

## A Paradigm Shift to Check the Increasing Trend of Cesarean Delivery is the Need of Hour: But How?

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### Abstract

**Objectives** To check the progressive increasing trend of caesarean delivery in a tertiary facility care centre.

**Aims** The purpose of this study is to implement a paradigm shift in caesarean delivery by introducing a new classification system and a check list based management protocol.

**Methods** The study was conducted from 1st January, 2007 to 31st December, 2008 at CNMC G&O Department. All deliveries in the year 2007 were compared retrospectively and all deliveries in the year 2008 under prospective study with implementation of a new strategic protocol. Comparative audit and analysis of deliveries in retrospective and prospective year reveals significant changes in the caesarean delivery rate.

**Results** In retrospective group all women in labour were allowed for spontaneous delivery and in prospective group all women were subjected to intervention protocol and caesarean delivery done in both the groups in need for risk of fetal and maternal salvage. Incidence of caesarean

delivery (CD) in retrospective group was 29 % while in the prospective group it was 18.4 %. Marked decrease in CD was observed for augmentation, induction and trial of labour (TOL) for delivery in prospective group. The result was compared with Robson's studies following similar type of classification system.

**Conclusion** Marked improvement was noticed in this new paradigm and more multicentric trial is needed to check the increasing trend of CD.

**Keywords** Check based protocol · Ten group classification · Paradigm shift · Trial of labour (TOL) · Caesarean delivery (CD) · VBAC (vaginal birth after caesarean section)

### Introduction

Cesarean section rate continues to be an issue of great concern to many midwives, obstetrician, women, and society as a whole. It is time the responsibility of cesarean section rate was redefined. There is also a need to adopt standard classification and statutory collection of information [1].

Progressive increase in cesarean delivery (CD) globally is a matter of concern for the last 10 years. Issues related to maternal choice [2], mode of delivery for non-cephalic presentation at term [3, 4], and vaginal delivery after previous scar have been the focus of attention. Maternal mortality and neonatal morbidity as being related to mode of delivery can not be denied.

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Modern obstetric practice for medical, social, economic, and legal reasons has witnessed an increase in the primary cesarean section rate everywhere [5]. The rate of cesarean section in the urban educated population in Chennai is 45 % [6]. In medical colleges and teaching hospitals in India, the overall rate for CD is 24.4 % [7] whereas the incidence rates of CD in public, charitable, and private sector hospitals are 20, 38, and 47 %, respectively, [8] indicating progressive increase in CD in different facility care centers.

Cesarean rates have increased globally by 21.3 % in England and 29.7 % in the USA in 2004, while vaginal birth after cesarean (VBAC) rates have decreased rapidly to just 9 % in the USA in 2004 when it was relatively high in the UK at 33.7 % (range 6–64 %) [9]. Pathania et al. [10] noted a success rate of VBAC at 63.2 % with no maternal mortality and perinatal mortality. A large study in the USA revealed that most CDs are related to previous cesarean section, breech presentation dystocia, non-reassuring fetal heart rate (NRFHR), and to late higher incidence rate of multiple gestations.

The objective of this study is to determine whether completion of the medical audit in labor ward practice could safely reduce cesarean section rate [11].

To reduce primary CD, proper selection of cases, common indication, intervention protocol, classification of women in labor in groups, and team approach to decide CD when spontaneous onset, induction, or trial of labor (TOL) poses a threat to the mode of delivery, will be the strategic management of this study.

## Methodology

Based on five principles (integrated approach)

1. Uniform process and procedure insuring an improved quality including medical care.
2. Every member of the obstetric team should be empowered to halt any process that is deemed to be dangerous.
3. CD should best be viewed as a process alternative, not as an outcome or quality end point.
4. Avoidance of ambiguous guideline and defensible non-specific guidelines.
5. Effective peer review, quality care, decision making, and judicious decision for all CDs, while recent acceptance of primary CD-on-demand reversal of this trend seems unlikely [12].

Based on this principle hospital corporation of America (HCA) suggested a new system of classification and check list-based intervention protocol by oxytocin, misoprostol, magnesium sulfate regimen for PIH, and eclampsia. Maneuvers for shoulder dystocia have been introduced to facilitate vaginal delivery (Table 1).

