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Rachna Bahl, Bryony Strachan and Deirdre J Murphy

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# Papers

## Outcome of subsequent pregnancy three years after previous operative delivery in the second stage of labour: cohort study

Rachna Bahl, Bryony Strachan, Deirdre J Murphy

### Abstract

**Objective** To evaluate the reproductive outcome and the mode of delivery in subsequent pregnancies after instrumental vaginal delivery in theatre or caesarean section at full dilatation.

**Design** Prospective cohort study.

**Setting** Two urban hospitals with a combined total of 10 000 deliveries a year.

**Participants** A cohort of 393 women with term, singleton, cephalic pregnancies who needed operative delivery in theatre during the second stage of labour from February 1999 to February 2000. Postal questionnaires were received from 283 women (72%) at three years after the initial delivery.

**Main outcome measure** Mode of delivery in the subsequent pregnancy.

**Results** 140 women (49%) achieved a further pregnancy at three years. 91/283 (32%) women wished to avoid a further pregnancy. Women were more likely to aim for vaginal delivery (87% (47/54) *v* 33% (18/54); adjusted odds ratio 15.55 (95% confidence interval 5.25 to 46.04)) and more likely to have a vaginal delivery (78% (42/54) *v* 31% (17/54); 9.50 (3.48 to 25.97)) if they had had a previous instrumental vaginal delivery rather than a caesarean section. There was a high rate of vaginal delivery after caesarean section among women who attempted vaginal delivery 17/18 (94%). In both groups, fear of childbirth was a frequently reported reason for avoiding a further pregnancy (51% after instrumental vaginal delivery, 42% after caesarean section; 1.75 (0.58 to 5.25)).

**Conclusion** Instrumental vaginal delivery offers advantages over caesarean section for future delivery outcomes. The psychological impact of operative delivery requires urgent attention.

### Introduction

A consensus group of the American College of Obstetricians and Gynecologists has suggested that to control rising rates of caesarean section there should be further training in instrumental vaginal delivery.<sup>1</sup> Many obstetricians are concerned, however, about the potential for neonatal trauma and maternal pelvic floor morbidity after instrumental delivery.<sup>2-4</sup> This has

led to a sharp fall in the number prepared to offer mid-cavity or rotational instrumental vaginal delivery,<sup>5</sup> even though caesarean section is associated with important potential consequences, including subfertility, uterine rupture, and placenta previa.

More than 75% of women in one study were able to achieve spontaneous vaginal delivery after a previous instrumental vaginal delivery.<sup>6</sup> Similar rates are not seen after a previous caesarean section, largely because fewer women are aiming for vaginal delivery.<sup>7</sup> Some North American maternity units decline women the choice of vaginal birth after caesarean section.<sup>8</sup>

We have previously reported that 4% of women in a UK population needed a trial of instrumental delivery in theatre or a caesarean section at full dilatation.<sup>9</sup> When we surveyed women one year after their initial delivery, those who had experienced an instrumental vaginal delivery were significantly more likely to report a preference for vaginal delivery in a subsequent pregnancy.<sup>10</sup> We have now surveyed our original cohort three years after the initial operative delivery to evaluate their reproductive outcome and mode of delivery in subsequent pregnancies.

### Methods

The original cohort study was done in the two urban hospitals in Bristol where all operative deliveries for the area are performed. All women who were fully dilated and had instrumental vaginal delivery in theatre or caesarean section were eligible for recruitment to the study.

Inclusion criteria were women at 37 or more completed weeks with a live, term, singleton, cephalic pregnancy. Study recruitment was from February 1999 to February 2000. Women meeting inclusion criteria were identified from delivery suite records within 24 hours of delivery and approached personally by researchers before hospital discharge. Full details of the cohort are described elsewhere.<sup>9</sup>

A questionnaire, sent at three years, requested information on subsequent fertility, voluntary subfertility

St Michael's Hospital, Bristol BS2 8EG

Rachna Bahl  
specialist registrar  
Bryony Strachan  
consultant

Maternal and Child Health Sciences, University of Dundee, Ninewells Hospital and Medical School, Dundee DD1 9SY  
Deirdre J Murphy  
professor

Correspondence to: D J Murphy  
[d.j.murphy@dundee.ac.uk](mailto:d.j.murphy@dundee.ac.uk)

