

Rising Trends of Caesarean Deliveries : A Boon or Bane?

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Abstract: The Caesarean section rates have been rapidly increasing worldwide. This is not necessarily an indicator of better obstetric outcome and may, in fact, be harmful. The reasons for this rising trend are multifaceted. Robson's classification of Caesarean sections allows comparison of Caesarean rates within a single delivery unit over a given time frame or with various other units. The focus should be decreasing rates of primary Caesarean deliveries. Various clinical and non clinical interventions may be used to achieve this target. While non clinical interventions aim at using audit and feedback as the chief tool in addressing this problem, clinical interventions include usage of labour management protocols, based on evidence based guidelines.

INTRODUCTION

Caesarean section is considered as the most significant intervention of child birth¹. The escalating rates of caesarean deliveries especially in the middle and high income countries, in the recent years, has been a cause for major concern. In 1985, the World Health Organisation (WHO) had issued a consensus statement suggesting that there were no additional health benefits associated with caesarean section rate exceeding 10-15%². However, the LSCS (Lower segment Caesarean Section) rates have exceeded far beyond this suggested cutoff, both in developing as well as developed nations.

In United States, the national rate of caesarean deliveries has steadily increased from 21% in 1996 to 32% in 2007 (nearly 48% rise)³. China has got the highest rate at 46%⁴. Latin America and the Caribbean have an average rate of 29.2% vis-a-vis Africa, which has the lowest rate at 3.5%⁵. In our country, the average rate has gone up from 2.9% in 1992-93 to 10.6% in 2005-06⁶. Within our country itself, there is a wide variation in the LSCS rates among various states. The scenario is further complicated by the disparity in rates between rural and urban areas within a specific state. Among the Indian states, Kerala has the highest rate of Caesarean deliveries, but the difference between rural-urban areas is minimal. (Table I)

Table I : Percentage of Lscs in Rural and Urban Areas Statewise⁶

STATE	RURAL AREAS	URBAN AREAS
Andhra Pradesh	19.4	32.2
Assam	3.7	17.4
Bihar	2.5	7.6
Delhi	5.0	12.6
Goa	23.7	27.3
Gujarat	5.5	14.7
Haryana	3.1	12.1
Himachal Pradesh	12.3	15.4
Jammu & Kashmir	9.2	29.0
Karnataka	11.6	22.2
Kerala	28.4	33.5
Madhya Pradesh	1.9	13.6
Maharashtra	7.7	19.9
Orissa	3.9	12.8
Punjab	14.8	19.6
Rajasthan	2.2	9.9
Uttar Pradesh	2.4	12.7
West Bengal	5.8	30

Data based on National Family Health Survey, 2005-2006

Several factors have contributed towards this phenomenal rise in number of Caesarean deliveries. (1) LSCS has, over the years, become a safer procedure due to advances in anaesthesia and surgical skills. (2) Increase in the number of expectant mothers who are at high risk (like elderly, obese, infertility treated etc.) (3) Decline in the rates of vaginal birth after prior Caesarean section (VBAC), the reasons for which are multifaceted (4) Increased demand for Caesarean on maternal request, in the absence of any medical or obstetric complications, especially in the developed world. (5) Urbanisation of rural areas (6) Changes in the preferences of care providers, due to fear of litigations, economic pressures, scheduling issues etc⁷. Over the years, the

women's perception of vaginal birth has changed drastically, with more women becoming aware of complications associated with it and also owing to their dissatisfaction with prolonged, painful labours.

THE MYTH OF 'IMPROVED' PERINATAL OUTCOME

The assumption that increased Caesarean delivery rate is an indicator of better obstetric outcome has not been proven in literature. In a population based study, involving 171,295 singleton births, perinatal mortality rates were found to be comparable among the three groups of physicians, ones who had low (<18%), medium and high (>27%) rates of performing LSCS. Low and very low birth weight infants delivered by 'high rate' physicians did not have a lower risk of mortality⁸. The WHO Global Survey (2005) on maternal and perinatal deaths in Latin America, analyzed data on 97,095 women delivering in 120 facilities in eight randomly selected countries. The results of the Survey showed that increasing LSCS rates did not improve the perinatal outcome, but was associated with higher neonatal morbidity and severe maternal morbidity and mortality⁹.

