



RESEARCH

Neonatal outcomes of patients with vaginal delivery after a Caesarean section

Sezaryen sonrası vajinal doğum yapan hastaların yenidoğan sonuçları

Emre Uysal¹, Nur Gözde Kulhan², Oğuzhan Günenc²

¹Yusufeli State Hospital, Gynecology and Obstetrics Department, Artvin, Türkiye

²Konya City Hospital, Gynecology and Obstetrics Department, Konya, Türkiye

Abstract

Purpose: The rates of caesarean section (CS) have been increasing in recent years in Türkiye and throughout the world. A previous CS is known to not be an absolute indication for repeat CS, and vaginal delivery (VD) (trial of labor after caesarean (TOLAC)) can occur after a CS. The aim of this study was to investigate the neonatal outcomes of TOLAC patients in Konya City Hospital.

Materials and Methods: A retrospective analysis was made of the records of all the births in Konya City Hospital between 10 August 2020 and 10 June 2022. The study included all patients with full or nearly complete cervical dilation-effacement and who had a previous CS. These patients were compared with patients who had elective CS and VD. A total of 119 patients were included in the study in 3 groups; TOLAC n:32, CS n:42, VD n:45.

Results: TOLAC patients gave birth earlier and the infant birth weight (2991.25gr), length (50.66cm) and head circumference (34.09cm) measurements were found to be significantly lower than those of the other groups. The development of any problem (icterus, respiratory distress syndrome (RDS), oxygen requirement, hypoglycemia, hypothermia) was determined at a significantly higher rate in the TOLAC (21.9%).

Conclusion: Patients with a history of CS do not have to have a repeat CS. TOLAC can be performed in appropriate cases, but care should be taken against uterine rupture, the need for emergency CS, and adverse neonatal outcomes.

Keywords: Caesarean section, neonatal, neonatal outcomes, trial of labor after caesarean (TOLAC), vaginal delivery

Öz

Amaç: Son yıllarda Türkiye'de ve dünyada, sezaryen (CS) oranları giderek artmaktadır. Önceki sezaryenlerin tekrar sezaryen için mutlak bir endikasyon olmadığı bilinmektedir ve sezaryen sonrası vajinal doğum (trial of labor after caesarean (TOLAC)) gerçekleşebilmektedir. BU çalışmanın amacı Konya Şehir Hastanesi'ndeki TOLAC hastalarının neonatal sonuçlarını araştırmaktır.

Gereç ve Yöntem: 10 Ağustos 2020 ile 10 Haziran 2022 tarihleri arasında Konya Şehir Hastanesi'nde gerçekleşen tüm doğumların kayıtlarının retrospektif analizi yapıldı. Çalışmaya tam veya tama yakın servikal dilatasyon-efasması olan ve daha önce sezaryen öyküsü olan tüm hastalar dahil edildi. Bu hastalar elektif CS ve vajinal doğum (VD) geçiren hastalarla karşılaştırıldı. Çalışmaya 3 grupta toplam 119 hasta dahil edildi; TOLAC n:32, CS n:42, VD n:45.

Bulgular: TOLAC hastalarının daha erken doğum yaptığı görüldü ve bebek doğum ağırlığı (2991.25gr), boyu (50.66cm) ve baş çevresi (34.09cm) ölçümlerinin diğer gruplara göre anlamlı derecede düşük olduğu görüldü. TOLAC'ta herhangi bir yenidoğan probleminin (sarılık, solunum sıkıntısı sendromu (RDS), oksijen ihtiyacı, hipoglisemi, hipotermi) gelişimi anlamlı olarak daha yüksek oranda bulundu (%21,9).

Sonuç: Sezaryen öyküsü olan hastaların tekrar sezaryen geçirmesine gerek yoktur. TOLAC uygun vakalarda yapılabilir ancak uterus rüptürü, acil sezaryen ihtiyacı ve olumsuz neonatal sonuçlara karşı dikkatli olunmalıdır.

