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A study of the efficacy and practicability of classification of caesarean section by Robson's criteria and its value in clinical practice

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Abstract
Background: The rate of Caesarean section is increasing and has given rise to the requirement of an internationally acceptable and applicable system of classification. The objective of this study was to analyse the efficacy and practicability of classification of caesarean section by Robson's criteria and its value in clinical practise.
Methods: This prospective observational comparative study was conducted in the Department of Obstetrics and Gynaecology of Dr. D.Y Patil Medical College, Hospital, Pimpri, Pune. A total number of 200 antenatal females that fulfilled the criteria were included.
Results: The overall Caesarean rate noted in our study was found to be 41%. 118 females of the 200 delivered vaginally while the rest were delivered by Caesarean section.
Conclusion: A relevant classification of Caesarean section rates and their indications allows an audit for evaluation and monitoring of the contributors to the Caesarean section rate and their impact.

Keywords: Caesarean section, Robson's classification, efficacy, labor

Introduction

"Caesarean section rates should no longer be thought of as being too high or too low, but rather whether they are appropriate or not, after taking into consideration all the relevant information."
-Dr. Michael Robson

"Every effort should be made to provide caesarean sections to women in need rather than striving to achieve a specific rate" -WHO Statement (2015).

Caesarean section is the termination of pregnancy and delivery of the live or dead foetus through an incision on the abdominal and uterine wall. Surgical outcomes are performed to improve the parturition outcomes. But the procedure itself carries inherent risks [1].

Although potentially life saving owing to its operative nature, this procedure has its own set of risks for both the foetus and mother in both present as well as future pregnancies. Short- and long-term complications of caesarean section include longer duration of hospital stay, Atonic postpartum haemorrhage, excessive blood loss and need for blood transfusion, postpartum puerperal sepsis, retained bits of placenta and possibility of adhesions in future pregnancies [2, 3], stillbirths and maternal and foetal morbidity and mortality [4].

Increasing rates of caesarean delivery rates worldwide is an area of intense interest and public health importance.

The caesarean section (CS) rate has been steadily rising at an alarming rate over last 5 decades. It has risen from 5% in 1940s and 1950s to 15% in 1970s and 1980s. But the last 2 decades have shown a dramatic rise in caesarean section rate worldwide which now exceeds 30% in some areas [5].

The World Health Organisation stated that there is no justification for any region to have caesarean section rates higher than 10-15%. The increased rates of caesarean section in the present scenario is due to multiple factors responsible for it like maternal age and others [6].

There is a lack of standardized classification or methodology used for retrospectively assessing and analysing the outcome and the rationality of these decisions. This makes comparison difficult between organizations and institutions.

Current opinion is widely varied on foetal monitoring during labour, the methods and indications of induction of labour, or the guidelines for caesarean delivery [7].

The rate of Caesarean section is increasing worldwide and this has given rise to the requirement of an internationally acceptable and applicable system of classification and comparison to draw valid global comparisons and investigate the determinant of the increasing trend of caesarean among different centres.

Dr. Michael Robson (from Dublin, Ireland), proposed "Robson classification" (also known as "the Ten Group Classification System") to allow easy comparisons and thereby provide a means for review and analysis for improvement in overall Obstetrics care. The easy applicability of this system is what makes it appropriate for worldwide use with a high rate of adaptability for various scenario [8].

In 2001, a new classification system for CS known as the "Ten-group" CS (TGCS) or Robson's classification was proposed. This classification system categorizes women into ten mutually exclusive and totally comprehensive categories of Caesarean section where each group has no overlap with the other and all possible indications of caesarean sections are included considering the following a priori criteria: parity, the previous obstetric record of the woman, the course of labor, including pre-labor CS, and gestational age [9].

A recent systematic review critically appraised various classification systems and found that the Robson's ten group classification system is easy to understand, clear, mutually exclusive, totally inclusive, reproducible and allows for prospective identification of categories which would benefit from active intervention to bring down overall caesarean section rate [10].

This system stratifies women according to their obstetric characteristics thereby allowing a comparison of caesarean section rates with minimum confounding factors. The categories are based on five basic obstetric characteristics that are routinely

Collected at all obstetrics centre

- Parity (nulliparous, multiparous with or without previous caesarean section)
- Onset of labour (spontaneous/induced or pre-labour Caesarean section)
- Gestational age (preterm or term)
- Presentation of foetus (cephalic, breech or transverse)
- Number of foetuses (single or multiple)

Based on this, there are 10 groups which are.