Classification of patient in 10 groups based on category of pregnancy (like single cephalic, single breech, single oblique or transverse lie, or multiple pregnancy). Obstetric records (nulliparous, multiparous, with or without scar). Mode of delivery (spontaneous labor, induced labor, or CD). Based on the above principle, labor cases were divided into 10 groups. This classification is followed in

**Table 1** Selection of patients and monitoring criteria for intervention methodology

Parameters for selection	Following use of oxytocin/misoprostol	Following mag-sulf therapy in P.I.H/eclampsia/P.T.L	Following management of shoulder dystocia
Prenatal record available/or not	Patient aware of hyper stimulation/risk	If for preterm labor dosage of magnesium sulfate should not be changed for 24 h	MC Roberts maneuvers
Pelvis adequate/or not	Minimum 30 min monitoring	Monitoring of respiration rate $\leq 12/\text{min}$	Suprapubic pressure
Estimated fetal weight $\geq 2.5/\leq 2.5$ kg	At least three contraction in 10 min	Total urine output $\geq 120$ ml in last 4 h	Episiotomy extension
Gestational age $\geq 37$ weeks kg/ $\leq 37$ weeks	No regular contraction following last dose/escalation	Medication, safety intubation and infusion verified every 4 h	Posterior arm release
Indication for ripening induction/ augmentation cephalic presentation	No late deceleration in CTG	Any convulsion/repeat dosage	Rubin's maneuver
No contraindication Obstetrician order Privilege for CD & obstetrician available on demand/not	Not more than two variable deceleration exceeding in 60 s	Progress of labor nor favorable resort to CD	Woods maneuver permutation or combination of above maneuvers according to the obstetricians choice to deliver the shoulder

PIH Pregnancy-induced hypertension, PTL Preterm labor

the UK, Ireland, Australia, India, Canada, and the USA for CD [13].

#### Check List-Based Protocol and Intervening Drugs

Selection of patients—prenatal records available or not; pelvis documented clinically, adequate or not by the team leader; average fetal weight; gestational age; cephalic or non-cephalic presentation.

Regular contraction, cervical change, fetal heart rate, and variation of fetal heart rate with contraction. No contraindication and patient should understand the risk of hyper stimulation and nonprogress of labor may be resorted to CD instead of vaginal delivery on demand. This guideline was complied with for the intervening drugs in the management strategy.

#### Misoprostol

25–50 mcg vaginally or sublingually and after monitoring the uterine contraction and progress of labor dosage may be repeated or drugs withdrawn.

#### Monitoring

Uterine contraction, progressive dilation of the cervix and descent of the presenting part, variability of fetal heart rate, and duration of labor as per partograph is also enlisted.

#### Intervention

By the team member if the process of delivery is associated with severe maternal and perinatal risk.

#### Oxytocin

2.5 unit of oxytocin in 500 ml of dextrose or ringer lactate solution equivalent to 5 miu/ml (20 drops/min). Increasing the drop rate/min and volume of infusion till optimization of uterine contraction established.

#### Rapid Escalation

5 miu in 500 ml dextrose solution 10 miu/min double the drop rate every 10 min and maximum 60 miu/min, and total volume of infusion should not be more than 630 ml in 5 h, and should not exceed 855 ml in 7 h.

#### Monitoring

Intervention criteria remain the same for augmentation or induction.

#### Magnesium Sulfate

Selection criteria of patients remain the same. Magnesium sulfate is being used for treatment of patient with preterm labor without hypertensive disorder; the doses remain the same for 24 h.

#### For Management of PIH/Eclampsia

Zero hour dosage of 4 gm magnesium sulfate diluted up to 20 ml with dextrose solution given slowly i.v. over 5 min, followed by 5 gm deep intramuscularly in each buttock—right and left (total 10 gm). Every 4 h, 5 gm magnesium sulfate is given deep intramuscularly in alternate buttock till the delivery process is completed. Repetition with less dosage may be needed if there is convulsion during the treatment.

#### Monitoring

Respiratory rate  $>12/\text{min}$ , total urine output  $\geq 120$  ml during the previous 4 h, deep tendon reflex present or not, additional medication, and monitoring of infusion rate.

#### Intervention

CD may be needed for fetal and maternal salvage.

#### Shoulder Dystocia

Head delivered, gentle attempts at traction assisted by maternal expulsive forces.

#### Maneuvers

Mc Roberts, Suprapubic pressure, episiotomy extended, posterior arm release, Rubins maneuver, Woods maneuver in permutation and combination they were applied according to the facility available for delivery of the shoulder. Not necessary to apply fundal pressure after the head was delivered and the arm under the symphysis at the point the head was delivered, right or left.

#### Materials and Methods

The theme of Robson's 10 group of classification of cesarean section as an outcome of audit and analysis was followed in our study. As it is a teaching institute for undergraduate and postgraduate studies for Medicos and Nursing personnel, more clinical, relevant liberal method adopted, emphasizing more on vaginal deliveries, was the theme of our classification system.

