

# Risk factors for severe perineal injury during childbirth: a case–control study of 60 consecutive cases

A. Groutz, A. Cohen, R. Gold, J. Hasson, A. Wengier, J. B. Lessing and D. Gordon

Urogynaecology and Pelvic Floor Unit, Department of Obstetrics and Gynaecology, Lis Maternity Hospital, Tel Aviv Sourasky Medical Centre, Sackler Faculty of Medicine, Tel Aviv University, Israel

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## Abstract

**Aim** The study aimed to evaluate the current risk factors for severe perineal tears in a single university-affiliated maternity hospital.

**Method** An obstetric database of 31 784 consecutive women who delivered from January 2007 to December 2009 was screened for cases of third-degree or fourth-degree perineal tears. Four controls, matched by time of delivery, were selected for each case of third- or fourth-degree perineal tear. Maternal and obstetric parameters were analyzed and compared between the study and control groups.

**Results** Sixty women (0.25% of all vaginal deliveries) had a third-degree (53 women) or a fourth-degree (seven women) perineal tear. The control group comprised 240 matched vaginal deliveries without severe tears. Primiparity, younger maternal age, Asian ethnicity, longer duration of second stage of labour, vacuum-assisted delivery and heavier newborn birth weight were significantly more common among women who had third- or fourth-degree perineal tears. Of the variables that were found to be statistically significant in the univariate analysis, only primiparity (OR = 2.809, 95% CI: 1.336–

5.905), vacuum delivery (OR = 10.104, 95% CI: 3.542–28.827) and heavier newborn birth weight (OR = 1.002, 95% CI: 1.001–1.003) were found to be statistically significant independent risk factors for severe perineal trauma.

**Conclusion** Identification of women at risk may facilitate the use, or avoidance, of certain obstetric interventions to minimize the occurrence of childbirth-associated perineal trauma.

**Keywords** Severe perineal tears, risk factors, labour and delivery

## What is new in this paper

Up-to-date data are described regarding the modern risk factors for third- and fourth-degree perineal tears in a single university-affiliated maternity hospital with approximately 10 000 deliveries per year. A series of 60 consecutive cases of severe perineal tears was analyzed and compared with 240 controls, matched by time of delivery.

## Introduction

Previous studies have shown an incidence, of up to 60%, of anal incontinence, perineal pain or dyspareunia following severe perineal obstetric injury. Such injuries may be occult, diagnosed by endosonographic imaging after an otherwise normal vaginal delivery, or clinically overt tear. Overt tears are classified into mild (first degree and second degree) or severe (third degree and fourth

degree), according to the extent of the injury [1]. The prevalence shows considerable population, location, and year dependent variation. Studies from the early 1990s reported perineal injury prevalence rates of 0.1–7.3% [2–5]. However, data since 2000 are scarce and inconsistent [6–8]. There is also no consensus regarding obstetric risk factors for severe perineal injury and whether such an injury is preventable [4,9–11].

Among various obstetric parameters, primiparity, assisted forceps delivery, persistent occipito posterior position and birth weight of more than 4000 g were previously found to be significantly associated with severe perineal tears. Other, less established, risk factors include

Correspondence to: Asnat Groutz MD, Urogynaecology, Lis Maternity Hospital, Tel Aviv Sourasky Medical Centre, 6 Weizman Street, Tel Aviv, Israel.  
E-mail: agroutz@yahoo.com

maternal age, postdate pregnancies, induction of labour, a prolonged second stage of labour, precipitate labour, epidural anaesthesia and various maternal birth positions [12].

There are almost no up-to-date data on the current risk factors for severe perineal tears. Their establishment of such risk factors may enable earlier identification of patients at risk and the use of preventive measures. The present study was undertaken to evaluate the current risk factors for third- and fourth-degree perineal tears in a single university-affiliated maternity hospital with approximately 10 000 deliveries per year.

## Method

The general obstetric cohort comprised 31 784 consecutive women who delivered in Lis Maternity Hospital, Tel Aviv Sourasky Medical Centre, from January 2007 to December 2009. Of these, 43.5% were primiparae and 56.5% were multiparae. Demographic, medical and obstetric data were prospectively documented and stored in a computerized database. Vaginal deliveries and Caesarean sections were performed in 76.2% and 23.8% of the women. The rate of instrument-assisted delivery was 4.1%; all were carried out by vacuum extraction. Epidural analgesia was administered to 74.6% of the women. Dysfunctional labour was defined by clinical criteria proposed by the American College of Obstetricians and Gynecologists [13]. According to these, prolonged second stage is defined as duration of more than 2 or 3 h, depending on parity and the use of epidural anaesthesia. Specifically, the 95th percentiles for the length of second stage are 1 h for multiparous women without epidural analgesia, 2 h for multiparous women with epidural analgesia or nulliparous women without epidural analgesia, and 3 h for nulliparous women with epidural analgesia. A third-degree tear was defined as injury to the perineum involving the anal sphincter muscles. A fourth-degree tear was defined as injury to the perineum involving the rectal mucosa [1]. The study protocol was approved by the Local Hospital Helsinki Committee.

