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A prospective observational study to analyze caesaream section rates using Robson ten group classification system at a tertiary care center in Mumbai, India.

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Abstract

Introduction: Cesarean section (CS) is defined as the birth of a fetus via laparotomy followed by hysterectomy. The global trends for surgical deliveries have risen in the last few decades. The challenge is to keep CS rates low while maintaining safe outcomes for the mother and infant. The WHO recommended Robson classification as a global standard tool for assessing, monitoring and comparing CS rates within healthcare facilities over time and between facilities. The main strengths of this classification are its simplicity, robustness, reliability and flexibility. The aim of this study is to analyze the cesarean section rates using Robson ten group classification system(TGCS) in a tertiary care referral center in Mumbai, India.

Methods: This is a prospective observational study that included the first consecutive 1000 antenatal women delivering from 1st August 2021 at our institute, which includes all deliveries of at least 500-gram birth weight or at least 22 weeks gestation. Each pregnant woman coming in labor, on admission was classified into one of the ten Robson groups. This data was then interpreted using Robson guidelines.

Results: The overall incidence of cesarean section is 40.5%.The Robson group with maximum women was group 3 (22.2%) and the group with the least number of women was group 9 (0.5%).The Robson group contributing the most to the overall cesarean section rate was group 5 (34.56%) and the group contributing the least was group 9 (1.23%).The primary CS rate was 27.7% and the maximum contribution was made by group 1, followed by group 2, group 10 and lastly group 3.The repeat section rate was 85.2%.VBAC rate was 14.8%.The most common indication of cesarean section was previous cesarean section (43.7%).

Conclusions: Robson TGCS is helpful in identifying the target areas for interventions and resources to reduce the CS rate. It is important to make maximum efforts to reduce the primary CS rates and increase rates of VBAC in order to achieve a reduction in the overall CS rate.

Keywords: Robson Ten Group Classification, Cesarean Section, Delivery, Labor, Birth.

Introduction

Cesarean section (CS) is defined as the birth of a fetus via laparotomy followed by hysterectomy. The global trends for surgical deliveries have risen in the last few decades. The rising CS rates are a major public health concern due to potential maternal and perinatal risks associated with this increase, the inequity in access and also increases the cost of health services [1-5].The challenge is to keep CS rates low while maintaining safe outcomes for the mother and infant. The WHO recommended Robson classification as a global standard tool for assessing, monitoring and comparing CS rates within healthcare facilities over time and between facilities [6]. According to users, most of whom were healthcare providers, the main strengths of this classification are its simplicity, robustness, reliability and flexibility [7]. The Robson classification is a complete perinatal classification unlike the other classifications that are based on the indications of CS. It includes all women who deliver at a specific setting and segregates them into categories that are totally inclusive and mutually exclusive based on the core variables which are usually routinely collected by obstetricians worldwide namely (1)Parity-nullipara/multipara (2)Previous CS-yes(one or more)/no (3)Onset of labour-spontaneous/induced/no labour(pre labour CS) (4)Number of foetuses-singleton/multiple (5)Gestational age-preterm(less than 37 weeks)/term(37 weeks or more) (6)Fatal lie and presentation-cephalic presentation/breech presentation/transverse lie/oblique lie. The aim of this study is to analyse the Cesarean section rates using Robson ten group classification system in a tertiary care referral centre in Mumbai, India and to device strategies to reduce the CS rates.

Materials and method

This is a prospective observational study that included the first cconsecutive 1000 antenatal women delivering from 1st August 2021 at our institute, which includes all deliveries of at least 500-grams birth weight or at least 22 weeks of gestation.After ethics committee clearance, detailed verbal and written consent was obtained from enrolled women.Each pregnant woman coming in labor, on admission was classified manually into one of the ten groups based on the 6 obstetric variables by receiving and collecting data from each individuals antenatal, labor and delivery records .Master chart was prepared and data entry was done in Microsoft Excel 2010.The collected data was reported in a standardized way using the "Robson classification report table" where the no. of CS in each group, no. of women in each group, group size, group CS rate, absolute group contribution to overall CS rate, relative contribution of each group to the overall CS rate was calculated.This data was then interpreted using Robson guidelines. The data was then analyzed in comparison to the WHO multicounty survey on maternal and newborn health (WHO MCS) and other similar Indian studies.

