

## Why We Do Caesars: A Comparison of the Trends in Caesarean Section Delivery over a Decade

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### Abstract

**Introduction:** In the United Kingdom, caesarean section (CS) rates have increased from 9% of deliveries in 1980 to 21% in 2001. A similar increase in CS rates has been seen in many developed countries. This is beyond the World Health Organisation's (WHO's) recommended level of 15%. This is a worrying trend as the risks of placenta previa, placenta accreta, hysterectomies, bladder and bowel injuries are increased with subsequent CS. We aim to ascertain the commonest indications for CS in a tertiary hospital and make recommendations to decrease future CS rates. **Materials and Methods:** This retrospective analysis compares the 5 most common indications for CS in 1999 and 2009. CS rates in the 2 study periods are tabulated and analysed as well. **Results:** In the first study period between January and December 1999, there were 2048 deliveries of which 365 were via CS. In the second study period of a decade later from January to December 2009, there were 1572 deliveries of which 531 were via CS. This gives an increase in CS rate from 17.8% in 1999 to 34% in 2009. The main indications for CS in 1999 were: cephalopelvic disproportion (18.6%), breech (14.2%), non-reassuring fetal status (11.8%), 1 previous CS (11.2%) and pregnancy-induced hypertension/pre-eclampsia/eclampsia (6.6%). The main indications for CS in 2009 were: 1 previous CS (18.1%), non-reassuring fetal status (12.2%), cephalopelvic disproportion (10.5%), 2 or more previous CS (7.9%) and breech (7.7%). **Conclusion:** There is a significant increase in CS rates over the last decade with an increased percentage of CS done because of a previous CS. This is associated with increased risk of complications as well. Recommendations are suggested with the view to decrease future CS rates.

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**Key words:** Breech, Cephalopelvic disproportion, Non-reassuring fetal status, Previous caesarean section

### Introduction

Increasing rates of caesarean deliveries have received widespread attention in recent years with increased awareness in the public domain. In the United Kingdom, caesarean section (CS) rates have increased from 9% of deliveries in 1980 to 21% in 2001.<sup>1</sup> A similar increase in CS rates has been seen in many developed countries. This is beyond the World Health Organisation's (WHO's) recommended level of 15%.<sup>2</sup>

There is much concern as to whether this increase benefits the woman and her offspring<sup>3</sup> as the risks of placenta previa, placenta accreta, hysterectomies, bladder and bowel injuries are increased with subsequent CS. Detailed analysis of difference in trends and reasons for the CS may identify pathways to lower CS rates (CSR). This study

aims to compare the CSR and the trends in indications for caesarean delivery in the obstetric unit at a local tertiary hospital between two 1-year study periods, in 1999 and a decade later, in 2009.

### Materials and Methods

The percentages of caesarean deliveries attributable to specific indications were computed for the period of January through December of 1999 and similarly for 2009. Relevant data were retrieved from the operating theatre computerised records, the obstetric unit database and patients' case records.

There were several reasons for choosing the 2 time periods. Firstly, 2009 reflects the current practice in our unit while 1999 reflects the general practice before the results of the

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Term Breech Trial were published. Secondly, it was noted that in the United States, following a decline in the early 1990s, the CSR increased by 53% from 1996 to 2007, from 21% to an all-time high of 32%.<sup>4</sup> It was postulated that a similar trend may be present in our population.

We assessed patterns of change in CSR by comparing the contribution of specific indications. All births were assigned to 1 of 5 indication groups. These 5 indications were chosen to include the majority of caesarean deliveries while limiting the number of indications to facilitate a straightforward analysis. We determined the contribution of each indication to the CSR in the respective study periods.

*Statistical Analysis*

Z-test was performed at 95% confidence interval to determine significant change in CSR between the 2 time periods.

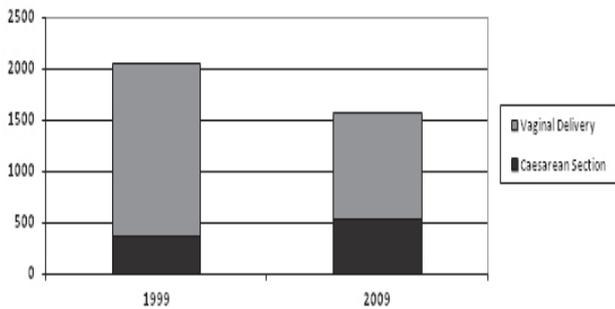


Fig. 1. CS Rates in 1999 and 2009.

