Özgün Araştırma / Original Article

Jinekoloji - Obstetrik ve Neonatoloji Tıp Dergisi
The Journal of Gynecology - Obstetrics and Neonatology

DOI: 10.38136/jgon.1262571

Evaluation of the Mode of Delivery According to the Robson Classification System During the Covid-19 Pandemic

Covid-19 Pandemisi Sırasında Doğum Şeklinin Robson Sınıflandırma Sistemine Göre Değerlendirilmesi

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ÖZ

Amaç: Amacımız Ankara Şehir Hastanesi'nde Covid-19 Pandemi sürecinde vajinal ve sezaryen doğum oranlarındaki değişimi göstermektir.

Gereçler ve Yöntem: Bu kesitsel çalışmaya 37-42 gebelik haftaları arasında doğum yapan gebeler dahil edildi. Robson 10 kategorisinin her biri için sezaryenle doğum oranları, Covid-19 öncesi ve Covid-19 dönemleri arasında karşılaştırıldı.

Bulgular: Çalışmaya 21366 gebe dahil edildi. Covid -19 sürecinde doğum yapan hastalar, Covid pozitif olanlar ve olmayanlar olarak iki gruba ayrılarak sezaryen oranları incelendi. Covid-19 pandemisi sırasında, daha önce sezaryen geçirmiş kadınlar (Robson grup 5) ve termde baş prezentasyonu ile spontan doğum yapmış nullipar kadınlar (Robson grup 1), sırasıyla %21,68 ile %6,5 ile Covid 19 olup olmadığına bakılmaksızın tüm sezaryen oranına en yaygın katkıda bulunanlardı. Aynı şekilde hastaları Covid pozitif ve Covid negatif olarak ayırarak değerlendirdiğimizde de tüm sezaryen oranına en büyük katkıyı Robson grup 5 yapmaktadır (%21,68).

Sonuç: Salgının başlangıcında sınırlı bilgimiz nedeniyle Covid-19 enfeksiyonu olan gebe grubunda daha yüksek sezaryen oranları beklenmekteydi. Annede var olan enfeksiyon, doğumu zorlaştırsa da doğumun zamanlaması ve şekli gebenin klinik durumuna, gebelik haftasına ve fetüsün durumuna göre bireyselleştirilmelidir.

Anahtar kelimeler: COVID-19, Doğum şekli, Robson sınıflandırması, Sezaryen

ABSTRACT

Aim: To show the change in the rates of vaginal delivery and cesarean section during the Covid-19 Pandemic in Ankara City Hospital.

Materials and Method: This cross-sectional study included pregnant women who gave birth between 37 and 42 gestational weeks. Cesarean birth rates for each of the 10 Robson categories, compared between Covid-19 and before Covid-19 groups.

Results: 21366 pregnant women were included in the study. The cesarean section rates were examined by dividing the patients who gave birth during covid -19 into two groups those who were infected with covid and those who were not. During the Covid-19 pandemic, women with previous CS (Robson group 5) and the nulliparous women who had spontaneous labor with a cephalic presentation at term (Robson group 1) were the most common contributors to the global CS rate, 21,68% and 6.5%, respectively regardless of being infected with Covid-19. Similarly, Robson group 5 makes the greatest contribution to the overall cesarean section rate (% 21,68) when we evaluate the patients by separating them as covid positive and covid negative.

Conclusion: At the beginning of the epidemic higher rates of cesarean section are expected in the group of pregnant women with Covid-19 infection due to our limited knowledge. Although the mother's infection complicates the delivery, the timing and mode of delivery should be individualized according to the clinical condition of the pregnant woman, the week of gestation, and the condition of the fetus.

Key Words: Cesarean section, COVID-19, Delivery mode, Robson classification

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Başvuru tarihi: 09.03.2023
Kabul tarihi: 24.04.2023

INTRODUCTION

The Robson Ten Group Classification System (RTGCS) is a classification system used to determine the rate of cesarean section among women with different obstetric characteristics objectively in terms of cesarean indications (1). The World Health Organization (WHO) recommends RTGCS as a global standard for monitoring, comparing, and evaluating cesarean section rates in healthcare institutions. RTGCS has been used in clinics in Turkey since May 2012. It is used to determine the rate of cesarean section among women with different obstetric characteristics in terms of cesarean indications. RTGCS allows for the analysis of patient data and the interventions to ensure safe obstetric care, with acceptable cesarean rates. It is an easily analyzable, understandable, and clinically applicable system (2).

The rate of cesarean section in our country is much higher than that recommended by WHO and cesarean section rates are increasing gradually (3, 4). Recently, complications due to Covid-19 infection are among the reasons for this increase. Based on the available data, the clinical characteristics of pregnant women with Covid-19 seem to resemble those of non-pregnant women, but the risk of preterm birth, miscarriage, and preeclampsia increases as complications in infected pregnant women. In addition, earlier studies have shown that Covid-19 is associated with adverse pregnancy outcomes, including premature birth, cesarean delivery, and fetal or neonatal death (5-7).

