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Complications of Cesarean Delivery Based on Robson's Classification in Women Referred to Hospitals Affiliated to Shiraz University of Medical Sciences: A Cross-Sectional Study

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ABSTRACT

Background & aim: WHO proposed using the Robson Ten Group Classification System (TGCS) for assessing, monitoring, and comparing cesarean section (CS) rates. This study aimed to identify which group of women have more complications after CS based on TGCS in Shiraz maternity teaching hospitals.

Methods: This cross-sectional study included a sample of 1787 pregnant women who underwent cesarean section. From September to November 2018, convenience sampling was carried out at selected maternity teaching hospitals affiliated with Shiraz University of Medical Sciences, Shiraz, Iran. Demographic, obstetric, and fertility-related data were collected through personal interviews and a review of CS records. This study employed the TGCS to classify the women based on their obstetric data. Descriptive statistical analysis was done using SPSS software (version 23).

Results: Out of the 1787 patients, 455 (25.5%) had planned and 1332 (74.5%) had emergency CS. Complications of CSs included three causes: surgical, maternal, and neonatal. Surgical complications were the most prevalent in groups 5, 10, and 8; maternal complications were the most prevalent in groups 5, 2, and 10; and neonatal complications were the most prevalent in groups 5, 2, and 10. The most common CS complications were breastfeeding disorders (56.1%) and bladder adhesions to the uterus (27.5%). In total, 563 (25%) patients had surgical complications, 1077 (49.6%) had maternal complications, and 531 (24.4%) had neonatal complications.

Conclusion: Most complications occurred in cases where the women had a previous history of CS (group 5). It seems essential to develop more efficient strategies to prevent unnecessary CSs.

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Introduction

Pregnancy and its termination form an important stage in women's life requiring care and prevention of threatening factors (1). Cesarean section (CS) is a very prevalent surgery. While it was first developed for emergency cases, it has become drastically popular around the world in recent decades. Its optimized method and low mortality rate elevate indications (2-3). Despite the life-saving nature of this intervention in cases where normal delivery is not possible or has complications for women or infants, research has indicated that the rise in CS rate over 15% does not significantly contribute to better

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maternal and neonatal health outcomes (4). Recent evidence suggests a ranging CS rate of 1.4% to 56.4% (18.6% on average) in 150 countries (5). Top CS rates in each region belong to the following countries: Brazil (55.6%), Dominican Republic (56.4%), Latin America and the Caribbean, Egypt (51.8%), and Italy (38.1%) in Europe; the United States (32.8%) in North America; and New Zealand (33.4%) in Oceania (5,6). Also, the rate of cesarean delivery in Chongqing, China was 36.01% and the rate of Cesarean Delivery on Maternal Request (CDMR) was 8.42% (7). However, according to studies, the cesarean birth rate in Iran is reported to be 3-4 times above the world standard. A 2014 systematic review suggested a CS prevalence of 48% based on the information recorded in university hospitals in Iran (8, 9). In the studies conducted, in cases where there is a mother's request for CS or delivery with healthy amniotic membranes, CS is used to prevent maternal or neonatal death. (10). In addition, CS rates vary significantly within and between countries. CS rate is higher among women living in urban areas, with higher education, and those visiting private hospitals (11, 12). The unexpected rise in the CS rate necessitates building a robust system to minimize unnecessary CS with no medical indications (13). Given the CS rate worldwide, obstetricians and gynecologists face some short-term and long-term complications that are particularly associated with multiparous women with one or more CS deliveries (14). A number of research studies have revealed the potential adverse effects that may arise from repeated CS for women and infants (14-16), from higher maternal risk of uterine rupture and abnormal placenta to stillbirth and iatrogenic preterm delivery. In addition, infants are at risk for allergic reactions and hormonal, physical, bacterial infection, and physiological effects over time (16). Taking into account midwifery records, labor stages, and gestational age, TGCS classifies women with CS into 10 exclusive and comprehensive groups (17). In 2015, the WHO recommended TGCS as an international CS classification system for hospitals to monitor how their operations are optimally utilizing CS. Additionally, this system would permit them to distinguish, inspect, and zero in on particular groups (18). Bracic et al. (2020) conducted a study entitled "10-year comparative study of cesarean births using the Robson" in a university hospital in Austria (2). Also, Geze et al. (2021) conducted a cross-sectional study to investigate the TGCS in identifying women contributing to CS rates in eastern Ethiopia (4). Additionally, this classification has been used in Australia (19) and South Asia to enhance outcomes for women, infants, and CS rates (20). In this classification, the overall cesarean rate is reported considering several groups (10 groups) with different risk levels, and this is the first important step for comparative analysis in groups. WHO has noted the effectiveness of Robeson's classification in aiding the reduction of the CS rate (21-22). Studies on Robeson's classification have been done in Iran, but they were different from the purpose of the present study. So it is not clear what the role of each Robson classification group is in the global rate of CS. This study aimed to identify which groups have more complications after CS based on TGCS in Shiraz maternity teaching hospitals.