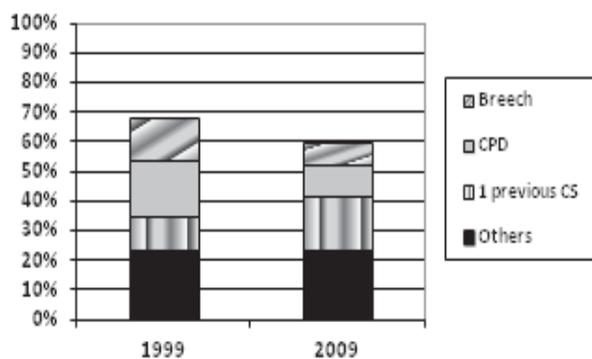


Fig. 2. Proportion of CS by the 5 commonest indications in each study period (highlighting statistically significant indications).

**Results**

In the first study period between January and December 1999, there were 2048 deliveries, of which 365 were via CS. In the second study period from January to December 2009, there were 1572 deliveries, of which 531 were via CS. Despite a 23.2% fall in total deliveries, CSR has doubled from 17.8% in 1999 to 34% a decade later (Fig. 1). The 5 main indications for CS in 1999 were: cephalopelvic disproportion (CPD) (18.63%), breech (14.25%), non-reassuring fetal status (NRFS) (11.78%), 1 previous CS (11.23%) and pregnancy-induced hypertension/pre-eclampsia/eclampsia (6.58%). The main indications for CS in 2009 were: 1 previous CS (18.08%), NRFS (12.24%), CPD (10.55%), 2 or more previous CS (7.91%) and breech (7.72%) (Fig. 2).

In the first study period, the main indication for CS was CPD with about one-fifth (18.63%) of all CS performed for this indication. One decade later, this had been replaced by the indication of a previous CS (Table 1).

Table 1. Trends of CS Indications

Indications	1999		2009	
	No.	Proportion (%)	No.	Proportion (%)
Abnormal lie	2	0.54	8	1.51
Abruption placentae	1	0.27	6	1.13
Breech	52	14.25	41	7.72
Cord prolapse/accident	3	0.82	1	0.19
CPD	68	18.63	56	10.55
Failed induction	17	4.66	30	5.65
Failed instrumental delivery	2	0.54	3	0.56
Fetal anomaly	2	0.54	2	0.38
Hypertensive disorders	24	6.58	19	3.58
Macrosomia	4	1.10	9	1.69
Maternal request	5	1.37	19	3.58
Multiple pregnancy	10	2.74	25	4.71
NRFS	43	11.78	65	12.24
Placenta previa	23	6.30	39	7.34
Poor progress	20	5.48	24	4.52
1 previous CS	41	11.23	96	18.08
2 or more previous CS	20	5.48	42	7.91
Previous myomectomy	9	2.47	1	0.19
Others	19	5.21	45	8.47
Total CS	365		531	

CPD: cephalopelvic disproportion; NRFS: non-reassuring fetal status; CS: caesarean section

Table 2. Proportion of CS by the 5 Commonest Indications in Each Study Period

Indications	Proportion (1999)	Proportion (2009)	Change	Z Value	1-Tail Confidence Level	2-Tail Confidence Level
Breech*	14.25 %	7.72%	-6.53%	3.037	99.9% (significant)	99.8% (significant)
CPD*	18.63%	10.55%	-8.08%	3.343	100% (significant)	99.9% (significant)
Hypertensive disorders	6.58%	3.58%	-3.00%	1.905	97.2% (significant)	94.3% (not significant)
NRFS	11.78%	12.24%	0.46%	0.103	54.1% (not significant)	8.2% (not significant)
1 previous CS*	11.23%	18.08%	6.85%	2.705	99.7% (significant)	99.3% (significant)
2 or more previous CS	5.48%	7.91%	2.43%	1.274	89.9% (not significant)	79.7% (not significant)