COMPLICATIONS OF CAESAREAN DELIVERIES

The procedure, per se, might have become safer, yet it is associated with short term and long term complications. Short term complications include: (1) anaesthesia complications (aspiration, Mendelson's syndrome, failed spinal etc.) (2) increased risk of postpartum infection requiring antibiotics, (3) haemorrhage and the need for blood transfusion, (4) deep venous thrombosis and pulmonary embolism, (5) longer time for recovery. (6) Increased incidence of neonatal respiratory morbidity (transient tachypnoea of the newborn) especially when done prior to 39 weeks' gestation. Long term complications are potentially more dangerous. These include (1) abnormal placentation, with the incidence of morbidly adherent placenta increasing with increase in number of prior LSCS¹⁰. (2) Caesarean scar ectopic pregnancy¹¹ (3) major obstetrical haemorrhage in subsequent pregnancies¹² (4) need for hysterectomy in subsequent pregnancy¹³ (5) scar endometriosis¹⁴ (6) adenomyosis¹⁵ (7) adhesion formation leading to bladder/bowel injury in case of subsequent abdominal surgeries¹⁶.

INDICATIONS CONTRIBUTING TO INCREASING LSCS RATES

Analyzing the various indications of LSCS which have contributed to the increasing rate of Caesarean deliveries, Barber et al⁷, found that subjectively defined indications (like non reassuring foetal heart tracing, labour arrest disorders, suspected macrosomia) are on the rise. This is in contrast to objectively defined indications such as malpresentations, obstetric conditions (cord prolapse, placenta praevia) etc., which have remained stable over the years. In the light of the above discussion, one question that comes to mind, is whether LSCS rates can be reduced without affecting perinatal outcome adversely?

THE "10 GROUP" CLASSIFICATION OF CAESAREAN SECTIONS

In 2001, a new classification system for Caesarean sections, known as the "10-group" or 'Robson's' classification, was described¹⁷. It provides

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a simple yet comprehensive framework for monitoring, auditing and analyzing LSCS rates at facility level. It is also used for comparing LSCS rates within a single delivery unit over the years or between various units¹⁸. Based on four obstetric concepts, it divides the obstetric population into ten groups. (Table 2 and 3) The relative size of each group is calculated. The LSCS rate in each group is calculated by number of LSCS in each group/number of labouring women in that group. The contribution of each group towards overall LSCS rate is also determined (number of LSCS in each group/ total number of women in the obstetric population).

Table 2: Robson's Classification: Obstetric Concepts and Their Parameters¹

OBSTETRIC CONCEPT	PARAMETERS
Category of pregnancy	Singleton, cephalic pregnancy Singleton breech pregnancy Singleton oblique or transverse lie Multiple pregnancy
Previous Obstetric record	Nulliparous Multiparous without a uterine scar Multiparous with uterine scar
Course of labour and delivery	Spontaneous labour Induced labour Pre labour Caesarean (elective/emergency)
Gestation	Gestational age in completed weeks at time of delivery

Table 3 : The 10 Group or Robson's Classification of Lscs¹

Groups	No. of LSCS in each group	Relative size of groups	LSCS rate in each group	Contribution of each group to overall rate.
1. Standard primi* with SPOL‡				
2. Standard primi* with IOL§ or pre labour LSCS				
3. Standard multiparous † with SPOL‡				
4. Standard multiparous † with IOL § /prelabour LSCS				
5. Single cephalic at ≥ 37 wks, prior LSCS				
6. Nulliparous breeches				
7. Multiparous breeches (including prior LSCS)				
8. Multiple pregnancies (including prior LSCS)				
9. All abnormal lies (including prior LSCS)				
10. Singleton cephalic <36 wks (including prior CS)				

Standard primi: Singleton pregnancy with cephalic presentation at e" 37
Standard multiparous: Singleton pregnancy with cephalic presentation at e" 37 weeks
SPOL ‡: Spontaneous onset of labour IOL §: Induction of labour

INTERPRETATION OF ROBSON'S CLASSIFICATION¹⁹

- **Group 1 and 3** are usually the largest groups in any obstetric population.
- **Group 1** is the most important group. It is less likely to have medical complications. Most common indications for LSCS in this group include foetal distress, dystocia.
- **Group 2:** The LSCS rates can be reduced by decreasing the number of labour inductions.
- **Group 3:** LSCS rate is generally around 1-2%. If LSCS rate >2% and the data has been accurately collected, then probably indicates unnecessary LSCS.
- **Group 5:** Contributes to maximum number of LSCS in any obstetric population. It is a heterogeneous group, including women with previous one or more LSCS (irrespective of VBAC), in either spontaneous or induced labour. Awaiting spontaneous onset of labour might decrease repeat LSCS. Overall, it is difficult to decrease LSCS rates in this group.
- **Group 6&7:** LSCS done for all breech presentations. Successful external cephalic version (ECV) at term decreases LSCS rates in this group.
- **Group 8:** Caesarean deliveries in all multiple pregnancies. Usually pregnancies complicated by high risk factors like conception after artificial reproductive techniques, gestational hypertension etc. It is difficult to reduce LSCS rates in this group

