

Changed pattern in the use of episiotomy in Sweden

G. Röckner *Research Fellow, A. Fianu-Jonasson Associate Professor*

Department of Obstetrics and Gynaecology, Karolinska Institute, Huddinge University Hospital, Sweden

Objective To study changes in the use of episiotomy since 1989, controlling for variables such as severe tears, epidural anaesthesia, duration of the second stage of labour, instrumental deliveries, birthweight and maternal position at delivery.

Design Retrospective study. Data were obtained from original birth records and questionnaires.

Setting Huddinge University Hospital and all labour wards ($n = 62$) in Sweden.

Population 10,661 women who were delivered vaginally (4575 nulliparae, 6086 multiparae) between 1992 and 1994, and 3366 nulliparae delivered in all Swedish hospitals during the month of March 1995.

Main outcome measures Episiotomy rates, severe tears and instrumental deliveries.

Results The rate of episiotomy was 1% and of severe tears 0.6% among multiparae delivered vaginally (including instrumental deliveries) at Huddinge University Hospital between 1992 and 1994. The rate of episiotomy was 6.6% and of severe tears 2.3% among nulliparae. Vacuum extraction and epidural anaesthesia were more commonly associated with episiotomy. Factors significantly associated with severe tears were infant birthweight ≥ 4000 g, vacuum extraction and episiotomy. In all Swedish labour wards in 1995 the mean incidence of episiotomy in nulliparae was 24.5%, a significant decrease from 33.7% in 1989. Wide variations occurred between hospitals (4%–50%).

Conclusion The use of episiotomy was much reduced at Huddinge University Hospital, with a consistently low rate of severe tears. This supports the growing evidence for individualised and restrictive use of episiotomy at childbirth.

INTRODUCTION

Episiotomy, the commonest intervention during childbirth, was first introduced for complicated deliveries, but in many countries it became a routine policy in clinical practice without scientific evidence of its benefits. During the last three decades the need for episiotomy has been questioned by childbirth activists, women themselves, midwives and obstetricians^{1–8}. Despite the paucity of evidence concerning the benefits of episiotomy, it is still believed to prevent anal sphincter injuries. The use of episiotomy varies extensively among labour wards in Sweden^{9,10} and also internationally^{1,2}.

Huddinge University Hospital is a teaching hospital for medical and midwifery students. About 3800–4100 deliveries occur annually. The hospital also serves as an obstetric and neonatal referral centre for nearby hospitals. In Sweden there is a midwife-based management of maternity care, with registered nurse midwives responsible for uncomplicated pregnancies, deliveries,

performance of episiotomy and suturing of perineal trauma, except for severe tears (third and fourth degree).

We have previously reported the use of episiotomy in vaginally delivered nulliparae in the department of obstetrics and gynaecology at Huddinge University Hospital. We found that episiotomy had a negative effect on the woman's wellbeing, was overused and needed to be reconsidered^{9,10}. The aim of the present study was to determine whether the episiotomy rate had changed since 1989, taking account of confounding variables such as severe tears, epidural anaesthesia, duration of the second stage of labour, instrumental interventions, birthweight and maternal positions. We used data collected at Huddinge University Hospital between 1992 and 1994 and from all labour wards in Sweden in the month of March 1995.

METHODS

We carried out a retrospective study of episiotomy rates and severe tears in women who were delivered vaginally between 1992 and 1994 at Huddinge University Hospital and compared them with data in 1989. Our data were based on 10,661 women (4575 nulliparae, 6086

Correspondence: Dr G. Röckner, Department of Obstetrics and Gynaecology, Karolinska Institute, Huddinge University Hospital, S-141 86 Huddinge, Sweden.

multiparae) who were delivered vaginally in the study period 1992–1994 (complete cohorts for women giving birth), collected from original birth records. Perineal tears of third and fourth degrees were defined as third degree if they extended partially or completely through the anal sphincter, and fourth degree if they included the sphincter and anal mucosa. An intact perineum was defined as no episiotomy or tears of any degree. Vaginal tears were not evaluated in this study.

Episiotomies and perineal trauma were repaired by nurse midwives, whereas third and fourth degree tears were repaired by obstetricians. Vacuum extraction and forceps were performed by obstetricians, although some pelvic floor outlet vacuum extractions were carried out by nurse midwives.