Anahtar kelimeler: Sezaryen, yenidoğan, yenidoğan sonuçları, sezaryen sonrası vajinal doğum (TOLAC), vajinal doğum

Address for Correspondence: Emre Uysal, Yusufeli State Hospital, Gynecology and Obstetrics Department, Artvin, Türkiye E-mail: emreuyosal53@dr.com

Received: 01.10.2023 Accepted: 11.12.2023

INTRODUCTION

If unexpected complications develop during pregnancy and delivery, caesarean section (CS) is a life-saving method for both mother and infant. In recent years, CS rates have been increasing in Türkiye and throughout the world, with an increase of >30% in some countries. In 2015, Türkiye had the fifth highest rate of CS in the world and was ranked first among the Organization for Economic Co-operation and Development (OECD) countries¹.

Most of the increasing CS indications are previous CS deliveries. In the 2019 Turkish Health Statistics report, the primary CS rate in Türkiye was announced as 26.5% and the total CS rate as 54.4%². However, it is known that a history of CS not an absolute indication for repeat CS and VD (trial of labor after caesarean (TOLAC)) can occur after a previous CS. Although VD is physiological, rupture of a previous uterine scar is a possible risk in TOLAC³. Therefore, if TOLAC is to be attempted, the patient should be closely monitored.

Vaginal birth in patients who have previously had a cesarean section shortens the mother's recovery time, eliminates surgical complications, and even reduces poor neonatal outcomes. However, there may be some complications if TOLAC fails⁴. These are the risk of emergency cesarean, uterine rupture, conditions requiring hysterectomy and blood transfusion, and the risk of infection such as wound site or endometritis^{3,5}. TOLAC has a lower chance of success in women who are older, obese, and non-white. A TOLAC management algorithm has been created in some institutions⁶.

In our clinic, VD for pregnant women with a history of CS is not a routine birth procedure. However, TOLAC is performed if the cervical effacement is complete or almost complete in the vaginal examination of pregnant women when they present at our hospital when the general condition of the patients is good (if there is no uterine rupture – shock signs and symptoms) and there is no fetal distress.

Although there are some studies on TOLAC in the literature, their number is quite low. More studies should be conducted and procedures should be established to recommend TOLAC to clinicians. TOLAC is as safe as VD in terms of maternal and fetal outcomes. Based on this, this study aimed to examine the neonatal outcomes of babies born with TOLAC, and elective CS and VD.

MATERIALS AND METHODS

Approval for this study was obtained from TR Health Sciences University Hamidiye Scientific Research Ethics Committee (date/decision number 9.30.2022 - 22/425) established in accordance with the institution where the study was conducted (Konya City Hospital). All the study procedures were in compliance with the provisions of the 1995 Declaration of Helsinki (Brazil as revised in 2013).

Konya City Hospital is one of the largest health institutions in Konya, and as a tertiary-level state hospital it is the most intense obstetrics clinic in the region. According to the information received from the hospital statistics unit, the total number of VD and CS in one month is between 800-900. As a routine practice in our clinic, TOLAC is not applied to patients with a history of CS. The decision for CS or TOLAC is made according to the patient examination on admission.

Study design and sample

In this retrospective, cross-sectional study, no interventional procedures were performed on the patients for the study. The records of all births in Konya City Hospital between August 10, 2020 and June 10, 2022 were examined. During this process, 43 patients who had vaginal birth after cesarean section were found. Patients with a gestational age of less than 37 weeks and with maternal complications (gestational hypertension, gestational diabetes, hypothyroidism, obesity, cardiovascular disease) were excluded from the study. Additionally, TOLAC was not applied to pregnant women with fetal anomalies. TOLAC was not performed on pregnant women with low cervical dilatation and effacement. Patients with full or nearly complete cervical dilation - effacement with a history of CS were included in the study. After these eliminations, 32 patients remained.

