study in which the definition of selective and routine practice was determined *a priori* and related with institutions. Nevertheless, all variables that may have impact in results and may be possible confounding factors were recorded and analyzed.

In conclusion, in this study the selective use of episiotomy was associated with less perineal trauma, less need for perineal suturing and less early perineal complications, without increasing of neonatal morbidity. Interestingly, the differences found between the groups (higher gestational age, superior weight and head circumference, increased instrumentation rate) con-



tribute to an increased risk of perineal trauma and early perineal complications in selective group. Thus, the routine practice of episiotomy showed no benefits. At moment, the question focuses on indications for selective practice of episiotomy. Thus, more prospective and randomized studies are necessary and until then the use of episiotomy should be pondered and based in case-by-case evaluations.

#### CONFLICT OF INTEREST

No conflict of interest needs to be declared.

#### AUTHOR'S CONTRIBUTIONS

The authors Rosália Silva Coutada e Cristina Nogueira-Silva contributed equally to this manuscript.

#### REFERENCES

1. Carroli G, Mignini L. Episiotomy for vaginal birth. *Cochrane Database Syst Rev* 2009; CD000081.
2. Bertozzi S, Londero A, Fruscalzo A, et al. Impact of episiotomy on pelvic floor disorders and their influence on women's well-being after sixth month postpartum: a retrospective study. *BMC Women's Health* 2011;11:12.
3. Borges B, Serrano F, Pereira F. Episiotomy - routine versus selective use. *Acta Med Port* 2003;16:447-454.
4. Carnide C, Almeida J, Branquinho M, Negrão L, Santos-Silva I. Episiotomy: old practices, new concepts. *Acta Obstet Gynecol Port* 2011;5:45-51.
5. Dannecker C, Hillemanns P, Strauss A, Hasbargen U, Hepp H, Anthuber C. Episiotomy and perineal tears presumed to be imminent: randomized controlled trial. *Acta Obstet Gynecol Scand* 2004;83:364-368.
6. Rodriguez A, Arenas E, Osorio AL, Mendez O, Zuleta JJ. Selective versus routine midline episiotomy for the prevention of third- or fourth-degree lacerations in nulliparous women. *Am J Obstet Gynecol* 2008;198:285.e1-4.
7. Viswanathan M, Hartmann K, Palmieri R, et al. The Use of Episiotomy in Obstetrical Care: A Systematic Review. *Evid Rep Technol Assess (Summ)* 2005;112:1-8.
8. Dannecker C, Hillemanns P, Strauss A, Hasbargen U, Hepp H, Anthuber C. Episiotomy and perineal tears presumed to be imminent: the influence on the urethral pressure profile, analmanometric and other pelvic floor findings - follow-up study of a randomized controlled trial. *Acta Obstet Gynecol Scand* 2005;84: 65-71.
9. Fritel X, Schaal J, Fauconnier A, Bertrand V, Levet C, Pigné A. Pelvic floor disorders 4 years after first delivery: a comparative study of restrictive versus systematic episiotomy. *BJOG* 2008;115:247-252.
10. Eason E, Labrecque M, Marcoux S, Mondor M. Effects of carrying a pregnancy and of method of delivery on urinary incontinence: a prospective cohort study. *BMC Pregnancy Childbirth* 2004;4:4.
11. Sartore A, De Seta F, Maso G, Pregazzi R, Grimaldi E, Guaschino S. The effects of mediolateral episiotomy on pelvic floor function after vaginal delivery. *Obstet Gynecol* 2004;103:669-673.
12. Signorello L, Harlow B, Chekos A, Repke J. Postpartum sexual functioning and its relationship to perineal trauma: a retrospective cohort study of primiparous women. *Am J Obstet Gynecol* 2001;184:881-888.
13. Hopkins L, Caughey A, Glidden D, Laros R. Racial/ethnic differences in perineal, vaginal and cervical lacerations. *Am J Obstet Gynecol* 2005;193:455-459.
14. Sears C, Wright J, O'Brien J, et al. The Racial Distribution of Female Pelvic Floor Disorders in an Equal Access Health Care System. *J Urol* 2009;181:187-192.
15. Sultan AH. Editorial: Obstetric perineal injury and anal incontinence. *Clin Risk* 1999; 5:193-196.
16. Riethmuller D, Courtois L. Liberal versus restrictive practice of episiotomy: do there exist specific obstetrical indications for episiotomy? *J Gynecol Obstet Biol Reprod (Paris)* 2006;35:32-39.
17. Murphy D, Macleod M, Bahl R, Goyder K, Howarth L, Strachan B. A randomized controlled trial of routine versus restrictive use of episiotomy at operative vaginal delivery: a multicenter pilot study. *BJOG* 2008;115:1695-1702.
18. Macleod M, Strachan B, Bahl R, et al. A prospective cohort study of maternal and neonatal morbidity in relation to use of episiotomy at operative vaginal delivery. *BJOG* 2008;115:1688-1694.
19. Simon-Toulza C, Parant O. Spatulas: description, obstetrical mechanics, indications and contra-indications. *J Gynecol Obstet Biol Reprod (Paris)* 2008; 37:222-230.
20. Macarthur A, Macarthur C. Incidence, severity, and determinants of perineal pain after vaginal delivery: a prospective cohort study. *Am J Obstet Gynecol* 2004;1199-1204.
21. Leeman L, Fullilove A, Borders N, Manocchio R, Alberts L, Rogers R. Postpartum perineal pain in a low episiotomy setting: association with severity of genital trauma, labor care, and birth variables. *Birth* 2009;36:283-288.
22. American College of Obstetricians-Gynecologists. Episiotomy clinical management guidelines for obstetrician-gynecologists: ACOG practice bulletin no 71. *Obstet Gynecol* 2006; 107:957-962.