Routine delivery management includes active manual support of the perineum and the foetal head when crowning through the vagina. Mediolateral episiotomies are performed selectively. All perineal injuries, including episiotomies and tears, are sutured by obstetricians. Cases of third- and fourth-degree tears are verified and managed by an experienced urogynaecological surgeon.

Of the general obstetric cohort (31 784 women), 60 (0.19%) women had third- or fourth-degree perineal tears. Four controls, matched by time of delivery, were selected for each case of severe perineal tear. Therefore,

the control group comprised 240 matched women who delivered vaginally just before or after the case subjects and did not have third- or fourth-degree perineal tears. Obstetric parameters comprised maternal age, ethnicity, parity, weight, gestational age at delivery, length of first and second stages of labour, use and type of analgesia (epidural or narcotics), labour induction or augmentation, oxytocin administration, mediolateral episiotomy, mode of delivery, and the newborn's Apgar scores, birth weight and gender. Statistical analysis was performed using Student's *t*-test for continuous data or the  $\chi^2$  test for categorical data.  $P < 0.05$  was considered statistically significant. Data are summarized as mean  $\pm$  SD or as a percentage, according to the variables. All variables that were found to be statistically significant in the univariate analysis were entered into a multivariate logistic regression model to identify independent risk factors. Multivariate analysis was performed using SPSS, version 15.0 (SPSS Inc., Chicago, Illinois, USA).  $P < 0.05$  was considered statistically significant.

## Results

Sixty women (0.25% of all vaginal deliveries) had a third-degree (53 women) or a fourth-degree (seven women) perineal tear. Their mean  $\pm$  SD age was  $31.2 \pm 4.7$  (range, 22–41) years. Six (10%) were of Asian origin (five were from the Philippines) and 39 (65%) were primiparae. Forty-four (73.3%) women had a spontaneous vaginal delivery, and 16 (26.7%) underwent vacuum-assisted delivery. A mediolateral episiotomy was performed in 34% of the 44 spontaneous vaginal deliveries and in all of the vacuum extractions. Obstetric characteristics and univariate comparison of the study and control groups are presented in Table 1. Of the various obstetric parameters, primiparity, younger maternal age, Asian ethnicity, longer duration of second stage of labour, vacuum-assisted delivery and heavier birth weight were significantly more common among women who had third- or fourth-degree perineal tears than among those who did not.

Multivariate logistic regression analysis is presented in Table 2. Of the variables that were found to be statistically significant in the univariate analysis, only primiparity, vacuum-assisted delivery and birth weight were found to be statistically significant independent risk factors for severe perineal trauma.

## Discussion

There was a very low prevalence of third- and fourth-degree perineal tears. Sixty (0.25% of all vaginal deliveries) cases of severe perineal tears were diagnosed over a 3-year

Characteristic	Study group ( <i>n</i> = 60)	Control group ( <i>n</i> = 240)	<i>P</i> -value
Primiparity	39 (65)	99 (41.3)	0.001
Age (years)	31.2 ± 4.7	33.5 ± 4.7	0.001
Asian ethnicity	6 (10)	4 (1.7)	0.006
BMI pre-pregnancy	21.7 ± 2.9	21.9 ± 3.8	0.709
BMI at delivery	27.2 ± 3.1	27.2 ± 4.1	0.972
Gestational age (weeks)	39.5 ± 1.5	39.4 ± 1.3	0.573
Oxytocin administration	29 (48.3)	84 (35)	0.073
Epidural analgesia	49 (81.7)	174 (72.5)	0.186
Previous Caesarean section	3 (5)	18 (7.5)	0.777
Second stage of labour (min)	91 ± 75	58 ± 51	< 0.001
Prolonged second stage of labour	13 (21.7)	16 (6.7)	0.001
Episiotomy	30 (50)	82 (34.2)	0.026
Vacuum extraction	16 (26.7)	9 (3.8)	< 0.001
Persistent occipito posterior position	6 (10)	9 (3.8)	0.088
Birth weight (g)	3.372 ± 463	3.229 ± 428	0.024
Birth weight > 4000 g	4 (6.7)	6 (2.5)	0.117

Data are given as mean ± SD or as *n* (%).

