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Retrospective evaluation of outcomes of vaginal birth after caesarean section in a tertiary center: a single-center study from Turkey

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ABSTRACT

Objectives: The aim of this study was to evaluate the trial of labor after caesarean (TOLAC) outcomes and determine its reliability by comparing it with elective repeat caesarean delivery (ERCD) and vaginal delivery.

Material and methods: For this purpose, the outcomes of patients aged 18–40 years who had 57 TOLACs, 72 vaginal deliveries, and 60 elective caesarean sections in Ankara Koru Hospital between January 1, 2019, and January 1, 2022 were compared.

Results: Gestational age was lower in the normal vaginal delivery (NVD) group than in the elective caesarean section and vaginal birth after caesarean delivery (VBAC) groups ($p < 0.0005$). The birth weight was statistically significantly lower in the NVD group than in the elective caesarean section and VBAC groups ($p < 0.0002$). No statistically significant correlation was found between the BMI values in all three groups ($p < 0.586$). There was no statistically significant difference between the groups in terms of pre- and post-natal haemoglobin and APGAR scores ($p < 0.575$)($p < 0.690$)($p < 0.747$). The rate of epidural and oxytocin use was higher in the NVD group than in the VBAC group ($p < 0.001$) ($p < 0.037$). There was no statistically significant correlation between the birth weights of the infants in the TOLAC group and failed VBAC ($p < 0.078$). No statistically significant correlation was

observed between the use of oxytocin for induction and failed VBAC ($p < 0.842$). There was no statistically significant correlation between epidural anaesthesia and failed VBAC ($p < 0.586$). A statistically significant correlation was found between gestational age and caesarean section as a result of a failed VBAC ($p < 0.020$).

Conclusions: The main reason for not preferring TOLAC continues to be uterine rupture. It can be recommended to eligible patients in tertiary centers. Because even when the factors increasing the success of VBAC were excluded, the rate of successful VBAC remained high.

Key words: TOLAC; VBAC; vaginal birth after caesarean delivery; caesarean section

INTRODUCTION

The World Health Organization (WHO) has determined the ideal rate for caesarean sections to be between 10–15%. However, in the past 40 years, caesarean section rates have increased all over the world, as well as in Turkey. The positive attitude toward vaginal birth after caesarean delivery (VBAC) has become widespread since 1995, with the bulletin published by the American College of Obstetrics and Gynecology (ACOG) stating that it can be recommended to patients who are eligible and have no contraindications [1]. Recently, VBAC rates have increased all over the world. Between 1990 and 2009, VBAC rates in the USA ranged from 38.5% to 69.8% [2]. Vaginal birth after caesarean delivery rates in Germany are 36.0–49.8% [3], while we could not find any clear data on VBAC rates in Turkey. The data on VBAC rates is mostly reported by studies with small sample sizes. Studies have found that VBAC is primarily recommended and performed by private practice physicians [4], and although VBAC is an alternative to an elective repeat caesarean section, obstetricians who still abstain from this due to uterine rupture, which is the most mortal maternal and neonatal risk, recommend an elective repeat caesarean section to patients. The probability of uterine rupture (single CD 0.72%; double CD 1.59%) increases as the number of caesarean sections increases [5]. Many studies have found that the most important predictive factor for successful VBAC is spontaneous labor [6–7]. International guidelines indicate very low complication rates in patients who have a cephalic presentation, who have a lower segment incision at the previous caesarean section, and who are eligible for VBAC [8–11]. Studies have found higher maternal mortality (0.013 vs 0.004%) in elective caesarean sections and higher neonatal mortality in VBAC (0.13 vs 0.05% for elective caesarean section) [12]. While the rate of unscarred uterine rupture is 0.003% [13], this rate is 0.30% in a previously operated uterus [12]. The incidence of uterine rupture for a patient scheduled for an elective caesarean section is 0.03%, while this rate is 0.47–5.6% for VBAC [12, 14]. In their