**Table 2** Ten group classification of cesarean section

Robson's classification	Our classification
1. First time mums single pregnancy head down $\geq 37$ weeks—spontaneous labor	1. Nulliparous, single, cephalic $\geq 37$ weeks—spontaneous labor
2. First time mums single pregnancy head down $\geq 37$ weeks—induced	2. Nulliparous, single, cephalic $\geq 37$ weeks—waited for spontaneous labor
3. First time mums single pregnancy head down $\geq 37$ weeks—no labor	3. Nulliparous, single, cephalic $\geq 37$ weeks—induced
4. Not first time mums single pregnancy head down $\geq 37$ weeks—spontaneous labor	4. Multiparous (excluding post CS), single, cephalic $\geq 37$ weeks—waited for spontaneous labor
5. Not first time mums single pregnancy head down $\geq 37$ weeks—induced	5. Post CS, single, cephalic $\geq 37$ weeks—in spontaneous labor
6. Not first time mums single pregnancy head down $\geq 37$ weeks—no previous CS, no labor	6. All multiparous breech in spontaneous labor—in spontaneous labor
7. Women who had a previous CS. Single pregnancy, head down $\geq 37$ weeks—no labor	7. All multiparous breech including post CS—waited for spontaneous labor
8. Single pregnancy, breech or presentation other than feet first or head first	8. All abnormal lie including post CS—cesarean delivery
9. Women having multiple pregnancy	9. All multiple pregnancy including post CS—spontaneous labor
10. Single pregnancy head first premature birth $\leq 37$ weeks	10. All single cephalic $\leq 36$ weeks (including post CS)—waited for spontaneous labor

**Table 3** Ten group classification and intervention procedure for delivery (retrospective year 2007)

Over all cesarean delivery rate—(CD) 2,195/7,556 (29 %)				
Groups	No of CD over total no of women in each group	Relative size of the group (%)	CD rate in each group (%)	Contribution made by each group to the over all CD rate (%)
1. Nulliparous, single, cephalic $\geq 37$ weeks—in spontaneous labor	309/1,993	26.3 (1,993/7,556)	15.5 (309/1,993)	4.08 (309/7,556)
2. Nulliparous, single, cephalic $\geq 37$ weeks—waited for spontaneous labor	537/928	12.2 (928/7,556)	57.8 (537/928)	7.1 (537/7,556)
3. Nulliparous (excluding post cesarean), single, cephalic $\geq 37$ weeks—in spontaneous labor	46/2,372	31.3 (2,372/7,556)	1.9 (46/2372)	0.6 (46/7,556)
4. Multiparous (excluding post cesarean) single, cephalic $\geq 37$ weeks—waited for spontaneous labor	158/870	11.5 (870/7,556)	18.1 (158/870)	2 (158/7,556)
5. Post CS, single, cephalic $\geq 37$ weeks—in spontaneous labor	586/672	8.8 (672/7,556)	87.2 (586/672)	7.75 (586/7,556)
6. All multiparous breech—in spontaneous labor	118/138	1.8 (138/7,556)	85.5 (118/138)	1.56 (118/7,556)
7. All multiparous breech (including post CS—in spontaneous labor	101/115	1.5 (115/7,556)	87.8 (101/115)	1.33 (101/7,556)
8. All abnormal lie including post CS—cesarean delivery	42/42	0.5 (42/7,556)	100 (42/42)	0.55 (42/7,556)
9. All multiple pregnancy (including post CS) in spontaneous labor	59/120	1.5 (120/7,556)	49.1 (59/120)	0.78 (59/7,556)
10. All single cephalic $\leq 36$ weeks (including post CS waited for spontaneous labor)	239/306	4 (306/7,556)	78 (239/306)	3.16 (239/7,556)

This retrospective and prospective study was carried out in Calcutta National Medical College and Hospital Obstetrics and Gynaecology Department by analyzing the

data from January 1, 2007 to December 31, 2008. In the year 2007 (retrospective study), all the patients were categorized into 10 groups, and spontaneous delivery allowed