\*statistically significant

CPD: cephalopelvic disproportion; NRFS: non-reassuring fetal status; CS: caesarean section

Statistical analysis showed that CS attributable to breech and CPD had decreased while “1 previous CS” is the only indication that has significantly increased. In addition, “2 or more previous CS” has replaced “hypertensive disorders” as one of the 5 commonest indications for CS a decade later in 2009 although the increase is not statistically significant (Table 2). However, there was a greater than twofold increase in the absolute number of CS due to “1 previous CS” (41 in 1999 to 96 in 2009) and those due to “2 or more previous CS” (20 in 1999 to 42 in 2009). There were no statistically significant changes in CSR due to hypertensive disorders or NRFS.

## Discussion

The CSR has doubled over a 10-year period, from 17.8% in 1999 to 34% in 2009 in our unit. This is a global phenomenon. The factors that have been implicated for this rise include many medical and psychosocial factors, such as malpractice concerns, reluctance to perform operative vaginal deliveries, concerns over aggressive oxytocin use, increased use of electronic fetal monitoring and most importantly, increasing number of patients with previous abdominal deliveries.<sup>5</sup> The Asia survey in 2007 to 2008 included Cambodia, China, India, Japan, Nepal, Philippines, Sri Lanka, Thailand and Vietnam.<sup>6</sup> The overall CSR was 27.3% and operative vaginal delivery rate was 3.2%. China had the highest overall CSR (46.2%) followed by Vietnam, Thailand and Sri Lanka; Cambodia had the lowest (14.7%).

This study shows that our CSR is comparable to that of the developed countries. More than 50% of the CS was due to breech, CPD, maternal hypertensive disorders, NRFS and 1 previous CS in 1999; and breech, CPD, NRFS, 1 previous CS and 2 or more previous CS in 2009. The 5 most common indications were very much similar for both years.

### Breech

The Term Breech Trial<sup>7</sup> was published in 2000. This randomised-controlled trial established that planned CS

conferred a lower fetal mortality and morbidity when compared to a vaginal breech delivery in centres where facilities existed to perform a safe CS. It would seem unusual that, the proportion of CS for breech decreased from 14.25% in 1999 to 7.72% in 2009. We believe the reason for this is the relative increase in CS for other indications rather than a true decrease in CS for breech presentation. The incidence of breech presentation at term is only 3% and this indication may contribute little to the overall CSR even if all term breech pregnancies underwent CS. A number of CS for breech may have been avoided by undertaking the recommended practice of external cephalic version (ECV)<sup>7</sup> for all malpresenting fetuses in the absence of any contraindications. It has been established that ECV reduces the CSR by lowering the incidence of breech presentation (relative risk (RR) 0.55, 95% confidence interval (CI) 0.33 to 0.91, risk difference 17%, number needed to treat (NNT) 6).<sup>8</sup> In our centre, all patients with no contraindications are offered ECV if the fetal presentation at term is breech. We would also propose that counselling for ECV and discussions on vaginal birth after CS (VBAC) be conducted by a consultant obstetrician.

### Cephalopelvic Disproportion (CPD)

There was a significant decrease in CPD from 18.63% in 1999 to 10.55% in 2009. The diagnosis of CPD is ideally made on the basis of failure to achieve progressive cervical dilatation in the course of an adequate trial of labour. We postulate that this decrease in the CSR attributable to CPD may have been due to the inadvertent inclusion of several cases of failed induction of labour under the CPD category in the 1999 cohort. In 2004, we implemented a more rigorous audit process to ensure that these cases of failed induction of labour were categorised correctly. We advocate the use of oxytocin to augment labour when necessary to ensure that failure to progress during labour can be attributed to CPD and not inadequate uterine contractions. It is notable that this intervention has not been shown to reduce the need for CS in randomised controlled trials.<sup>9</sup>

### Previous Caesarean Section (CS)

Increasing rates of primary CS have led to an increased proportion of the obstetric population with a history of previous caesarean deliveries. Both the American College of Obstetricians and Gynecologists (ACOG) and the National Institutes of Health (NIH) have endorsed the feasibility of VBAC.<sup>10-12</sup> The ACOG published a practice guideline summarising the evidence supporting VBAC as the preferred method of delivery after 1 previous CS and a possible method of delivery after 2 or more CS.<sup>13,14</sup> The proportion of women who decline VBAC is, in turn, a significant determinant of overall rates of caesarean birth.<sup>15</sup> In a more litigation-conscious society, there is anxiety over induction of labour in patients with a previous CS scar.<sup>16</sup> Moreover, patients correctly have the autonomy to decide what mode of delivery they want, and many perceive CS to be the safer choice.