nomogram for successful VBAC, Grobman et al. [15] first listed the factors that determine VBAC success and should be considered at the first visit. They found that maternal age, BMI, ethnic group, previous vaginal delivery, vaginal birth after caesarean section, and recurrence of the previous caesarean indication had predictive values [15]. Then, models, which include the admission Bishop score and are believed to provide a better prediction, were created [16]. In addition, factors such as prostaglandin use [17], a fetal weight of 4000 g and above [18], a short inter-delivery interval (12 months or less time from the previous caesarean delivery) [14], a lower uterine segment measurement of 0.6 mm thinner in the third trimester [19] have been reported to pose a risk for trial of labor after caesarean (TOLAC).

Here, it is necessary to define two different conditions, TOLAC and VBAC. Vaginal birth after caesarean delivery may occur as a result of the TOLAC. Not every TOLAC may result in VBAC. Elective repeat caesarean delivery (ERCD) is elective performed before onset uterine contractions.

This study was conducted in Ankara Koru Hospital, where an average of 4800 deliveries occur annually. Without using any model, the VBAC decision was made based on the patient's request, pelvic examination, and Bishop score. The aim of this study was to examine the outcomes of patients admitted to the delivery room upon the request of VBAC, to analyze the VBAC success rate and uterine rupture rates in the group without previous successful VBAC or vaginal delivery, and to compare the outcomes with those of patients who had elective C/S and primigravida vaginal delivery.

MATERIAL AND METHODS

This retrospective study included three groups of patients, aged 18–40, who were admitted to the delivery room for a trial of labor after caesarean (TOLAC), elective repeat caesarean delivery (ERCD), and primigravid patients who delivered vaginally in Ankara Koru Hospital between January 1, 2019, and January 1, 2022. Group 1 included TOLAC patients; Group 2 included patients who had ERCD with only one previous caesarean section; and Group 3 included primigravid pregnant women who had a spontaneous vaginal delivery (SVD). Those with a history of myomectomy, classical vertical incision, cardiovascular disease, cerebrovascular disease, hematologic disease, history of pelvic trauma, estimated fetal weight of 4500 g and above, placenta previa or placental invasion anomaly, non-cephalic presentation, fetal malformation, termination, intrauterine still fetuses, vaginal delivery between previous deliveries, high-risk pregnant women (IUGR, preeclampsia, etc.), and patients with a history of delivery < 37 weeks gestation and above were excluded from the

study. Since having a history of a previous vaginal delivery increases the probability of a successful VBAC, this was not included in the study as it would affect the results, causing bias. Patient data were obtained from patient files. Parameters such as patient age, gestational age, total number of deliveries, number of caesarean or vaginal deliveries, previous caesarean section, initiation of induction, pharmacological drugs used, maternal complications of rupture, infant's birth weight, and newborn well-being were examined.

Spontaneous labor was expected for all patients who had a vaginal delivery. Patients who were scheduled for an elective caesarean section after 39–40 weeks of gestation and had a caesarean section were included. Patients with a request for VBAC were referred to an experienced team. All the deliveries were carried out by a team of three obstetricians and three midwives who were experienced in TOLAC. Patients were informed in detail about all possible risks, and their consent was obtained. The onset of spontaneous labor was waited up to 42 weeks of gestation. Patients who presented with amniotic fluid discharge or with a complaint of pain were transferred to the delivery room, where fetal non-stress testing and tocodynamometer (toco) monitoring were performed. The labor process was monitored using a partograph. Patients with a Bishop score of < 4 and below were initiated on prostaglandin E2 for cervical ripening. In addition, amniotomy with oxytocin or for augmentation was performed on patients with a cervical dilatation of < 1.2 cm/hour or less than three contractions in 10 minutes of toco monitoring.

