



An Australian prospective cohort study of risk factors for severe perineal trauma during childbirth

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Received 1 March 2005; received in revised form 24 March 2006; accepted 4 April 2006

Abstract

Objective: to determine risk factors for the occurrence of severe perineal trauma (third and fourth degree tears) during childbirth.

Design: a prospective cohort study was conducted using the hospital's computerised obstetric information system. Additional data were gathered on women who sustained severe perineal trauma. Descriptive statistics and logistic regression were used to assess risk factors for severe perineal trauma. Midwives were asked to comment on possible reasons for severe perineal trauma. Written responses made by midwives were analysed using content analysis. Discussion groups with midwives were held to further explore their experiences.

Setting: Royal Prince Alfred Hospital, Sydney, Australia.

Participants: all women having vaginal births ($n = 6595$) in a 2-year period between 1 April 1998 and 31 March 2000, in both the birth centre and the labour ward.

Measurements and findings: 2% of women ($n = 134$) experienced severe perineal trauma. One hundred and twenty-two women had third-degree tears and 12 had fourth-degree tears. Primiparity, instrumental delivery, Asian ethnicity and heavier babies were associated with an elevated risk of severe perineal trauma. Midwives identified several factors they believed contributed to severe perineal trauma. These were lack of effective communication with the woman during the birth, different birth positions, delivery technique, ethnicity and obstetric influences.

Key conclusions: findings support current knowledge that primiparity, instrumental birth, heavier babies and being of Asian ethnicity are associated with increased rates of severe trauma. Specific attention needs to be paid to the strong association found between being of Asian ethnicity and experiencing severe perineal trauma.

Implications for practice: further identification and validation of the concerns expressed by midwives to reduce severe perineal trauma is warranted so that preventative strategies can be used and researched.

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Keywords Tear; Episiotomy; Perieum

Introduction

Perineal trauma after childbirth can cause short- and long-term complications for women. Severe perineal trauma can cause long-term complications, such as involuntary loss of faeces and flatus. After third-degree perineal tears, up to 85% of women have persistent sphincter defects and up to 50% have anorectal complaints (Sultan et al., 1993b; Haadem and Gudmundsson, 1997; Poen et al., 1998). There is increasing evidence that instrumental delivery is a risk factor for severe perineal trauma (Sultan et al., 1993a,b; MacArthur et al., 1997; Donnelly et al., 1998). Randomised trials have shown that episiotomy is not effective in reducing the rate of severe perineal trauma and may indeed be harmful (Harrison and Brennan, 1984; Sleep et al., 1984; House et al., 1986; Sleep and Grant, 1987; Klein et al., 1992; Argentine Episiotomy Trial Collaborative Group, 1993; Eltorkey et al., 1994). There is also evidence that the lithotomy position, fetal malpositions, fetal macrosomia, certain racial and ethnic groups (Rizk and Thomas, 2000; Goldberg et al., 2003), perineal body length (Deering, et al., 2004), women of low socio-economic status and very young teenagers are more likely to sustain perineal trauma (Renfrew et al., 1998).

In 1998, midwives and doctors at a tertiary maternity unit in Sydney, Australia, became concerned that their severe perineal trauma rate (1.9%) was one of the highest in the state of New South Wales (NSW) (NSW Health, 1998). This was despite a relatively low episiotomy rate of 11.8%, compared with 18.1% for NSW and an instrumental delivery rate of 11.8%, compared with 10.5% for the State. The high numbers of women from Asian backgrounds (19%) (NSW Health, 1998) giving birth in the maternity unit was hypothesised by many of the midwives and doctors to partly explain the high severe perineal trauma rate. This study was designed to identify the risk factors for severe perineal trauma in this population in order to help midwives and doctors reduce the rate, improve their practice and thereby contribute to the improved well-being of childbearing women. It was also hoped that a prospective study would ensure correct identification of all severe perineal trauma and an accurate incidence could be determined.

Methods

Design

A prospective cohort study was conducted over a 2-year period.

Setting

The hospital in which the study was undertaken is situated in central Sydney and cares for a significant proportion of women from non-English-speaking backgrounds (NESB). More than 45% of women are from NESBs, with 19% being born in an Asian country (NSW Health, 1998). 'Asian' was defined as being born in the following countries: China, Vietnam, Hong Kong, Indonesia, Japan, Laos, Cambodia, Taiwan, North Korea, South Korea, Thailand, Philippines, Burma and Malaysia. Almost one-quarter (23%) of women require interpreters to facilitate communication with health-care staff.