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**Table 1** Fertility and pregnancy outcome at three years in relation to mode of delivery at index pregnancy. Values are numbers (percentages) unless stated otherwise

	Index pregnancy		Odds ratio (95% confidence interval)	
	Instrumental vaginal delivery (n=133)	Caesarean section (n=150)	Unadjusted	Adjusted*
<b>Planned further pregnancy</b>	92 (69)	100 (67)	1.12 (0.68 to 1.85)	1.24 (0.68 to 2.24)
Had difficulty conceiving	5/92 (5)	19/100 (19)	0.25 (0.09 to 0.69)†	0.33 (0.12 to 0.98)†
Had involuntary infertility for >1 year	2/92 (2)	3/100 (3)	0.72 (0.12 to 4.40)	0.70 (0.11 to 4.33)
<b>Achieved a planned further pregnancy at 3 years (%)‡</b>	73/92 (79)	67/100 (67)	1.89 (0.98 to 3.64)	2.09 (1.10 to 4.28)†
Ectopic pregnancy	4/73 (5)	0	-	-
Miscarriage	13/73 (18)	11/67 (16)	1.10 (0.46 to 2.66)	0.85 (0.21 to 3.45)
Preterm delivery (<37 weeks)	1/73 (1)	2/67 (3)	0.45 (0.04 to 5.10)	0.55 (0.04 to 7.74)
Term delivery (≥37 weeks)	54/73 (74)	54/67 (81)	0.68 (0.31 to 1.52)	0.71 (0.32 to 1.61)

\*Adjusted for parity to maternal age, social class, previous neonatal trauma, and previous prolonged hospital stay.

†P<0.05.

‡Includes one woman who was pregnant at the time of the survey where outcome was not yet known.

(where the woman wished to avoid a further pregnancy), involuntary subfertility (where the woman had difficulty conceiving or failed to conceive), pregnancies achieved, outcome of pregnancies, and planned and actual mode of delivery. The researchers sought the reasons for voluntary subfertility using focused questions derived from a published questionnaire survey.<sup>11</sup> The duration of involuntary subfertility was recorded, and for women who reported difficulty in conceiving, the interval to conception was recorded. Non-respondents were sent reminders and then telephoned. Delivery outcome information was validated against the maternity database record for each individual woman.

The primary outcome of interest was mode of delivery in a subsequent pregnancy. The secondary outcomes were subfertility, early pregnancy loss, and preterm delivery.

### Statistical analysis

Univariate comparisons were made between the maternal, labour, and postnatal characteristics of the two groups—both for the original cohort and the respondents at three years—to look for any obvious non-respondent bias and to ascertain potential confounding factors. The caesarean section group was considered to be the reference group, and the vaginal delivery group the comparison group. The two groups were compared for reproductive and delivery outcomes after the initial delivery. If a woman reported more than one pregnancy after the index delivery, the first subsequent pregnancy was considered in the main analyses. Multivariate analyses were also carried out, with adjustment for potential confounding factors.

### Results

Two hundred and eighty three women from the original cohort of 393 (72%) returned the postal questionnaire sent three years after their previous operative delivery. The demographic, obstetric, and neonatal characteristics of the respondents and the original cohort were similar, suggesting that the study sample at follow up was representative of the original cohort (see table 1 in the full version of this article on [bmj.com](http://bmj.com)).

Women were less likely to report difficulty conceiving and were more likely to have achieved a further pregnancy after an instrumental vaginal delivery than after a caesarean section (table 1). The interval between trying for a pregnancy and conception ranged from four to 24 months. A total of 140 women (49%) had achieved a further pregnancy at three year follow up, representing 73% (140/192) of those who had planned or were going to consider a further pregnancy. No woman reported a termination of pregnancy. Of the 91 women who had not planned to have a further pregnancy, almost half (42/91) stated that they “could not go through childbirth again” (51% (21/41) after instrumental vaginal delivery, 42% (21/50) after caesarean section), with no significant difference between the two groups.