In the NICHD study of 30,132 prelabour CS, placenta accreta was present in 0.24%, 0.31%, 0.57%, 2.13%, 2.33% and 6.74% of women undergoing their first, second, third, fourth, fifth, and sixth or more caesarean births, respectively.<sup>17</sup> Hysterectomy was required in 0.65%, 0.42%, 0.90%, 2.41%, 3.49% and 8.99% of women undergoing their first, second, third, fourth, fifth, and sixth or more caesarean births, respectively.<sup>17</sup>

In one study, it was noted that maternal death in women with prior CS was 44/100,000 as compared to 17/100,000 in women with VBAC. However, majority of the cases of maternal death in women with prior CS were due to medical disorders.<sup>17</sup>

The reasons for a significant rise in the CS rate in women with 1 previous CS are multifactorial. The rising rate may reflect the increasing influence of maternal choice in mode of delivery, especially when the risk-benefit considerations for either option appear comparable. Clearly, prevention of the first caesarean section is the key to reducing CS for previous CS.

It is important that the indication for induction of labour is reviewed by a senior obstetrician as inappropriate induction of labour may result in suboptimal progress in labour, then resulting in a CS. We would propose that the advantages of VBAC be emphasised to enable these women to make an informed choice for a vaginal birth if there are no contraindications. In women who have had 1 or 2 lower segment CS, a comprehensive discussion with their obstetricians and the provision of information on the associated risks with repeat operations may better enable

them to make an informed choice when deciding on the mode of delivery.

### Non-Reassuring Fetal Status (NRFS)

The CSR for fetal distress remained fairly stable over the 2 study periods. Continuous electronic fetal monitoring in the labour ward, together with fetal scalp capillary pH measurements when necessary have been shown to more accurately diagnose fetal distress and to reduce unnecessary CS<sup>18</sup> when compared to electronic fetal monitoring alone. We continue to provide facilities for the measurement of fetal scalp pH to keep the CSR for fetal distress in check.

### Maternal Request

Women now have greater influence over the management of their deliveries.<sup>19</sup> A number opt for elective CS due to the fear of episiotomies, long painful labours, difficult instrumental deliveries, pelvic floor trauma and subsequent incontinence that are associated with vaginal births.<sup>19</sup> Although more women in the 2009 cohort had maternal request CS, the absolute numbers of these women are small and the proportions were not statistically significant (Table 3). This would suggest that maternal request CS do not contribute significantly to our overall CS rate. We discourage maternal request CS in our institution, and they are only carried out after the reasons for the request are explored and a comprehensive discussion on the risks of CS carried out.

### Conclusion

The increasing trend of CS shows a change in management of obstetrics and increasing patients' autonomy in deciding the mode of delivery. It is recommended that we offer ECV to term breeches with uncomplicated antenatal history and an option of VBAC to patients with 1 previous CS in order to decrease the CS rates. Pros and cons of each option should be explained and documented. It is important to recognise that the ever increasing CSR is a global phenomenon that is not accompanied by a reduction in perinatal morbidity and mortality. Patients' autonomy should always be respected but it is our responsibility to ensure that adequate and unbiased information is provided so that these decisions are more likely to result in good outcomes. The prospect of an unnecessary CS and its implications in future pregnancies can then be avoided.

Table 3. Proportion of CS Due to Maternal Request

Indications	Proportion (1999)	Proportion (2009)	Change	Z Value	1-Tail Confidence Level	2-Tail Confidence Level
Maternal request	1.37%	3.58%	2.21%	1.803	96.4% (significant)	92.2% (not significant)

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