- **Group 9:** smallest group. It represents all Caesarean deliveries for malpresentation except breech presentation. ECV helpful in reducing LSCS rates.
- **Group 10:** This group represents all preterm Caesarean deliveries. LSCS rates high in tertiary referral centres, due to availability of good nursery facilities. It is difficult to safely reduce LSCS rates in this group.

The focus of attention should be on decreasing the rates of primary LSCS, especially in groups 1 and 2. It is difficult to bring down rates of secondary LSCS (Group 5), without compromising on the safety of mother and foetus.

STRATEGIES TO REDUCE PRIMARY CAESAREAN SECTIONS

These strategies can be broadly classified as clinical and non clinical interventions (Table 4). Clinical interventions are those pertaining to labour management like induction of labour, dystocia during labour, non reassuring foetal heart tracings and malpresentations. Non clinical interventions, on the other hand, deal with audit and feedback.

CLINICAL INTERVENTIONS

Induction of labour: Elective induction of labour at term increases the risk of LSCS by two fold²⁰. Induction of labour for uncomplicated pregnancies at 41 weeks has shown to decrease LSCS rates²¹. Diagnosis of failed induction should be made only after adequate administration of Oxytocin for at least 12 hours in the latent phase. American College of Obstetricians and Gynaecologists (ACOG) recommends "Allowing at least 12-18 hours of latent phase, before diagnosing failed induction, may decrease the risk of LSCS²²."

Table 4: Clinical Interventions Useful In Decreasing Lscs Rates

Interventions	Source of evidence from literature	Relative Risk	No. of RCTs* analyzed	No. of subjects
Active management of labour in low risk women	Cochrane systematic review, 2009 ²³	0.77 (95% CI † 0.63-0.94)	7	5390
Early amniotomy and Oxytocin for preventing dystocia	Cochrane systematic review, 2008 ²⁴	0.88 (95% CI 0.77-0.99)	10	7553
Continuous support (one to one) during labour	Cochrane systematic review, 2011 ²⁵	0.79 (95% CI 0.67-0.92)	21	15,061
Amnioinfusion for potential/suspected cord compression	Cochrane meta analysis, 1997(updated 2010) ³⁰	0.52 (95% CI 0.40- 0.69)	9	953
ECV for breech presentation	Cochrane systematic review 1996 (updated 2010) ³⁵	0.63 (95% CI 0.44 – 0.90)	7	1245
Mandatory second opinion and peer review feedback	Cochrane systematic review, 2011. ³⁷	RD § -1.9 (95% CI -3.8 to -0.1)	10	NA **

RCTs * : Randomised controlled trials RD § : Risk difference
CI † : Confidence intervals NA ** : Not available
ECV ‡ : External cephalic version

Dystocia: Use of a policy of ' active management of labour' was found to cause modest reductions in LSCS rates (RR 0.77,95% CI 0.63 -0.94) in comparison to routine obstetric care, in a large meta analysis of randomized controlled trials²³. The components of this policy included: strict diagnosis of labour, routine amniotomy, early augmentation of labour with Oxytocin and one to one support in labour by a professional. The reviewers, however, concluded that this benefit should be balanced against the risks of multiple interventions in management of low risk pregnancies²³.

Following this, another Cochrane systematic review assessed the use of two key components of active management of labour, that is, early amniotomy and early augmentation of labour with Oxytocin, in nulliparous women in spontaneous labour. The meta analysis concluded that the use of these two components, when used as a preventive measure in labour, caused a statistically significant reduction in the LSCS rates (RR 0.88; 95% CI 0.77-0.99)²⁴.

Women having continuous support during labour are more likely to have shorter labours and spontaneous vaginal delivery. They are also less likely

to have operative vaginal delivery or LSCS²⁵. Support was found to be most effective when provided by a non professional or by someone not belonging to labouring woman's social network.