The Robson ten-group classification system [11].

1. Nulliparous, singleton, cephalic, ≥37 weeks' gestation, in spontaneous labour
2. Nulliparous, singleton, cephalic, ≥37 weeks' gestation, induced labour or caesarean section before labour
   a. Nulliparous, singleton, cephalic, ≥37 weeks' gestation, induced labour
   b. Nulliparous, singleton, cephalic, ≥37 weeks' gestation, caesarean section before labour
3. Multiparous (excluding previous caesarean section), singleton, cephalic, ≥37 weeks' gestation, in spontaneous labour
4. Multiparous without a previous uterine scar, with singleton, cephalic pregnancy, ≥37 weeks' gestation, induced or caesarean section before labour
   a. Multiparous without a previous uterine scar, with singleton, cephalic pregnancy, ≥37 weeks' gestation, induced labour
   b. Multiparous without a previous uterine scar, with singleton, cephalic pregnancy, ≥37 weeks' gestation, caesarean section before labour
5. Previous caesarean section, singleton, cephalic, ≥37 weeks' gestation
6. All nulliparous with a single breech
7. All multiparous with a single breech (including previous caesarean section)
8. All multiple pregnancies (including previous caesarean section)
9. All women with a single pregnancy in transverse or oblique lie (including those with previous caesarean section)
10. All singleton, cephalic, <37 weeks' gestation pregnancies (including previous caesarean section)

Aims and Objective

To Study of the efficacy and practicability of classification of caesarean section by Robson's criteria and its value in clinical practice

Objectives

1. To record data of antenatal females admitted for safe confinement and classify them into a category based on Robson's criteria
2. Analyze the method of delivery (vaginal/caesarean section) in patients of each category
3. Compare the data thus obtained to assess relative rates of caesarean section in each category
4. Identify subgroups requiring closer monitoring for investigation into the indications of caesarean section

Materials and Methods

Study design: Study was prospective observational comparitive study design Subjects aged > 18 years coming to OPD and wards of Dr. DY. Patil Medical College, Hospital and Research Centre, 102 Pimpri, Pune-411018.

Place of study: Dr. D.Y. Patil Medical College, Hospital & Research Centre, Pimpri, Pune-411018

Period of study: October, 2017 to September, 2019 Period required for data Analysis and reporting: 6 months

Sample Size: 200 Antenatal Females

Sample size calculated considering current population pregnancy rate in India for reproductive age group of 18 to 35 years being 27%. Low risk pregnancies considering the exclusion criteria are about 50%. Using 27% rate for our unit in our institution calculated sample size would be about 303. Out of these general population about 50% would be referred to tertiary care centre ie. Dr. DY Patil medical college and a 10% non-respondent rate. So by SPSS statistical software roughly on average 200 cases will be enrolled for my study.

Institute Ethics committee approvals was obtained before the start of study.

Written & informed consent was obtained from all patients.

Inclusion criteria

- Antenatal patients admitted in unit 1 of department of Obstetrics and Gynecology during study period for safe confinement and in labour.
- Age groups from 18-35 years

Exclusion criteria

- Patients with other co morbidities not related to pregnancy like known cases of epilepsy, schizophrenia, Seropositive cases
- Patients not giving consent for study
- Elderly gravida with age more than 35 years
- Teenage pregnancy with age less than 18 years
- Randomization: Purposive random sampling

Method of Study

Data was collected using a pretested protocol meeting the objectives of the study. Detailed history and necessary investigations were undertaken. The purpose of the study was explained to the patient and informed consent obtained.

Only cases satisfying all inclusion and exclusion criteria were selected for the study

Statistical analysis: The data was analysed using EPIINFO version 20. All appropriate statistical test were applied and variables correlated.

