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Original Research Article

ANALYSIS OF CAESAREAN SECTIONS ACCORDING TO ROBSON'S CRITERIA AT A TEACHING HOSPITAL: A CROSS-SECTIONAL STUDY

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ABSTRACT

Background: Caesarean section rates are increasing worldwide, often without clear medical indications. The Robson Ten Group Classification System offers a standardized approach to assess and compare Caesarean section (CS) practices. Therefore, this study is aimed to classify cases using Robson's criteria, analyze the indications for Caesarean sections, and identify target groups for optimizing delivery practices.

Materials and Methods: A hospital-based observational study was conducted in the Department of Obstetrics and Gynaecology at a teaching hospital from January to December 2023. All pregnant women who underwent Caesarean section during this period were included through convenient sampling, totaling 454 cases. Clinical and obstetric data were collected and classified according to the modified Robson's Ten Group Classification system.

Results: Most women were aged 26–30 years, and 48.7% had a previous LSCS. Majority were booked, term, singleton, and cephalic presentation cases. Emergency CS was more than elective, and in group 2 and 4, pre-labor CS accounted for the largest proportion. Robson Group 5 was the leading contributor (42.3%), followed by Groups 2 (25.1%) and 1 (14.5%). Group 5 showed a high rate of elective repeat CS, while fetal distress and CPD were common indications in Groups 1 and 2. Breech and multiple pregnancies were predominant in Groups 6–8, and **severe** oligohydramnios and prior CS were key factors in Group 10.

Conclusion: Caesarean section rates were high in repeat CS and primary procedures, particularly in Robson Groups 5, 2, and 1. Enhancing the uptake of vaginal birth after Caesarean (VBAC), improving labor monitoring, and implementing Robson-based audits are essential for optimizing Caesarean delivery practices.

Keywords: Robson classification, Caesarean section, Vaginal birth.

INTRODUCTION

Caesarean section (CS), defined as the delivery of a fetus through incisions in the abdominal and uterine walls while excluding procedures like those for uterine rupture or abdominal pregnancy, has become one of the most commonly performed surgeries globally.[1,2] Its increasing prevalence, especially in urban tertiary centers, contrasts starkly with limited access in remote areas, reflecting a global disparity where CS may be underused in some regions and overused in others.[3] The World Health Organization (WHO) highlights this trend as a public health concern, reporting that over 21% of global births are by CS—a figure expected to approach 29% by 2030—despite evidence showing no added benefit to maternal or neonatal outcomes when CS rates exceed 10–15%.[4,5] Medically unnecessary CS can lead to avoidable complications such as infections, anaesthetic risks, postpartum issues, delayed breastfeeding, and prolonged hospitalization, reinforcing the need for rational use.[6,7] In India, the average CS rate stands at 21.5% according to NFHS-5, with rates exceeding 50% in some states and private institutions, driven by factors like advanced

maternal age, obesity, IVF use, fear of litigation, and inconsistent clinical guidelines.[8,9]

The lack of a standardized classification system further complicates meaningful comparisons and policy formulation at national and international levels.[10] To address these gaps, the Robson Ten Group Classification System (TGCS) has emerged as a globally endorsed tool to evaluate and standardize the analysis of CS rates. This system classifies women into ten mutually exclusive and fully inclusive groups based on obstetric characteristics such as parity, gestational age, onset of labor, fetal presentation, and number of fetuses.[11] Its simplicity, reproducibility, and adaptability make it a practical framework for comparing CS rates across different institutions and countries. In 2015, WHO recommended the TGCS as the global standard for monitoring and auditing CS rates, urging all facilities to adopt it and publish their data whenever feasible.[5] Subsequently, in 2016, the International Federation of Gynecology and Obstetrics (FIGO) also endorsed the Robson classification as a best practice standard.[12]

The TGCS not only facilitates data comparability but also allows identification of specific groups contributing most to the CS burden, thereby enabling evidence-based strategies to optimize obstetric care. For example, Robson Group 5—comprising multiparous women with a previous CS and a singleton cephalic pregnancy at term—is often a major contributor to the overall CS rate in many facilities.[11] By identifying such trends, interventions like promoting vaginal birth after Caesarean (VBAC) or standardizing indications for elective CS can be strategically implemented.