Methods

This was a cross-sectional study conducted in 2018. According to previous studies (23), a number of 1787 CS samples in selected maternity teaching hospitals affiliated with Shiraz University of Medical Sciences have been sampled. The samples were selected for 3 months from September to November 2018 via convenience sampling according to the number of cases referred for childbirth in each hospital. Out of 2819 people in the sample group, 1032 underwent vaginal delivery and 1787 underwent CS within 3 months. In this survey, the majority of mothers referred to Hazrat Zainab (PBUH) Hospital with a sample number of 1016 and Hafez Hospital with a smaller sample number of 771. The study was approved by the Ethics Committee of Shiraz University of Medical Sciences (IR.SUMS.REC.1397.404).

The inclusion criteria were undergoing CS, being literate in Persian, no smoking or drug abuse, no history or current medical condition (based on self-report and medical records), full consciousness of the mother after delivery (being able to breastfeed the baby), and a planned pregnancy. Incomplete medical records and withdrawal from participation were the

exclusion criteria. Eligible women who were referred to maternity teaching hospitals for childbirth provided their informed consent to participate. The study objectives were explained to the participants, and they were asked to complete the sociodemographic and midwifery information parts of the questionnaire (with 38 questions). Other parts were completed using their medical records. Sociodemographic characteristics were collected through personal interviews during 30-60 minutes of sampling, and current pregnancy information (parity, gestational age, time of onset of labor, etc.) was collected from medical records. To record CS complications, patients' files were used, and statements and relevant specialists' reports were also collected and recorded. In addition, in some shifts, the help of a trained researcher assistant was taken because the researcher could not be present in the hospital 24 hours a day.

To ensure the scientific validity of the questionnaire, the content validity method was employed. This involved researching pertinent scholarly materials and recognizing intervening variables to design a proper survey. Afterward, five number of faculty members examined and validated the questionnaire. It was guaranteed to the participants that all their data would be kept confidential. The accuracy of the information recorded at the time of sampling was ensured as follows: the researcher was present at the time of sampling and completed parts of the questionnaire from the mothers present in the cesarean delivery groups based on the inclusion criteria. Also, since the information in the files was completed by the midwife in the researcher's presence, and the delivery room manager and the resident manager checked it again at the end of the shift, the researcher was confident about the accuracy of the information recorded in the file to record the rest of the information and birth complications. When there was uncertainty, the mother herself was helpful in some cases. Descriptive statistical analysis of the data was done by utilizing SPSS-23 software.

Results

Out of 1787 cesarean births, 455 women (25.5%) had a planned cesarean birth, whereas 1332 women (74.5%) underwent an emergency cesarean. The majority of the women with cesarean section were multiparous with cesarean section (58.6%) and had term pregnancy (84.7%) (Table 1).

Table 1. Demographic characteristics of the study population

Variable	Frequency (%)
Maternal age	
<20	173(9.7)
20-24	423(23.7)
25-29	824(46.1)
≥30	367(20.5)
Education	
<Diploma	688 (38.5)
≥Diploma	1099(61.5)
Parity	
Nulliparous	541 (30.3)
Multiparous (excluding previous CS)	199 (11.1)
Multiparous with Previous CS	1047 (58.6)
Gestational age at delivery	
Term	1513 (84.7)
Preterm	274 (15.3)
Type of cesarean section	
planned	455 (25.5)
Emergency	1322 (74.5)

Table 2. Types of complications of cesarean delivery in the participants

Complications of cesarean section	Frequency (%)
Lactation disorders	1002(56.1)
Bladder adhesion to the uterus	491(27.5)
Omentum adhesion to the uterus	197(11)
Uterine atony	142(7.9)
Baby jaundice	148(8.3)
Embolism	17(1)
Transient neonatal tachypnea	14(0.8)
Maternal infection	14(0.8)
Respiratory Distress Syndrome	12(0.7)
Suspected sepsis	5(0.3)
Adhesion of the omentum to the abdomen	169(9.5)
Bladder adhesion to the abdomen	189(10.6)
Apgar 1 minute less than 7	380(21.3)
Apgar 5 minutes less than 7	30(1.7)

In this study of the frequency of CS complications, the most common complications were breastfeeding disorders (56.1%) and bladder adhesion to the uterus (27.5%) (Table 2).