Data collection

Data were prospectively gathered on all child-bearing women who gave birth from 1 April 1998 to 31 March 2000 ($n = 6595$ women). Obstetric records were consistent during the period of study. Data were gathered using a computerised database that records details on each woman and her baby. The database is known as the Obstetric Information System (OIS). Data included marital status, country of birth, private or public health insurance status, need for an interpreter, smoking, maternal age, parity, onset of labour, mode of birth, incidence of impacted shoulders, epidural analgesia and anaesthesia, episiotomy, and higher birth weight. 'Impacted shoulders' was synonymous with shoulder dystocia, where impaction of the anterior shoulder against the maternal symphysis takes place after the baby's head has been born. Higher birth weight was defined as greater than or equal to 4000 g. Perineal trauma was defined using categories from the Royal College of Obstetricians and Gynaecologists (RCOG, 2004) (Box 1).

Additional data were collected on women who suffered severe perineal trauma. Severe perineal trauma was defined as both third- and fourth-degree tears. Third-degree tears were defined as any tear involving the anal sphincter, and fourth-degree tears were defined as any tear involving the rectal mucosa. A measuring tool was not used. A time frame of 2 years was chosen to enable a reasonable amount of data to be available for analysis and comparison.

The midwives caring for women who sustained the severe perineal trauma during the birth were asked to comment on possible reasons or risk factors for each incidence of severe perineal trauma on a survey form. If an obstetrician was the accoucheur, the midwife receiving the baby would fill out the survey form to ensure completion. This form was

Box 1 Degree of perineal trauma.

Degree	Trauma
First	Injury to the skin only
Second	Injury to the perineum involving perineal muscles but not involving the anal sphincter
Third	Injury to the perineum involving the anal sphincter complex (classifications of 3a, 3b, 3c not used)
Fourth	Injury to the perineum involving the anal sphincter complex and anal epithelium
(RCOG, 2004)	

filled out shortly after birth when the mother's clinical records were being completed. There was no additional training undertaken by midwives who were identifying the trauma and completing the survey form. More than one comment could be made on each survey form. The comments were divided into those concerning the mother, those concerning the baby and those classified as iatrogenic. As there was a predominance of comments regarding the condition of the perineum, maternal comments were sub-classified into 'perineal' and other'.

Although some third-degree tears may have been classified as second-degree tears, the survey form allowed for validation of the computerised data collection. Where a discrepancy was observed, the medical record was checked for degree of trauma and method of perineal repair.

During the study, two discussion groups were conducted with 25 labour ward midwives to further explore comments that emerged from the survey. These discussion groups occurred in the context of a delivery ward inservice day, and those midwives who attended participated. Midwives who did not want to participate in the discussion did not have to but none declined to do so. As this study was conducted by midwives as a quality assurance activity in the delivery ward, it was well supported.

The study was commissioned by the Labour Ward Policy and Procedures Committee as a quality activity to help understand the high rate of severe perineal trauma and to look at strategies to reduce the rate. As the study was part of a PhD, research ethics committee approval was obtained from the University of Technology Sydney.

Analysis

All women who had a vaginal birth were included in the analysis. This included women who had an episiotomy. Women who had an elective or emer-

gency caesarean section were excluded, even if they had a trial of forceps before the caesarean section. The incidence of third- and fourth-degree perineal tears for vaginal births was then calculated.

From anecdotal experience, being of Asian ethnicity was considered to be a particular risk factor for severe perineal trauma. This particular group was, therefore, examined specifically as a risk factor for severe perineal trauma.

A univariate analysis was undertaken for potential risk factors, with the outcome variable being presence or absence of severe perineal trauma. This was expressed as the odds ratio (OR) of the occurrence of severe perineal trauma for these individual risk factors. Confidence intervals (CI) at the 95% level were calculated for each OR. A model using logistic regression was developed. Covariates were known from the literature and the earlier analysis as being risk factors for severe perineal trauma. Variables in the model were as follows: parity, ethnicity, onset of labour, mode of birth, impacted shoulders, epidural, episiotomy and birth weight. The level of significance was set at <0.05 . SPSS for Windows version 10 was used for the analysis. Content analysis was used to analyse the midwives' comments from the data sheets. Themes were identified to describe the commonality of the issues raised. A similar process was used to analyse data that arose from the discussion groups.

Findings

The overall incidence of severe perineal trauma in the sample was 2% ($n = 134$). There were 122 third-degree tears (91%) and 12 (9%) fourth-degree tears. There was one repeat third-degree in the 2-year study period. Severe perineal trauma remained stable during the 2-year period.

