



Cesarean Rate and Indications at a Tertiary Center

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ABSTRACT

Objective: The aim of this study was to assess the change in the frequency of cesarean delivery and indications for a cesarean section procedure over a 2-year time period at a tertiary center.

Materials and Methods: A retrospective examination of all births that occurred at the Kayseri Training and Research Hospital between May 2018 and April 2020 was conducted. The data of patients who had a cesarean delivery were recorded and compared by year. The Robson Ten Group Classification System of perinatal events and outcomes was used to categorize the deliveries.

Results: A total of 18,576 patients gave birth in the hospital during the study period. The rate of vaginal delivery was 65.11% and the cesarean delivery rate was 34.89%. During the period May 2018-April 2019, 32.64% of deliveries were by cesarean section, and the rate was 36.87% in May 2019-April 2020. The most common indication for a cesarean procedure was a history of cesarean delivery, followed by fetal distress.

Conclusion: The 2-year rate of cesarean deliveries in the hospital was 34.89%, which is well below the mean rate for Turkey. As seen in the literature, the most common indication for a cesarean delivery was a history of a previous cesarean procedure, and the most common indication for a primary cesarean was fetal distress.

Keywords: Cesarean delivery, cord prolapse, fetal distress, non-progressive labor, multiple pregnancy

INTRODUCTION

Cesarean section delivery is a method of surgical birth performed by making an incision in the abdomen and the uterus to remove the fetus when vaginal delivery is not possible or there is not sufficient time to wait for vaginal delivery (1). A legal text describing the adoption of a child during the reign of King Hammurabi of Babylon (1795-1750 BC) provided evidence of the first known cesarean section. An explanation of a cesarean technique was recorded in a medical text from Germany in 1480, however, early efforts usually resulted in the death of the mother. A successful cesarian operation in Uganda in 1879 was witnessed and described by the English doctor, R.W. Felkin (2, 3).

With time, a cesarean delivery has become safer, although it must not be forgotten that it is a surgical operation and that the indications for the procedure should be considered carefully (4). The indications for cesarean delivery have changed over the years, and it is now sometimes performed in cases where vaginal birth is possible or at the request of the mother.

The World Health Organization (WHO) recommends that the cesarean rate not exceed 15% (5). The indications for cesarean delivery are primarily a history of cesarean delivery, malpresentation, fetal distress, prolonged labor/failed induction, placental detachment, and cord prolapse (6). Though various factors may push the patient or the surgeon towards a cesarean delivery, the risks of the procedure remain, including wound site infection and intraoperative complications, such as placental invasion and bladder or intestinal injury (7). These risks can be reduced by decreasing the number primary cesareans and only performing the procedure after attempting vaginal birth in suitable patients.

The aim of this study was to examine the change in the rate of cesarean delivery and the indications applied over a 2-year time period at a tertiary center.

Cite this article as:
Bulut AN, Ceyhan V.
Cesarean Rate and
Indications at a Tertiary
Center. Erciyes Med J
2022; 44(1): 39-43.

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Submitted
18.09.2021

Accepted
12.05.2021

Available Online
13.12.2021

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Table 1. Demographic details of the patients

	05/2018–04/2019 (n=2782)	05/2019–04/2020 (n=3700)	Total (n=6482)	p
Age (years)	27.6±5.9	27.6±5.9	27.6±5.9	0.803
Body mass index (kg/m ²)	27.7±1.7	27.6±1.9	27.6±1.8	0.492
Gravida, median (minimum–maximum)	2 (1–12)	2 (1–14)	2 (1–14)	0.016
Parity, median (minimum–maximum)	2 (1–12)	2 (1–14)	2 (1–14)	0.016
Gestational weeks	38.0±2.3	37.9±2.5	37.9±2.4	0.027
Infant weight (g)	3120.9±552.1	3104.4±579.6	3111.5±568.0	0.250
Infant height (cm)	49.4±9.6	49.2±3.3	49.3±6.8	0.224

MATERIALS and METHODS

Approval for this study was granted by the Clinical Research Ethics Committee of Kayseri Training and Research Hospital on September 17, 2020 (no: 148). All of the patients provided informed consent to participate in the study.

Births that took place at Kayseri Training and Research Hospital between May 2018 and April 2020 were retrospectively reviewed. Details of age, body mass index, gravida, parity, previous delivery type, gestational week and cesarean indications were recorded. These values were compared according to year. The Robson Ten Group Classification System of perinatal events and outcomes was applied to categorize the deliveries.

Severe preeclampsia was defined according to the American College of Obstetricians and Gynecologists (ACOG) guideline: systolic blood pressure of ≥ 160 mmHg or diastolic blood pressure of ≥ 100 mmHg on 2 occasions at least 4 hours apart and proteinuria, or gestational hypertension and thrombocytopenia (platelet count less than $100 \times 10^9/L$), impaired liver function as indicated by abnormally elevated blood concentrations of liver enzymes (to twice the upper limit of normal concentration), severe persistent right upper quadrant or epigastric pain not accounted for by alternative diagnoses, renal insufficiency (serum creatinine concentration >1.1 mg/dL or a doubling of the serum creatinine concentration in the absence of other renal disease), pulmonary edema, or new-onset headache unresponsive to acetaminophen and not accounted for by alternative diagnoses, or visual disturbances (8). The ACOG definition of fetal macrosomia of a fetal weight >4000 – 4500 g was also used (9).