CS complications (surgical, maternal, and neonatal) and their frequencies in Shiraz maternity teaching hospitals are presented based on Robson's classification. Surgical complications (bladder adhesion to the uterus, bladder adhesion to the abdomen, omentum adhesion to the abdomen, and omentum adhesion to the uterus) were most common in groups 5 (86.9%), 10 (8.9%), and 8 (8.1%), respectively (Figure 1). Maternal complications (improper breastfeeding status, maternal infection, embolism, and uterine atony) were most common in group 5 (45.7%), group 2 (21.3%), and group 10 (13.7%), respectively (Figure 2). Neonatal complications (Apgar score < 7 in minute 1, Apgar score < 7 in minute 5, suspected sepsis, transient neonatal tachypnea, neonatal jaundice, and respiratory distress syndrome) were most common in group 5 (46.3%), group 2 (17.3%), and group 10 (15.6%), respectively (Figure 3). In total, among the 1787 subjects, 563 (31.5%) had surgical complications, 1077 (60.3%) had maternal complications, and 531 (29.7%) had neonatal complications (Table 3).

Table 3. Distribution of cesarean delivery complications according to Robson's classification

References	Surgical complications		Maternal complications		Neonatal complications		Total
	Yes	No	Yes	No	Yes	No	
G2							
*Number	0	38	27	11	13	25	38
**Group	0.0	100.0	71.1	28.9	34.2	65.8	100.0
***Complications	0.0	3.1	2.5	1.5	2.4	2.0	2.1
G3							
Number	2	346	229	119	92	256	348
group	0.6	99.4	65.8	34.2	26.4	73.6	100.0
Complications	0.4	28.3	21.3	16.8	17.3	20.4	19.5
G4							
Number	0	30	16	14	8	22	30
group	0.0	100.0	53.3	46.7	26.7	73.3	100.0
Complications	0.0	2.5	1.5	2.0	1.5	1.8	1.7
G5							
Number	3	112	57	58	32	83	115
group	2.6	97.4	49.6	50.4	27.8	72.2	100.0
Complications	0.5	9.2	5.3	%8.2	6.0	6.6	6.4
G6							
Number	489	344	492	341	246	587	833
group	58.7	41.3	59.1	40.9	29.5	70.5	100.0
Complications	86.9	28.1	45.7	48.0	46.3	46.7	46.6
G7							
Number	0	55	33	22	21	34	55
group	0.0	100.0	60.0	40.0	38.2	61.8	100.0
Complications	0.0	4.5	3.1	3.1	4.0	2.7	3.1
G8							
Number	8	27	21	14	14	21	35
group	22.9	77.1	60.0	40.0	40.0	60.0	100.0
Complications	1.4	2.2	1.9	2.0	2.6	1.7	2.0
G9							
Number	10	74	48	36	22	62	84
group	11.9	88.1	57.1	42.9	26.2	73.8	100.0
Complications	1.8	6.0	4.5	5.1	4.1	4.9	4.7
G10							
Number	1	5	6	0	0	6	6
group	16.7	83.3	100.0	0.0	0.0	100.0	100.0

References	Surgical complications		Maternal complications		Neonatal complications		Total
	Yes	No	Yes	No	Yes	No	
Complications	0.2	0.4	0.6	0.0	0.0	0.5	0.3
G2							
Number	50	193	148	95	83	160	243
group	20.6	79.4	60.9	39.1	34.2	65.8	100.0
Complications	8.9	15.8	13.7	13.4	15.6	12.7	13.6
Total							
Number	563	1224	1077	710	531	1256	1787
group	31.5	68.5	60.3	39.7	29.7	70.3	100.0
Complications	100.0	100.0	100.0	100.0	100.0	100.0	100.0

* frequency ; **Percentage in Robson group ;***The percentage of complications in the research sample