These patients were compared with those who had elective CS and VD. The standard effect size was determined as 0.7 with a 5% margin of error and 80% power. Accordingly, it was calculated that there would be at least 32 women in the groups⁵. A total of 119 patients were included in the study in 3 groups of TOLAC (n:32), CS (n:42), and VD (n:45). The study was retrospective and cross-sectional, and the patient data were obtained from the patient files, including age, gravida, parity, number of previous CS, height, weight, body mass index (BMI), urinalysis, hemogram results taken on admission for delivery

and at the sixth hour postpartum, and neonatal information including gestational week at birth, 1 and 5-minute APGAR scores, cord blood pH, length, weight, head circumference, icterus, respiratory distress, hypoglycemia, hypothermia, and neonatal intensive care admissions.

The births of TOLAC and VD group patients were performed by obstetricians or midwives under the supervision of obstetricians. The surgeries of the CS group patients were also performed by obstetricians. Neonatal examination was performed by pediatricians. Patient file records (such as patient and neonatal demographic data, examination findings) were kept by the attending physician in a timely manner.

Statistical analysis

Data obtained in the study were analyzed statistically using IBM SPSS Statistics version 22.0 software (IBM Corp., Armonk, NY, USA). Continuous and categorical variables were shown as numbers of patients and percentages. The Chi-square test was used to compare numbers and mean values in the analyses. The One-Way ANOVA test was used as

there were 3 groups for mean and standard deviation value comparisons. The Kolmogorov-Smirnov normality test was applied to the mean values. Following the One Way ANOVA test, the Tamhane test was used in post hoc analysis to compare values that were found to be heterogeneously distributed, and the Tukey test was used to compare values that were found to be homogeneously distributed. A value of $p < 0.05$ was considered statistically significant.

RESULTS

Three groups were compared in this study; TOLAC, n:32, CS, n:42, and VD, n:45. There was no significant difference between these three groups in terms of age, gravida, parity and BMI ($p > 0.05$). The mean number of CS was 1.34 ± 0.6 in the TOLAC group and 2.07 ± 1.45 in the CS group. Although the number of previous CS in the CS group was relatively higher, this difference was not statistically significant ($p > 0.05$). No significant difference was found between the three groups in terms of prenatal hemoglobin (HB), platelet (PLT), white blood cell (WBC), and pyuria in urine ($p > 0.05$). (Table 1).

Table 1. Demographic data, prenatal hemogram and pyuria

Parameters	Groups						P value
	TOLAC (n=32)		CS (n=42)		VD (n=45)		
	Mean	Std. Deviation	Mean	Std. Deviation	Mean	Std. Deviation	
Age (years)	30.06	5.76	28.62	6.20	28.69	5.73	0.516
Gravida	3.66	2.21	3.31	1.52	3.27	1.78	0.617
Parity	2.31	1.64	2.07	1.45	1.89	1.56	0.506
Number of Caesarean Sections	1.34	0.60	2.07	1.45	0.00	0.00	0
BMI (kg/m ²)	25.97	3.20	26.37	2.85	27.05	2.40	0.228
HB (gr/dl)	11.46	1.48	11.69	1.51	12.07	1.40	0.174
PLT (10 ³ /mm ³)	229.78	80.88	231.38	77.53	225.02	56.96	0.912
WBC (10 ³ /mm ³)	10.54	3.02	10.41	3.54	11.14	3.30	0.554
Pyuria (leukocyte 1+, 2+,3+)	1.38	1.34	1.17	1.21	1.67	1.17	0.167

One Way ANOVA, Tamhane test, Tukey test ; TOLAC: trial of labor after cesarean, CS: caesarean section, VD: vaginal delivery, BMI: body mass index, HB: hemoglobin, PLT: platelet, WBC: White blood cell

In all three groups, a change was observed in the hemogram values measured at the sixth hour after birth compared to the prenatal period. The HB and HTC values decreased in all three groups, but was not statistically significant ($p>0.05$). There was seen to be a statistically significant decrease in PLT value after

the birth in all three groups compared to before ($p<0.05$). When the groups were evaluated in terms of WBC, there was an increase in all three groups compared to the prenatal period, but this was not statistically significant ($p>0.05$). (Table 2).