Statistical Analysis

Statistical analysis was performed using SPSS Statistics for Windows, Version 17.0 software (SPSS Inc., Chicago, IL, USA). Continuous variables that conformed to normal distribution were presented as mean±SD values ($p > 0.05$ in Kolmogorov-Smirnov test or Shapiro-Wilk test [$n < 30$]), and continuous variables that did not demonstrate normal distribution were presented as median values. Comparisons between groups were conducted using the Student t-test with normally distributed data and the Mann-Whitney U test for non-normally distributed data. Comparisons between groups of categorical variables were analyzed using the Fisher exact test. A value of $p < 0.05$ was considered statistically significant.

RESULTS

A total of 18,576 patients gave birth at the study hospital between May 2018 and April 2020, of which 65.11% were vaginal deliveries and 34.89% were cesarean deliveries. Cesarean deliveries represented 32.64% of the total during the period May 2018–April 2019, and 36.87% during May 2019–April 2020. The demographic data of the patients are shown in Table 1.

The number of multiparity patients who underwent a cesarean delivery during the period examined in 2018–2019 was statistically significantly higher than that of the year 2019–2020. The mean number of gestational weeks of the cesarean patients in the year May 2018–April 2019 was greater than that of the subsequent year during the same period. The indications for cesarean delivery in May 2018–April 2019 and May 2019–April 2020 are shown in Table 2, and the rates according to the Robson classification system are shown in Table 3.

The number of macrosomic infants, non-progressive labor and head-pelvis incompatibility cases was statistically significantly higher in the year May 2019–April 2020 than in the previous year. The number of presentation anomaly and repeated cesarean delivery cases was statistically significantly higher in the 2018–2019 period studied. The indications for a cesarean delivery are presented in Tables 2 and 3.

In all, 26 pregnant women with a history of a previous cesarean delivered vaginally. None developed any maternal complications, including uterine rupture and neonatal complications or neonatal death. These women had cervix dilatation along with pain and uterine contractions, and were willing to have a vaginal delivery.

DISCUSSION

This study was an evaluation of the cesarean indications and cesarean rates at a tertiary center to analyze changes over a 2-year period. The 2-year cesarean rate was 34.89% and the annual rate increased in the interval examined. In both years, the most common indication was a history of cesarean delivery, and the most common indication for a primary cesarean in both years was fetal distress.

Several studies have reviewed cesarean rates and indications. Maskey et al. (6) reported a cesarean delivery rate of 36.8%,

Table 2. Cesarean indications and rates

	05/2018–04/2019 (n=2782)		05/2019–04/2020 (n=3700)		Total (n=6482)		p
	n	%	n	%	n	%	
Fetal distress	178	6.4	241	6.5	419	6.5	0.893
Fetal macrosomia	51	1.8	110	3.0	161	2.5	0.004
Severe preeclampsia	11	0.4	29	0.8	40	0.6	0.069
Presentation anomaly (breech/transverse/oblique/foot presentation)	138	5.0	140	3.8	278	4.3	0.024
Non-progressive labor	105	3.8	188	5.1	293	4.5	0.001
Previous cesarean delivery	1997	71.8	2567	69.4	4564	70.4	0.001
Cord prolapse	7	0.3	17	0.5	24	0.4	0.247
Ablatio placenta, placenta previa	24	0.9	26	0.7	50	0.8	0.558
Amnion with meconium	6	0.2	7	0.2	13	0.2	1.000
Previous uterine surgery	16	0.6	26	0.7	42	0.6	0.633
Cephalopelvic disproportion	46	1.7	113	3.1	159	2.5	0.0001
Mother's choice	4	0.1	2	0.1	6	0.1	1.000
Multiple pregnancy	137	4.9	170	4.6	307	4.7	0.575
Fetal anomalies (hydrocephalus, sacrococcygeal teratoma, etc.)	2	0.1	1	0.0	3	0.0	1.000
IVF pregnancy	3	0.1	2	0.1	5	0.1	1.000
Systematic disease (DM, HT, cholestasis, etc.)	4	0.1	2	0.1	6	0.1	1.000
Vertical transition maternal infection (HIV, HSV-2, HCV, etc.)	1	0.0	1	0.0	2	0.0	1.000
Other	52	1.9	58	1.6	110	1.7	0.404

DM: Diabetes mellitus; HCV: Hepatitis C virus; HSV-2: Herpes simplex virus 2; HT: Hypertension; IVF: *In-vitro* fertilization