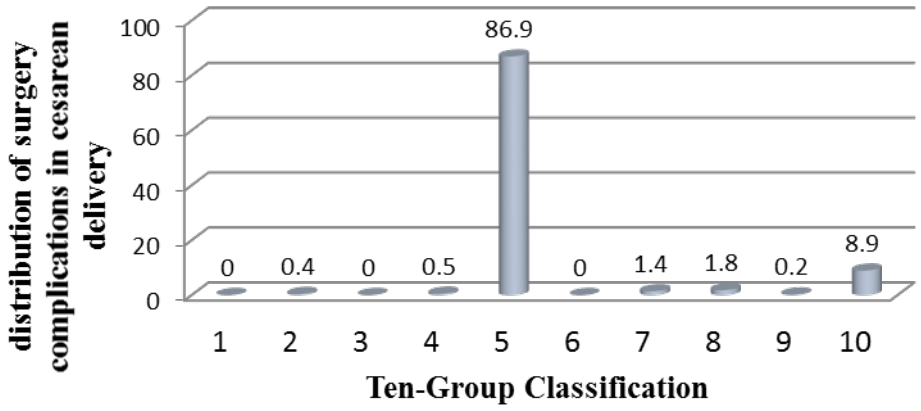

Figure 1. Distribution of complications of cesarean delivery based on Robson's classification

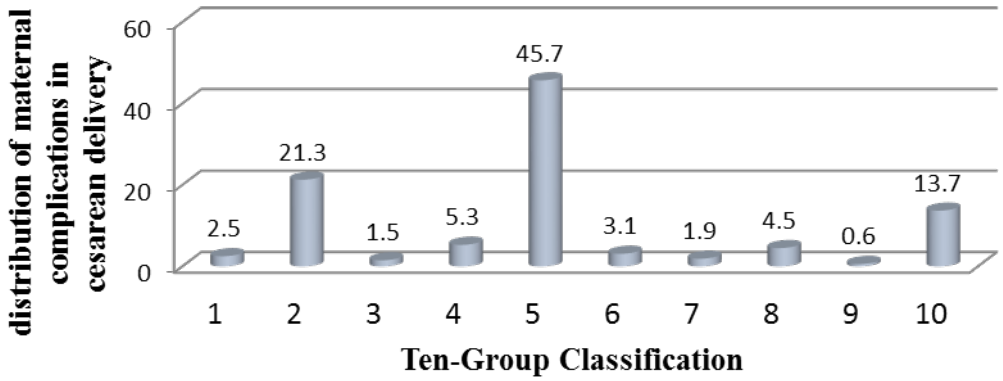

Figure 2. Distribution of maternal complications of cesarean delivery based on Robson's classification

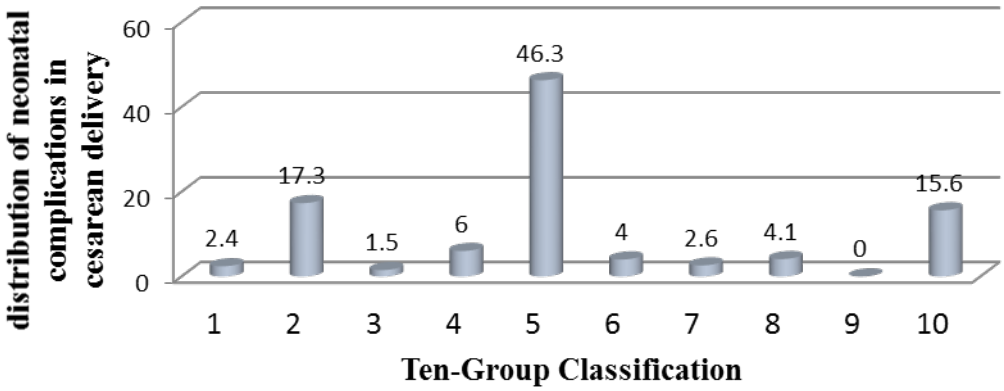

Figure 3. Distribution of neonatal complications of cesarean delivery based on Robson's classification

Discussion

The aim of this study was to identify which groups have more complications after CS based on TGCS in Shiraz maternity teaching hospitals.

In the present study, the most common complications were breastfeeding disorders (56.1%) and bladder adhesion to the uterus.

Research results indicated that 27.5% of the bladder adhered to the uterus. This study supports Yaghmaei et al.'s (2018) findings, which state that the rate of pelvic adhesions in women who have undergone CS in Tehran was 32.02% (24). The rise in the CS rate has been ongoing, increasing in women who have Intra-abdominal adhesions were greater in women with a history of CS compared to those without a history. Also, with the increase in the number of CS, the rate of intra-abdominal adhesion increases (25), and the surgeons' knowledge of the possibility of intra-abdominal adhesion in women with previous CS (groups 5 and 10) can be effective and help them deal with possible problems (24). Contrary to the present study, Moro et al. (2015) (26) reported 45.1% pelvic adhesions in London. This discrepancy can be due to their sample which included women with previous CS and other surgeries, while in our study only patients with previous CS were included.