Despite increasing global attention, the analysis of CS rates using the Robson classification remains underreported in many Indian healthcare institutions. This lack of standardized evaluation hampers clinical governance and resource planning. Moreover, without clear documentation of CS indications, it is difficult to determine whether a CS was justified. Given the rising trends in surgical deliveries and the need for quality maternal health services, especially in teaching hospitals which serve as both treatment and training centers, evaluating CS trends using TGCS is essential. Therefore, this study aimed to evaluate the indications for Caesarean sections, categorizing the cases according to Robson's ten group classification system, and exploring opportunities for standardizing and improving CS practices.

MATERIALS AND METHODS

Study design: This was a hospital-based cross sectional study.

Study setting: This study was conducted in the Department of Obstetrics and Gynaecology of a tertiary care teaching hospital located in Andhra Pradesh, India. The hospital serves a diverse population and offers both emergency and elective obstetric services.

Study duration: The study was carried out over a period of one year, from January 2023 to December 2023.

Study population: The study population consisted of all antenatal women who underwent Caesarean section delivery after 28 weeks of gestation, regardless of fetal outcome or presence of congenital anomalies during the study period.

Inclusion and exclusion criteria

All pregnant women who underwent Caesarean section during the study period were included. There were no exclusion criteria, and all eligible cases were documented and categorized using Robson's classification system.

Sample size: The sample size for the study was calculated using the formula for estimating a single population proportion. Assuming a Caesarean section rate of 62%,[13] with a 95% confidence level and an absolute precision of 5%, the minimum required sample size was estimated to be 362. However, we have included all the all eligible cases during the specified one-year period for this study.

Sampling technique: A convenient sampling method was adopted for this study. All consecutive cases of Caesarean section performed between the study period were included.

Study procedure: After receiving approval from the institutional ethics committee and relevant administrative authorities, the study was initiated. All women who underwent Caesarean section during the study period were included after confirming eligibility as per the inclusion criteria. Each case was systematically evaluated based on obstetric characteristics such as parity, gestational age, onset of labor, fetal presentation, number of fetuses, and history of previous Caesarean delivery. Using these parameters, cases were categorized into the appropriate group according to Robson's ten group classification system. Classification was based on clinical documentation available in the hospital records.

Data collection: Information was gathered from hospital delivery registers, patient case files, operative records, and inpatient notes. For each subject, demographic and obstetric variables such as maternal age, parity, gestational age at delivery, labor onset (spontaneous, induced, or no labor), fetal presentation (cephalic, breech, or transverse), number of fetuses, and prior Caesarean sections were recorded. Additional details including the indication for Caesarean and whether the procedure was elective or emergency were also documented. All data were entered into a structured proforma tailored to Robson's classification framework.

Study tools: The study employed the Robson's ten group classification system to categorize Caesarean section cases. This classification divides women into distinct groups based on parity, gestational age, fetal presentation, onset of labor, and history of previous Caesarean section.

Independent and outcome variables: The independent variables in this study included maternal age, parity, gestational age at delivery, onset of labor (spontaneous, induced, or pre-labor Caesarean), fetal presentation (cephalic, breech, or transverse), number of fetuses (singleton or multiple), and history of previous Caesarean section. The primary outcome variable was the distribution of Caesarean section cases across the ten Robson groups.

Ethical considerations: The study protocol was reviewed and approved by the Institutional Human Ethics Committee. Written informed consent was obtained from all participants prior to inclusion in the study. Confidentiality and privacy of patient data were maintained.

Statistical analysis: Data were entered into Microsoft Excel and analyzed using IBM SPSS version 16.0. Descriptive statistics were employed to summarize the data. Categorical variables were presented as frequencies and percentages.

