

## Classification of Caesarean Section According to Robson Criteria: An Approach to Optimize Caesarean Section Rates at Tertiary Care Hospital in Western India

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### ABSTRACT

**Introduction:** Caesarean section (CS) rates have been increasing worldwide. For proper assessment of CS rate, the ten group Robson classification is recommended by WHO. We are analyzing the CS rates by classifying the caesarean sections using Robson's ten group classification. The aim of this study is to perform an analysis based on Robson's ten group classification system and to identify strategies to optimize CS rate in our institution.

**Materials and Methods:** This was a retrospective observational study conducted in the department of obstetrics and gynaecology between July 2022 to December 2022 at SardarVallabhbai Patel Institute of Medical Sciences and Research (SVPIMSR) in Ahmedabad, western India. **Results:** Total number of deliveries during the study period was 3121. The total numbers of CS were 1078 (34.55%) and total vaginal deliveries were 2043 (65.45%). The main contributors to overall caesarean section rate were group 5 (previous CS) (14.03%) and group 2 (nullipara, singleton cephalic, >=37 weeks) (11.40%). Women with one previous LSCS contributed majorly to the CS rate.

**Conclusions:** Robson's classification is easily implementable and an effective tool for surveillance. The results can be compared between Institutions, states and countries. By using Robson classification, groups identified which contributed the most to the overall CS rate and approach to reduce the same has to be our prime objective. Any reduction in CS in nullipara group affect the CS rate in the total group of nulliparous women with a potential for vaginal birth and would also reduce number of women in group 5 (previous CS).

**Keywords:** Caesarean section, Robson classification, Vaginal deliveries

### INTRODUCTION

Caesarean section (CS) rates have been increasing worldwide and have caused concerns.<sup>1</sup> Over the past 4.5 decades there has been increase in the caesarean section rates in developed and developing countries. In 1985 WHO has proposed the ideal rate for caesarean section to be between 10-15%.<sup>2</sup> The purpose of is to identify strategies to optimize caesarean section rate by changing labour management protocol.

The proportion of caesarean section at population level is an important indicator to access quality of maternal health services offered in a country.<sup>3</sup> The overall CS rates differ significantly between different institutions.<sup>4</sup> Many reasons include the differences in patient characteristics, differences in institutional obstetric practice, pregnancy and labour management protocols and available resources.<sup>5</sup> CS should only be conducted based on specific indications.<sup>6</sup>

For this policymakers, program managers, clinicians, and administrators need a standardized and internationally accepted classification system for monitoring and comparison of CS rates in a meaningful manner.<sup>7</sup> A systematic review of existing CS

classification system identified 27 different classification systems for CS from which Robson's Ten Group Classification System (RTGCS) was found to be the best option.<sup>8</sup> The Ten-Group Robson classification has been praised for its simplicity, robustness, reproducibility, and flexibility.<sup>9</sup> RTGCS recommended for monitoring CS rates by both WHO in 2014 and FIGO in 2016.<sup>10,11</sup> Various subdivisions to the original ten groups have been suggested such as having subdivisions based on the mode of onset of labour.<sup>12</sup> This classification system has been used in single-institution studies, jurisdictional, and national registries and recently with international comparisons.<sup>7,12</sup>

According to Robson et al study, this is a crucial step in the audit process as even small changes to the CS rate within these target groups can bring about significant changes to the overall CS rate.<sup>6,7</sup> RTGCS offers a standardized comparison method within a particular institution over time or between institutions at a national, regional or global level.<sup>5,6,8</sup> In addition, RTGCS can inform about impact of interventions at both institutional and national levels by analysing the overall and group-specific CS rates over time.<sup>9</sup> Application of the classification system in different institutions across the world have yielded similar results, although some had significant differences.<sup>13,14,15,16</sup>

### **AIMS AND OBJECTIVES**

The aim of this study is to perform an analysis based on Robson ten group classification systems and to identify strategies to optimize CS rate in our institution.

