

# The effect of general anesthesia applied during cesarean section on newborn bilirubin

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## ABSTRACT

**Aims:** Today, delivery is often performed as normal spontaneous vaginal delivery (NSVD) and cesarean section operations. Deliveries with NSVD mostly take place in the delivery room without the need for additional anesthetic agents. General anesthesia and regional anesthesia techniques are applied in cesarean section operations. In this study; the aim of this study was to examine the effect of general anesthesia on newborn bilirubin and to compare it with the bilirubin level of babies born without general anesthesia with NSVD method.

**Methods:** Between March 2022 and September 2022, 152 patients over the age of 18 with term pregnancy NSVD and elective cesarean section without complications were randomly included in the study. Cases diagnosed with liver and biliary tract disease, systemic liver and biliary tract effective drug use, Dcoombs (+) and COVID 19 (+) clinics were excluded.

**Results:** Of the patients included in our study, 75 (49.3%) were given general anesthesia and 77 (50.7%) delivered with NSVD without general anesthesia. It was determined that the first hour bilirubin and the fourth hour bilirubin values were significantly higher ( $p < 0.05$ ,  $p = 0.001$ ) in the general anesthesia group compared to the group that did not receive general anesthesia. In the group that did not receive general anesthesia, the APGAR 5<sup>th</sup> min score was found to be significantly ( $p < 0.05$ ,  $p = 0.027$ ) higher than the general anesthesia group. APGAR 1 min value did not differ significantly ( $p > 0.05$ ) between the anesthesia-free and general anesthesia groups. Neonatal weight, head circumference, and infant height did not differ significantly between the groups that did not receive general anesthesia and those who did not receive general anesthesia ( $p > 0.05$ ).

**Conclusion:** Between general anesthesia and non-anesthesia groups; it has been determined that the bilirubin value measured in babies born by cesarean section under general anesthesia is higher. It seems that it may be more beneficial to avoid systemic effective practices as much as possible and to disseminate NSVD.

**Keywords:** Anesthesia, cesarean section, neonatal bilirubin

## INTRODUCTION

Birth is known to be one of the most challenging experiences most mothers have in their lifetime. While NSVD can often be performed without anesthesia; in some obstetric patients, anesthesia may be required in various interventional procedures, especially in cesarean section.<sup>1</sup> Cesarean section operation is performed with general anesthesia and regional anesthesia methods. General anesthesia application in obstetric surgery started in 1847 with the use of ether at birth.<sup>2</sup> While trying to provide only one person's safety and optimal conditions in anesthesia applied in most surgeries and surgical applications; in the cesarean section, the safety of the mother and the baby affected by any changes in the mother must also be ensured, and precautions should be taken accordingly.<sup>3</sup> In the 1960s and 1970s, while attention was drawn to the correlation between the rates of binding of drugs to serum bilirubin and their secretion

into breast milk, on the other hand, there were studies on the effects of drugs used in pre-pregnancy, especially the liver and biliary tract, and the effects of drugs used in childbirth and anesthesia.<sup>4,5</sup> In these studies, the regional anesthesia techniques used, the drugs used in these techniques, the transfer of anesthetic gases to the baby via the uteroplacental circulation and their effects on the newborn are noteworthy.<sup>6,7,8</sup> The purpose of this study; to evaluate the effect of general anesthesia applied during cesarean section on the level of bilirubin on the newborn.

## METHODS

After getting approval from the İstanbul Medipol University Clinical Researches Ethics Committee with the date 17.02.2022 and decision number 153, followed in the obstetrics and

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gynecology clinic; the data of babies who were delivered with NSVD between March 2022 and September 2022 and who were born with ASA 1 electively under general anesthesia after cesarean section were analyzed prospectively. The groups were divided into 2 groups as those who received general anesthesia (n=75) and those who did not receive anesthesia (n=77). During the induction phase of general anesthesia, 2 mg/kg propofol and 0.5 mg/kg rocuronium were administered as standard, and no anesthetic agent was administered to those who gave birth with NSVD. The newborns' 1st and 5th minute APGAR scores, birth weight, height, head circumference, 1st hour and 4th hour bilirubin levels were evaluated by recording transcutaneously.

COVID (+) and DCoombs (+) cases were excluded. Emergency cases, drug use affecting the systemic hepatic biliary tract, pregnancies under the age of 18 and non-term pregnancies were excluded from the study. This study was conducted in accordance with the principles of the Declaration of Helsinki. Consent was obtained from all patients included in the study.