Observation and Result

Table 1: Distribution of patients based on type of delivery

Type of delivery	Frequency	Percentage
Caesarean	82	41
Vaginal	118	59
Total	200	100

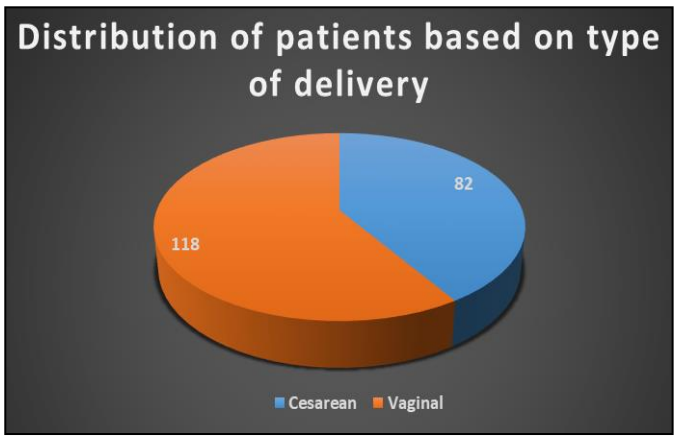

Fig 1: Distribution of patients based on type of delivery

Majority of patients in the study underwent vaginal delivery while only 41% of the patients observed underwent caesarean section. The overall caesarean section rate was noted to be 41% which is slightly higher than average due to the tertiary nature of our healthcare institution acting as a referral hospital.

Majority of cases admitted at our institution are referral cases from various primary and community health centres in the vicinity with certain obstetric indications or medical co morbidities which could explain the slightly higher caesarean section rate noted at our hospital with more number of high risk cases being observed.

Table 2: Distribution of patients based on Robson's groups

Robson's group	Number of women in the group	Relative size of the group in percentage (%)
1	60	{60/200*100} 30
2a	2	1
2b	2	1
3	92	46
4a	3	2
4b	2	1
5	21	10
6	4	3
7	2	1
8	5	2
9	2	1
10	5	2
Total	200	100

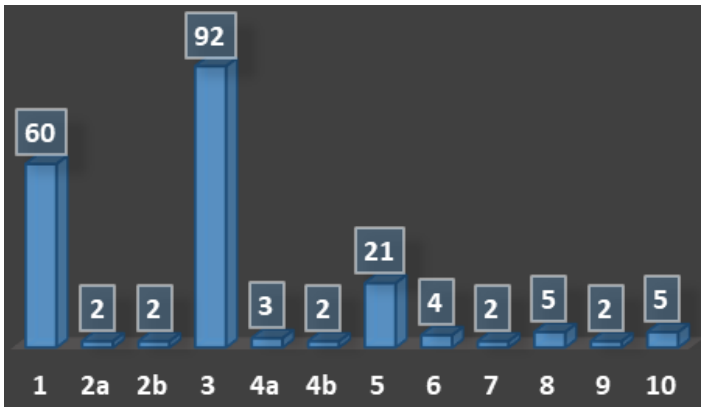

Fig 2: Distribution of patients based on Robson's groups

Graphical distribution of the study population based on the Robson's criteria for all antenatal females included in the study records a majority of patients with multiparity having a previous vaginal delivery at 46% followed by nulliparous patients with cephalic presentation going into spontaneous labour at more than 37 weeks of gestation at 30%. This group was followed by patients with previous history of caesarean section at 10.5% in group 5 of Robson's criteri

Table 3: Distribution of type of delivery in each Robson's group

Robson's group	No of Normal deliveries	No of CS sections	Percentage of CS in the group (no of cs in the group/total pts in the group *100)
1	33	27	{27/60*100}45
2a	2	0	0
2b	0	2	100
3	75	17	18.5
4a	2	1	33.3
4b	0	2	100
5	1	20	95.2
6	1	3	75
7	0	2	100
8	2	3	60
9	0	2	100
10	2	3	60

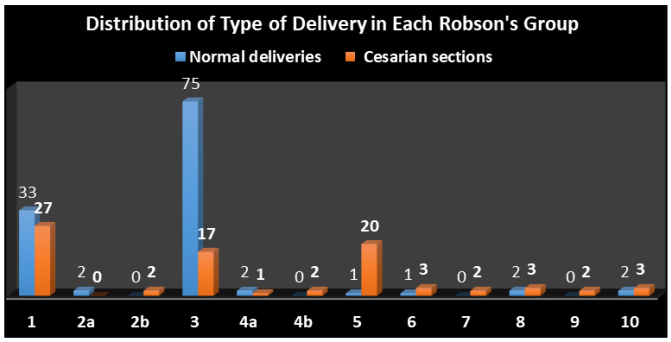

Fig 3: Distribution of type of delivery in each Robson's Group

This representation of retrospective analysis of mode of delivery in antenatal females falling under respective Robson's criteria draws a comparison between the vaginal deliveries and caesarean sections in each category.