Data on SARS-CoV-2 infection during pregnancy have been extensively studied, but there is no scientific consensus yet. In cases of Covid-19, if the disease is asymptomatic or mild, no change in labor-management is required. Covid-19 infection does not affect determining the mode of delivery. Cesarean delivery is performed with standard obstetric indications (8). There is no evidence that cesarean delivery will reduce vertical transmission. Despite all these, cesarean section was found to be performed in most cases regarding the mode of delivery during the pandemic process, and fetal distress was frequently reported as an indication (9).

Numerous studies have been conducted on the effects of the pandemic on maternal, fetal, and neonatal outcomes (10). In this study, we aimed to show the change in the rates of vaginal delivery and cesarean section during the Covid-19 Pandemic in Ankara City Hospital. The data of the pandemic years were evaluated retrospectively using RTGCS.

MATERIALS AND METHOD

We conducted a secondary analysis of our hospital's delivery data set to investigate differences in cesarean birth rates during the Covid-19 period and before Covid-19. The present cross-sectional study included low-risk pregnant women who gave birth between 37 and 42 gestational weeks at the University of Health Sciences, Ankara City Hospital, and Zekai Tahir Burak Training Hospital between March 2019 and February 2021. The project was approved by the Ethical Institutional Review Board (No:E2-21-479).

The patients were divided into 2 groups those who gave birth in the pre-covid-19 period and those who gave birth during the covid-19 pandemic (Table 2). We also divided the patients who gave birth during the Covid-19 pandemic into two groups covid negative and covid positive (Table 3). A total of 10,727 deliveries remained to represent the total births in these hospitals during that period. The data required for the RTGCS for the patients included in the study were collected by the principal investigator and entered into the SPSS system. This classification system is a method used to determine cesarean-section rates and causes, enabling the examination of women according to their obstetric characteristics (11). The characteristics of the groups according to the RTGCS are mentioned below (Table 1). Maternal age, mode of delivery, indication if cesarean delivery was performed, maternal disease, and obstetric complications that may affect the mode of delivery were also recorded. Demographic characteristics, parity, smoking, obstetric and neonatal outcomes were obtained from the charts and electronic database of the patients. Gestational age was determined by the reported last menstrual period and dating of first-trimester ultrasound measurements. The body mass index (BMI) was calculated as weight divided by height in m2. The exclusion criteria included multiple gestations, maternal fever, gestational diabetes, pregnancy-induced hypertension, oligohydramnios, and any history of chronic systemic disease.

The primary outcome of interest was cesarean birth rates for each of the 10 Robson categories, compared between Covid-19 and before Covid-19 groups. Our secondary outcome is to compare the cesarean section rate of positive and negative patients who gave birth during the Covid-19 pandemic. In the pre-research study, importance was given to the confidentiality of the personal information of the patients. In the analysis of data qualitative variables were summarized with numbers and percentages.

Descriptive statistics were calculated with the help of the collected data, using the Statistical Package for Social Sciences, version 21 of the SPSS program. The distribution of the parameters was analyzed by the Kolmogorov-Smirnov and Shapiro-Wilk tests. The continuous variables with normal distribution were presented by means of standard deviation (SD) and were compared by the independent samples t-test. Nonparametric variables without normal distribution were tested by the Mann-Whitney U test. The chi-squared and the Fisher exact tests were used for categorical data.

RESULTS

21366 pregnant women who gave birth in Ankara City Hospital between 2019 and 2021 were included in our study. The number of patients who gave birth in the pre-Covid-19 period was 10639 and the number of patients who gave birth during the Covid-19 pandemic was 10727. Cesarean section rates of both groups were examined one by one. The cesarean section rates were examined by dividing the patients who gave birth during covid -19 into two groups those who were infected with covid and those who were not. Patient characteristics including maternal age, parity, gestational age at delivery, birth outcome, neonatal birthweight, and smoking rate were generally similar between the Covid-19 and control groups (Table 1).

Table 1. Demographic, obstetrics and neonatal characteristics of all patients except for patients Covid-19 positive

Variable	Pre-Covid-19 Group	During The Covid-19 Group	P
	(n=10639)	(n=10727)	
Age (years) (Mean±SD)	29.21 ± 4.52	30.06 ± 4.33	0.834
Gravidity Median (Min-Max)	3(2-6)	3(2-7)	0.078
Parity Median (Min-Max)	2(1-6)	2(1-4)	0.286
BMI (kg/m^2) (Mean±SD)	31.21 ± 3.73	32.57 ± 4.06	0.042
Gestational age at delivery (wk)(Mean±SD)	39.34 ± 1.18	39.09 ± 1.27	0.70
Birthweight (g) (Mean±SD)	3213 ± 374	3465 ± 588	0.639
Apgar scores (n, %) 1th min <7	145(1.79%)	191(2.3%)	0.646
Apgar scores (n, %) 5th min <7	72(0.89%)	105(1.27%)	0.879
NICU (n, %)	67(0.83%)	74(0.89%)	0.501
Smoking (n, %)	89(11%)	108(13%)	0.421

* P<0.05, significant. BMI: Body Mass Index, NICU: Requirement of neonatal intensive care unit.