Most of the data concerned nulliparae because episiotomy is more usually performed on them. We compared figures with those from our previous study⁹ in 1989 which included 400 vaginally delivered nulliparae at Huddinge University Hospital (the first 100 in each quarter of that year were selected).

We continued our study of nulliparous women at the national level. The use of episiotomy was determined by means of a questionnaire sent to all labour wards in Sweden (11 university and 51 community hospitals), requesting information for one month in 1995. All 62 labour wards in Sweden answered the questionnaires. From the period with the highest rate of delivery (March to June)¹¹, March was randomly selected. The information requested related to nulliparae and concerned the type of episiotomy, frequency, policy concerning this procedure, and the commonest position of the women during delivery. In 1995, there were 102,384 deliveries in Sweden¹¹, nearly all in hospital, with a home delivery rate of about one per thousand¹².

Positions during delivery were divided into three groups: 1. lithotomy (on the back, semi-sitting with knees bent and legs flexed in stirrups); 2. lithotomy (on the back, semi-sitting on the delivery bed); and 3. alternative positions (i.e. squatting, lateral Sims', on a cushion, on hands and knees, standing, or on a birth chair or in a 'soft bed').

Statistical analysis

The following tests were used to analyse the data: Student's *t* test, χ^2 test, and χ^2 test for trend, as well as various characteristics such as parity, use of episiotomy, severe tears, calculated as yearly percentage, and multiple logistic regression¹³.

Clinical factors were compared in women who had undergone episiotomy and in those who had not. A logistic regression model was used to ascertain the possibility of confounding factors. The following risk factors were taken into account: epidural anaesthesia,

duration of second stage, episiotomy, severe tears, instrumental intervention and birthweight.

To evaluate the severe tears, together with different background factors, all cases of severe tears were chosen among nulliparae delivered vaginally during 1992–1994 ($n = 106$). As controls, we randomly chose twice as many nulliparae who had been delivered vaginally and who had not had severe tears ($n = 212$) during the same period. This was done because the statistical power would not have increased very much if more controls had been used, the weakness being that we could not increase the number of cases with severe tears.

In the evaluation of episiotomy as a dependent factor, we randomly sampled 100 episiotomies (cases) from our material and one control for each case and analysed the data multivariately with respect to various risk factors (covariates).

A sample of 604 nulliparae, who had not had an episiotomy between 1992 and 1994 was randomly drawn from 4575 nulliparae delivered vaginally at Huddinge University Hospital to evaluate deliveries with an intact perineum. The sample was compared with figures for 1989 and consisted only of nulliparae in whom episiotomy had not been performed.

This study was approved by the ethics committee of Huddinge University Hospital.

RESULTS

A total of 12,072 women gave birth at Huddinge University Hospital from January 1992 to December 1994. Of these, 1411 deliveries were by caesarean section; 10,661 were vaginal deliveries (4575 nulliparae, 6086 multiparae). Of multiparae with vaginal deliveries, 63 (1%) had an episiotomy; a third or fourth degree tear occurred in 38 (0.6%).

Of the 4575 nulliparae who had a vaginal delivery, 302 (6.6%) had an episiotomy in 1992–1994. This represented a decrease in the rate of episiotomy, when compared with data from 1989: 104 of 400 (26%). Of the 302 episiotomies, 268 (89%) were mediolateral and 34 (11%) midline. Between 1989 and 1992–1994 the rate of nulliparae with an intact perineum tended to rise (Table 1).

Table 1. The rate of intact perineum in 1989, compared with 1992–1994, in nulliparous women without episiotomies.

Year	No. of nulliparae	No. with intact perineum	%	<i>P</i>
1989	400	176	44	0.071*
1992–1994	604	301	50	

* χ^2 3.3; df = 1.

Table 2. Distribution of third and fourth degree tears in all vaginal deliveries among nulliparae during 1992–1994 ($n = 4575$). Values are given as n (%).

Nulliparae	3° partial	3°	4°	TOTAL 3° 4°
No episiotomy ($n = 4273$)	57 (1.3)	22 (0.5)	8 (0.2)	87 (2.0)*
With episiotomy ($n = 302$)	8 (2.6)	8 (2.6)	3 (1.0)	19 (6.3)*

* $\chi^2 = 21.7$; $df = 1$; $P < 0.001$.