- To classify the caesarean section by using Robson ten group classification
- To assess the proportions of CS in Robson ten group classification
- An approach to optimize CS rate in our institution

### **MATERIALS AND METHODS**

#### **Study design and study period**

This was a retrospective observational cross sectional study conducted in the department of obstetrics and gynaecology between July 2022 to December 2022 at Sardar Vallabhbhai Patel Institute of Medical Sciences and Research (SVPIMSR) in Ahmedabad, western India.

#### **Inclusion criteria**

All pregnant women who had crossed the period of viability ( $\geq 28$  weeks of gestation) and delivered during July 2021 to December 2021 were included in the study and classified according to Robson's classification system as given in (Table1).

#### **Data source and variables**

Data were collected by trained data collectors. Medical records were reviewed and analysed regarding obstetric information. This includes past obstetric history (parity and previous CS), onset of labour (spontaneous, induced, or CS before labour), fetal presentation or lie (cephalic, breech or other malpresentation), number of fetuses (single or multiple), mode of delivery (vaginal or CS), and gestational age (term or preterm).

#### **Statistical analysis and data processing**

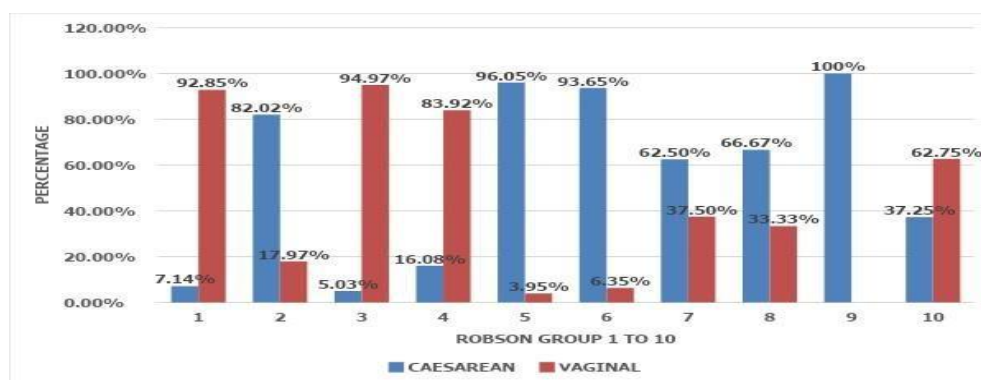
Data was collected and entered in Microsoft excel sheet version 2010 and statistical analysis was done. The overall CS rate at the institution was calculated first. Women were categorized into one of the ten Robson groups. For each group, relative size of group, CS rate in each group and contribution to overall CS rate were calculated.

### **RESULTS**

Total number of deliveries during the study period was 3121. The total number of caesarean sections was 1078 (34.55%) and total vaginal deliveries were 2043 (65.45%). CS rate in group 2 (nulliparous, singleton cephalic,  $\geq 37$  weeks) was 82.02%, group 5 (previous CS) was 96.05%, group 6 (primi breech) was 93.65%, group 9 (abnormal lie) was 100%.

**Table 1: Robson’ 10-Group Classification**

Group	Description
1	Nullipara, singleton cephalic, ≥37 weeks, spontaneous labour
2	Nullipara, singleton cephalic, ≥37 weeks A: Induced B: Caesarean section before labour
3	Multipara, singleton cephalic, ≥37 weeks, spontaneous labour
4	Multipara, singleton cephalic, ≥37 weeks A: Induced B: Caesarean section before labour
5	Previous caesarean section, singleton cephalic, ≥37 weeks A: Spontaneous labour B: Induced C: Caesarean section before labour
6	All nulliparous breeches A: Spontaneous labour B: Induced C: Caesarean section before labour
7	All multiparous breeches (including previous caesarean section) A: Spontaneous labour B: Induced C: Caesarean section before labour
8	All multiple pregnancies A: Spontaneous labour B: Induced C: Caesarean section before labour
9	All abnormal lies (including previous caesarean section but excluding breech) A: Spontaneous labour B: Induced C: Caesarean section before labour
10	All singleton cephalic, ≤ 36 weeks (including previous caesarean section) A: Spontaneous labour B: Induced C: Caesarean section before labour