Classification of the women according to the RTGCS is shown in Table 2.

Table 2. The Robson 10-Group Classification System comparison of groups

The Robson 10-Group Classification System		Pre-Covid-19 Group (n=10639)		During The Covid-19 Group (n=10727)		
		CS rate in each group, (%)	Contribution made by each group to the overall CS rate %	CS rate in each group, (%)	Contribution made by each group to the overall CS rate %	p
1	Nulliparous, singleton, cephalic, ≥37-week gestation, in spontaneous labor	15,21	3,68	33,22	6,5	<0.001*
2	Nulliparous, singleton, cephalic, ≥37-week gestation, induced or CS before labor	27,77	2,14	37,98	5,65	<0.001*
3	Multiparous, singleton, cephalic, full-term, without a previous caesarean section, spontaneous labour.	5,29	1,37	11,21	1,78	0.27
4	Multiparous, singleton, cephalic, full-term, without a previous uterine scar, induced labour or prelabour caesarean section	7,71	1,14	15,07	2,75	0.002*
5	Multiparous, singleton, cephalic, full-term, with a previous caesarean section	100	20,91	100	21,87	0.918
6	Nulliparous, singleton, breech	100	1,32	100	1,45	0.545
7	Multiparous, singleton, breech	100	1,23	100	1,84	0.186
8	All multiple pregnancies	-	-	-	-	-
9	All women with a single pregnancy in transverse or oblique lie	100	0,13	100	0,43	0.739
10	All preterm singleton, cephalic, <37-week gestation pregnancies	48,8	1,79	47,86	2,71	0.345

Table 3 shows the contribution of the cesarean section (CS) rate in each group as covid positive and covid negative during the Covid-19 pandemic.

Table 3. The Robson 10-Group Classification System comparison of Covid negative and Covid positive groups during Covid-19

	The Robson 10-Group Classification System	During The Covid-19 Group Covid negative (n=10190) Contribution made by each group to the overall CS rate %	During The Covid-19 Group Covid positive (n=537) Contribution made by each group to the overall CS rate %	p
1	Nulliparous, singleton, cephalic, ≥37-week gestation, in spontaneous labor	6,13	13,59	<0,001*
2	Nulliparous, singleton, cephalic, ≥37-week gestation, induced or CS before labor	5,85	1,86	<0,001*
3	Multiparous, singleton, cephalic, full-term, without a previous caesarean section, spontaneous labour.	1,80	1,48	0,451
4	Multiparous, singleton, cephalic, full-term, without a previous uterine scar, induced labour or prelabour caesarean section	2,57	6,33	0,001*
5	Multiparous, singleton, cephalic, full-term, with a previous caesarean section	21,68	25,32	0,236
6	Nulliparous, singleton, breech	1,47	1,11	0,563
7	Multiparous, singleton, breech	1,80	2,60	0,703
8	All multiple pregnancies	-	-	-
9	All women with a single pregnancy in transverse or oblique lie	0,45	0,18	0,581
10	All preterm singleton, cephalic, <37-week gestation pregnancies	2,63	4,28	0,239

In the Pre-Covid-19 group, 3590 (33.74%) of 10639 pregnant women were delivered by cesarean section. Multiparous women who had previous cesarean section labor with a cephalic presentation at term (Robson group 5) make the greatest contribution to the overall cesarean section rate (% 20,91). The nulliparous women who had spontaneous labor with a cephalic presentation at term (Robson group 1) follow with a rate of 3.68%.

In the during the Covid-19 group, 4831 (45.03%) of 10727 pregnant women delivered by cesarean section. Multiparous women who had previous cesarean section labor with a cephalic presentation at term (Robson group 5) make the greatest contribution to the overall cesarean section rate (% 21,87). The nulliparous women who had spontaneous labor with a cephalic presentation at term (Robson group 1) follow with a rate of 6.50%.

When the pre-covid group and during covid-19 group were compared, the cesarean section rates of Robson group 1, Robson group 2, and Robson group 4 were calculated as 3.68-6.5% / 2.14-5.65% / 1.14%-2.75%, respectively. These differences were statistically significant (p<0.001, p<0.001, p=0.002, respectively).