Severe tears in nulliparae in the 1992–1994 group occurred in 106 women (2.3%). However, when severe tears in this group were compared with those in 1989 (1%), a significant difference in severe tears was found (χ^2 test for trend, $P = 0.031$). There was a significant increase in the rate of third and fourth degree tears in women who had an episiotomy (Table 2). The indications for episiotomy, as recorded by obstetricians and nurse midwives, are shown in Table 3. Fetal or maternal indications were almost equally frequent.

Of the 4575 nulliparae having vaginal deliveries in 1992–1994, there were 676 vacuum extractions and 33 deliveries using forceps. Thus there were 709 instrumental deliveries (15.5%). Of these, 584 (82%) were performed without an episiotomy and 125 (18%) with an episiotomy. Using multiple logistic regression, we found that vacuum extraction and epidural anaesthesia were both significant factors for episiotomy when considered together (Table 4), indicating that episiotomy

was more common with vacuum extraction and epidural anaesthesia.

The associated factors of birthweight, vacuum extraction, episiotomy and epidural anaesthesia are shown in Table 5. These factors were analysed univariately with respect to third and fourth degree tears. Birthweight > 4000 g, vacuum extraction and episiotomy were significantly associated with severe tears.

Table 6 shows the results of multiple logistic regression for third and fourth degree tears. When birthweights were divided into < 4000 g and ≥ 4000 g, there was a somewhat stronger association with third and fourth degree tears than with birthweight as a continuous factor and the former was therefore used. Vacuum extraction and epidural anaesthesia were strongly correlated ($r = 0.32$; $P < 0.001$), as were vacuum extraction and episiotomy ($r = 0.26$; $P < 0.001$).

The data represented the whole country during March 1995. All 62 departments of obstetrics in Sweden

Table 3. Indications for episiotomy in nulliparae ($n = 4575$).

	n (%)
Fetal	
Fetal distress (imminent)	127 (2.8)
Breech	9 (0.2)
Dystocia, 2 with macrosomia	3 (0.1)
Maternal	
Secondary arrest	100 (2.2)
Rigid perineal	57 (1.2)
Circumcised	6 (0.1)
TOTAL	302 (6.6)

Table 4. Multiple logistic regression with respect to episiotomy odds ratios (OR) with 95% confidence intervals (CI). $n = 200$ of observations, $n = 100$ of episiotomies. EDA = epidural anaesthesia; VE = vacuum extraction.

Factors	β	SE	OR	CI	P
EDA	0.900	0.308	2.46	1.34–4.50	0.004
VE	0.866	0.330	2.38	1.24–4.54	0.009
Birthweight	-0.006	0.035	0.99	0.93–1.06	0.863
Duration	0.006	0.076	1.01	0.87–1.17	0.935

VE, EDA: no = 0, yes = 1.

Birthweight per 100 g, duration of second stage per 10 min.

Table 5. Third and fourth degree tears among nulliparae, univariate analysis. Values are given as n (%) unless otherwise indicated. OR = odds ratio; VE = vacuum extraction; EDA = epidural anaesthesia.

	No ($n = 212$)	Yes ($n = 106$)	χ^2	OR	P
Birthweight > 4000 g	10 (4.7)	22 (20.8)	20.1	5.3	< 0.001
VE	29 (13.7)	38 (35.9)	20.9	3.5	< 0.001
Episiotomy	11 (5.5)	19 (17.9)	13.4	4.0	< 0.001
EDA	102 (48.1)	55 (51.9)	0.4	1.2	0.553

Coding birthweight < 4000 g = 0, > 4000 g = 1; episiotomy: no = 0, yes = 1.

Table 6. Multiple logistic regression with respect to third and fourth degree tears in nulliparae. OR = odds ratio; CI = 95% confidence interval; VE = vacuum extraction; EDA = epidural anaesthesia.

Factors	β	SE	χ^2	OR	CI	P
Birthweight	1.651	0.424	15.2	5.2	2.3–12.0	<0.001
VE	1.218	0.328	13.8	3.4	1.8–6.4	<0.001
Episiotomy	1.082	0.433	6.2	3.0	1.3–6.9	0.012
EDA	-0.449	0.283	2.5	0.6	0.4–1.1	0.112
Constant	-1.053					

Coding birthweight < 4000 g = 0, > 4000 g = 1; episiotomy: no = 0, yes = 1.

answered a questionnaire. Three labour wards have been closed since 1989.

Figure 1 shows the use of episiotomy in nulliparae who were delivered vaginally on all labour wards in 1995 in Sweden, compared with use in 1989. Three labour wards had rates as low as 4%–5% in 1995.

