

Changing Trends in Indications for Caesarean Sections in a Tertiary Hospital

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Abstract

Objectives: To study the caesarean section rate and the trends in indications for caesarean delivery at the Singapore General Hospital (SGH) during two study periods of 6 months each. **Materials and Methods:** The percentages of caesarean sections attributable to specific indications were computed for the first 6 months of 1998 and the last 6 months of 2001. Subgroup analysis of "less common indications" was performed. **Results:** In the first half of 1998, 170 caesarean sections were performed giving a rate of 16.77%. 54.12% of women were multiparous. The main indication for caesarean section was dystocia (4.24% of deliveries). Two hundred and sixty caesarean sections were performed in the later half of 2001 giving a caesarean section rate of 25.10%. 53.46% of women were multiparous. The main indication for caesarean section was dystocia (5.41% of deliveries). Increase in caesarean section rate in 2001 was attributed to statistically significant increase in caesarean section for previous caesarean section and placenta previa major. Other changes in practice included shorter operating time which may be related to decision not to perform peritoneal closure. **Conclusion:** Studying indications for caesarean section are useful for hospitals, clinicians and researchers in determining strategies to lower primary and repeat caesarean section rate.

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Key words: Caesarean sections rates, Indications, Trends

Introduction

Increasing rates of caesarean deliveries have received widespread attention in recent years and has increased widespread discussion in the public domain.¹ The ideal caesarean section rate has never been defined and national rates of caesarean delivery vary from country to country.² Detailed analysis of difference in trends and reasons for the caesarean section may identify pathways to lower caesarean section rates.³

This study aims to compare the caesarean section rates and the trends in indications for caesarean delivery in the obstetric unit of the Singapore General Hospital (SGH) between two 6-month study periods, in 1998 and 2001.

Materials and Methods

The percentages of caesarean deliveries attributable to specific indications were computed for the period of January through June of 1998 and July through December of 2001. Relevant data were retrieved from the 1998 and 2001 operating theatre computer records, the obstetric unit database and patients' case records.

There were several reasons for choosing the two time

periods. Firstly, the last 6 months of 2001 was chosen to reflect current practice in our unit. Secondly, we wanted to study the impact of the Term Breech Trial (published in year 2000) on our practice. Lastly, we wanted to assess practice in the same group of obstetricians in the 3-year period so as to minimise any bias introduced by different practices of individual doctors before 1998.

We assessed patterns of change in caesarean section rate 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.² We determined the contribution of each indication to the caesarean section rate in the respective study periods. A subgroup analysis was performed for the "less common indications" group as it constituted at least a third of the caesarean section in each study period.

For statistical analysis, we calculated the standard error of difference between two proportions⁴ to detect statistically significant changes in the caesarean section rate by indication and the Student's *t*-test to calculate significant

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changes in the operating time, between the two study periods.

Results

Of the 1014 births recorded in the first half of 1998, 170 were caesarean sections, giving a caesarean section rate of 16.77% (Table I). The mean age of the women was 32.42 years. 54.12% of the women who delivered by caesarean section were multiparous. Of the 1036 births recorded in the second half of 2001, 260 were caesarean sections, giving a rate of 25.10%, a significant increase from the first study period. The mean age of the women was 32.6 years. 53.46% of the women who delivered by caesarean section were multiparous.

In the first study period, the main indication for caesarean section was dystocia. 4.24% of deliveries underwent caesarean section for dystocia (Table II). In the second study period, the main indication was also dystocia (5.41% of deliveries). Statistical analysis showed that caesarean section that was attributable to previous caesarean section (i.e. repeat caesarean section) and “less common indications” had increased (Fig. 1). There were no statistically significant changes due to breech presentation as well as dystocia as an indication for caesarean section between the 2 study periods (Fig. 1; Table II). However, there was a 44% increase in absolute number of caesarean section due to breech (from 27 cases in 1998 to 39 cases in 2001) and a 30% increase in the number of caesarean section due to dystocia (from 43 cases in 1998 to 56 cases

in 2001). For the additional 22 deliveries in 2001, 90 more caesarean sections were performed. Of these, there were 12 additional caesarean sections for breech and 13 additional caesarean sections for dystocia.