No significant difference in mean maternal age was found between women who had severe perineal trauma and those who did not. Women who had severe trauma were less likely to have private health insurance, more likely to be Asian and more likely to need an interpreter (Table 1).

In a univariate analysis, primiparity, being of Asian background, having an augmented labour, an instrumental birth, impacted neonatal shoulders (shoulder dystocia), epidural analgesia, an episiotomy and a birth weight of greater than 4000 g were all significantly associated with an increased risk of severe trauma.

Most (81%) of the severe perineal trauma occurred in primiparous women (OR 4.6; 95% CI 2.9–7.2). Asian women were almost twice as likely to have severe perineal trauma than non-Asian women (OR 1.9; 95% CI 1.3–2.8). Augmented labours were associated with a significant increase (OR 2.8; 95% CI 1.8–4.1), as was having epidural analgesia (OR 1.7; CI 1.2–2.5), an instrumental birth (OR 3.3; 95% CI 2.3–4.7) or an episiotomy (OR 2.8; 95% CI 1.9–4.2). Impacted shoulders were associated with a four-fold increase in severe perineal trauma (OR 4.8; 95% CI 1.7–12.7) as was having a large baby (OR 2.3; 95% CI 1.5–3.5) (Table 2).

In the logistic regression model, the four significant predictors associated with severe perineal trauma were primiparity, instrumental birth, Asian ethnicity and heavier birth weight. Augmentation of labour, epidural analgesia, impacted shoulders and episiotomy did not significantly contribute to the risk of perineal trauma in the model.

The most common position for birth chosen by women who experienced severe perineal trauma was semi-recumbent (34%). The next most common position was lithotomy (34%), and all these cases were associated with an instrumental delivery. In

16% of cases, no birth position was recorded on the data-collection form. As data on the woman's birthing position were not collected on the Office of Immigration Statistics, we were unable to compare these findings with women who did not experience severe perineal trauma. This needs further exploration in future studies.

Comments from midwives in relation to severe perineal trauma

Midwives were asked to describe when they thought the severe trauma occurred. In 42% of incidents, midwives identified the tear as occurring with the birth of the baby's head. The midwives felt they did not know when the tear occurred in 19% of the cases. Other factors such as 'shoulders' (8%); 'the head and shoulders' (5%); and, 'posterior arms' (2%) made up the remaining comments for when the severe trauma occurred. Unfortunately, in 22% of the cases, the information was not filled in.

Reasons given by midwives to explain why severe perineal trauma may have occurred were divided into perineal, fetal, iatrogenic and other (Table 3). The most common risk factor for severe trauma documented by the midwives was a 'short perineum' (21 comments). This was predominantly associated with women of Asian ethnicity. The other comment midwives frequently made were that the birth was 'uncontrolled' (10 comments). This had to do with being unable to communicate with the woman during the birth and also the birth attendant being unprepared for the birth.

The discussion groups further explored these comments. Communication with the woman was seen as one of the most important ways of minimising perineal trauma. Other factors were the

Table 1 Demographics of the two groups: severe perineal trauma compared with no severe perineal trauma.

	Severe trauma (n = 134)		No severe trauma (n = 6461)		OR (95% CI)
	n	%	n	%	
Married	117	91.4	5449	87.8*	1.28 (0.75–2.21)
Asian	35	26.1	1021	15.8†	1.88 (1.25–2.83)
Public health insurance	120	89.9	5057	78.4‡	2.38 (1.33–4.33)
Interpreter required	42	31.6	1491	23.2§	1.52 (1.03–2.23)
Mean age [SD]	30.3	5.2	30.9	6.2	NA

*Missing data on n = 261.

†Missing data n = 18.

‡Missing data n = 9.

§Missing data n = 24.

Table 2 Univariate and adjusted analysis for risk factors for severe perineal trauma.