The 62 labour wards who replied in March 1995 reported that 3366 nulliparae had been delivered vaginally, 787 (24.5%) of whom had had an episiotomy. This represented a significant ($P < 0.001$) decline in the use of episiotomy from 33.7% in 1989, although the rate had increased on some labour wards. Medio-lateral episiotomy was most common (58 labour wards); and mid-line episiotomy was reported by four labour wards. There was no difference in the mean incidence of episiotomy between the 11 university hospitals and 51 community hospitals (23% and 24%, respectively). Out of 23 hospitals in 1989, 10 had a policy for routine use

of episiotomy at delivery in special cases. The indications for use of episiotomy included prematurity and breeches ($n = 5$); breech presentation ($n = 3$); and prematurity, breech presentation and vacuum deliveries ($n = 2$) and 13 hospitals had reversed such a policy in 1995.

Each department was asked which delivery position was commonest among nulliparae delivered vaginally. The lithotomy (semi-sitting on the delivery bed) was commonest in 27 departments. Of 1321 women delivered, 353 (26.7%) had an episiotomy. At 26 other hospitals, 'alternative positions' were commonest and episiotomy was performed on 299 of 1561 women (19%). In the remaining nine hospitals, lithotomy with stirrups was used most frequently; this was far fewer than the 27 hospitals reporting such a policy in 1989. Of 484 deliveries in these nine hospitals, 135 (27.9%) in 1995 had an episiotomy, a decline from 1672 deliveries 549 (32.8%) in 1989 ($P = 0.091$).

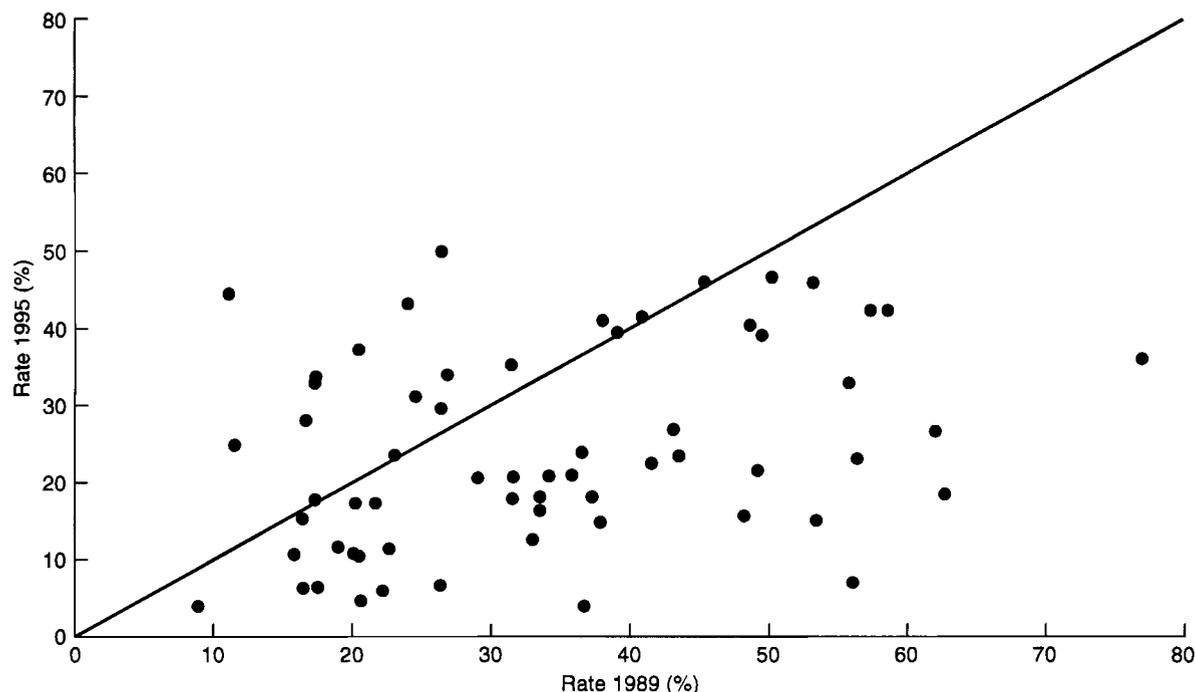


Fig. 1. Use of episiotomy in nulliparae on all labour wards in Sweden compared with 1989. Each ward represented by a single dot.