Table 2. Comparison of hemogram values before and after birth

Parameter	Groups						P value
	TOLAC (n=32)		CS (n=42)		VD (n=45)		
	Mean	Std. Deviation	Mean	Std. Deviation	Mean	Std. Deviation	
HB exchange (gr /dl)	-0.85	0.93	-1.02	0.92	-1.01	1	0.701
HTC exchange (%)	-2.9	3.1	-3.11	3.14	-3.3	2.99	0.853
PLT exchange ($10^3/mm^3$)	-47.5	84.7	-27.59	46.22	-14.68	34.09	<0.05
WBC exchange ($10^3/mm^3$)	+3.2	3.3	+2.88	3.44	+4.20	4.96	0.305

One Way ANOVA, Tamhane test, Tukey test ; TOLAC: trial of labor after cesarean, CS: caesarean section, VD: vaginal delivery, HB: hemoglobin, PLT: platelet, WBC: White blood cell

When the birth weeks of all three groups were compared, the TOLAC group was determined to give birth earlier (37.59 ± 1.52 weeks) and this result was statistically significant ($p<0.05$). Neonatal outcomes were compared between the groups. The TOLAC (50.66 ± 2.07 cm) and CS (50.55 ± 1.95 cm) infants were determined to be statistically significantly smaller than the VD (51.89 ± 2.18 cm) infants ($p<0.05$). In the TOLAC group, infant birth weight (2991.25 ± 471.97 kg) and head circumference

(34.09 ± 1.53 cm) were found to be significantly lower than in the other groups ($p<0.05$). There was no significant difference between the three groups in terms of pH and 1st minute APGAR score obtained from infant cord blood gas ($p>0.05$). In the comparisons of the 5-min APGAR scores, the CS group score (9.29 ± 0.55) was statistically significantly lower than that of the other two groups ($p<0.05$). (Table 3).

Table 3. Neonatal outcomes

Parameter	Groups						P value
	TOLAC (n=32)		CS (n=42)		VD (n=45)		
	Mean	Std. Deviation	Mean	Std. Deviation	Mean	Std. Deviation	
Pregnancy Week	37.59	1.52	38.45	0.83	39.02	1.03	<0.05
Length (Cm)	50.66	2.07	50.55	1.95	51.89	2.18	<0.05
Weight (Kg)	2991.25	471.97	3316.33	423.51	3415.56	353.22	<0.05
Head Circumference (Cm)	34.09	1.53	34.88	1.09	34.62	1.19	<0.05
pH	7.30	0.08	7.33	0.05	7.30	0.06	0.056
APGAR 1 MIN	8.56	0.56	8.21	0.65	8.49	0.82	0.07
APGAR 5 MIN	9.56	0.50	9.29	0.55	9.58	0.58	<0.05

One Way ANOVA, Tamhane test, Tukey test ; TOLAC: trial of labor after cesarean, CS: caesarean section, VD: vaginal delivery

There was no significant difference between the sexes of the babies in all three groups ($p>0.05$). No significant difference was determined between the groups in terms of neonatal icterus, hypoglycemia, hypothermia, or respiratory distress syndrome (RDS) ($p>0.05$). When these neonatal problems were evaluated in general, problems were detected in 7

(21.9%) infants in the TOLAC group, which was significantly higher than in the other groups ($p<0.05$). These 7 infants (21.9%) in the TOLAC group were admitted to the neonatal ICU, which was a significantly higher rate than in the other groups ($p<0.05$). (Table 4).