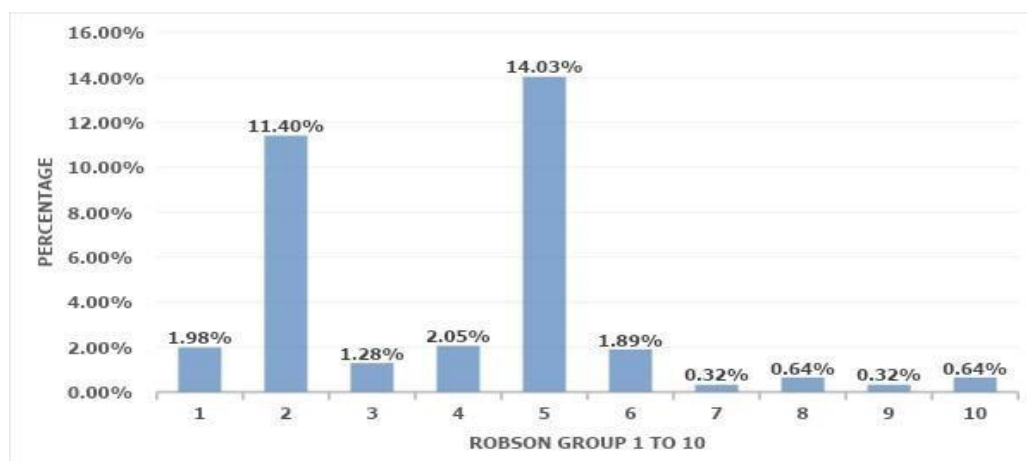


**Figure 1: distribution of deliveries across the ten groups**

**Table 2: CS Rate by 10 Group Robson Classification**

Robson 10 group	No. of CS over total no. of women in each group	Relative size of group (%) (% of total no. of births)	CS rate in each group (%)	Absolute group contribution to overall CS rate of 34.55% (%)	Relative group contribution to overall CS rate (%)
Group 1	62/868	27.81(868/3121)	7.14(62/868)	1.98(62/3121)	5.75(62/1078)
Group 2	356/434	13.90(434/3121)	82.02(356/434)	11.40(356/3121)	33.02(356/1078)
Group 3	40/795	25.47(795/3121)	5.02(40/795)	1.28(40/3121)	3.71(40/1078)
Group 4	64/394	12.75(398/3121)	16.08(64/398)	2.05(64/3121)	5.93(64/1078)
Group 5	438/456	14.61(456/3121)	96.05(438/456)	14.03(438/3121)	40.63(438/1078)
Group 6	59/63	2.02(63/3121)	93.65(59/63)	1.89(59/3121)	5.47(59/1078)
Group 7	10/16	0.51(16/3121)	62.50(10/16)	0.32(10/3121)	0.93(10/1078)
Group 8	20/30	0.96(30/3121)	66.67(20/30)	0.64(20/3121)	1.85(20/1078)
Group 9	10/10	0.32(10/3121)	100(10/10)	0.32(10/3121)	0.93(10/1078)
Group 10	19/51	1.63(51/3121)	37.25(19/51)	0.64(19/3121)	1.76(19/1078)
<b>Total</b>	<b>1078/3121</b>	<b>100</b>	<b>34.55</b>	<b>34.55</b>	<b>100</b>

Women in Group 1 (nulliparous women with single cephalic pregnancy at term in spontaneous labour) made the largest contribution to the obstetric population accounting for 27.81% of all deliveries. This was followed by Group 3 (multiparous women with single cephalic pregnancy at term in spontaneous labour without previous CS) 25.47% and Group 5 (previous CS) 14.61%.