DISCUSSION

This retrospective study evaluated the prevalence of episiotomy and severe tears in nulliparae at Huddinge University Hospital in particular, and in nulliparae on all labour wards in Sweden. Most of the data analysed were restricted to nulliparae, as episiotomy is more common among them compared with multiparae. At the very least multiparae in any such study need to be considered separately. The present study shows that multiparae had a considerably lower incidence of episiotomies and severe tears. Despite the well known relation between parity and the use of episiotomy, national statistics on the use of this procedure have not been systematically collected in other countries, except the UK and Sweden¹.

Our chief findings were that the use of episiotomy in nulliparae at Huddinge University Hospital had decreased dramatically from 26% in 1989 to 6.6% in 1992–1994, and that the incidence of severe tears had remained low. It seems possible that this low rate of both episiotomy and severe tears was due to the results of our previous studies^{9,10} and others^{2-7,14} which showed no evidence that episiotomy was beneficial in all deliveries, and that this led to discussions (formal and informal) among midwives, obstetricians and students at the clinic. This may have contributed to a heightened awareness resulting in changed attitudes towards the use of episiotomy and a more objective consideration of its place in clinical practice.

The present study showed a trend towards an increased rate of women with an intact perineum since 1989. Other authors¹⁵ found that the rate of vaginal tears increased when the rate of episiotomy declined, and an increase in the rate of women with an intact perineum. However, in our study we did not determine the severity of vaginal tears, and thus these tears could have ranged from unsutured minor trauma to extensive sulcus tears. In the management of perineal trauma it is important to recognise that episiotomy itself is a second degree tear, since superficial muscles of the perineum are cut¹⁵. Woolley⁸ found that episiotomy can be associated with many complications and the only advantage of episiotomy is reduced anterior tears, although such tears are considered to carry minimal morbidity. Even if the number of vaginal tears is increased, we believe that a low rate of both episiotomy and severe tears must be considered to outweigh this. Thus, an individualised and restrictive use of episiotomy is recommended^{16,17}. However, it is important that the overall perineal damage is assessed.

There was a trend towards a significant increase in severe tears (2.3%) in 1992–1994 compared with (1%) in 1989⁹. This may be explained by an increase in instrumental deliveries from 11.5% in 1989⁹ to 15.5% in 1992–1994. It has been suggested that instrumental

deliveries produce more perineal trauma (both episiotomy and tears) than spontaneous deliveries¹⁷⁻¹⁹. In our study vacuum extraction was the method used most for instrumental deliveries at Huddinge University Hospital, as it is considered to produce less perineal trauma.

In the present study in nulliparae multiple logistic regression showed that epidural anaesthesia and vacuum extraction were significantly associated with episiotomy and that risk factors such as birthweight ≥ 4000 g, vacuum extraction and episiotomy were significantly associated with severe tears. These findings accord with that of Sultan *et al.*²⁰. On the other hand, Combs *et al.*²¹ found no effect of birthweight, but nulliparity, median episiotomy and instrumental delivery were associated with severe tears. Our results are also consistent with other reports^{7,18,22}.

Our findings provide no evidence that episiotomy prevents severe tears (Table 2). Most severe tears were partial and few were of the fourth degree. The use of a mediolateral episiotomy rather than a midline one may have prevented fourth degree tears. A higher rate of severe tears using midline episiotomy, in contrast to mediolateral, has been reported in several studies^{2,7,8,21,22}. Bansal *et al.*¹⁵ reported a decrease in third and fourth degree tears (9% to 4.2%) after reducing the incidence of midline episiotomy in all spontaneous deliveries from 86% to 10.4%. Ecker *et al.*²³ reduced the use of midline episiotomy in operative deliveries in nulliparae from (95.5% to 38.7%) and found a decrease in fourth degree tears from (14.8% to 5.8%) and the rate of third degree tears remained unchanged (28.3% to 29.7%).

In most European countries the commonest used episiotomy is medio-lateral in contrast to the midline episiotomy used in the United States and Canada^{2,7} but the episiotomy technique which provides the best outcome is unclear.

The national sample of nulliparae in 1995 comprised 9.7% of all vaginal deliveries in nulliparae¹¹ and is considered to be representative of the whole year. There was a wide variation (4%–50%) between labour wards in the frequency of episiotomy (Fig. 1). Despite the fall from 33.7% in 1989 to 24.5% in 1995, the rate increased on some labour wards. This great variation gives cause for concern and demonstrates lack of consensus about its use. One factor may be the lack of scientific support for episiotomy; another could be more frequent interventions in labour and at birth. This, in turn, might be due to differing attitudes regarding the appropriate level of care and technology^{7,22,24}.