Table 4. Neonatal complications

Parameter			Groups			p value
			TOLAC (n=32)	CS (n=42)	VD (n=45)	
Gender	Male	Count	18	20	21	0.675
		% within group	56.3%	47.6%	46.7%	
	Female	Count	14	22	24	
		% within group	43.8%	52.4%	53.3%	
Problem*	No	Count	25	38	44	<0.05
		% within group	78.1%	90.5%	97.8%	
	Yes	Count	7	4	1	
		% within group	21.9%	9.5%	2.2%	
Icterus	Yes	Count	3	2	1	0.366
		% within group	9.4%	4.8%	2.2%	
	No	Count	29	40	44	
		% within group	90.6%	95.2%	97.8%	
Rds	Yes	Count	1	0	0	0.254
		% within group	3.1%	0.0%	0.0%	
	No	Count	31	42	45	
		% within group	96.9%	100.0%	100.0%	
Hypoglycemia	No	Count	32	42	45	
		% within group	100.0%	100.0%	100.0%	
Hypothermia	No	Count	32	42	45	
		% within group	100.0%	100.0%	100.0%	
NICU Hospitalization**	Yes	Count	7	2	1	<0.05
		% within group	21.9%	4.8%	2.2%	
	No	Count	25	40	44	
		% within group	78.1%	95.2%	97.8%	

chi square test; TOLAC: trial of labor after cesarean, CS: caesarean section, VD: vaginal delivery, RDS: respiratory distress syndrome, NICU: newborn intensive care unit; *Problem; Icterus, RDS, Oxygen requirement, Hypoglycemia, Hypothermia; ** Admission to the neonatal intensive care unit in the first 24 hours after birth

DISCUSSION

If CS is performed with the right indication in the right patient, it can be life-saving for the mother and/or infant. In recent years, the number of CS births has increased worldwide, as is the case in Türkiye. In 2019, the primary CS rate in Türkiye was 26.5% and the total CS rate was 54.4%². The majority of all causes of CS is the patient's history of CS,

because the most feared complication is uterine rupture from the old scar line⁸. Other complications are emergency CS, blood transfusion, endometritis, invasive birth and perineal injury^{3,5}. TOLAC success rate is 70-80%. However, a history of CS is still not an absolute condition for a subsequent CS, and TOLAC can be tried in suitable patients. Because if TOLAC is successful, the hospitalization and recovery time are shortened and the patient's

probability of having a VD in her next pregnancy increases. In Konya City Hospital, TOLAC is performed according to the examination of the patient on admission.

In this study, the three patient groups of TOLAC, CS, and VD were compared. There was no significant difference between all three groups in terms of age, gravida, parity and BMI. In respect of prenatal care, no significant difference was seen between the groups in the pyuria, HB, WBC, PLT and complete urinalysis values. These results show that the patients in the groups were homogeneously distributed.

In a study in 2022, Kiremitli et al. stated that maternal complications such as anemia are more common in CS deliveries, especially in emergency CS⁹. In a study by Hashima et al. in 2007, maternal anemia and fetal distress were found to be associated with CS, and no cause-and-effect relationship was found between maternal anemia and TOLAC¹⁰. Dilutional anemia in pregnancy is physiological¹¹. In VD, approximately 300 cc of bleeding may occur during the separation of the placenta and its appendages, and there may be a decrease in hemoglobin and hematocrit levels due to this. However, if the hemoglobin level is <11 g/L within 1 week postpartum, anemia is diagnosed¹². In the current study, postpartum HB and HCT levels decreased in all three groups compared to previous HB and HCT levels, but no significant difference was found between the groups.

Dahlström et al. concluded that uncomplicated VD does not affect platelet counts¹³. In a study by Usluoğulları et al. it was shown that the platelet count decreased significantly more in CS deliveries¹⁴. In the current study, the highest platelet decrease was found in the TOLAC group and the least decrease in the VD group, and this difference was determined to be significant. Sindram-Trujillo et al. found no significant difference in leukocyte levels after VD and CS¹⁵. Although there was an increase in WBC in all the current study groups, no significant increase was found.