RESULTS

Between January 1, 2019, and January 1, 2022, a total of 13,755 deliveries occurred in Ankara Koru Hospital, of which 7703 (56%) were vaginal. A total of 467 patients had a vaginal birth after caesarean delivery, but only 57 of them were included in the study. One hundred and eighty-seven patients whose pregnancy was terminated between 20-24 weeks of gestation due to a major fetal anomaly, 36 patients with stillbirths, 93 pregnant women with a history of previous vaginal delivery, and 94 patients with deliveries below 37 weeks of gestation were excluded from the study.

Maternal age was statistically significantly lower in the normal vaginal delivery (NVD) group than in the ERCD group ($p < 0.0002$). There was no significant difference between the NVD and VBAC groups, as well as between the ERCD and VBAC groups.

Gestational age was lower in the NVD group than in the ERCD and VBAC groups ($p < 0.0005$). Birth weight was statistically significantly lower in the NVD group than in the ERCD and VBAC groups ($p < 0.0002$). No statistically significant correlation was found

between the BMI values in all three groups ($p < 0.586$). There was no statistically significant difference between the groups in terms of pre- and post-natal hemoglobin and APGAR scores. In addition, no uterine rupture was observed in all three groups. Table 1.

The comparison of the DVD and VBAC groups revealed no statistically significant difference between the groups in terms of time to delivery, prostaglandin use rate, and pre- and postnatal haemoglobin levels. The rate of epidural and oxytocin use was higher in the NVD group than in the VBAC group. Table 2.

In the TOLAC subgroup analysis, the reasons for previous caesarean sections were non-progressed labor in 27 (47%) patients, acute fetal distress in 7 (12%) patients, fetal macrosomia in 5 (8.7%) patients, cephalo-pelvic disproportion in 15 (26.3%), and non-vertex presentation in 3 patients (5.2%). Of the patients, 44 (77.1%) had a history of a caesarean section once, 11 (19.3%) had a cesarean section twice, and 2 (3.4%) had a cesarean section three times. Nine (15.7%) of these 57 patients had to undergo a cesarean section. Eighty-eight percent ($n = 8$) of patients who had a repeat caesarean section after TOLAC had a history of only one caesarean, and 12% ($n = 1$) had a history of two previous caesarean sections. Of the patients with unsuccessful VBAC, 55.5% ($n = 5$) had a repeat caesarean section due to labor dystocia, 33.3% ($n=3$) due to acute fetal distress, and 11.1% ($n = 1$) due to cephalo-pelvic disproportion.

No statistically significant correlation ($p < 0.078$) was found between unsuccessful VBAC and birth weight in the TOLAC group. In the VBAC group, 2 (3.5%) patients were initiated on prostaglandin for induction, 32 (56%) patients were initiated on oxytocin, and the number of patients who underwent an amniotomy was 7 (12%). On the other hand, 16 patients were followed up spontaneously.

In the TOLAC group, 3 (21.4%) of the 16 patients who received epidural anaesthesia had a caesarean section, and 9 had a successful VBAC. In addition, 2 patients in the TOLAC group received prostaglandin. In the TOLAC group, 7 (24%) of the 32 patients who received oxytocin had a caesarean section, and 22 (76%) had VBAC.

In the TOLAC group, patients had a repeat caesarean section at a maximum of 40 weeks ($n = 8$, 88%) as a result of failure. No statistically significant correlation ($p < 0.842$) was found between the use of oxytocin for induction and failed VBAC. A total of 16 (29%) patients received epidural analgesia. No statistical correlation ($p < 0.586$) was found between epidural anaesthesia and caesarean section. There was a statistically significant correlation ($p < 0.020$) between gestational age and caesarean section as a result of unsuccessful VBAC. Patients had a caesarean section at a maximum of 40 weeks ($n = 8$, 80%).