	Severe trauma (n = 134)		No severe trauma (n = 6461)		Unadjusted OR (95% CI)	Adjusted OR (95% CI)
	n	%	n	%		
Parity						
Multiparity	26	0.8	3378	99.2	Referent	Referent
Primiparity	108	3.5	3064	96.6	4.6 (2.9–7.22)	3.98 (2.51–6.32)
Ethnicity						
Non-Asian	99	1.8	5422	98.2	Referent	Referent
Asian	35	3.3	1021	96.7	1.88 (1.25–2.82)	1.83 (1.22–2.75)
Onset of labour						
Spontaneous	64	1.5	4150	98.5	Referent	Referent
Augmentation	43	4.1	1004	95.9	2.78 (1.88–4.11)	1.61 (1.0–2.58)
Induction	27	2.0	1295	98.0	1.35 (0.86–2.13)	1.04 (0.64–1.70)
Mode of birth						
Spontaneous	84	1.5	5467	98.5	Referent	Referent
Instrumental	50	4.8	994	95.2	3.27 (2.29–4.68)	1.92 (1.20–3.07)
Impacted shoulders						
No	129	2.0	6409	98.0	Referent	Referent
Yes	5	8.8	52	91.2	4.78 (1.65–12.72)	2.10 (0.76–5.74)
Epidural analgesia						
No	80	1.7	4648	98.3	Referent	Referent
Yes	54	2.9	1813	98.1	1.73 (1.20–2.49)	0.73 (0.47–1.14)
Episiotomy						
No	96	1.7	5666	98.3	Referent	Referent
Yes	38	4.8	795	95.4	2.82 (1.89–4.20)	1.14 (0.71–1.83)
Birth weight (g)						
< 3999	104	1.8	5733	98.2	Referent	Referent
≥ 4000	30	4.0	727	96	2.27 (1.47–3.50)	2.64 (1.69–4.13)

contribution of different birth positions to increased perineal trauma. Technique was also discussed, particularly the ability to deliver a baby who had a presenting posterior arm without causing further perineal trauma. The midwives all believed that women of Asian ethnicity were more likely to experience severe perineal trauma. This was seen as partly to do with physical aspects, such as shorter perineums, which were more likely to become swollen and less likely to stretch well. Also, problems in communicating with the women during the birth were described as contributing to the trauma. An example of this was telling the woman to breathe as the baby's head was born. The woman may not understand the midwife and push expulsively, leading to a less controlled birth.

Midwives put forward strategies, such as encouraging different birthing positions that alter the pressure of the fetal head on the perineal body, such as left lateral, squatting and all fours, to reduce the rate of severe perineal trauma. They

also suggested that the application of ice packs might reduce oedema and improve perineal outcomes.

Discussion

This study has a number of limitations. The way women from individual Asian countries were categorised under one classification of 'Asian' makes individual analysis difficult. Individual ethnic variations are lost in such a classification system. As country of birth rather than ethnicity is recorded, some women who were classified as non-Asian could be second-generation Asian women born in Australia. Nonetheless, this system of classification was seen as a way to further explore this issue with this group as a whole. Further research is needed to understand whether some ethnic groups are more at risk than others. It is also unfortunate that the position women adopt for the birth was not

Table 3 Reasons given by midwives explaining why severe perineal trauma may have occurred.

Maternal	Fetal	Iatrogenic
Perineal	Tight shoulders/dystocia (4)	Extended episiotomy (8)
Short perineum (21)	Both shoulders delivered at once (1)	Misdiagnosed position (4)
Oedematous perineum (10)	Posterior arm (3)	Failed vacuum then forceps (5)
Tight/rigid perineum (8)	Big baby (3)	Epidural (2)
Button holed (3)	Rapid birth (3)	Total = 19
Previous large tear/scar (2)	Fetal distress (1)	
Previous 3rd degree (1)	Caput and moulding (2)	
Refused suturing previously (1)	Total = 17	
Infiltrated women-no anterior episiotomy (1)		
Total = 47		
Other		
Uncontrolled (10)		
Anxious (1)		
Poor communication (2)		
Small woman (3)		
Long labour (4)		
Vaginismus (1)		
Total = 21		
134 responses in total		

Number of responses are shown in brackets.

recorded in the Office of Immigration Statistics, as we could not look at the relationship between birth position and perineal outcome. As no tool was used to measure the length of the perineal body or independently verify the degree of trauma, there is a possibility that some trauma was misclassified. Research indicates that many anal sphincter injuries are missed on clinical examination (Andrews et al., 2006).

The overall incidence of severe perineal trauma in this study was 2%. This is higher than many other hospitals in NSW (NSW Health, 2002), and may be because of the high proportion of women from Asian backgrounds. The rate of severe perineal trauma is also higher than that documented in some European reports (Brink Henriksen, et al., 1992; Moller et al., 1992; Sultan, et al., 1993b; Kamm, 1994) but lower than reports from the USA (Green and Soohoo, 1989; Wilcox et al., 1989; Combs et al., 1990).