In a study by Ram et al. in 2018, it was concluded that the gestational week had no effect on TOLAC birth success¹⁶. In another study on the causes of TOLAC and success, it was found that TOLAC reduced the success rate if the gestational week was ≥ 40 ¹⁷. In the current study, the mean gestational week of the TOLAC group was found to be 37.59 ± 1.52 weeks, which was lower than that of the CS and VD groups ($p < 0.05$). However, since TOLAC was not

performed electively in our clinic, it is not possible to comment on the success of TOLAC in the advanced weeks of pregnancy. All of the TOLAC group successfully delivered vaginally and no patient developed uterine rupture or other complications. Li et al. performed TOLAC in selected patients, and reported that uterine rupture did not develop in any of the patients¹⁸. The uterine rupture rate was found to be 0.6% in the study of Uno et al.¹⁷.

In the study by Li et al, the infants of successful TOLAC patients had a lower birth weight¹⁸. In parallel with those results, the current study showed that neonatal baby length, weight and head circumference values were significantly lower than those of the other two groups ($p < 0.05$). The reason for this was thought to be the 37.59 ± 1.52 weeks of gestation.

In a study conducted with a TOLAC patient group in Germany, no significant difference was determined between the groups in the pH of neonatal cord blood gases⁷. Similarly, in the current study, no difference was found between the pH values of neonatal cord blood gas between all three groups.

Grünebaum et al. conducted a study in the USA and reported that patients who had a VD at home after CS had earlier week and low birth weight infants compared to those delivered in the hospital, and the 5th minute APGAR score was found to be lower. They also found a higher incidence of neurological dysfunction in these infants¹⁹. According to the literature, the minimum 1st and 5th minute APGAR scores are known to be low in CS delivered infants^{20,21}. Accordingly, in the current study, the neonatal APGAR 1st and 5th minute scores were found to be lower in the CS group compared to the other groups. Although this decrease was not statistically significant at the 1st minute, it was found to be significant at the 5th minute ($p < 0.05$). The 1st APGAR score of the TOLAC group was found to be relatively higher than the other groups, and the 5th minute APGAR score was relatively higher than the CS group and lower than the VD group. Considering that the mean week of birth in the TOLAC group is lower, the fact that the 1st and 5th minute APGAR scores are higher than the CS group is an important finding. This finding demonstrates the impact of VD on neonatal outcomes.

There was no significant difference between the gender distribution of the babies of all three groups

in the current study demonstrating that the groups were homogeneously distributed.

In a study by Litwin et al., the neonatal intensive care hospitalization rates were found to be higher in infants born with TOLAC, and this was attributed to preterm births. The most common reason for neonatal intensive care admission was found to be the need for ventilation²². Similarly, TOLAC was found to have a strong correlation with both newborn depression and admission to the intensive care unit in a cohort research carried out by Studsgaard A et al.²³. Izbudak et al. compared TOLAC and neonatal outcomes of CS, and reported no significant difference between the groups in terms of neonatal intensive care hospitalization rates and respiratory distress²⁴. Kamath et al. compared successful and unsuccessful TOLAC and CS patients, and reported higher neonatal hospitalization rates for CS. Neonatal oxygen requirement was found to be lower in the successful TOLAC group than in the unsuccessful TOLAC group²⁵. In the current study, the neonatal intensive care admission rate was higher in the TOLAC group. Hypothermia and hypoglycemia did not develop in the infants of any group, and there was no difference between the three groups in terms of icterus and respiratory distress syndrome. However, when neonatal problems were evaluated under a single heading, neonatal problems were found to be more common in the TOLAC group. The reason for this was thought to be the early term gestational weeks of the TOLAC group patients. Prospective randomized controlled studies are needed to better understand the maternal and fetal benefits and harms of TOLAC application.

The limitations of this study were that it was conducted in a single center and the number of patients was relatively low. Since there is no TOLAC guideline applicable to every patient in Türkiye, TOLAC was applied only to selected patients.