DISCUSSION

Our study can be described as one of the few studies in Turkish clinics. Although caesarean rates are known to be 52% in Turkey [20], VBAC rates are not known exactly, but successful VBAC rates have been reported as 55–84% in studies conducted with a small number of patients [21–24]. The most important non-medical factor for the low preference for VBAC may be the fear of medico-legal problems. As a matter of fact, in countries where malpractice cases are less frequent, obstetricians recommend and perform VBAC at higher rates [25]. Moreover, studies have shown that senior and more experienced obstetricians recommend vaginal birth after caesarean sections much more than less experienced physicians [26, 27]. In our study, maternal age was statistically significantly lower in the NVD group than in the ERCD group because the NVD group consisted of primigravid patients. Patients in the ERCD group had a history of caesarean section, and patients in the TOLAC group also had a history of birth. Therefore, it is normal for the NVD group to have a lower mean age.

A similar retrospective study by Sahin et al. [24] evaluated the outcomes of a total of 474 patients scheduled for VBAC, resulting in 216 (45.6%) successful deliveries while 258 (54.4 %) patients had to have a repeat caesarean section. Unlike our study, 98 (20.6%) patients included in this study had a vaginal birth before a caesarean section. In addition, 29 (6.2%) patients had a history of vaginal birth after caesarean section. In total, 27.1% of the patients included in the study had a history of vaginal delivery. This leads to a significant reduction in the rate of failed VBAC [24]. In contrast, we only included patients who did not have a history of vaginal delivery or successful VBAC in their previous pregnancies. Patients with a history of vaginal delivery or a history of VBAC were excluded from the study. Of the patients admitted for TOLAC, 84.2% (n = 48) had successful VBAC. The difference between our study and other studies was the exclusion of patients with a history of previous vaginal deliveries, which increased the success factors.

Lazarou et al. [28] also found a successful VBAC rate of 85% in their study, which supports the results of our study.

Different studies have reported uterine rupture rates in VBAC to be approximately 0.3–0.7% [29, 30]. We are of the opinion that a zero rate of uterine rupture in all three groups in our study is related to the number of patients. However, we believe that the main reason obstetricians do not prefer TOLAC is the complication of uterine rupture. Therefore, larger prospective studies are needed to predict and minimize this complication.

Medical induction of labour with prostaglandin E2 (dinoprostone) is not recommended by some scientific societies, such as ACOG or SOGC, in patients with a previous cesarean section and should not be used except in rare circumstances after appropriate counselling [31, 32]. Some studies that have evaluated cervical ripening with prostaglandin E2 (PGE2) have shown conflicting results [33, 34]. Due to the lack of conclusive results, many countries continue to use PGE2.

Rare circumstances after appropriate counselling. Chiemsi et al. [35] investigated the effect of oxytocin and prostaglandin E2 use on VBAC success in VBAC patients and found no statistically significant relationship. Our study also showed no statistical relationship between VBAC success and oxytocin, in line with this study. Sakala et al. [36] showed in their study that epidural anaesthesia did not increase the success rate of VBAC. Our study also supports the results of this study.

Birth weight was significantly higher in the ERCD and TOLAC groups than in the SVD group. This is related to the fact that the gestational week of the SVD group was lower than that of the other two groups in our study. The TOLAC subgroup analysis revealed no correlation between birth weight and having a caesarean section ($p < 0.078$). There are also studies supporting our results (28) and, conversely, supporting that birth weight is directly related to failed VBAC [37, 38].

Although uterine rupture was not observed in our TOLAC trials in patients with a history of two or more caesarean sections, studies have shown high maternal morbidity rates in TOLAC trials after two or more caesarean sections [39]. Women who request TOLAC trial after two or more caesarean sections, considering the available evidence, they should have the option of a carefully monitored vaginal delivery.

Our study showed no significant difference in the minute 5 Apgar score of infants between all three groups. In their study, Guise et al. found that the well-being of infants born in the TOLAC group was statistically significantly better than that of those in the ERCD group [40]. Moreover, our study revealed no statistically significant difference in decreased postnatal haemoglobin between all three groups. In their study, Takeya et al. did not find a significant difference in pre- and post-operative haemoglobin difference between the patient group with an elective caesarean section after caesarean section and the TOLAC group [41].