### Statistical Analysis

IBM SPSS version 28 (IBM Co., Chicago, USA) was used for statistical analysis of the data. The normal distribution of the variables was checked with the Kolmogorov-Smirnov test. Descriptive statistical

methods (mean, standard deviation) were used. Mann-Whitney U test and chi-square test were used to compare quantitative and qualitative data. Statistical significance level was defined as  $p < 0.05$ .

### RESULTS

The ages of the patients did not differ significantly ( $p > 0.05$ ) between the non-anesthesia and general anesthesia groups. The height, weight, and BMI value of the patients did not differ significantly ( $p > 0.05$ ) between the non-anesthesia and general anesthesia groups. The week of gestation did not differ significantly ( $p > 0.05$ ) between the non-anesthesia and general anesthesia groups. The number of births did not differ significantly ( $p > 0.05$ ) between the non-anesthesia and general anesthesia groups. The rate of comorbidities did not differ significantly ( $p > 0.05$ ) between the non-anesthesia and general anesthesia groups. The rate of drug use in the general anesthesia group was significantly higher than in the non-anesthesia group ( $p < 0.05$ ,  $p = 0.005$ ) (Table 1).

APGAR 1 min value did not differ significantly ( $p > 0.05$ ) between the anesthesia-free and general anesthesia groups. The APGAR 5th min value in the general anesthesia group was significantly ( $p < 0.05$ ) lower than the group that did not

**Table 1. Information about pregnant**

	Min-Max	Medyan	Ort.±ss/n-%	
Age	20.0-41.0	29.0	30.0±4.3	
Height (cm)	150.0-186.0	167.0	166.9±5.1	
Weight (kg)	60.0-96.0	73.0	73.4±7.3	
BMI	21.0-33.9	26.3	26.4±2.8	
Gestation week (wk)	30.0-42.0	39.0	38.8±1.2	
Number of births	1.00-4.0	2.0	1.9±0.78	
<b>Comorbidities</b>				
(-)			116	75.8%
(+)			37	24.2%
GDM			5	3.3%
Varicose vein disease			6	3.9%
HT			10	6.5%
Asthma			7	4.6%
Anxiety			3	2.0%
Thyroid disease			2	1.3%
Vertigo			2	1.3%
Rheumatoid arthritis			1	0.7%
Ulcerative colitis			1	0.7%
Drug use				
(-)			131	85.6%
(+)			22	14.4%
Type of birth				
NSVD			77	50.7%
Cesarean section			75	49.3%
APGAR 1 min	7.0-10.0	9.0	8.5±0.70	
APGAR 5 min	8.0-10.0	10.0	9.5±0.61	
Newborn weight (gr)	2325-4700	3270	3288±380	
Height (cm)	44.0-55.0	51.0	50.8	2.0
Head circumference (cm)	31.0-39.0	35.0	34.8	1.5
1 hour bilirubin	0.10-2.6	0.90	0.98±0.57	
4 hour bilirubin	0.30-3.1	1.7	1.7±0.73	
DCoombs				
(-)			152	99.3%
(+)			1	0.7%
Suspected COVID 19				
(-)			153	100%
(+)			0	0.0%

BMI: Body mass index, GDM: Gestational diabetes mellitus

receive anesthesia. The newborn weight, height, and head circumference values did not differ significantly ( $p>0.05$ ) between the anesthesia-free and general anesthesia groups. In the general anesthesia group, 1<sup>st</sup> hour bilirubin and 4<sup>th</sup> hour bilirubin values were significantly higher than the group without anesthesia ( $p<0.05$ ,  $p=0.001$ ) (Table 1). The Dcoombs rate did not differ significantly ( $p>0.05$ ) between the anesthesia-free and general anesthesia groups. Between maternal and baby blood groups; There was no significant difference in blood group distribution (Table 2). The rate of Suspicion of COVID 19 did not differ significantly ( $p>0.05$ ) between the non-anesthesia and general anesthesia groups (Figure).