**Figure 2 Contribution of Each Group of Robson's Classification to Overall Caesarean Section Rates**

The contribution of group 5 (previous CS) to overall caesarean section rate is 14.03%. This group is the major contributor to the caesarean section rate. CS rate in this group was 96.05%. The next major contributor to overall caesarean rate is by group 2 (nullipara, singleton cephalic,  $\geq 37$  weeks) which is 11.40%. The contribution of group 3 and 4 to overall caesarean section rate is 1.28 % and 2.05% respectively. Group 6 and Group 7 include nulliparous and multiparous women with breech presentation respectively. Together these two groups contributed 2.21% to the overall CS. The contribution of group

9 (abnormal lie) and 10 (preterm CS) to overall caesarean section rate is 0.32% and 0.64 % respectively.

## DISCUSSION

For the last 30 years, there has been a public concern about increasing CS rates.<sup>7</sup> WHO stated in 1985 that no region should exceed rates higher than 10-15% of caesarean sections.<sup>2</sup> The caesarean section rate in our study is 34.55%.

Caesarean section is a key intervention to decrease maternal and perinatal morbidity and mortality. It is also one of the best indicators of the quality of maternal health services.<sup>3</sup> Despite its proven benefits, it has associated complications such as anaesthetic accidents, infection, bleeding and even death. Future pregnancies can also be complicated by spontaneous preterm birth, uterine rupture, Placenta previa (increases with each subsequent CS, 0.7% with previous 2 CS, 1.8% with previous 3 CS and 4% with previous 4 CS), Placenta accreta (10-fold increases over the last decades), caesarean scar pregnancy (0.15% after 1 CS) and peripartum obstetric hysterectomy. These increase morbidity and mortality in pregnant women and specially for women in resource-limited settings with poor access to comprehensive obstetric care.<sup>5,7,17</sup>

The Robson ten group classification system enables institution-specific monitoring and auditing and can be a powerful tool to inform practice across different settings.<sup>5,7</sup> In this study, by using RTGCS we assessed relative size of group, CS rate in each group and contribution to overall CS rate.

It is evident that, the caesarean section rate in group 2 (nullipara, cephalic) and 4 (multipara, cephalic) is more than group 1 (nullipara, cephalic, spontaneous labour) and 3 (multipara, cephalic, spontaneous labour). There is a rising trend in the incidence of induction of labour.<sup>7</sup> This implies that induction of labour was associated with increased caesarean section rates. Strategies to reduce this have to be implemented. Proper management of labour, indication for induction, methods used for induction and the criteria used for failed induction has to be defined stringently. Women with uncomplicated pregnancy should be allowed for spontaneous progress of labour with fetomaternal monitoring till 40 weeks 6 days. In such pregnancy induction of labour should be offered only after 40 weeks 6 days, after assessment of individual case, Bishops score and choosing the appropriate induction agent. This will help to reduce number of induction failure cases and hence reduce the CS rate. The best way to reduce overall CS is to prevent primary CS. For this, improved case selections for labour induction and pre labour CS is utmost importance. Any reduction in CS in this group would affect the CS rate in the total group of nulliparous women with a potential for vaginal birth and would also reduce number of women in group 5 in the years to come.<sup>18</sup>

Group 3 and 1 had lower CS rate of 1.28% and 1.98% indicating multiparous women who came in spontaneous labour had higher vaginal delivery rate. This also shows that nulliparous and multiparous women in spontaneous labour had lower caesarean section rates, which indicate that we are dealing with a comparatively low risk population.

Costa ML et al, Litorp H et al and Sah S et al studies across different settings identified group 5 (previous CS) as the leading contributor to the CS rate.<sup>13,14</sup> In our study, group 5 was the largest contributor to overall CS rate and its relative size to obstetric population was less than 15%. This is mainly because most women with previous one LSCS undergone an elective repeat caesarean section prior to labour. Though the safety and long-term benefits of vaginal birth after CS (VBAC) are well established<sup>16,19</sup>, 96.05% of women in group 5 underwent repeat CS (Table 2). The number of women who attempt VBAC has declined over recent years due to fear of uterine rupture and perinatal loss.