The limitations of our study are its retrospective design and small sample size. The strength of the study is that all patients in the TOLAC group were selected from candidates who will have their first vaginal delivery and compared with primigravida NVD patients, excluding patients with characteristics that increase VBAC success. Furthermore, patients

who had ERCD, which is considered a reliable method of delivery for those who previously had a caesarean section, were also compared with patients in the TOLAC group.

CONCLUSIONS

According to the results of our study, VBAC may be a safe option for eligible patients in tertiary centers under the supervision of an obstetrician experienced in TOLAC and a midwife, considering that the caesarean section rates in Turkey are much higher than the limits recommended by the World Health Organization.

Author's contribution

All authors have read and approved the submission of the manuscript. The manuscript has not been published and is not considered for publication elsewhere in whole or in part in any language.

Ethics

This study was completed in accordance with the principles of the Declaration of Helsinki. The approval for the study was obtained from the Ethics Committee of Gazi University under the number E.537062.

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Conflict of interest

There is no conflict of interest to declare.

Table 1. Comparison of the groups

	NVD	ERCD	**TOLAC**	**p**
N	72	60	57	
Maternal age [years]	Mean: 29.4 SD: ± 2.99 Medyan: 30 Range: 19–37	Mean: 32.05 SD: ± 3.6 Medyan: 32 Range: 24–40	Mean: 30.6 SD: ± 4.3 Medyan: 31 Range: 20–40	**0.0002***
GW**	Mean: 38 + 6	Mean: 39+3	Mean: 39 + 5	0.0005*

	SD: ± 8.4 Medyan: 39 Range: 36–41	SD: ± 3.5 Medyan: 39–40 Range: 39–40	SD: ± 8.4 Medyan: 40 Range: 37–42	
Birth weight [gr]	Mean: 3193.5 SD: ± 365.6 Medyan: 3190–3200 Range: 2170–4200	Mean: 3404.3 SD: ± 362.4 Medyan:3340–3360 Range: 2820–4650	Mean: 3460.7 SD: ± 425.1 Medyan: 3490 Range: 2500–4260	**0.0002***
Uterine rupture	0	0	0	
Apgar 5. min	Mean: 9 SD: ± 1 Medyan: 9 Range: 4–10	Mean: 9.5 SD: ± 0.2 Medyan: 9 Range: 7.5–9.5	Mean: 8.5 SD: ± 0.6 Medyan: 9 Range: 6–10	0.747*
HGB before birth [gr/dL]	Mean: 11.5 SD: ± 1.3 Medyan: 11.6 Range: 6.8–14.3	Mean: 12.05 SD: ± 1.06 Medyan: 12.1–12.2 Range: 9.6–14	Mean: 11.5 SD: ± 2.3 Medyan: 11.6 Range: 6.8–14.3	0.575*
Postpartum HGB [gr/dL]	Mean: 10.6 SD: ± 1.3 Medyan: 10.5 Range:5.5–13.5	Mean: 10.9 SD: ±1.23 Medyan: 11 Range: 7.8–13.2	Mean: 10.5 SD: ± 1.35 Medyan: 10.5 Range: 5.5–13.5	0.690*
HGB difference before and after birth [gr/dL]	Mean: 0.9 SD: ± 0.9 Medyan:0.9 Range: (–1.3)–3.9	Mean: 1.2 SD: ± 0.9 Medyan:1.2 Range: (–1.5)–4.1	Mean: 0.9 SD: ± 0.8 Medyan:1 Range: (–1.3)–3.9	0.782*

*One-way ANOVA; NVD — normal vaginal delivery; ERCD — elective repeat caesarean delivery; TOLAC — trial of labor after caesarean; SD — standard deviation

Table 2. Comparison of normal vaginal delivery (NVD) and vaginal birth after caesarean delivery (VBAC)