BMI, body mass index.

**Table 1** Patient's characteristics: univariate analysis.

**Table 2** Significant independent risk factors: multivariate analysis.

Variable	OR	95% CI	<i>P</i> -value
Primiparity	2.809	1.336–5.905	0.006
Vacuum extraction	10.104	3.542–28.827	< 0.001
Heavier birth weight (g)	1.002	1.001–1.003	< 0.001

period. When compared with matched controls of various obstetric parameters, only primiparity, vacuum-assisted delivery and heavier newborn birth weight were found to be significant independent risk factors for severe perineal trauma.

Large retrospective epidemiological series from the early 1990s identified several risk factors for obstetric injury [2–5,12], but obstetric practice underwent some major changes during the third millennium, such as a significant increase in the number of Caesarean sections, reduction of the use of forceps, selective use of episiotomy, a preference for mediolateral episiotomy, women deferring their first pregnancy and delivery in older age. In addition, there is an increased medical and public awareness of birth-induced pelvic floor injury. Recent data regarding risk factors for severe perineal tears in the third millennium are scarce: Eskandar and Shet [14] reviewed a small database of 3038 deliveries over 2 years (2005 and 2006) and identified 36 cases of third- or fourth-degree perineal tears (1.58% of all vaginal deliveries). Of the various obstetric parameters, primiparity

and persistent occipito posterior position were the only statistically significant risk factors for a severe perineal tear. Conversely, induction of labour, mediolateral episiotomy, epidural analgesia and instrument-assisted delivery in the occipito anterior position were protective.

Valbo *et al.* [15] analyzed an obstetric database from five Norwegian hospitals. Of 12 438 midwife-conducted non-operative vaginal deliveries, 357 cases of third- or fourth-degree perineal tears were identified. Sphincter tear incidence varied significantly, from 1.3 to 4.7%, among the five hospitals. Oxytocin administration during the second stage of labour, and epidural analgesia, were applied significantly more often in the hospital with the lowest rate of sphincter tears. In a prospective British study of 241 women expecting their first vaginal delivery, Andrews *et al.* [8] identified 59 (25%) cases of sphincter injury. Multiple logistic regression analysis revealed heavier birth weight and mediolateral episiotomy as independent risk factors for severe injury. However, the investigators noted that an episiotomy angled closer to the midline was significantly associated with such injuries, and that, in the studied series, no midwife and only 13 (22%) doctors performed a truly mediolateral episiotomy. Therefore, the observed risk associated with episiotomy may be related to an inappropriate episiotomy technique. Hornemann *et al.* [16] analyzed a database of 2967 first vaginal deliveries. Of these, 50 (1.7%) cases of severe perineal tears were identified. Multivariate analysis revealed five significant risk factors for such tears, including episiotomy (both mediolateral and midline),

older maternal age, instrument-assisted vaginal delivery (both vacuum and forceps), heavier birth weight and occipito posterior position. Interestingly, a smaller number of previous, unsuccessful pregnancies was also identified as a risk factor for severe laceration.

The results of the present study support some of these risk factors, including primiparity and heavier birth weight, but also emphasize the importance of vacuum delivery. Several previous studies have demonstrated an increased risk of perineal trauma following forceps delivery compared with vacuum delivery [17–20]. Others, however, have also reported high rates of perineal trauma following vacuum delivery [16,21]. We do not use forceps in our obstetric practice, so no comparison can be made between the two instrument-assisted delivery methods. Diversity between obstetricians in their primary choice of instrumental delivery and in their clinical skills may explain some of these differences. In addition, it is possible that the main cause of perineal trauma during instrument-assisted delivery is the obstetric indication for such an intervention, namely dysfunctional labour, rather than the type of the instrument used *per se*. Thus, avoiding instrumental intervention may facilitate prolonged distension of the vagina by the foetal head, causing greater perineal injury.

In conclusion, significant risk factors for severe perineal tears include primiparity, vacuum delivery and heavier birth weight. Early and accurate prenatal detection of a heavier baby, early prenatal identification of patients at risk, avoidance of forceps delivery, avoidance of midline episiotomy, selective use of mediolateral episiotomy and a minimum 25% rate of Caesarean delivery may all be responsible for the very low rates of severe perineal tears in our routine obstetric practice. Early identification of women at risk may facilitate the use, or avoidance, of certain obstetric interventions to minimize the occurrence of childbirth-associated perineal trauma.

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