Thirteen labour wards had changed their policy since 1989, but 10 still had a policy of routine use of episiotomy for indications such as the protection of the fetal head of preterm birth or to enlarge the vagina at breech deliveries and vacuum extraction. It has been

suggested that a preterm infant's head is more vulnerable to injury from compression during delivery than that of a full term infant. However, there is no evidence that an episiotomy reduces these risks^{17,25}. This difference in indications and practice might be connected with difficulty in changing long held medical traditions, as noted by Klein *et al.*^{7,24}. In older obstetric textbooks, episiotomy has been prescribed as a routine procedure, especially for nulliparae¹. Only in the most recent literature has it been stated that episiotomy should be individualised and used restrictively under specified fetal and maternal indications^{7,16,17,26}.

Of the different positions reported, lithotomy (on the back, semi-sitting on a delivery bed) was the commonest position used in 27 labour wards. Alternative positions were commonest in 26 units, an increase of 12 since 1989. In the remaining nine labour wards, the lithotomy position with stirrups was most frequently used. Eighteen labour wards had extended their use of alternative positions and although the rate of episiotomy for each position was not reported, these wards had the lowest rate of episiotomy with a mean of 19%. Differences in delivery positions appear to reflect different ideas in obstetric care philosophy and practice among midwives. Their experiences, beliefs and attitudes tend to favour a more natural delivery, allowing a free choice of position. Our findings accord with that of other studies^{14,27-29}.

The fact that the lithotomy position with stirrups was commonest on nine labour wards raises the question of the suitability of this position, especially since Borgotta *et al.*³⁰ have demonstrated that perineal trauma can be limited by rational avoidance of this position. Other authors² have suggested that the lithotomy position subjects the perineum to mechanical stress, thereby reducing the natural distensibility of the perineal tissues and increasing the risk of tears.

CONCLUSION

We do not doubt the need for episiotomy in some situations when it simply cannot be avoided and the benefits outweigh the risks. The results of this study provide evidence that the use of episiotomy can be restricted to specified fetal and maternal indications. The change in the pattern of episiotomy usage in Sweden may have been influenced by previous studies. Continuing audit could lead to further benefits for childbearing women.