	NVD	**VBAC**	**p**
Time until birth [hour]	Mean: 6.4 SD: ± 3.7 Median: 6 Range: 0–15	Mean: 6.9 SD: ± 5.1 Median: 6.1–6.4 Range: 0–22.5	0.059[t]
Epidural use (n/%)	42/58.3%	16/29%	**0.001**[c]
Oxytocin use (n/%)	53/73.6%	32/56%	**0.037**[c]
Prostaglandin use (n/%)	2/2.8%	2/3.5%	0.811[c]

[t] t-test; [c] Chi-Square test

References

1. Vaginal delivery after previous cesarean birth. Int J Gynaecol Obstet. 2004; 52(1): 90–98, doi: 10.1016/s0020-7292(96)90009-0.
2. Uddin SFG, Simon AE. Rates and success rates of trial of labor after cesarean delivery in the United States, 1990–2009. Matern Child Health J. 2013; 17: 1309–1314.
3. Gross MM, Matterne A, Berlage S, et al. Interinstitutional variations in mode of birth after a previous caesarean section: a cross-sectional study in six German hospitals. J Perinat Med. 2015; 43(2): 177–184, doi: 10.1515/jpm-2014-0108, indexed in Pubmed: 25395596.
4. Wells CE. Vaginal birth after cesarean delivery: views from the private practitioner. Semin Perinatol. 2010; 34(5): 345–350, doi: 10.1053/j.semperi.2010.05.008, indexed in Pubmed: 20869551.
5. Tanos V, Toney ZA. Uterine scar rupture - Prediction, prevention, diagnosis, and management. Best Pract Res Clin Obstet Gynaecol. 2019; 59: 115–131, doi: 10.1016/j.bpobgyn.2019.01.009, indexed in Pubmed: 30837118.
6. Li YX, Bai Z, Long DJ, et al. Predicting the success of vaginal birth after caesarean delivery: a retrospective cohort study in China. BMJ Open. 2019; 9(5): e027807, doi: 10.1136/bmjopen-2018-027807, indexed in Pubmed: 31129593.
7. Dy J, DeMeester S, Lipworth H, et al. No. 382-Trial of Labour After Caesarean. J Obstet Gynaecol Can. 2019; 41(7): 992–1011, doi: 10.1016/j.jogc.2018.11.008, indexed in Pubmed: 31227063.

8. Sentilhes L, Vayssière C, Beucher G, 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(1): 25–32, doi: 10.1016/j.ejogrb.2013.05.015, indexed in Pubmed: 23810846.

9. Reif P, Brezinka C, Fischer T, et al. Labour and Childbirth After Previous Caesarean Section: Recommendations of the Austrian Society of Obstetrics and Gynaecology (OEGGG). Geburtshilfe Frauenheilkd. 2016; 76(12): 1279–1286, doi: 10.1055/s-0042-118335, indexed in Pubmed: 28017971.

10. American College of Obstetricians and Gynecologists. Practice bulletin no. 205: vaginal birth after cesarean delivery. Obstet Gynecol. 2019; 133(2): e110–27.

11. Gupta JK, Smith GCS, Chodankar RR. RCOG Green-top guideline no. 45: Birth after previous caesarean birth. Royal College of Obstetricians and Gynaecologists 2015.

12. Guise JM, Denman MA, Emeis C, et al. Vaginal birth after cesarean: new insights on maternal and neonatal outcomes. Obstet Gynecol. 2010; 115(6): 1267–1278, doi: 10.1097/AOG.0b013e3181df925f, indexed in Pubmed: 20502300.

13. Gibbins KJ, Weber T, Holmgren CM, et al. Maternal and fetal morbidity associated with uterine rupture of the unscarred uterus. Am J Obstet Gynecol. 2015; 213(3): 382.e1–382.e6, doi: 10.1016/j.ajog.2015.05.048, indexed in Pubmed: 26026917.

14. Bujold E, Mehta SH, Bujold C, et al. Interdelivery interval and uterine rupture. Am J Obstet Gynecol. 2002; 187(5): 1199–1202, doi: 10.1067/mob.2002.127138, indexed in Pubmed: 12439503.