As increase in caesarean section due to the “less common indications” was statistically significant, subgroup analysis was performed. The increase in caesarean section rate due to placenta previa major was statistically significant (Fig 1; Table III). There was also a statistically significant increase in caesarean section for “rare indications”.

We found that the operating time for caesarean section had decreased from 47.0 minutes to 37.8 minutes ($P = 0.000001$; Table IV; Fig. 2). This may be due to peritoneal non-closure.⁵

Discussion

In 1985, WHO issued a consensus statement suggesting there were no additional health benefits when the caesarean section rate rose above 10% to 15%.⁶ This was based on an examination of estimates of national caesarean section rates and maternal and perinatal mortality rates from various countries. Despite this, caesarean section rate continued to rise in the 1990s and by 2000 it was close to or exceeding 20%. At SGH, the caesarean section rate in the years preceding 1998 ranged from 12% in 1990 to 14% in 1997. In the intervening year (1999), the caesarean section rate had increased to 18%. The overall increase in caesarean

TABLE I: INCREASE IN CAESAREAN SECTION RATE

Deliveries	1998			2001		
	CS	Total	% CS (p1)	CS	Total	% CS (p2)
	170	1014	16.77%	260	1036	25.10%
SD				1.79%		
p2-p1				8.33%		
95% confidence interval				4.83 – 11.83		

CS: caesarean section; SD: standard deviation

TABLE II: PROPORTION OF CAESAREAN SECTION DELIVERIES BY INDICATIONS

Indications	Number		Proportion		Change	Standard error	95% confidence interval	
	1998	2001	1998	2001				
Previous LSCS*	17	45	1.68%	4.34%	2.67%	0.75%	1.20%	4.14%
Fetal distress	22	19	2.17%	1.83%	-0.34%	0.62%	-1.55%	0.88%
Dystocia	43	56	4.24%	5.41%	1.16%	0.95%	-0.69%	3.02%
Breech	27	39	2.66%	3.76%	1.10%	0.78%	-0.42%	2.63%
Less common indications*	61	101	6.02%	9.75%	3.73%	1.19%	1.41%	6.06%
Total deliveries	1014	1036						

LSCS: lower segment caesarean section; * Statistically significant

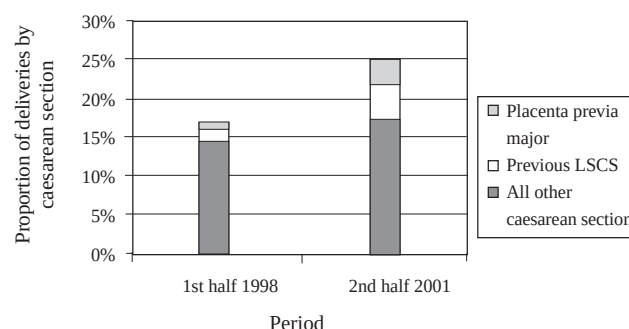


Fig. 1. Change in proportion of caesarean sections (highlighting statistically significant indications).

TABLE III: PROPORTION OF CAESAREAN SECTION DELIVERIES BY LESS COMMON INDICATIONS

Less common indications	Number		Proportion		Change	Standard error	95% confidence interval	
	1998	2001	1998	2001				
PP major*	8	35	0.79%	3.38%	2.59%	0.63%	1.36%	3.82%
Rare indications**	10	15	0.99%	1.45%	0.46%	0.48%	-0.49%	1.41%
SPE	14	14	1.38%	1.35%	-0.03%	0.51%	-1.03%	0.98%
Multiple	11	12	1.08%	1.16%	0.07%	0.47%	-0.84%	0.99%
Abnormal lie	9	10	0.89%	0.97%	0.08%	0.42%	-0.75%	0.91%
Macrosomia	2	9	0.20%	0.87%	0.67%	0.32%	0.04%	1.30%
Abruptio placenta	3	3	0.30%	0.29%	-0.01%	0.24%	-0.47%	0.46%
IUGR/Chorioamnionitis	4	3	0.39%	0.29%	-0.10%	0.26%	-0.61%	0.40%
Total deliveries	1014	1036						