Maximum sample size is seen in group 3 of multiparous females with singleton fetus of more than 37 weeks of gestation going into spontaneous labour in which, of the 92 females, 75 underwent normal vaginal delivery and 17 were subjected to caesarean section.

In nulliparous females with singleton pregnancies with cephalic presentation (Robson group 1), of a total of 59 antenatal females, 33 underwent vaginal delivery while 27 were subjected to caesarean section.

The Robson Group 5 comprised of patients having a previous caesarean section showed a relatively high repeat caesarean rate with 20 of the total 21 patients in this category undergoing repeat caesarean section.

Table 4: Contribution made by each Robson's group to the overall CS

Robson's group	Percentage Contribution made by each group to the overall CS (number of cs in the group/total number of CS*100)
1	{27/82*100}33
2a	0
2b	2
3	21
4a	1
4b	2
5	24
6	4
7	2
8	4
9	2
10	4
Total	100

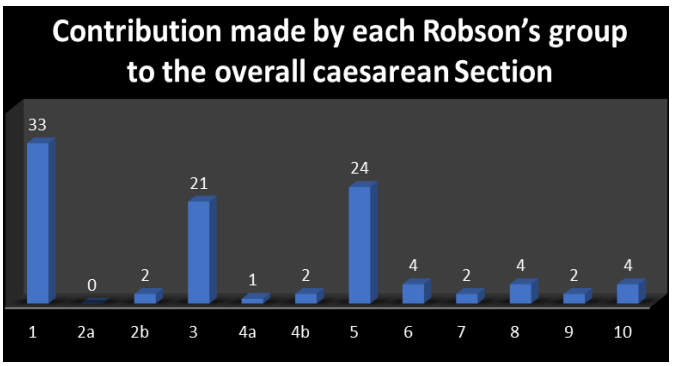

Fig 4: Contribution made by each Robson's group to the overall caesarean section

This graph is a comparison of the contribution of the absolute number of caesarean sections in each group to the total number of caesarean sections observed in this study.

Caesarean sections among group 1 of nulliparous singleton cephalic pregnancies was noted to be maximum overall at 33% of the total caesarean section rate. This was followed by group 5 of patients having a prior caesarean section contributing 24% of the caesarean sections while group 3 despite having the largest sample size contributed only 21% of the CS rate due to the majority of women in this group delivering vaginally.

Discussion

WHO recommends use of Robson's classification for health care institutions to formulate strategies aimed at optimizing the CS rates & monitoring efficacy of such strategies? It would also help to validate quality of health care provided by an institution & rationality of clinical practices while simultaneously

sensitizing health care workers to the rising CS rates & their deleterious effects.

The Robson classification would help to provide an in-depth analysis to comprehend the subtypes of various indications for Caesarean sections done at a particular institute and identifying the dominant obstetric population of a region scattered around a health care facility.

In the present study, maximum obstetric population was in the age group of 21-25 years of age which is consistent with the overall obstetric population in the country while the mean age of mother at first birth in India is about 20 years of age. The maximum antenatal female population in the country today is aged between 20-25 yrs of age for nulliparous & multiparous females.

On comparison based on parity it was evident that multiparous patents without previous CS formed the majority of the study group. These patients with previous vaginal delivery usually form groups 3 & 4 of the Robson classification which hence has the maximum obstetric population in our study.

The overall Caesarean rate noted in our study done at Dr. D. Y. Patil Medical College was found to be 41% which is relatively higher than some other studies. 118 females of the 200 delivered vaginally while the rest were delivered by Caesarean section. The high overall CS rate may be explained by the rationale that since this was an institutional study done at a tertiary care centre and not a population-based survey, the obstetric population comprises of multiple referral cases from nearby primary health centers with certain criteria precluding vaginal delivery. Thus, many patients are referred cases having absolute indications for caesarean section obviating possibility of vaginal delivery in them.

In our study maximum obstetric population was formed by group 3 forming 46% of the total population followed by group 1 (30%) & then group 5 (10%)

In group 3 relative rate of CS seen was only 18.5% with majority of women delivering vaginally (81.5%) In other groups, like twins, malpresentations & breech presentation, caesarean sections were noted to be more than vaginal delivery with 100% C Section seen in groups 7 & 9. These findings are continent with a study published in JOGI by RG Yadav *et al.* where the group contributing maximum to Caesarean Sections was group 1 at 37% followed by group 5 at 17% & then group 3 at 15%. This study was an institutional study done in 40000 patients & gave a result consistent with our present study.