Results

Table 1: Relative size of each group by Robson classification during our study period:

Group	Obstetric Population	Number of women in group	Group size (%)
1	Nulliparous women with a single cephalic pregnancy, ≥37 weeks gestation in spontaneous labor	181	18.1%
2	Nulliparous women with a single cephalic pregnancy, ≥37 weeks gestation who had labor induced or were delivered by CS before labor	94	9.4%
3	Multiparous women without a previous CS, with a single cephalic pregnancy, ≥37 weeks gestation in spontaneous labor	222	22.2%
4	Multiparous women without a previous CS, with a single cephalic pregnancy, ≥37 weeks gestation who had labour induced or were delivered by CS before labour	61	6.1%
5	All multiparous women with at least one previous CS, with a single cephalic pregnancy, ≥37 weeks gestation	165	16.5%
6	All nulliparous women with a single breech pregnancy	17	1.7%
7	All multiparous women with a single breech pregnancy including women with previous CS(s)	24	2.4%
8	All women with multiple pregnancies including women with previous CS(s)	40	4%
9	All women with a single pregnancy with a transverse or oblique lie, including women with previous CS(s)	5	0.5%
10	All women with a single cephalic pregnancy < 37 weeks gestation, including women with previous CS(s)	191	19.1%
	Total	1000	100%

Table 2: Robson classification report table

Study Institute				2021		
Group	Number of CS in group	Number of women in group	Group size (%)	Group CS rate (%)	Absolute group contribution to overall CS rate (%)	Relative contribution of group to overall CS rate (%)
1	58	181	18.1%	32.04%	5.8%	14.32%
2	36	94	9.4%	38.29%	3.6%	8.88%
3	28	222	22.2%	12.61%	2.8%	6.91%
4	14	61	6.1%	22.95%	1.4%	3.45%
5	140	165	16.5%	84.84%	14%	34.56%

6	14	17	1.7%	82.35%	1.4%	3.45%
7	21	24	2.4%	87.5%	2.1%	5.18%
8	25	40	4%	62.5%	2.5%	6.17%
9	5	5	0.5%	100%	0.5%	1.23%
10	64	191	19.1%	33.5%	6.4%	15.8%
Total	405	1000		40.5%		100%

Out of total 1000 women delivered, 405 underwent CS (40.5%). The primary CS rate was 27.7% and the maximum contribution was made by group 1, followed by group 2, group 10 and lastly group 3. The repeat section rate was 85.2%. VBAC rate was 14.8% (33).

Table 3: Distribution of women according to Number of Previous Cesarean Sections.

Number of previous CS	Number	Percentage
0	777	77.7%
1	178	17.8%
2	39	3.9%
3	6	0.6%
Total	1000	

Table 4: Ranking according to indication of Cesarean sections

Indications for cesarean section	Number	Percentage
Previous cesarean section	177	43.7%
Fetal distress	93	22.96%
Malpresentation/Malposition	53	13%
Nonprogress of labour /Failure of induction	42	10.37%
Intra uterine growth restriction (IUGR)	22	5.43%
Cord Prolapse	17	4.19%
Placenta Previa	16	3.95%
Pre-eclampsia	15	3.7%
Abruptio Placentae	14	3.45%
Cephalopelvic disproportion	12	2.96%
Maternal genital tract infection	3	0.74%
Previous myomectomy	2	0.49%
Eclampsia	2	0.49%
Miscellaneous	18	4.44%

Miscellaneous causes include precious pregnancy, IVF conception etc. A single woman can have multiple indications for cesarean section and the significant imminent ones have been chosen and noted, hence the sum will not be 405 but instead higher.

Robson group wise analysis of indications of cesarean sections.

In group 1, fetal distress was the main indication of CS followed by non-progress of labour. In group 2 , failure of induction was the most common indication of cesarean section followed by fetal distress .In group 3 findings were similar to group 1 with fetal distress being the most common indication followed by non-progress of labour .In group 4 , fetal distress followed by failure of induction were the main indications. In group 5 , 131 pregnant women had previous history of cesarean section either as a contributing factor or the main indication for current cesarean section. The second most common indication was seen to be various causes of antepartum haemorrhage like placenta Previa, and abruption placentae. In group 6 , malposition and Malpresentation was the main cause followed by cord prolapse , IUGR

and Doppler changes .In group 7 also, the main indication for cesarean section was malposition and Malpresentation followed by history of previous cesarean section .In group 8 , the nulliparous women were seen to undergo cesarean sections in this pregnancy mainly due to malposition and Malpresentation , while the multiparous women underwent cesarean sections mainly due to having history of previous cesarean section.