IUGR: intrauterine growth retardation; PP: placenta previa; SPE: severe pre-eclampsia

* Statistically significant

** Rare indications are those with only one case per indication, e.g. Crohn's disease and recto-vaginal fistula

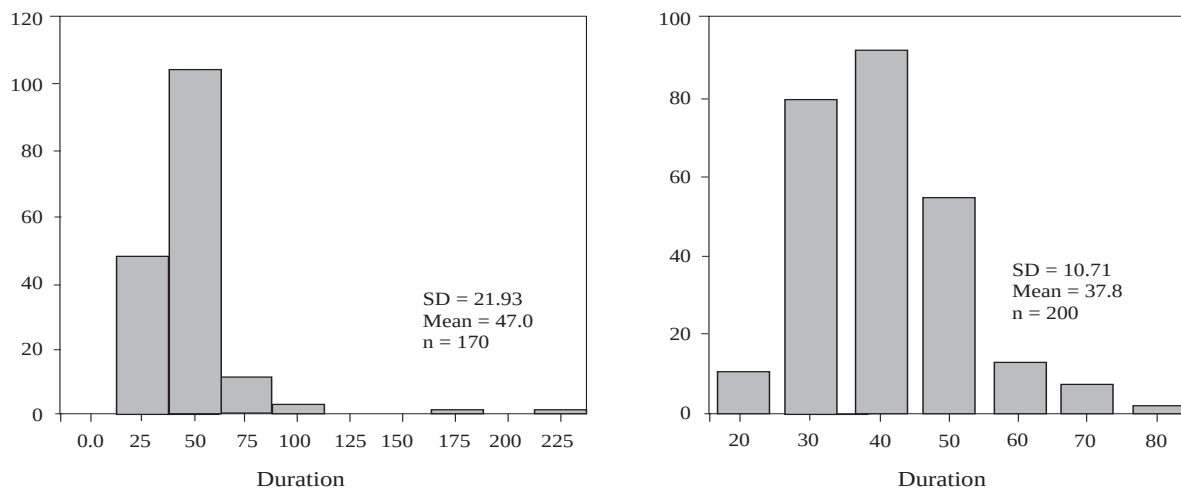


Fig. 2. Histogram of operating time for caesarean sections in the first half 1998 (left) and second half of 2001 (right).

TABLE IV: DURATION OF OPERATION

	1998	2001
Duration (mean)	47.03	37.83
Observations	170	260
P value	0.000001	

section rate observed between the 2 study periods from 16.7% to 25.1% is a finding common to many developed countries. In comparison, caesarean section rate was 21.3% in England in 2000, 12% to 14% in the Nordic countries in 1999, and 22% in the USA in 1999.

As over 60% of caesarean section can be attributed to repeat caesarean section, dystocia, fetal distress and breech presentation, management practices that reduce the number of caesarean section performed for these indications could contribute to the stabilisation of caesarean section rate.⁶ In particular, reducing primary caesarean section for dystocia

and fetal distress and increasing the rates of vaginal birth after caesarean section (VBAC) would help to reduce caesarean section rate.⁷

Previous Lower Segment Caesarean Section (LSCS)

In our study, previous LSCS contributed significantly to the overall increase in caesarean section rate. Strategies to reduce caesarean section have focused on the different indications. Of particular interest has been the emergence of VBAC as a safe alternative to repeat caesarean section. Both the American College of Obstetricians and Gynecologists (ACOG) and the National Institutes of Health (NIH) have endorsed the feasibility of VBAC.⁷⁻⁹ The ACOG published a practice guideline summarising the evidence supporting VBAC as the preferred method of delivery after 1 previous caesarean section and a possible method of delivery after 2 or more caesarean sections.^{10,11}

Other possible reasons for low uptake of VBAC include an increasingly litigation-conscious society, concern about

induction of labour in women with a previous scar¹² and, most importantly, the new commonly-held belief that mode of delivery is a matter of personal choice and many women who have had a previous caesarean section may indeed prefer an operative delivery as they perceive it to be safer. A more detailed analysis on patient's autonomy is discussed under Patient's Request.