A strong association was found between Asian ethnicity and severe perineal trauma, supporting anecdotal experiences and recent research (Goldberg et al., 2003). Although this may be an issue related to anatomy of the perineum, such as having shorter perineal bodies (Rizk and Thomas, 2000; Deering et al., 2004), an inability to communicate effectively was also identified by midwives as a contributing factor. This lack of communication was

due to NESB women not being able to understand the midwives, and was also associated with feelings of fear and being out of control. A systematic review of practices to minimise trauma to the genital tract in childbirth (Renfrew et al., 1998) found that motivation, confidence, control and pain tolerance had not been specifically addressed by research. The effect of fear and lack of communication on perineal outcome warrants further study. It is also a reminder to midwives of the importance of using health interpreters to reduce confusion and fear. Unfortunately, it is not always practical or possible to have an interpreter present for the birth, although this was encouraged strongly after the study. For some women, however, it has been found to be unacceptable, particularly when the interpreter is male. Parent education classes run by specially trained educators who spoke Cantonese and Vietnamese were commenced to enable women to ask questions and become better informed. Several attempts have been made to implement 'one-to-one' models of midwifery care to enhance communication and support for these women; however, this has not been forthcoming to date.

Higher baby birth weight was found to be a significant predictor of severe perineal trauma in this study. Health practitioners have hypothesised that Asian women are having bigger babies in

Australia than they would have in their own countries because of dietary changes. Some studies support this hypothesis (Dhawan, 1995), whereas others have shown that lower birth weight persists in second-generation Asian babies (Margettes et al., 2002). It is difficult to obtain data regarding the incidence of severe perineal trauma among Asian women in their own countries. A comparative study of birth weights and perineal outcomes in Asian women giving birth in their country of origin and in Australia is needed to address this issue. Short perineal bodies are a physical reality in some women that cannot be altered, but research is needed into how to reduce oedema of the perineum. Research into the effect of ice on reducing oedema during the second stage could be one way to do this.

An increased risk of severe perineal trauma in primiparous women was found in this study, supporting findings of other research (Green and Soohoo, 1989; Wilcox et al., 1989; Moller et al., 1992; Sultan et al., 1993a; Leeuw et al., 2001). Assisted vaginal delivery was found to be associated with an increase in severe perineal trauma, which is again supported by other studies (Moller Bek and Laurber, 1992; Sultan et al., 1993b; Poen et al., 1998; Leeuw et al., 2001).

Reducing the need for an instrumental delivery and improving the technique of operators could potentially result in a reduction in severe perineal trauma. A review of 11 randomised trials (Howell et al., 2001) showed that the use of epidural analgesia is associated with an increased use of instrumental vaginal deliveries, which was itself a significant risk factor for severe perineal trauma in our study. Continuous electronic fetal monitoring also increases the likelihood of low-risk women having operative vaginal births (Thacker et al., 2004). The continuous presence of a support person in labour has been shown to reduce the rate of operative vaginal delivery (Hodnett, 2004).

Midwives also felt that, in some cases, epidural analgesia might lead to increased perineal oedema. This was said to be due to inability of women to mobilise and longer second stages. In this study, however, epidural ceased to be a significant risk factor for severe perineal trauma after logistic regression.

Maternal positioning in second stage has been shown to be associated with differing rates of trauma for women. Lower rates of trauma have been found for women choosing semi-sitting, lateral or squatting positions, whereas higher rates of trauma have been found to be associated with standing upright or the lithotomy position with stirrups (Renfrew et al., 1998). Positions for birth were not

recorded for all women, so it is not possible to draw any conclusions around the birth position and odds of sustaining severe perineal trauma. Further research is needed in this area, with particular consideration of cultural and ethnic issues.

The findings of this study have been used to provide education sessions to midwives on how to protect the perineum when delivering the baby's shoulders and also how to deliver posterior arms that present before the birth of the anterior shoulder. This factor was identified by several midwives as having been the possible cause of the severe perineal trauma. This study has encouraged us to pursue further investigation into the effect of different birth positions on perineal outcome. Improving the technique of operators is also a fundamental part of ongoing improvement in obstetric outcomes.

Conclusion

In this study, being primiparous, being of Asian ethnicity or having instrumental births put women at increased risk of sustaining severe perineal trauma during birth. In order to try and reduce the incidence of severe perineal trauma, effort needs to be made to reduce the incidence of instrumental deliveries. More research is needed into methods for reducing the incidence of severe trauma in women of Asian ethnicity; into reducing oedematous perineums during birth; the effect of fear and lack of communication; and the effect of birth positions on women's perineal outcomes.

Acknowledgment

The authors would like to thank the midwives involved in the study.

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