The increasing number of cesarean sections every year poses a serious public health problem and a great financial burden on the public. To avoid these problems, cesarean section rates need to be reduced. First of all, the decision for cesarean section should be made with the correct indication for this. It should be disseminated among clinicians that patients with a history of previous cesarean section do not need a repeat cesarean section and that suitable patients can give birth vaginally. More studies should be conducted with large patient groups and management guidelines on TOLAC should be prepared for clinics and even

countries. In this way, we think that clinicians will be more inclined to perform vaginal birth after cesarean section.

In conclusion, patients who have previously given birth by CS do not have to have a repeat CS. TOLAC can be performed in appropriate cases. Because the advantages of TOLAC include early mobilization, short hospitalization and recovery period, no need to care for a large abdominal wound, and an increased likelihood of having a VD in the patient's next pregnancy. But care should be taken emergency CS, blood transfusion, endometritis, invasive birth and perineal injury.

Author Contributions: Concept/Design : EU, NGK, OG; Data acquisition: NGK, OG; Data analysis and interpretation: EU, NGK; Drafting manuscript: EU, OG; Critical revision of manuscript: EU, NGK; Final approval and accountability: EU, NGK, OG; Technical or material support: ŞÖ, SŞ, FÖKS, SC; Supervision: EU, NGK; Securing funding (if available): n/a.

Ethical Approval: Date of 30.09.2022 and 2022/22-6 from the Hamidiye Scientific Research Ethics Committee of the University of Health Sciences.

Peer-review: Externally peer-reviewed.

Conflict of Interest: Authors declared no conflict of interest.

Financial Disclosure: Authors declared no financial support

Acknowledgement: Thanks to Caroline Jane WALKER for her help with English Grammar.

REFERENCES

1. Öz ME. Tokat devlet hastanesi 2019-2020 yılları arasında sezaryen oranları analizi. *Gaziosmanpaşa Üniversitesi Tıp Fakültesi Dergisi*. 2020;12:83-8.
2. T.C. Sağlık Bakanlığı. Sağlık İstatistikleri Yıllığı 2019 Haber Bülteni. Ankara, T.C. Sağlık Bakanlığı, 2019.
3. Tanos V, Toney ZA. Uterine scar rupture-prediction, prevention, diagnosis, and management. *Best Pract Res Clin Obstet Gynaecol*. 2019;59:115-31.
4. Sentilhes L, Vayssière C, Beucher G, Deneux-Tharaux C, Deruelle P, Diemunsch P et al. Delivery for women with a previous cesarean: guidelines for clinical practice from the French College of Gynecologists and Obstetricians (CNGOF). *Eur J Obstet Gynecol Reprod Biol*. 2013;170:25-32.
5. Beucher G, Dolley P, Lévy-Thissier S, Florian A, Dreyfus M. Maternal benefits and risks of trial of labor versus elective repeat cesarean delivery in women with a previous cesarean delivery. *J Gynecol Obstet Biol Reprod (Paris)*. 2012;41:708-26.
6. ACOG Practice Bulletin No. 205: Vaginal birth after cesarean delivery. *Obstet Gynecol*. 2019;133:e110-27.
7. Gitas G, Proppe L, Ertan AK, Baum S, Rody A, Kocaer M et al. Influence of the second stage of labor on maternal and neonatal outcomes in vaginal births after cesarean section: a multicenter study in Germany. *BMC Pregnancy Childbirth*. 2021;21:356.
8. Vandenberghe G, Bloemenkamp K, Berlage S, Colmorn L, Deneux-Tharaux C, Gissler M, et al. The