During the Covid-19; 4526 (44.41%) of 10190 covid-19 negative pregnant women were delivered by cesarean section. Multiparous women who had previous cesarean section labor with a cephalic presentation at term (Robson group 5) make the greatest contribution to the overall cesarean section rate (% 21,68). The nulliparous women who had spontaneous labor with a cephalic presentation at term (Robson group 1) follows with a rate of 6.13%. 305 (56.79%) of 537 covid-19 positive pregnant women delivered by cesarean section during the Covid-19. Multiparous women who had previous cesarean section labor with a cephalic presentation at term (Robson group 5) make the greatest contribution to the overall cesarean section rate (% 25,32). The nulliparous women who had spontaneous labor with a cephalic presentation at term (Robson group 1) follow with a rate of 13.59%. Robson group 1 cesarean section rates of Covid-19 positive and negative patients during the Covid-19 were calculated as 13.59% and 6.13%, respectively. This difference was statistically significant (p<0.001).

DISCUSION

RTGCS, unlike other classifications created according to cesarean section indication, is not only for women who have given birth by cesarean section but also for “all women”. It is a perinatal classification as a whole. It provides classification into one of 10 groups that are inclusive and do not contain two different lines at the same time. This uniform coding system establishes a strict quality control system by establishing specific diagnostic criteria for possible complications. The present study was conducted in a tertiary center in Turkey, which is the reference hospital for pregnant women infected with Covid-19. To the best of our knowledge, this is the first study that gives birth data using RTGCS during the Covid-19 pandemic.

We observed that during the Covid-19 pandemic, women with previous CS (Robson group 5) and the nulliparous women who had spontaneous labor with a cephalic presentation at term (Robson group 1) were the most common contributors to the global CS rate, 21,68% and 6.5%, respectively regardless of being infected with Covid-19. Similarly, multiparous women who had previous cesarean section labor with a cephalic presentation at term (Robson group 5) make the greatest contribution to the overall cesarean section rate (% 21,68) when we evaluate the patients by separating them as covid-positive and covid negative.

Yadav et al. analyzed data retrospectively over a period of 10 years and found that the largest contributions to the total

CS rate are Robson Group 1 (37.62 %) and Robson group 5 (17.06 %). Their study from India reported similar results to our study (12).

Cai et al. evaluated articles to determine which mode of delivery is better for preventing possible vertical transmission from Covid-19 positive pregnant women to neonates in their review. They have reported the rate of neonatal complications is not greater when the mother delivers by vaginal delivery. Cai et al concluded their paper that '' Covid-19 infection should not be an indication for a cesarean birth" (13).

Al-Tawfiq et al. also determined the rate of cesarean section in their study. They found delivery during Covid-19 higher than MERS-CoV. Although outcomes are much worse in pregnant women with MERS-CoV, the increased rate of cesarean section in women infected with Covid-19 compared with MERS-CoV is interesting (14).

Pregnant women with a diagnosis of Covid-19 in our country, with the recommendation of the Ministry of Health, if necessary, perinatology, infectious diseases, pulmonology, anesthesia, and neonatal specialists Obstetrics and Gynecology in cooperation with multidisciplinary teams, including followed by obstetricians. In mild or asymptomatic patients, Covid-19 is not an indication to change the planned delivery method (15, 16). Cesarean delivery should be performed with standard obstetric indications, as there is no evidence that it will reduce vertical transmission (17). However, a cesarean section may be preferred by health professionals with the thought that it may be more common due thought to high exposure to infection in the hospital at the beginning of the pandemic (18).

There are some limitations to our study. Unfortunately, we were unable to clearly specify the indications for cesarean section due to the uncertainty of the covid 19 infection. However, the most important strength of our study is that it is a large cohort study that includes data from a tertiary health center.

Discussions on the clinical course of the covid-19 disease in pregnant women, possible complications, treatment methods, follow-up, and intrapartum management are still continuing. At the beginning of the epidemic, higher rates of cesarean section are expected in the group of pregnant women with Covid-19 infection due to our limited knowledge. Although the mother's infection complicates the delivery, the timing and mode of delivery should be individualized according to the clinical condition of the pregnant woman, the week of gestation and the condition of the fetus. Although increased cesarean section rates are not a novel finding considering that epidemic diseases such as covid -19 are possible today, the value of our work will be better understood. There is a need for further studies on Covid-19 infection during pregnancy and childbirth, as there is not enough data at the moment.

Ethical approval

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Authors Contribution

Authors' roles EUO, GNB and HLK contributed to statistical analyses, and interpretation of data and drafted the paper. The study was conceived and designed by ASOE and EUO. The data were collected by EUO and GNB. All co-authors interpreted the data and participated in finalizing the manuscript. All co-authors approved the final version of the manuscript.

Acknowledgments

None declared.

Declaration of Competing Interest

All the authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Financial or funding support

The authors received no funding for the completion of the study or manuscript

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