Attempts to reduce repeat CS by promoting trial of labour after CS (TOLAC) may be undertaken by full-fledged obstetric and expert neonatal care units with dedicated staff and careful selection of cases. Most often those who achieve a VBAC are mothers who come in active labour with advanced cervical dilatation, others end up with repeat CS to avoid the burden of intensive monitoring and risk of medicolegal issues if mishap occurs. VBAC should be offered and encouraged for all patients unless there is a separate complicating

risk factor that justifies CS because it is safer for both mother and infant. To reduce the CS in group 5, TOLAC should be considered in every woman and discussion of risk and benefits of VBAC should be done. This will require antenatal counselling strategies and vigilant labour management protocols and encouragement of more patients for VBAC that will reduce the number of repeat CS.

The contribution of group 6 (primi breech) and 7 (multiparous breech) to overall caesarean section rate is 1.89% and 0.32% respectively. 93.65% of cases in group 6 and 62.5% in group 7 underwent caesarean section. Normal delivery rate in group 6 and 7 is 6.35% and 37.50%. This increase was seen post publication of term breech trial. several studies showed a high rate of CS in Group 6 and 7<sup>13</sup>, which is similar to our study. External cephalic version (ECV) reduces non-cephalic births and caesarean section significantly. After explaining risk and benefits, all women with breech presentation should be offered an ECV. Trial of labour should be considered for breech after explaining the risks and benefits. The contribution of group 9 (abnormal lie) to overall caesarean section rate is 0.32%. To decrease caesarean section in this group external version in to a breech or preferably a cephalic presentation should be attempted if the patient is at term or near term. The CS rate within Group 10 (preterm CS) was found to be 37.25%.

Groups 6-10 were smaller groups with high percentages of CS. Because of unavoidable obstetric indications, percentages of CS in these groups were high. When compared with Thomas et al, Stavrou EP et al, Bernardes J et al studies internationally, almost all studies conveyed comparable results in groups 6-10. Robson group 1, 2 and 5 contributes to more than two third of overall caesarean section rate. According to Fatusic et al, caesarean section rate was 25.47%.

In this study, the main contributing groups to the overall CS rate were the Previous CS (Group 5) and Primigravida groups, (Groups 1 and 2), i.e., giving the contribution rate of approx 70%, which is similar to Thomas et al and Robson et al studies. The contribution of primary CS rate to the overall CS rate by single cephalic term pregnancies (Groups 1, 2, 3, 4) was 48% in this study. The study results showed that one third (33%) of the total CS rate was contributed by Group 5 (438 CS out of 456 labouring women with previous CS), which is higher than Thomas et al study (one-fourth of the total CS rate). This clearly demonstrates the significance of the Robson's criteria, where different institutions and countries would have to develop different strategies to address the CS rates.

## CONCLUSION

The Robson ten group classification system (RTGCS) is only starting point but it is important to have a common starting point. It is easily implementable and an effective tool for ongoing surveillance. The results can be compared between Institutions, states and countries. It allows standardized comparisons of CS rates across time and settings. With the help of RTGCS, specific groups of women which contribute the most to the overall CS rate can be identify. All hospitals and hospital authorities can use the modified Robson's classification system as a part of a quality improvement initiative to monitor caesarean section rates. The Robson classification can work as an audit tool to identify the groups that have the greatest impact on the CS rate. By using Robson classification, groups identified which contributed the most to the overall CS rate and approach to reduce the same has to be our prime objective. Any reduction in CS in nullipara group affect the CS rate in the total group of nulliparous women with a potential for vaginal birth and would also reduce number of women in group 5 (previous CS) in the year to come. More inclination towards vaginal birth after CS (VBAC) can lower CS rates.

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