Table 2. Blood groups distribution		
	n	%
<b>Maternal blood group</b>		
0-	8	5.2%
0+	52	34.0%
A-	5	3.3%
A+	60	39.2%
AB+	1	0.7%
B-	5	3.3%
B+	22	14.4%
<b>Baby blood group</b>		
0-	7	4.6%
0+	46	30.1%
A-	12	7.8%
A+	52	34.0%
AB+	4	2.6%
B-	1	0.7%
B+	31	20.3%

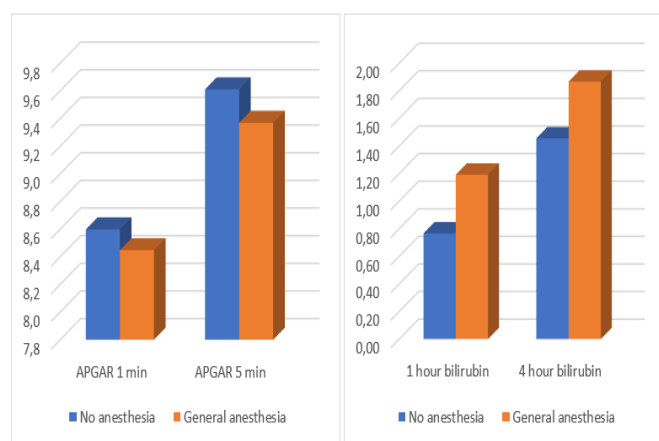


Figure. Apgar and bilirubin values

## DISCUSSION

Birth is one of the vital processes that has not lost its importance for centuries and maintains its popularity. Most of the time, the mode of delivery is determined by clinicians according to both the anatomical and clinical conditions of the patient and the fetus. With the increase in cesarean section operations worldwide and in our country in recent years, the anesthesia method applied in cesarean section operations and its effects on the newborn have become an important issue.

Since the 1970s, we have come across publications that draw attention to the relationship between the applied anesthesia method and neonatal jaundice. At the beginning of the subjects that are especially emphasized in the studies are the deliveries with or without anesthesia, the transfer of anesthetic drugs to the baby via the umbilical cord and their effects on the newborn.<sup>9</sup>

Studies investigating the effects of volatile anesthetic drugs on bilirubin levels and liver functions have also been conducted, and it seems that more studies are needed in this area.<sup>10,11</sup> In a study in which newborn bilirubin levels with general anesthesia and NSVD were compared, 24-hour serum bilirubin values were found to be high, although not statistically significant.<sup>12</sup> El Kabbany et al.<sup>13</sup> there is a current study reporting that maternal general anesthesia has a negative effect on newborn bilirubin. In our study, we found that the 1st hour bilirubin and 4<sup>th</sup> hour bilirubin values in the general anesthesia group were significantly higher than the group that did not receive anesthesia ( $p<0.05$ ,  $p=0.001$ ).

In another study, newborn heart rate was significantly lower in the general anesthesia group, and the 1<sup>st</sup> minute APGAR scores were found to be significantly lower in the general anesthesia group, and the 5<sup>th</sup> minute APGAR scores were found to be similar.<sup>14</sup> In our study, although the APGAR 1<sup>st</sup> minute scores did not differ significantly between the general anesthesia group and the group that did not receive anesthesia; APGAR 5<sup>th</sup> min value was found to be significantly ( $p<0.05$ ) lower in the general anesthesia group.

In one of the remarkable studies, a significant relationship was found between cesarean section and anesthesia and newborn bilirubin, while in another similar study, researchers could not detect a relationship between delivery type and newborn bilirubin levels.<sup>15</sup> In a study, newborn weight did not show a significant difference in 160 cases (32% regional, 68% general anesthesia) in a comparison according to the anesthesia method in cesarean deliveries.<sup>16</sup> In our study, there was no statistically significant difference between the two groups in terms of newborn weight, height and head circumference ( $p>0.05$ ).

## CONCLUSION

As a result, in our study, the bilirubin values of the newborns who underwent general anesthesia were found to be higher than the newborns who were born with NSVD without anesthesia. Making normal delivery more common is seen as beneficial, new randomized studies are needed on this subject.

## ETHICAL DECLARATIONS

**Ethics Committee Approval:** The study was carried out with the permission of Medipol University Faculty of Medicine Research and Application Hospital Clinic Ethics Committee (Date: 17/02/2022, Decision No: 153).

**Informed Consent:** All patients signed the free and informed consent form.

**Referee Evaluation Process:** Externally peer-reviewed.

**Conflict of Interest Statement:** The authors have no conflicts of interest to declare.

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