According to our findings, 56.1% of participants were diagnosed with breastfeeding disorders. This is comparable to Boskabadi et al.'s (2014) report, which stated a prevalence rate of 55% in infants (27). According to the results, breastfeeding disorders in cesarean mothers were reported with a high prevalence of 56.1. As in other studies, cesarean delivery is associated with mother-infant separation, reduced breastfeeding ability, reduced acceptance of the baby, insufficient milk supply, and a delay in the initiation of breastfeeding, which predicts the shortening of breastfeeding duration and breastfeeding disorders (28-32). Although breastfeeding is physiological, it also requires skill and learning. Teaching the mother the correct principles and methods of breastfeeding will reduce physical problems during feeding, improve latching on, and increase the transfer of milk to the baby (27). Gedefaw et al. (2020) reported that cesarean delivery has an adverse effect on the initiation of breastfeeding. Cesarean delivery, primipara, and unwanted pregnancy were correlated with a delay in the first breastfeeding (33). Adherence to a proper breastfeeding position and ways to stimulate the let-down reflex can lead to maximum milk intake by the baby with minimal problems for the mother (34). The results suggest that the uterine atony rate was 7.9%.

Inconsistently, Rouse et al. (2005) (35) and Butwick et al. (2014) (36) reported 6% and 4% rates, respectively, which is due to the large sample size in the two studies. Multiparity, CS, and labor induction are risk factors for uterine atony. Therefore, the percentage of this complication has increased in groups 5 (multiparous with previous CS) and 2 (nulliparous with labor induction) as a more uterine cause Due to uterine causes, the percentage of this complication has increased in

groups 5 (multiparous with a previous CS) and 2 (nulliparous with labor induction) (37). Similarly, studies by Hansen et al. and Smiths et al. (2008) have shown more life-threatening complications, such as respiratory distress syndrome and transient tachypnea in the newborn in CS cases (38, 39). Respiratory dysfunction may be due to undetected pulmonary immaturity (40) and catecholamine deficiency in CS (41). Some researchers have reported that CS when performed at the start of labor, lowers neonatal respiratory complications. Accordingly, some researchers suggest that CS be postponed until labor pains begin (42) or postponed until after week 39 of pregnancy (43). In instances where the mother's or baby's life is at stake, CS is recommended to be incorporated as a delivery method.

On the other hand, comprehensive support, including cultural interventions for natural childbirth in order to modify women's beliefs and increase their knowledge, as well as planning a supportive and special care system for women with previous CS, will help them make a decision for VBAC (44). Also, the study of Mache et al. (2021) has suggested that to ensure the appropriate use of the delivery method, women with a previous cesarean delivery should be carefully checked for the possibility of vaginal delivery, and the hospital should regularly monitor the symptoms of cesarean delivery (45).

A strength of this study was that it was the first of its kind to be conducted in Iran to investigate CS complications based on TGCS in Shiraz maternity teaching hospitals. Another strength was the large sample size, which made it possible to determine the number of samples in each Robson stratum, making it possible to compare each stratum with the other stratum more clearly.

Suggestions for further research include the fact that repeated cesarean surgery has a direct effect on increasing maternal and newborn complications (46-48). Since the number of cases of vaginal delivery after cesarean section is still low due to the negative beliefs and attitudes of mothers and families and some legal considerations, it is suggested to train families and pregnant women to increase their awareness and change their attitudes about vaginal delivery, should it be performed after CS, which may be effective in reducing the complications of CS. Besides, legal support will increase the motivation and persuasion of specialist doctors who perform vaginal delivery after CS. On the other hand, conducting similar studies across the country and also comparing neonatal complications in normal delivery after CS with repeated CS and delivery without a history of CS, may be effective in reducing the prevalence of CS. The limitation of the present study included the inaccuracy of the complete registration of the mothers' hospital records, which did not allow a wider evaluation of some information.

Conclusion

In this study, the biggest group that played a role in the CS rate were multiparous women with a previous cesarean history (group 5). Complications such as breast-feeding disorders, adhesions to the uterus, respiratory distress syndrome, and transient tachypnea are caused. Consequently, it is necessary to devise more effective ways to motivate women who have previously undergone a CS to consider attempting a vaginal birth after cesarean (VBAC). In addition, the rate of cesarean delivery in premature births is increasing, which should be taken into consideration regarding the subsequent clinical consequences of this issue. On the other hand, considering the high rate of maternal and neonatal complications of CS, this is more important for Iran, which has changed its population policy to increase the population and should have appropriate strategies to prevent unnecessary CS and reduce maternal mortality and complications.

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Conflicts of interest

The authors declared no conflicts of interest.

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