Less practical experience in operative vaginal delivery for obstetricians-in-training may have contributed to a higher reliance on caesarean section over operative vaginal delivery as the solution of choice in many situations.

In future, this indication should be a major source of reductions in caesarean section rate because of:

- 1) its importance as an indication for caesarean section, and
- 2) major changes in the management of labour and delivery of births in women with previous caesarean section.²

Fetal Distress

A small reduction in caesarean section rate may be possible through a different approach to the diagnosis of fetal distress. That the introduction of electronic fetal monitoring in the absence of fetal scalp blood pH estimation contributed to increasing caesarean section rate in the 1980s is supported by several randomised controlled trials.¹³⁻¹⁵ However, the combined use of electronic fetal monitoring and fetal scalp blood pH estimation has been reported to reduce the diagnosis of fetal distress and resulting caesarean section.¹⁶ Fetal distress did not contribute significantly to the increase in caesarean section rate in our study as objective diagnosis by fetal scalp blood pH estimation was established in late 1980s, before the first study period.

Dystocia

Dystocia is another potential area for reductions in caesarean section rate which could be brought about by changes in the management of labour and delivery. Use of oxytocin to augment labour may play a role in the reduction of caesarean section for dystocia,^{17,18} although this has not been demonstrated in controlled trials.¹⁹ More importantly, there is an urgent need to develop objective criteria for the diagnosis of dystocia.³ Although the proportion of caesarean section for dystocia in our unit was not significantly different for the two study periods, dystocia is a major contributor to the caesarean section rate in our unit. The 30% increase in absolute number of caesarean sections due to dystocia necessitates the development of evidence-based strategies to anticipate and objectively diagnose dystocia.

Breech

The Term Breech Trial²⁰ was a landmark study (published in the year 2000) which has influenced clinical practice in the management of term breech pregnancies. Although

we did not detect any statistically significant change in caesarean rates for breech presentation in our study, there was a 44% increase in absolute number of caesarean sections due to breech. This may suggest that many clinicians are changing their practice in accordance with the evidence from the Term Breech Trial.

Two aspects in the management of breech presentation at term warrant discussion. Firstly, up to 50% of breeches in which vaginal delivery is attempted may eventually deliver by caesarean section. Secondly, increasing practice of external cephalic version (ECV) may have decreased the number of breeches at term. Further analysis is indicated to assess the uptake of this policy of universal caesarean section for breech presentation at term. The potential contribution of breech presentation to decline in caesarean section rate is small chiefly due to the small number of births with this indication (2%) at term.²

Less Common Indications

In this category, subgroup analysis demonstrates that placenta previa major contributed significantly to the overall increase in caesarean section rate between the two study periods. The number of placenta previa major increased 4-fold from 1998 to 2001. This trend is consistent with increasing caesarean section rate as women with prior caesarean section are at greater risk of developing placenta previa in subsequent pregnancies.²¹ The risk of clinically significant placenta previa and accreta increases with each additional caesarean due to lower segment uterine scarring.²²

The statistically significant increase in caesarean section rate due to "rare indications" such as Crohn's disease and recto-vaginal fistula must be interpreted with caution due to the small numbers. "Rare indications" refer to those with only 1 case per indication and in each situation, mode of delivery was individualised after counselling.

Caesarean section rate performed for the remaining "less common" indications, such as severe pre-eclampsia (SPE), multiple pregnancies, abnormal lie and abruptio placenta, remain unchanged between the two study periods although there was a 4-fold increase in caesarean section done for macrosomia.