15. Grobman WA, Lai Y, Landon MB, et al. National Institute of Child Health and Human Development (NICHD) Maternal-Fetal Medicine Units Network (MFMU). Development of a nomogram for prediction of vaginal birth after cesarean delivery. Obstet Gynecol. 2007; 109(4): 806–812, doi: 10.1097/01.AOG.0000259312.36053.02, indexed in Pubmed: 17400840.

16. Metz TD, Stoddard GJ, Henry E, et al. Simple, validated vaginal birth after cesarean delivery prediction model for use at the time of admission. Obstet Gynecol. 2013; 122(3): 571–578, doi: 10.1097/AOG.0b013e31829f8ced, indexed in Pubmed: 23921867.

17. Lydon-Rochelle M, Holt VL, Easterling TR, et al. Risk of uterine rupture during labor among women with a prior cesarean delivery. N Engl J Med. 2001; 345(1): 3–8, doi: 10.1056/NEJM200107053450101, indexed in Pubmed: 11439945.

18. Elkousy MA, Sammel M, Stevens E, et al. The effect of birth weight on vaginal birth after cesarean delivery success rates. Am J Obstet Gynecol. 2003; 188(3): 824–830, doi: 10.1067/mob.2003.186, indexed in Pubmed: 12634665.

19. Kok N, Wiersma IC, Opmeer BC, et al. Sonographic measurement of lower uterine segment thickness to predict uterine rupture during a trial of labor in women with previous Cesarean section: a meta-analysis. Ultrasound Obstet Gynecol. 2013; 42(2): 132–139, doi: 10.1002/uog.12479, indexed in Pubmed: 23576473.

20. The Ministry of Health of Turkey. Turkey Demographic and Health Survey p. 109, 2018.

21. Akçay T, Göl K, Şahin İ, et al. The safety of vaginal birth after cesarean. Turkiye Klinikleri J Gynecol Obst. 2001; 11(4): 224–227.

22. Senturk MB, Cakmak Y, Atac H, et al. Factors associated with successful vaginal birth after cesarean section and outcomes in rural area of Anatolia. Int J Womens Health. 2015; 7: 693–697, doi: 10.2147/IJWH.S83800, indexed in Pubmed: 26203286.

23. Takmaz T, Dural HR, Gorchıyeva I, et al. The Obstetrics Outcomes of Vaginal Birth After Cesarean Section in a Cohort with High Induction of Labor Rate. J Clin Obstet Gynecol. 2020; 30(4): 146–152.

24. Sahin S, Ozkaya E, Eroglu M, et al. Predictors of successful vaginal birth after a caesarean in women with a previous single caesarean delivery. Eur Rev Med Pharmacol Sci. 2022; 26(5): 1594–1600.

25. Brick A, Layte R, Farren M, et al. Recent Trends in Vaginal Birth After Caesarean Section. Ir Med J. 2016; 109(10): 482, indexed in Pubmed: 28644587.

26. Kwee A, Cohlen BJ, Kanhai HHH, et al. Caesarean section on request: a survey in The Netherlands. Eur J Obstet Gynecol Reprod Biol. 2004; 113(2): 186–190, doi: 10.1016/j.ejogrb.2003.09.017, indexed in Pubmed: 15063958.

27. Appleton B, Targett C, Rasmussen M, et al. Knowledge and attitudes about vaginal birth after Caesarean section in Australian hospitals. VBAC Study Group. Vaginal Birth After Caesarean. Aust N Z J Obstet Gynaecol. 2000; 40(2): 195–199, doi: 10.1111/j.1479-828x.2000.tb01146.x, indexed in Pubmed: 10925909.

28. Lazarou A, Oestergaard M, Netzl J, et al. Vaginal birth after cesarean (VBAC): fear it or dare it? An evaluation of potential risk factors. J Perinat Med. 2021; 49(7): 773–782, doi: 10.1515/jpm-2020-0222, indexed in Pubmed: 34432969.