Ambulation during first stage of labour was shown to decrease the duration of first stage and the need for intrapartum analgesia, but had no effect on the mode of delivery²⁶. Hydration and nutrition of women in active labour who are at low risk for requiring general anaesthesia, did not bring about statistical significant difference in rates of LSCS and operative vaginal deliveries in comparison to women with restricted intake of food and water during labour²⁷. Contrary to the popular belief, usage of partogram has no beneficial effect in reducing LSCS rates, as shown by a large Cochrane meta analysis²⁸.

Non Reassuring Foetal Heart Tracing

The use of continuous electronic foetal heart rate monitoring (EFM) in labour has its own pitfalls. In delivery units where this method of foetal monitoring is being routinely employed, "non reassuring foetal status" is one of the most common indications for Caesarean deliveries. Care providers are more likely to perform LSCS in the presence of doubtful cardiotocographic (CTG) tracings due to fear of litigation in the event of perinatal asphyxia. This has led to a large number of unwarranted Caesarean sections.

Non usage of continuous EFM in low risk women in spontaneous labour has been proposed as one of the measures to decrease LSCS rates²⁹. Amnioinfusion has been shown to be effective in relieving recurrent variable decelerations in foetal heart rate (FHR), caused due to cord compression. According to a large meta analysis of randomized, controlled trials (RCTs), it lowers the use of LSCS for foetal distress, diagnosed based on FHR monitoring alone³⁰.

The presence of intra and inter observer variability in the interpretation of intrapartum CTG, limits its utility in identifying foetuses at risk of being asphyxiated. Some strategies that aid in increasing the objectivity of intrapartum CTG interpretation include foetal scalp pH estimation and standardization of non reassuring FHR tracings⁷. Use of foetal ECG waveform analysis as an adjunct to continuous EFM, resulted in fewer operative vaginal deliveries and fewer babies with neonatal encephalopathy, but did not bring about a reduction in LSCS rates³¹. There is, at present, insufficient evidence in literature to recommend the usage of vibro-acoustic stimulation test (VAST) to assess foetal well being in the presence of a non reassuring FHR trace³².

A comparatively newer adjunct to EFM is estimation of lactate levels in the foetal scalp blood. Lactate is a metabolite of anaerobic metabolism and, hence, a biochemical marker of tissue hypoxia. The level of lactate in scalp blood is estimated by an electrochemical assay using electrode strips, requiring only 5 microlitre of scalp blood. Levels > 4.8 mmol/L is suggestive of metabolic acidosis in the foetus and requires immediate delivery³³. According to a Cochrane review, foetal scalp blood lactate estimation is more likely to be successful in comparison to foetal scalp pH estimation in predicting intrapartum asphyxia³⁴.

Malpresentations

Attempting ECV at term reduces the chance of non cephalic births and LSCS done for this indication (RR 0.63, 95% CI 0.44-0.90), according to a Cochrane systematic review, analyzing seven RCTs involving 1245 women³⁵.

NON CLINICAL INTERVENTIONS

Effective audit of labour management and all Caesarean deliveries followed by feedback, is useful in cutting down rates of LSCS within a delivery unit.³⁶ A Cochrane meta analysis of 16 RCTs showed that mandatory second opinion, prior to posting a patient for LSCS, resulted in small yet statistically significant reduction in overall LSCS rates, by reducing the number of intrapartum LSCS. Peer review feedback at department meetings brought about statistically significant reduction in number of repeat LSCS at 48 months³⁷.

Use of medical audit cycle in the labour ward is also helpful in reducing LSCS rates³⁸. (Figure 1)

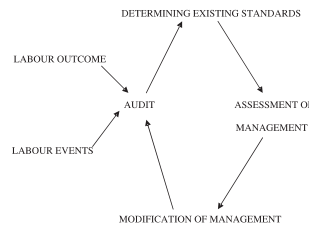


Figure 1 : The Medical audit cycle¹ can be used in labour wards to decrease LSCS rates

CONCLUSION

LSCS rates higher than risk adjusted expected rate for an institution have not shown to improve maternal or neonatal outcomes, but lead to unnecessary cost due to intervention³⁹. Attempts to convert subjective indications for performing LSCS into objective ones, based on clear, evidence based guidelines on labour management as well as increased accountability of care provider for the decision to perform LSCS at different levels (private practice, departmental, hospital, or state) will be beneficial in addressing the issue of rising LSCS rates.⁷ In the words of Dr. Michael Robson, "A Caesarean section rate can be considered appropriate only if information is available to explain and justify it..."

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