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References

- Graham ID. *Episiotomy: Challenging Obstetric Interventions*. Oxford: Blackwell Science, 1997.
- Thacker SB, Banta D. Benefits and risks of episiotomy: an interpretative review of the English language literature, 1860-1980. *Obstet Gynecol Surv* 1983; **38**: 322-338.
- Sleep J, Grant AM, Garcia J, Elbourne DR, Spencer JAD, Chalmers I. West Berkshire perineal management trial. *BMJ* 1984; **289**: 587-590.
- Harrison RF, Brennan M, North PM, Reed JV, Wickman EA. Is routine episiotomy necessary? *BMJ* 1984; **288**: 1971-1975.
- House MJ, Cario G, Jones MH. Episiotomy and the perineum: a random controlled trial. *J Obstet Gynaecol* 1986; **7**: 107-110.
- Argentine Episiotomy Trial Collaborative Group. Routine vs selective episiotomy: a randomized trial. *Lancet* 1993; **42**: 1517-1518.
- Klein MC, Gauthier RJ, Robbins JM, Kaczorowski J, Jorgensen SH, Franco ED, Johnson B, Waghorn K, Gelfand MM, Guralnick MS, Luskey GW, Joshi AK. Relationship of episiotomy to perineal trauma and morbidity, sexual dysfunction and pelvic floor relaxation. *Am J Obstet Gynecol* 1994; **171**: 591-598.
- Woolley RJ. Benefits and risks of episiotomy: a review of English language literature since 1980. *Obstet Gynecol Surv* 1995; **50**: 806-835.
- Röckner G, Ölund A. The use of episiotomy in primiparae in Sweden. A descriptive study with particular focus on two hospitals. *Acta Obstet Gynecol Scand* 1991; **70**: 325-330.
- Röckner G, Henningsson A, Wahlberg V, Ölund A. Evaluation of episiotomy and spontaneous tears of perineum during childbirth. *Scand J Caring Sci* 1988; **1**: 19-24.
- Statistics Sweden, Population Statistics, Örebro, Sweden, 1995.
- The Swedish Homebirth Association, S-15021 Sjögren D. Mölnbo, Sweden, 1997.
- Breslow NE, Day NE, Davis V. In: Davis W, editor. *Statistical Methods in Cancer Research. Vol. 1: The Analysis of Case-Control Studies*. Lyon: International Agency for Research on Cancer, 1980; 192-246.
- Brandt-Graham S, Cantanzarite V, Bernstein J, Varela-Gittings F. A comparison of attitudes and practices of episiotomy among obstetrical practitioners in New Mexico. *Soc Sci Med* 1990; **31**: 191-201.
- Bansal RK, Tan WM, Ecker JL, Bishop J, Kilpatrick SJ. Is there a benefit to episiotomy at spontaneous vaginal delivery? A natural experiment. *Am J Obstet Gynecol* 1996; **175**: 897-901.
- Carrolli G, Belizan J, Stamp G. Episiotomy policies in vaginal births (Cochrane Review). In: The Cochrane Library, Issue 2. Oxford: Update Software, 1998.
- Enkin M, Keirse MJNC, Renfrew M, Neilson J. *A Guide to Effective Care in Pregnancy & Childbirth*. Oxford: Oxford University Press, 1995. (Instrumental vaginal delivery, pp 315-318, Second stage of labour 6:2, Episiotomy: pp 231-235, Preterm birth 4:2-3, Routine use of early episiotomy, pp 281-283).
- Farabow WS, Roberson VO, Maxey J, Spray BJ. A twenty-year retrospective analysis of the efficacy of epidural analgesia-anesthesia when administered and/or managed by obstetricians. *Am J Obstet Gynecol* 1993; **169**: 270-278.
- Johansson RB, Menon VJ. Vacuum extraction vs forceps delivery. In: Neilsen JP, Crother CA, Hodnett ED, Hofmeyr GJ, Keirse MJNC, editors. *Pregnancy and Childbirth Module of The Cochrane Database of Systematic Reviews* (updated 03 June 1997). Available in The Cochrane Library (database on disk and CDROM). The Cochrane Collaboration; Issue 3. Oxford: Update Software, 1997.
- Sultan AH, Kamm MA, Hudson CN, Bartram CI. Third degree obstetric anal sphincter tears: risk factors and outcome of primary repair. *BMJ* 1994; **308**: 887-891.
- Combs CA, Robertsson PA, Laros RK. Risk factors for third-degree and fourth-degree perineal lacerations in forceps and vacuum deliveries. *Am J Obstet Gynecol* 1990; **63**: 100-104.

- 22 Hueston WJ. Factors associated with the use of episiotomy during vaginal delivery. *Obstet Gynecol* 1996; **87**: 1001–1005.
- 23 Ecker JL, Tan WM, Bansal RK, Bishop JT, Kilpatrick SJ. Is there a benefit to episiotomy at operative vaginal delivery? Observations over ten years in a stable population. *Am J Obstet Gynecol* 1997; **176**: 411–414.
- 24 Klein MC. Studying episiotomy: when beliefs conflict with science. *J Fam Pract* 1995; **41**: 483–488.
- 25 The TG. Is routine episiotomy beneficial in low birth weight delivery? *Int J Gynecol Obstet* 1990; **31**: 134–140.
- 26 Cunningham FG, MacDonald PC, Gant NF et al. *William's Obstetrics*. Norfolk: Appleton & Lange, 1997.
- 27 Gardosi J, Sylvester S, Lynch C. Alternative positions in the second stage of labour: a randomised controlled trial. *Br J Obstet Gynaecol* 1989; **96**: 1290–1296.
- 28 de Jong PR, Johanson RB, Baxen P. Randomised trial comparing the upright and supine positions for second stage of labour. *Br J Obstet Gynaecol* 1997; **104**: 567–571.
- 29 Turnbull D, Holmes A, Shields N, Cheyne H, Twaddle S, Gillmour WH, McGinley M, Reid M, Johnstone I, Greer I, McIlwaine G, Lunan CB. Randomised controlled trial of efficacy of midwife-managed care. *Lancet* 1996; **348**: 213–218.
- 30 Borgotta L, Piening SL, Cohen WR. Association of episiotomy and delivery position with deep perineal laceration during spontaneous delivery in nulliparous women. *Am J Obstet Gynecol* 1989; **160**: 294–297.

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