For deciding Malpresentation and malposition, only the lie of baby "A" was taken into consideration. In all the deliveries of group 8 both the babies were delivered either vaginally or by cesarean section. There was never a situation where one baby was delivered vaginally and the other by cesarean during the study period. In group 9 , there was 100% cesarean section rate as transverse and oblique lie is an indication for cesarean section itself. Group 10 is a very vast group comprising of nulliparous and multiparous women. Amongst the nulliparous women in group 10, the most common indication for cesarean was intrauterine growth restriction and Doppler changes followed by fetal distress. Amongst the multiparous women the most common indication of cesarean section was previous cesarean section followed by fetal distress and non-progress of labour and failure of induction.

Discussion

Being a tertiary care center we receive referrals from all the peripheral hospitals due to lack of necessary facilities at peripheral hospitals like non availability of operation theatres, non-availability of experienced doctors at peripheral level at odd hours/night hours, no availability of anesthetist, non-availability of blood bank, non-availability of NICU and ICU facilities. Many high risk women are sent for registration and referred to our hospital thus contributing to a higher cesarean section rate.

The general principles of interpretation of Robsons report table was applied to our study population and the following were our findings.

Table 5: Assessment of the CS rates using Robsons guidelines

Steps for interpretation	Interpretation by Robson	MCS population	Our study	Further interpretation
CS rate in group 1	<10%	9.8%	32.04%	Rate is higher than Robson and MCS probably due to tertiary referral centre
CS rate in group 2	20-35%	39.9%	38.29%	Rate is higher than Robson but lower than MCS due to our hospital being a high-risk referral centre. Could also be due to poor success rates of IOL or poor choice of women to induce.
CS rate in group 3	<= 3%	3%	12.61%	Rate is higher than Robson and MCS due to high-risk population or due to inappropriate indications for CS
CS rate in group 4	<=15%	23.7%	22.95%	Rate is higher than Robson and MCS due to

				our hospital being a high risk referral center. Could also be due to poor success rates of IOL or poor choice of women to induce.
CS rate in group 5	50-60%	74.4%	84.84%	Rate is higher than Robsons and MCS. This could be due to larger number of women with two or more previous CS; or policy of scheduling of pre labour CS for all women with 1 previous scar without attempting a trial of labour.
CS rate in group 8	Around 60%	57.5%	62.5%	The rate is in line with Robsons criteria.
CS rate in group 10	Around 30%	25.1%	33.5%	Rate is in line with Robsons criteria and higher than MCS due to many cases of high risk pregnancies that need preterm pre labour CS
Relative contribution of group 1,2 and 5 to overall CS rate	2/3rd (66%) of all CS	63.7%	57.76%	The rate is lower than Robsons and MCS
Absolute contribution of group 5 to overall CS rate	NA	28.9%	34.56%	The rate is higher than MCS indicating that in previous years the CS rates in groups 1 and 2 have been high.

We have to take into account that the Robson criteria were devised in 2001 and the multi country survey (MCS) was done in the year 2010-2011. The WHO MCS was a cross-sectional study implemented in over 300 health facilities in 29 countries and included over 314,000 women from Africa, Asia, Eastern Mediterranean region, and Latin America [8,9].Every year the cesarean section rates have been on an increase. Therefore along with the fact that our center is a tertiary care center where women are referred for cesarean sections itself, we have a higher cesarean section rate.

Comparison with similar studies in Mumbai and India

In a similar study done by Asthana S et al [10] in a tertiary care hospital in Mumbai in 2019, a total of 1062 deliveries were conducted.The number of women who underwent CS were 455 (42.84%) and normal (vaginal) deliveries were 578 (54.42%)

Jogia and Mehta et al [11] in 2022 used the Robson classification to assess cesarean section at a medical college hospital in Gujarat, India. They found that out of total 5514 women delivered during the study period, 2262 (41.02%) were delivered by CS.