Women were more likely to aim for a vaginal delivery if they had had a previous instrumental vaginal delivery than if they had had a previous caesarean section (table 2). This association was reported at one year after the index pregnancy and persisted when the women were planning delivery in the subsequent pregnancy. Women were more likely to have a vaginal

**Table 2** Mode of delivery for subsequent pregnancy in relation to mode of delivery at index pregnancy in women who achieved term pregnancy. Values are numbers (percentages) unless stated otherwise

Delivery for subsequent delivery	Index pregnancy		Odds ratio (95% confidence interval)		Relative risk ratio (95% confidence interval)
	Instrumental vaginal delivery (n=54)	Caesarean section (n=54)	Unadjusted	Adjusted*	
Preferred vaginal delivery at 1 year after index delivery <sup>15</sup>	39 (72)	16 (30)	6.18 (2.68 to 14.2)†	8.15 (3.07 to 21.67)†	2.44 (1.57 to 3.80)†
Planned vaginal delivery prior to subsequent delivery	47 (87)	18 (33)	13.4 (5.07 to 35.6)†	15.55 (5.25 to 46.04)†	2.61 (1.77 to 3.86)†
Achieved vaginal delivery for subsequent delivery	42 (78)	17 (31)	7.62 (3.22 to 10.0)†	9.50 (3.48 to 25.97)†	2.47 (1.63 to 3.75)†

\*Adjusted for parity, maternal age, social class, previous neonatal trauma, and previous prolonged hospital stay.

†P<0.05.

delivery if they had had a previous instrumental vaginal delivery, although there was a high rate of vaginal delivery in women who had had a previous caesarean section and were aiming for a vaginal delivery subsequently (17/18 (94%)). Three of the 42 (7%) women who had previously had an instrumental vaginal delivery had a subsequent instrumental vaginal delivery (all ventouse), compared with eight of the 17 (47%) women who had had a previous caesarean section (seven subsequently had a ventouse and one a forceps delivery). Six women had given birth twice since the initial delivery, four after an instrumental delivery and two after a caesarean section. All were delivered vaginally.

## Discussion

Women are more likely to achieve a spontaneous vaginal delivery if they have had a previous instrumental vaginal delivery rather than a previous caesarean section. Fear of childbirth is a frequently reported reason for avoiding further pregnancies after either of these operative delivery modes.

### Aiming for and achieving vaginal delivery

Most women who have had a caesarean section rather than instrumental vaginal delivery for the management of poor progress in the second stage of labour, are now being delivered by caesarean section in subsequent pregnancies, with knock-on effects for the overall rate of caesarean section.<sup>7</sup>

Our previous work suggested that women make a decision about future mode of delivery at an early stage after caesarean section, usually before hospital discharge.<sup>10</sup> Fear of a further emergency caesarean section in labour and of the risk of uterine rupture<sup>12</sup> and perinatal death<sup>13</sup> make it unlikely that this trend will be easily reversed.

The emphasis will need to be on achieving a vaginal delivery in the first pregnancy. Women who have had an instrumental vaginal delivery should be reassured by the very high rate of spontaneous vaginal delivery that can be achieved in a subsequent pregnancy. Our cohort shows a high success rate among women with the most complex instrumental deliveries and confirms what has been reported for instrumental deliveries as a whole.<sup>6</sup> High rates of vaginal delivery can be achieved after caesarean section in women choosing this option, although instrumental vaginal delivery is more common.

### Difficulty conceiving

Studies have shown that women who deliver by caesarean section may have subsequent difficulty conceiving,<sup>11 14-16</sup> while a further study reports equal rates of subsequent childbearing for primigravidae who had had instrumental delivery for mid-cavity arrest and primigravidae who had had spontaneous vaginal deliveries.<sup>9</sup>

Our data suggest that this apparent association between operative delivery and subsequent subfertility may be a particular problem after delivery by caesarean section. Complex instrumental vaginal delivery may also be a factor, however, reflected in a higher than average rate of ectopic pregnancy.

## What is already known on this topic

An increasing proportion of women who want a spontaneous vaginal delivery have an operative delivery—instrumental vaginal delivery or caesarean section—in the second stage of labour

Few studies have examined the consequences of such operative delivery for future pregnancies

## What this study adds

Women are far more likely to have a subsequent spontaneous vaginal delivery after an instrumental delivery than after a caesarean section

Fear of childbirth is often reported, after all types of operative delivery, as a reason for avoiding future pregnancies

### Avoiding pregnancy

Childbirth can have a detrimental effect on a mother's emotional wellbeing. Some 25%-33% of women report traumatic symptoms associated with childbirth,<sup>17-19</sup> which may be sufficient to deter women from having further pregnancies. In our cohort, many of the women who chose not to have more children stated that they could not go through childbirth again, confirming the findings of others<sup>11</sup> and the results of a qualitative study from our cohort.<sup>20</sup>

Current strategies for reducing emotional morbidity, such as "debriefing," have produced disappointing results,<sup>21-23</sup> and further work is needed in this area.