- international network of obstetric survey systems study of uterine rupture: a descriptive multi-country population-based study. *BJOG*. 2019;126:370-81.
9. Kiremitli S, Kiremitli T, Yılmaz N. Hastanemizde son bir yıl içerisinde yapılan acil ve elektif sezaryen doğum sonuçlarının değerlendirilmesi. *Jinekoloji-Obstetrik ve Neonatoloji Tıp Dergisi*. 2022;19:1121-6.
 10. Hashima JN, Guise J-M. Vaginal birth after cesarean: a prenatal scoring tool. *Am J Obstet Gynecol*. 2007;196:e22-3.
 11. Jung J, Rahman MM, Rahman MS, Swe KT, Islam MR, Rahman MO et al. Effects of hemoglobin levels during pregnancy on adverse maternal and infant outcomes: a systematic review and meta-analysis. *Ann N Y Acad Sci*. 2019;1450:69-82.
 12. Milman N. Postpartum anemia I: definition, prevalence, causes, and consequences. *Ann Hematol*. 2011;90:1247-53.
 13. Dahlström BL, Nesheim B. Post partum platelet count in maternal blood. *Acta Obstet Gynecol Scand*. 1994;73:695-7.
 14. Usluoğulları B, Kaygusuz I, Simavli S, Eser A, Inegöl Gümüş İ. Effects of cesarean section on mean platelet volume. *Platelets*. 2015;26:657-60.
 15. Sindram-Trujillo AP, Scherjon SA, van Hulst-van Miert PP, Kanhai HH, Roelen DL et al. Comparison of decidual leukocytes following spontaneous vaginal delivery and elective cesarean section in uncomplicated human term pregnancy. *J Reprod Immunol*. 2004;62:125-37.
 16. Ram M, Hirsch L, Ashwal E, Nassie D, Lavie A, Yogeve Y et al. Trial of labor following one previous cesarean delivery: the effect of gestational age. *Arch Gynecol Obstet*. 2018;297:907-13.
 17. Uno K, Mayama M, Yoshihara M, Takeda T, Tano S, Suzuki T et al. Reasons for previous cesarean deliveries impact a woman's independent decision of delivery mode and the success of trial of labor after Cesarean. *BMC Pregnancy Childbirth*. 2020;20:170.
 18. Li WH, Yang MJ, Wang PH, Juang CM, Chang YW, Wang HI et al. Vaginal birth after cesarean section: 10 years of experience in a tertiary medical center in Taiwan. *Taiwan J Obstet Gynecol*. 2016;55:394-8.
 19. Grünebaum A, McCullough LB, Arabin B, Chervenak FA. Serious adverse neonatal outcomes such as 5-minute Apgar score of zero and seizures or severe neurologic dysfunction are increased in planned home births after cesarean delivery. *PLoS One*. 2017;12:e0173952.
 20. Ajibo BD, Wolka E, Aseffa A, Nugusu MA, Adem AO, Mamo M et al. Determinants of low fifth minute Apgar score among newborns delivered by cesarean section at Wolaita Sodo university comprehensive specialized hospital, southern Ethiopia: an unmatched case control study. *BMC Pregnancy Childbirth*. 2022;22:665.
 21. Obsa MS, Shanka GM, Menchamo MW, Fite RO, Awol MA. Factors associated with Apgar score among newborns delivered by cesarean sections at Gandhi memorial hospital, Addis Ababa. *J Pregnancy*. 2020;2020:e5986269.
 22. Litwin CE, Czuzoj-Shulman N, Zakhari A, Abenhaim HA. Neonatal outcomes following a trial of labor after caesarean delivery: a population-based study. *J Matern Fetal Neonatal Med*. 2018;31:2148-54.
 23. Studsgaard, A., Skorstengaard, M., Glavind, J., Hvidman, L., Ulbjerg, N. Trial of labor compared to repeat cesarean section in women with no other risk factors than a prior cesarean delivery. *Acta Obstet Gynecol Scand*. 2013;92:1256-63.
 24. İzbudak G, Tozkır E, Cogendez E, Uzun F, Eser SK. Comparison of maternal-neonatal results of vaginal birth after cesarean and elective repeat cesarean delivery. *Ginekol Pol*. 2021;92:306-11.
 25. Kamath BD, Todd JK, Glazner JE, Lezotte D, Lynch AM. Neonatal outcomes after elective cesarean delivery. *Obstet Gynecol*. 2009;113:1231-8.