RESULTS

Out of the 454 women who underwent Caesarean delivery, most women were between 26 and 30 years of age (43.8%), followed by those in the 21–25 years age group (32.8%). Primigravida cases constituted 39.4%, and patients with previous LSCS constituted 48.7%. The majority were booked cases (93.6%), at term gestation (89.2%), with singleton (97.4%) and cephalic presentations (95.1%). Emergency Caesarean sections were more common (55.1%) than elective procedures (44.9%). Pre-labor CS (in cases like fetal distress, CPD, grade 3 Meconium stained liquor with unfavourable cervix) accounted for the highest proportion (46%), followed by spontaneous (37%) and induced labor (17%) [Table 1].

Table 1: Distribution of demographic and obstetric characteristics of Cesarian cases (n = 454)

Variable	Category	Frequency (n)	Percentage (%)
Age (years)	≤ 20	17	3.7%
	21 – 25	149	32.8%
	26 – 30	199	43.8%
	31 – 35	69	15.2%
	≥ 36	20	4.4%
Previous history of LSCS	Yes	221	48.7%
	No	233	51.3%
Parity	Primi	179	39.4%
	2nd gravida	169	37.2%
	3rd gravida	79	17.4%
	≥ 4th gravida	27	5.9%
Booking status	Booked	425	93.6%
	Un-booked	29	6.4%
Gestational age	Term	405	89.2%
	Pre-term	49	10.8%
Fetal number	Singleton	442	97.4%
	Multiple	12	2.6%
Presentation (singleton only)	Cephalic	420	95.1%
	Breech	22	4.9%
Labor onset	Spontaneous	168	37.0%
	Induced	77	17.0%
	Pre-labor CS	209	46.0%
Type of LSCS	Elective	204	44.9%
	Emergency	250	55.1%

Table 2: Distribution of patients according to Robson's criteria (N=454)

Robson's criteria	n	%
Group 1	66	14.5
Group 2	114	25.1
Group 3	5	1.1
Group 4	5	1.1
Group 5	192	42.3
Group 6	16	3.5
Group 7	6	1.3
Group 8	13	2.9
Group 9	0	0.0
Group 10	37	8.1

Table 3: Distribution of labor onset and Robson's criteria

Group	Spontaneous		Induced		Pre-labor	
	n	%	n	%	N	%
Group 1	66	100.0	0	0.0	0	0.0
Group 2	0	0.0	74	64.9	40	19.1
Group 3	5	100.0	0	0.0	0	0.0
Group 4	0	0.0	2	40.0	3	60.0

Group 5	57	29.7	0	0.0	135	70.3
Group 6	8	50.0	0	0.0	8	50.0
Group 7	2	33.3	0	0.0	4	66.7
Group 8	8	61.5	0	0.0	5	38.5
Group 9	0	0.0	0	0.0	0	0.0
Group 10	22	59.5	1	2.7	14	37.8

Table 4: Distribution of C S Indications and Robson Classification (n=454)

Indication Category	Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8	Group 10
Breech Presentation	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	17 (81.0%)	1 (4.8%)	3 (14.3%)	0 (0.0%)
CPD/Contracted Pelvis	29 (54.7%)	22 (41.5%)	1 (1.9%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (1.9%)	0 (0.0%)
Failed Induction	0 (0.0%)	8 (100.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Fetal Distress	13 (25.0%)	31 (59.6%)	4 (7.7%)	3 (5.8%)	1 (1.9%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Gestational Diabetes	3 (75.0%)	1 (25.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Hypertensive Disorders	1 (20.0%)	2 (40.0%)	0 (0.0%)	0 (0.0%)	1 (20.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (20.0%)
IUGR	2 (22.2%)	3 (33.3%)	1 (11.1%)	0 (0.0%)	1 (11.1%)	0 (0.0%)	0 (0.0%)	2 (22.2%)	0 (0.0%)
Labour Arrest	1 (11.1%)	8 (88.9%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Meconium Stained Liquor	12 (41.4%)	16 (55.2%)	0 (0.0%)	1 (3.4%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Multiple Pregnancy	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	7 (100.0%)	0 (0.0%)
Oligohydramnios	12 (48.0%)	8 (32.0%)	1 (4.0%)	0 (0.0%)	2 (8.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	2 (8.0%)
Other	4 (26.7%)	1 (6.7%)	0 (0.0%)	0 (0.0%)	9 (60.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (6.7%)
PROM	2 (22.2%)	4 (44.4%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	3 (33.3%)
Placenta Previa	2 (66.7%)	1 (33.3%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Patients conceived with Assisted Reproductive Technology (ART)	0 (0.0%)	2 (66.7%)	1 (33.3%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Previous LSCS	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	161 (79.7%)	0 (0.0%)	3 (1.5%)	0 (0.0%)	38 18.8%)