Table 6: Relative size of each Robson group (no. of women in each group/total number of women delivered*100)

Group	Our study	Asthana S et al[10]	Jogia A et al[11]
1	18.18%	13.2%	17.9%

2	9.4%	43%	23.5%
3	22.2%	5.5%	18.3%
4	6.1%	11.2%	8.8%
5	16.5%	12.4%	15.7%
6	1.7%	3.2%	3.3%
7	2.4%	1.1%	1%
8	4%	2.1%	1.1%
9	0.5%	0.3%	0.4%
10	19.1%	4.9%	9.8%

Table 7: Relative contribution of each Robson group to overall CS rate (CS in each group/total no. of CS*100)

Group	Our study	Asthana S et al[10]	Jogia A et al[11]
1	14.32%	8.35%	13.93%
2	8.88%	25.27%	28.47%
3	6.91%	3.30%	2.61%
4	3.45%	6.59%	2.52%
5	34.56%	29.01%	37.36%
6	3.45%	7.47%	6.23%
7	5.18%	2.64%	1.28%
8	6.17%	4.83%	1.06%
9	1.23%	0.88%	0.93%
10	15.8%	11.65%	5.61%

Strategies to reduce CS rates

- The need of the hour is to reduce the primary CS. It is important to monitor the modifiable indications for CS in Groups 1, 2, 3, and 4 so that the overall CS rate for the institute could be controlled to an extent. The reduction in primary CS for women in Groups 1, 2, 3, and 4 would affect the overall CS rates in Group 5 (post cesarean pregnancies). This would definitely serve to be a major step towards lowering the CS rate in the institute.
- Trial of VBAC can contribute to decline in CS rate in women with previous LSCS. Eencouraging vaginal birth after CS (VBAC) and deconstructing the stigma of "once a cesarean, always a cesarean has to be emphasized".
- Cesarean section rate is also greatly increased in breech presentation (Groups 6 and 7). Hence, specific training on external cephalic version (ECV) and assisted vaginal delivery should be organized periodically. Obstetricians should be encouraged to perform ECV to reduce CS rate in Groups 7 and 8
- Training on Louwen manouvers should be done before attempting delivery of term primiparous breech women after the other criterias are fulfilled. This will bring down the CS rate drastically especially in Group 6.
- Induction of labourr (IOL) and pre-labour cesarean in both first time mothers and multiparous have contributed to the current scenario. Ccareful assessment of cases before induction of labour in nulliparous women, are likely to be few effective strategies.
- Providing a fearless working environment to the obstetricians can help in bold decision making thereby curbing the overall CS rates.
- However, one should not forget to make every effort to provide Caesarean Sections to women in need, rather than striving to achieve a specific rate as per WHO 2015 amendment.

Conclusions

We observed that.

- The overall incidence of cesarean section is 40.5%.
- In our study population the Robson group with maximum women was group 3 n=222 (22.2%) and the group with the least number of women was group 9 n=5 (0.5%).
- The Robson group contributing the most to the overall cesarean section rate was group 5 (34.56%)

and the group contributing the least was group 9 (1.23%).

- The primary CS rate was 27.7% and the maximum contribution was made by group 1, followed by group 2, group 10 and lastly group 3.
- The repeat section rate was 85.2%.
- VBAC rate was 14.8%.

We can conclude that the Robson TGCS is an easy way to audit CS rates, to give an insight into certain birth groups and also to make comparisons between institutions, countries and regions. It is helpful in identifying the target areas for interventions and resources to reduce the CS rate. It is important to make maximum efforts to reduce the primary CS rates and increase rates of VBAC in order to achieve a reduction in the overall CS rate. Honouring a second opinion for the decision of CS, optimal management in labour, appropriate use of augmentation, correct interpretation of fetal heart rate monitoring, senior obstetrician involvement in decision making and use of confirmatory tests where fetal compromise is suspected are measures which can be used to decrease cesarean rates. Ccareful assessment of cases before induction of labour and formulating protocols for the same can reduce the burden of unnecessary surgical intervention. Sspecific training on ECV and assisted vaginal delivery should be organized periodically and obstetricians should be encouraged to perform ECV to reduce CS rate in Groups 7 and 8. Providing a fearless working environment to the obstetrician allows for bold decision making, thereby curbing the overall CS rate. However amidst all these efforts to achieve a specific rate we should not forget to provide cesarean sections to women in need.

Abbreviations

CS - Caesarean Section.

ECV - External cephalic version

ICU - Intensive care unit

IOL - Induction of labour

IUGR - Intra Uterine Growth Retardation.

IVF - In-Vitro fertilization

LSCS - Lower Segment Caesarean Section.

MCS - Multi country survey

NICU - Neonatal intensive care unit

TGCS - Ten Group Classification System.

VBAC - Vaginal Birth after Caesarean Section.

WHO - World Health Organization.

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