Table 3. Cesarean rate according to Robson Ten Group Classification System

	05/2018–04/2019 (n=2782)		05/2019–04/2020 (n=3700)		Total (n=6482)		p
	n	%	n	%	n	%	
Nulliparous, single cephalic, ≥ 37 weeks, in spontaneous labor (Group 1)	192	6.9	305	8.2	497	7.7	0.049
Nulliparous, single cephalic, ≥ 37 weeks, induced or CS before labor (Group 2)	163	5.9	271	7.3	434	6.7	0.022
Multiparous (excluding previous CS), single cephalic, ≥ 37 weeks, in spontaneous labor (Group 3)	175	6.3	239	6.5	414	6.4	0.823
Multiparous (excluding previous CS), single cephalic, ≥ 37 weeks, induced or CS before labor (Group 4)	63	2.3	91	2.5	154	2.4	0.668
Previous CS, single cephalic, ≥ 37 weeks (Group 5)	1829	65.7	2240	60.5	4069	62.8	0.0001
All multiparous breeches (Group 6)	73	2.6	92	2.5	165	2.5	0.782
All multiparous breeches (including previous CS) (Group 7)	61	2.2	105	2.8	166	2.6	0.121
All multiple pregnancies (including previous CS) (Group 8)	109	3.9	132	3.6	241	3.7	0.501
All abnormal lies (including previous CS) (Group 9)	10	0.4	16	0.4	26	0.4	1.000
All single cephalic, ≤ 36 weeks (including previous CS) (Group 10)	107	3.8	209	5.6	316	4.9	0.001

CS: Cesarean section

with a greater rate of primary cesareans than repeat cesarean deliveries. They found that the most common indication was fetal distress, followed by a history of cesarean delivery. In a study that analyzed 1997–2012 data, Lurie et al. (10) reported that a history of cesarean delivery was the most common reason for the procedure, and the highest rate, 22.86%, was observed in the period 2005–2009 (10).

In another study of a 30-year period, the rate of cesarean delivery was reported to be 25.3%, and that there was an increased frequency of emergency cesarean procedures over time (11). According to the data provided by the 1998 Population and Health Research in Turkey, although there were differences between regions, the general rate of cesarean births was 13.9%. Subsequent studies have reported a rate of 21.2% in 2003, 36.7% in 2008, and 48.0% in 2013 (12). Although the rate of cesarean delivery at our center increased in an interval of a year, it is still well below the present average in Turkey.

Currently, there is no classification system useful in the follow up of cesarean rates that avoids confounding factors. In 2011, the WHO concluded that the most advantageous was the Robson Ten Group Classification System, defined by Dr. Michael Robson in 2001 as a means to compare obstetric characteristics (13). According to the current study data, the most common indication for cesarean delivery in both years was a history of cesarean (Robson Group 5) (Table 3). However, there was a statistically significant decrease in this rate in the subsequent year, which can be attributed to efforts to attempt a vaginal birth after a previous cesarean at our center.

The indications for cesarean delivery can be categorized as emergency or elective indications. A request by the mother and the preference of some clinicians are considered elective indications. The main factor in selecting a cesarean delivery is, of course, the well-being of the fetus, but an underlying factor for clinicians is the practice of defensive medicine, implemented as a means to avoid potential lawsuits that can involve very high amounts of compensation and other consequences. One patient factor is that more women are prioritizing career goals, which has contributed to an increase in maternal age, and the idea that it represents an easier birth and a means to avoid labor pain, which may be related the influence of social and media pressure. Consequently, it seems that maternal requests for a cesarean delivery may well continue to increase in the future. Other factors include the rising obesity rate and costs. Clinicians can be faced with a complicated situation.

In a review by Court et al. (14), it was noted that the preference for a cesarean delivery was 0.3% to 14% in women with no medical indication (14). Menacker et al. (15) reported that obstetric indications should be observed based on ethical values in a decision to perform a cesarean delivery (15). These include recognition of the increased risk and the likelihood of subsequent surgical deliveries. The current study results revealed a constant rate of cesarean delivery related to maternal request of 0.1%, which is extremely low.

CONCLUSION

The results of this study demonstrated that the 2-year cesarean delivery rate at our clinic was 34.89%, which was well below the current average rate in Turkey. Consistent with the literature, the most common indication overall was a history of cesarean delivery, and the most common indication for a primary cesarean was fetal distress. In our clinic, the rate of maternal request for a cesarean delivery was very low. The vast majority of the indications were based on obstetric reasons. In some appropriate cases, vaginal birth was attempted following a previous cesarean and most cases were successful. Obstetric reasons should be the primary source of a decision to perform a cesarean delivery.

Ethics Committee Approval: The Kayseri Training and Research Hospital Clinical Research Ethics Committee granted approval for this study (date: 17.09.2020, number: 148).

Informed Consent: Written informed consent was obtained from patients who participated in this study.

Peer-review: Externally peer-reviewed.

Author Contributions: Concept – ANB; Design – ANB, VC; Supervision – VC; Data Collection and/or Processing – VC; Analysis and/or Interpretation – ANB; Literature Search – ANB; Writing – ANB; Critical Reviews – ANB, VC.

Conflict of Interest: The authors have no conflict of interest to declare.

Financial Disclosure: The authors declared that this study has received no financial support.

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