Classification according to Robson's ten group system revealed that Group 5 (multiparous women with previous CS, singleton cephalic, ≥37 weeks) was the leading contributor, accounting for 42.3% of all Caesarean sections. This was followed by Group 2 (nulliparous, singleton cephalic, ≥37 weeks, induced or pre-labor CS) at 25.1% and Group 1 (nulliparous, singleton cephalic, ≥37 weeks, spontaneous labor) at 14.5%. Groups 3, 4, and 9 had the lowest representation, each below 2% [Table 2]. The detailed distribution of labor onset within each Robson group is illustrated in [Table 3]. When labor onset patterns were analyzed across Robson groups, Group 1 and Group 3 showed 100% spontaneous onset. Group 2 had a high induction rate (64.9%) and a substantial pre-labor CS rate (35.1%). Notably, 70.3% of women in Group 5 underwent pre-labor Caesarean section, suggesting a strong inclination toward elective repeat CS in this subgroup.

CS indications across Robson groups is provided in [Table 4]. Fetal distress was a common indication in Groups 1 and 2, accounting for 25% and 59.6% respectively. Cephalopelvic disproportion (CPD) and contracted pelvis were primarily seen in Groups 1 and 2 as well. Breech presentation was almost exclusively responsible for CS in Group 6 (81%) and contributed to cases in Groups 7 and 8. Multiple pregnancy was the sole indication in all Group 8 cases. Group 10 (preterm singleton cephalic) was significantly associated with previous LSCS (18.8%) and severe oligohydramnios (29.7%).

DISCUSSION

Factors contributing to the elevated rate in our study include the limited practice of trial of labor after Caesarean (TOLAC), short inter-conception intervals, and a high incidence of primary CS for indications like cephalopelvic disproportion (CPD) The mean maternal age in our study was 27.19 years, comparable to figures reported by Pravina et al. and Parveen et al.[18,19] Increasing maternal age, often linked to urbanization and delayed family planning, has been associated with higher CS rates due to greater obstetric risk profiles. Our data show that 39.4% of women were nulliparous and 60.6% were multiparous, with a substantial number undergoing repeat CS due to prior uterine scars. The high repeat

CS rate underlines the importance of promoting VBAC where feasible.[20] Primary CS accounted for 51.3% of cases, a concerning statistic as it fuels future repeat CS. This proportion suggests the need for focused clinical audits, improved intrapartum management, and effective postpartum family planning to reduce closely spaced pregnancies.[21] Our study's antenatal registration rate was 93.6%, higher than other reported figures such as Baser et al..[22] Despite robust antenatal care, the CS rate remained high, implying missed opportunities in labor decision-making.