### Strengths and weaknesses

This was a prospective cohort study with 100% recruitment of eligible women within a defined geographical area. Our results are likely to be generalisable to other similar urban populations, although we had a low background rate of non-white women.

Our high rate of follow up at three years, and close similarity of respondents to the original cohort, means that potential bias from loss of follow up is reduced. Recall bias is unlikely to be an issue, given that we surveyed these women at six weeks, one year, and three years. Any potential for misreporting is likely to apply equally to each comparison group.

### Conclusions

Operative delivery in the second stage of labour has important implications for future delivery outcomes. Instrumental vaginal delivery increases the woman's chance of achieving a subsequent spontaneous vaginal delivery. Although morbidity issues need to be considered with instrumental vaginal delivery, we must continue to offer choice when difficulties are encountered in the second stage of labour. Further work is urgently needed to tackle the psychological morbidity experienced by women in these circumstances.

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## Randomised controlled trial of labouring in water compared with standard of augmentation for management of dystocia in first stage of labour

Elizabeth R Cluett, Ruth M Pickering, Kathryn Getliffe, Nigel James St George Saunders

### Abstract

**Objectives** To evaluate the impact of labouring in water during first stage of labour on rates of epidural analgesia and operative delivery in nulliparous women with dystocia.

**Design** Randomised controlled trial.

**Setting** University teaching hospital in southern England.

**Participants** 99 nulliparous women with dystocia (cervical dilation rate < 1 cm/hour in active labour) at low risk of complications.

**Interventions** Immersion in water in birth pool or standard augmentation for dystocia (amniotomy and intravenous oxytocin).

**Main outcome measures** Primary: epidural analgesia and operative delivery rates. Secondary: augmentation rates with amniotomy and oxytocin, length of labour, maternal and neonatal morbidity including infections, maternal pain score, and maternal satisfaction with care.

**Results** Women randomised to immersion in water had a lower rate of epidural analgesia than women allocated to augmentation (47% v 66%, relative risk 0.71 (95% confidence interval 0.49 to 1.01), number needed to treat for benefit (NNT) 5). They showed no difference in rates of operative delivery (49% v 50%, 0.98 (0.65 to 1.47), NNT 98), but significantly fewer received augmentation (71% v 96%, 0.74 (0.59 to 0.88), NNT 4) or any form of obstetric intervention

(amniotomy, oxytocin, epidural, or operative delivery) (80% v 98%, 0.81 (0.67 to 0.92), NNT 5). More neonates of women in the water group were admitted to the neonatal unit (6 v 0, P = 0.013), but there was no difference in Apgar score, infection rates, or umbilical cord pH.

**Conclusions** Labouring in water under midwifery care may be an option for slow progress in labour, reducing the need for obstetric intervention and offering an alternative pain management strategy.

### Introduction

Management strategies for slower than expected progress in the first stage of labour (dystocia) vary from immediate augmentation<sup>1-2</sup> to delayed intervention up to four hours after diagnosis.<sup>3-5</sup> Comparison between strategies is difficult as specific features often differ. Our current trial was based on two precepts. Firstly, that incomplete understanding of labour may lead to unnecessarily early intervention. Secondly, that anxiety and pain may trigger a stress response,<sup>6</sup> leading to reduced uterine activity and dystocia.<sup>7</sup> Labouring in water may ameliorate this stress response by aiding relaxation and pain relief. A Cochrane review concluded that, for women at low risk of complications,

Nightingale Building (67), University of Southampton, Southampton SO17 1BJ

Elizabeth R Cluett  
lecturer in midwifery  
Kathryn Getliffe  
professor of nursing

Medical Statistics Group, Health Care Research Unit (805), Southampton General Hospital, Southampton SO16 6YD

Ruth M Pickering  
senior lecturer in medical statistics

Trust Management Office (Mail point 18), Southampton General Hospital  
Nigel James St George Saunders  
medical director

Correspondence to: E R Cluett  
ec1@soton.ac.uk

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