**Table 4** Ten group classification and intervention procedure for delivery (prospective year 2008)

Over all cesarean delivery rate—(CD) 1471/7993 (18.4 %)				
Groups	No of CD over total no of women in each group	Relative size of the group (%)	CD rate in each group (%)	Contribution made by each group to the over all CD rate (%)
1. Nulliparous, single, cephalic $\geq 37$ weeks—augmented	156/2,036	25.4 (2,036/7,993)	7.6 (156/2,036)	1.9 (156/7,993)
2. Nulliparous, single, cephalic $\geq 37$ weeks—induced	346/1,019	12.7 (1,019/7,993)	33.9 (346/1,019)	4.3 (346/7,993)
3. Nulliparous (excluding post cesarean), single, cephalic $\geq 37$ weeks in spontaneous labor—augmented	48/2,416	30.2 (2,416/7,993)	1.9 (48/2,416)	0.6 (48/7,993)
4. Multiparous (excluding post cesarean) single, cephalic $\geq 37$ weeks—augmented	107/914	11.4 (914/7,993)	11.7 (107/914)	1.3 (107/7,993)
5. Post CS, single, cephalic $\geq 37$ weeks—induced	413/768	8.9 (716/7,993)	57.6 (413/716)	5.1 (413/7,993)
6. All multiparous breech—induced	125/200	2.5 (200/7,993)	62.5 (125/200)	1.5 (125/7,993)
7. All multiparous breech (including post CS—TOL	107/179	2.2 (179/7,993)	59.7 (107/179)	1.3 (107/7,993)
8. All abnormal life (including post CS)—cesarean delivery	38/38	0.4 (38/7,993)	100 (38/38)	0.4 (38/7,993)
9. All multiple pregnancy (including post CS)—TOL	15/70	0.8 (70/7,993)	21.4 (15/70)	0.18 (15/7,993)
10. All single cephalic $\leq 36$ weeks (including post CS)—TOL	116/353	4.4 (353/7,993)	32.8 (116/353)	1.4 (116/7,993)

no definite protocol for augmentation and induction, and strict monitoring criteria were not adopted. Termination by CD was the discreet decision of individual team leader. In the year 2008 (prospective group), all the 10 categories of patients were subjected to intervention like augmentation, induction, TOL, and magnesium sulfate therapy for PIH and eclampsia. All the cases were monitored by the team leader to hold the process of vaginal delivery in any unfavorable situation. For CD, the team member must be available within 30 min from the time of decision making.

## Results and Analysis

Principle followed in Table 2 in Robson's classification vaginal delivery attempted in 1, 2, 4, and 5 and pre-labor cesarean section was done in group 3 and groups 6–10. In our classification, only pre-labor cesarean section was done in group 9, and in the rest of the group, vaginal delivery is the method of first choice, and in case of no progress, then post-labor cesarean section is the choice.

In Table 3, at the top of the table, the numerator indicates the total no. of CDs carried out and the denominator the total no. of women in the obstetric population.

The first column represents the 10 groups of women for study. Numerator in the second column of each group represents the no. of CDs and denominator indicates the total no. of women in each group. In third column, the

relative size of each of the 10 group has been calculated by taking the denominator of each group and dividing it by the total denominator of the obstetric population and expressed in percentage. Fourth column shows the CD rate within each group calculated by dividing the numerator in each group by the denominator in each group, expressed in percentage. Fifth column shows the percentage contribution made by each group to the overall CD rate which is calculated by dividing the numerator of each group by the total denominator of the obstetric population. The contribution made by each group to the overall CD rate is not only dependent on the CD rate within the group but also on the size of the group (Table 4).

## Group Analysis (Retrospective and Prospective Study)

In Groups 1 and 2 nulliparous, the incidence rate of CD was almost 50 % less in the prospective groups where definite intervention methodology was adopted. The incidence rates of CD in multiparous are the same in both the study groups. In Groups 4 and 6 in multiparous single and multiparous breech, the incidence rates of CD are more in the retrospective groups. In the Groups 3 and 8 incidence rates of CD remain same. In Groups 5, 7, 9, and 10 in retrospective groups they are 30–40 % higher than those in prospective groups where TOL was conducted as per protocol. The success of TOL in our study is at par with available data. In both the groups, emergency or elective

CD was done for abnormal lie including previous CS, obstructed labor, and BOH. The incidence rate of CD in the year was 29 % out of 7,556 deliveries with 2,195 CDs, while in 2008, out of 7,993 deliveries, 1,471 were delivered by CD and the incidence rate is 18.4 %.

In Robson's studies out of 21,125 deliveries by implementing the 10-group classification system, cesarean section rate decreased to 9.5 from 12 %. In spontaneous laboring nulliparous women with a single tone, cephalic, term pregnancy, cesarean section was significant in 19.7 % of all sections. Early diagnosis and treatment of dystocia reduce the cesarean section rate to 2.4 from 7.5 %.

Shah et al. [14] in 1996 in a retrospective and prospective study reported that TOL in post CD with induction and augmentation by oxytocin was 64.29 %, whereas in our study it is 42.4 %.