Certain norms that would help to achieve this goal include

1. Appropriate case selection & counseling for VBAC
2. Further analysis & evaluation of foetal distress like foetal scalp blood pH monitoring to defect foetal acidosis.
3. Performing external versions at adequate gestational age when not otherwise contraindicated.
4. Reducing primary section rate & hence the sample size of group 5 in future.
5. Revising protocols for prolonged labour

Evidence based modern obstetrics recommends use of induction of labour only in cases with certain clear indication like postdatism with unfavorable cervix. Reducing the rampant use of induction in unindicated cases would certainly help optimize the primary CS rate in nulliparous women. Formulating a protocol of induction after 41 completed weeks of gestation for applying a definition of postdatism is thus the need of the hour.

Another common indication of CS noted in nulliparous women is failure to progress & foetal distress. Both these indications need a careful review & audit to limit CS done in this group.

Hence failure of induction and non-progress of labour as indications for CS require further analysis & review. All emergency CS must be reviewed for the course of labour they were in when decision of CS was taken & pattern of cervical dilatation and stage of labour also must be taken into account.

Foetal distress in our study was monitored by continuous electronic foetal monitoring by cardiotocography & distress was defined as sustained foetal bradycardia (early / late / variable deceleration) or tachycardia which may also be associated with meconium stained liquor. There may be variation between different institutes for diagnosis of foetal distress based on monitoring methodology employed at a particular institute.

In group 5 – commonest indication for elective repeat CS was found to be patient not giving consent for VBAC after being explained risks & benefits & opting for elective repeats CS whereas in patients undergoing TOLAC, most common indication was noted to be non-progress of labour & foetal distress. Of Patients in preterm labour (group 10), the most common indication was noted to be preterm premature rupture of membranes followed by unwillingness of patient for TOLAC.

WHO guidelines for monitoring of foetal heart rate must be adhered to with auscultation done every 15 minutes in 1st stage of labour & every 5 minutes in 2nd stage. Continuous EFM should be reserved for high risk cases with potential to causes foetal distress like preeclampsia intra uterine growth restriction, cord loop round foetal neck & preterm fetus along with induction of labour.

However, as our institute is a tertiary care center with majority of referral cases, almost all patients have certain high-risk factors premeditating electronic foetal monitoring in all patients. Careful audit of interpretation of Cardiotocogram in sync with Partogram would help reduces CS rates in antenatal women. Protocol based strategy to manage non-progress of labour would further help in reduction of CS rates in this group. Extensive evaluation of women undergoing CS for non-progress of labour is a necessary targeted intervention to analyze the burden of un-necessary caesarean sections.

Certain guideline-based management protocols in assessment of labour patients would include.

1. Trained labour attendant to help shorten duration of labour, make it more efficient & alleviate fears of the female.
2. Trained obstetrician to intervene when required to reduced perinatal morbidity & maternal mortality.
3. Meticulous assessment of pelvic dimensions to rule out contracted pelvis, cephalopelvic disproportion & prevent obstructed labour.
4. Partrographic Monitoring of progress of labour to promptly diagnose prolonged & obstructed labour as well as arrest of dilatation & descent.
5. Rational use of oxytocic drugs for induction & augmentation of labour in eligible patients to prevent unindicated inductions & subsequent foetal distress.

Conclusion

Robson 10-group classification helps in ease and convenience in information retrieval about Caesarean section rate which provides an appropriate retrospective insight into certain birth groups. Certain interventions aimed at reducing primary section rates include modifying the protocols for non-reassuring fetal status, adequate counselling for VBAC and setting up of VBAC clinics, training of obstetricians to perform external versions for breech presentation when not contraindicated could reduce the

contribution of Robson's groups towards the absolute primary C-Section rates.

Efforts aimed at reducing the overall CS rate should focus on reducing the primary CS rate (Group 1 and 2) and on increasing vaginal birth after CS (Group 5).

A relevant classification of Caesarean section rates and their indications allows an audit for evaluation and monitoring of the contributors to the Caesarean section rate and their impact.

It also allows comparison between institutions, regions, and countries that adopt this classification to help in objective review and analysis of these rates.

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