Gestational age analysis showed 89.2% term and 10.8% preterm CS. These findings reflect clinical concerns like scar tenderness or hypertensive disorders that often necessitate early delivery. Accurate dating and differentiation between preterm and growth-restricted fetuses are essential to avoid unnecessary early intervention.[23] Most singleton pregnancies had cephalic presentations (95.1%), with breech in 4.9%, consistent with prior studies (19). Breech cases predominantly underwent elective CS due to comorbidities or lack of patient consent for vaginal delivery. Inspite of readiness to perform external cephalic version (ECV) ,the success rate was found to be low, indicating a potential area for intervention. In our study, 46% of CSs were pre-labor, 37% followed spontaneous labor, and 17% followed induction. Similar distributions were seen in earlier studies.[19] The preference for pre-labor CS, despite adequate ANC coverage, suggests a cautious institutional approach to high-risk pregnancies due to fear of medicolegal litigations and raises concerns about the overuse of elective CS.[24] Elective CS accounted for 44.9%, while 55.1% were emergency procedures. Emergency indications like fetal distress, failed induction, and non-progression of labor dominated. Enhancing labor monitoring through standardized tools like partograms and CTG interpretation training may help reduce emergency CS.[25]

Using Robson's 10-group classification system enabled a structured audit of CS practices. Robson Group 5 (multiparous women with prior CS) was the largest contributor at 42.3%, consistent with global patterns and previous Indian studies.[1,11] Promoting VBAC and refining eligibility criteria can reduce unnecessary repeat CS in this group.[12] Group 2 (nulliparous, induced or pre-labor CS) contributed 25.1%. Common indications were failed induction, fetal distress, and unfavorable cervix. Clear guidelines on induction, proper use of cervical ripening agents, and adoption of operative vaginal delivery may help reduce CS in this group.[26] Group 1 (nulliparous, spontaneous labor) contributed 14.5%, and main CS indications included CPD and meconium stained liquor (MSL). This group represents a low-risk population where CS reduction is crucial. Overdiagnosis of fetal distress due to misinterpreted CTG is a persistent issue.[27] Training in CTG interpretation and judicious use of fetal surveillance tools may reduce unnecessary interventions. Group 10 (singleton cephalic, <37 weeks) contributed 8.1%. Indications included severe oligohydramnios, hypertensive disorders, and prior LSCS. While many were medically indicated, efforts to optimize maternal health and prolong pregnancy where safe could mitigate preterm CS rates.[28] Groups 3 and 4 (multiparous without prior CS) contributed 1.1% each, aligning with Robson's expectations. Their low contribution indicates appropriate obstetric management and data accuracy.[11] The ratio of Groups 3 to 4 is often used as a quality indicator. Groups 6 and 7 (nulliparous and multiparous breech) and Group 8 (multiple gestation) contributed 3.5%, 1.3%, and 2.9% respectively. These cases were largely managed by elective CS, reflecting institutional limitations in offering vaginal breech and twin deliveries due to patient acceptance and medicolegal reasons. Strengthening training in vaginal breech delivery and twin delivery can reduce CS in these groups.[29] Group 9 (transverse/oblique lie) contributed no cases in our cohort, reflecting early antenatal detection and timely planned intervention. The absence of cases in this group may also relate to low overall incidence. Robson classification proved a valuable framework for auditing CS practices, enabling targeted analysis and highlighting key groups driving CS rates. Its continued use is endorsed by WHO and FIGO for global comparison and policy development.[11,12]

A key strength of this study is the comprehensive application of the Robson's Ten Group Classification System within a tertiary care setting, allowing for structured and standardized evaluation of CS practices. Additionally, the high antenatal booking rate contributed to the completeness and reliability of the dataset. However, there are some limitations. This study was conducted at a single tertiary care center, which may limit the generalizability of findings to other healthcare settings, particularly primary or secondary-level facilities. This study did not include detailed maternal and neonatal outcome data, which limited the assessment of the clinical impact and safety of Caesarean deliveries.

CONCLUSION

The Caesarean section rate was high in this tertiary care setting, with Robson's Group 5 being the major contributor, followed by Groups 2 and 1. The substantial number of primary and elective Caesarean deliveries can be reduced with labor management strategies such as promoting vaginal birth after CS, refining induction protocols, mandatory second opinion for doing CS, prenatal child birth training workshops, adequate labor analgesia, psycho education for the women with fear of childbirth, labour companion, strengthening family planning services, enhancing intrapartum monitoring, and adopting regular Robson-based audits to ensure more judicious and evidence-based use of Caesarean delivery.

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