29. Macones GA, Peipert J, Nelson DB, et al. Maternal complications with vaginal birth after cesarean delivery: a multicenter study. Am J Obstet Gynecol. 2005; 193(5): 1656–1662, doi: 10.1016/j.ajog.2005.04.002, indexed in Pubmed: 16260206.

30. Cahill AG, Tuuli M, Odibo AO, et al. Is vaginal birth after cesarean (VBAC) or elective repeat cesarean safer in women with a prior vaginal delivery? Am J Obstet Gynecol. 2006; 195(4): 1143–1147, doi: 10.1016/j.ajog.2006.06.045, indexed in Pubmed: 16846571.

31. Practice Bulletin No. 184: Vaginal Birth After Cesarean Delivery. Obstet Gynecol. 2017; 130(5): e217–e233, doi: 10.1097/AOG.0000000000002398, indexed in Pubmed: 29064970.

32. Martel MJ, MacKinnon CJ. No. 155-Guidelines for Vaginal Birth After Previous Caesarean Birth. J Obstet Gynaecol Can. 2018; 40(3): e195–e207, doi: 10.1016/j.jogc.2018.01.014, indexed in Pubmed: 29525045.

33. Haas J, Barzilay E, Chayen B, et al. Safety of low-dose prostaglandin E2 induction in grandmultiparous women with previous cesarean delivery. J Matern Fetal Neonatal Med. 2014; 27(5): 445–448, doi: 10.3109/14767058.2013.818651, indexed in Pubmed: 23841832.

34. López-Jiménez N, García-Sánchez F, Pailos RH, et al. Induction of Labor with Vaginal Dinoprostone (PGE) in Patients with a Previous Cesarean Section: Obstetric and Neonatal Outcomes. J Clin Med. 2021; 10(22), doi: 10.3390/jcm10225221, indexed in Pubmed: 34830502.

35. Cieminski A. Induction and augmentation of labor after prior cesarean delivery. Ginekologia i Poloznictwo. 2012; 23(1): 18–24.

36. Sakala EP, Kaye S, Murray RD, et al. Epidural analgesia. Effect on the likelihood of a successful trial of labor after cesarean section. J Reprod Med. 1990; 35(9): 886–890, indexed in Pubmed: 2231564.

37. Mizrachi Y, Barber E, Kovo M, et al. Prediction of vaginal birth after one ceasarean delivery for non-progressive labor. Arch Gynecol Obstet. 2018; 297(1): 85–91, doi: 10.1007/s00404-017-4569-4, indexed in Pubmed: 29052016.

38. Kyvernitakis I, Reichelt J, Kyvernitakis A, et al. Trends of vaginal birth after cesarean delivery in Germany from 1990 to 2012: a population-based study. Z Geburtshilfe Neonatol. 2014; 218(5): 203–209, doi: 10.1055/s-0034-1385920, indexed in Pubmed: 25353214.

39. Tahseen S, Griffiths M. Vaginal birth after two caesarean sections (VBAC-2)-a systematic review with meta-analysis of success rate and adverse outcomes of VBAC-2 versus VBAC-1 and repeat (third) caesarean sections. BJOG. 2010; 117(1): 5–19, doi: 10.1111/j.1471-0528.2009.02351.x, indexed in Pubmed: 19781046.

40. Guise JM, Eden K, Emeis C, et al. Vaginal birth after cesarean: new insights on maternal and neonatal outcomes. Obstet Gynecol. 2010; 115(6): 1267–1278, doi: 10.1097/AOG.0b013e3181df925f, indexed in Pubmed: 20502300.

41. Takeya A, Adachi E, Takahashi Y, et al. Trial of labor after cesarean delivery (TOLAC) in Japan: rates and complications. Arch Gynecol Obstet. 2020; 301(4): 995–1001, doi: 10.1007/s00404-020-05492-8, indexed in Pubmed: 32185554.