Russillo B et al. [15] in 2008 in a study of TOL in patients of obstetrician and family physician opined that the outcome in the two groups are similar, which reminds the urge for vaginal delivery in family physician abroad.

## Discussion

Outcome of the present study revealed that augmentation or induction has reduced the incidence rate of CD in prospective group in the nulliparous women. Incidence rate of CD is more in multiparous single and nulliparous breech in the retrospective group where spontaneous mode of delivery was followed. CDs for mal presentation with previous scar and BOH remain the same in both the study groups. Significant reduction in the CD rate that has been noticed in the post-cesarean group in prospective study where TOL was done under strict monitoring of the progress of the labor and fetal condition as per HCA protocol is worth mentioning.

Ultimate outcome of CD corroborates with relevant study by other authors. ACOG in 1988 and 1999 suggested that TOL after previous CD is a reasonable option and as a result, VBAC rate in USA increased from 3.5 % in 1980 to 28.3 % in 1996. In our study, it is 13 % in retrospective group and 14.3 % in prospective group (group 7). Alarming, the incidence rates of CD for preferred choice of women in our infrastructure in the study are still debatable, but the decision by the team leader for CD is often erratic in the non-protocol group, which may be a cause for higher incidence.

## Conclusion

In the recent past, no methodology for common indication of cesarean section has been adopted. Controversy and

differences of opinion and more than one indication CD create scope for logistic discussion about the existing methodologies, but the method proposed in this study is simple and requires minimum resources.

Implementation of new paradigm in classification, indication, intervention by drugs, maneuvers, and applying methodologies like augmentation, induction, and TOL under close supervision and monitoring led to a decrease in the incidence rate of CD from 29 % in the retrospective group to 18.4 % in the prospective group.

With due care and caution, the team member must not hesitate to resort to CD for fetal and maternal salvage. When it is deemed necessary to be present at the facility, the team member must be available within 30 min from the time of decision making.

This is an umbrella attempt in our institution toward checking the progressive trend for CD by implementing a new classification system (which is the international trend) and to follow some intervention methodology to reach the goal. We believe that more such multicentric trials in different tertiary care centers (Medical Colleges) will reflect the real scenario in future.

## References

1. Robson MS. Can we reduce the caesarean section rate? *Best Pract Res Clin Obstet Gynecol.* 2001;15:179–94.
2. Wax GR, Cartin A, Pinette MG, et al. Patient choice caesarean and evidenced base review. *Obstet Gynaecol Surv.* 2004;59:601–16.
3. Grisaru S, Samueloff A. Primary non-medically indicated caesarean section (section on request) evidence based on modern vogue? *Clin Perinatol.* 2004;31:409–30.
4. Hegar R, Daltveit AK, Hofoss D, et al. Complications in caesarean delivery rates and risk factors. *Am J Obstet Gynecol.* 2004;190:428–34.
5. Mahale AR, Ghodke UP, Bhingare PE, et al. *J Obstet Gynecol India.* 2008;58:507–10.
6. Pai M, Sundaram P, Radhakrishnan KK, et al. High rate of caesarean section in an affluent section of Chennai: is it cause for concern? *Nat Med J India.* 1999;12:156–8.
7. Kambo I, Bedi M, Dhilon BS, et al. A critical appraisal of caesarean section rates at teaching hospitals in India. *Int J Gynecol Obstet.* 2002;79:151–8.
8. Sreevidya S, Sathiyasekaran BW. High caesarean rate in Madras (India). A population based cross sectional study. *BJOG.* 2003;110:106–11.
9. Guise GM, Hasima J, Osterweil P. Evidence base vaginal birth after caesarean section. *Best Pract Res Clin Obstet Gynaecol.* 2005;19:117–30.
10. Pathania K, Premi HK, Gupta J, et al. Delivery following previous CS (a retrospective study). *Obstet Gynaecol.* 2000;50:63–7.
11. Robson MS, Scudemore IW, Walsh SM, et al. *Am J Obstet Gynecol.* 1996;174:199–205.
12. Hele RW, Haser WB. Elective prophylactic caesarean delivery ACOG. *Clin Rev.* 2005;10:1–50.

13. National Maternity Hospital, Annual clinical report. Dublin National Maternity Hospital. 2005; 96–7.
14. Shah DS, Mehata AV, Gondalia R. Twice a caesarean always a caesarean? J Obstet Gynecol India. 1996;46:770–4.
15. Russillo B, Sewitch MJ, Cardinal L, et al. Comparing rate of trial of labour attempts, VBAC success and fetal and maternal complications in family physicians and obstetrician. J Obstet Gynaecol Can. 2008;30:123–8.