Patient's Request

In our study, there was just one maternal request for caesarean section in the absence of indications, in each study period. However, this issue deserves discussion as the concept of patient-centred choice is gaining credence with caesarean section done increasingly for maternal request.²³

Several reasons are cited for this trend. Some women with a history of difficult instrumental vaginal delivery or long and painful labour may not contemplate further attempts

at vaginal delivery.²⁴ Others are concerned about fetal brain damage and pelvic floor trauma. While developmental delays are unrelated to the mode of delivery, an elective caesarean section does avert the need for episiotomies, prolonged labour, difficult instrumental deliveries and pelvic floor trauma with predisposition to incontinence.

Postpartum faecal incontinence is more common than previously realised. Women with occult anal-sphincter injury are at high risk of faecal incontinence after a second vaginal delivery.²⁵ Forceps and vacuum extraction deliveries are risk factors with no protection demonstrated from emergency caesarean section performed in late labour.^{26,27}

Current evidence suggests that risk of mortality associated with caesarean section was increased 7-fold compared to vaginal delivery.²⁸ Nevertheless, the absolute risk of maternal death from caesarean section remains low.²⁹ More importantly, caesarean section is not without morbidity. Short-term risks to the mother include haemorrhage, infection, ileus and even pulmonary embolism. Long-term complications include adhesions, intestinal obstruction, viscus injury and uterine rupture. There may be an effect on future fertility as there is a strong association between having a previous caesarean section and the subsequent development of placenta previa.²¹ The risk increases with number of prior caesarean section by a dose-response pattern. The risk of placenta accreta was 24% with a placenta previa and 1 prior caesarean section and 67% with 4 or more prior caesarean section.²²

Two reports – “Health Committee Maternity Services” and “Changing Childbirth” – suggested that women should have a pivotal role in their obstetric care.³⁰ We should respect a woman’s choice if it is fully informed and if she can demonstrate an understanding of the implications. Until evidence points towards either mode of delivery as being superior to the other, prophylactic caesarean section can no longer be considered clinically unjustifiable. It now forms part of an accepted medical practice and majority of obstetricians are prepared to agree to maternal request for caesarean section.³¹

Some argue that successful litigation for failure to do a caesarean section would cost more than many additional sections but there is no evidence that a policy of increased caesarean section would prevent disability. The wide variation in caesarean section rates suggest that there is no consensus among obstetricians about when a caesarean section is medically indicated.³²

Caesarean section remains an important area of controversy. Patients’ right to autonomy is a fundamental human right but choice needs to be informed.²² Obstetricians must be aware of the consequences of decisions about the

mode of delivery as neither method is devoid of risks. Ultimately, competent women are free to decline medical advice and treatment. The (negative) right to decline treatment needs to be distinguished from the supposed (positive) right to demand it. A patient, however competent, cannot invariably, impose her demands.³³ Healthcare providers could not preserve their professional integrity or credibility if they were to act as mere instruments to the patients’ demands. Decision-making should be a collaborative enterprise based on mutual respect with the patient’s interest in mind.

The significant reduction in operating time may be due to a combination of factors, such as decision not to perform peritoneal closure⁵ by majority of obstetricians, as well as increased supervision by senior staff.

Differences between the two study periods in patient and hospital characteristics may have contributed to the changes in indications. Further research with controls for demographic differences is required to determine the extent to which these variables contributed to the increase in caesarean section rate.³ The number of deliveries in this preliminary study is small. Subsequent studies will be conducted based on calculations using 1 year’s worth of data.

Conclusion

The high rates and increasing trend of caesarean section rate reflect a change in obstetric practice, patient views and patient empowerment in recent years. Studying indications for caesarean sections are useful for hospitals, clinicians and researchers in determining strategies to reduce caesarean section rate. A review of our results can help to identify potential areas for reduction of caesarean section rate. Previous caesarean section may be the major source of future reductions of the caesarean section rate in our unit.

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