

# The Effect of the Frequency of Vaginal Examination During the Birth Process on Birth Comfort and Maternal-Fetal Outcomes

© Fatma Kayabaşı<sup>1</sup>, © Zümrüt Yılar Erkek<sup>2</sup>

<sup>1</sup>Department of Midwifery, Tokat Gaziosmanpaşa University Graduate Education Institute, Tokat, Türkiye

<sup>2</sup>Department of Midwifery, Tokat Gaziosmanpaşa University Faculty of Health Sciences, Tokat, Türkiye

## Abstract

**BACKGROUND/AIMS:** This study was conducted to determine the effect of the frequency of vaginal examination (VE) during labor on pregnant women's birth comfort and maternal-fetal outcomes.

**MATERIALS AND METHODS:** This descriptive study was conducted with 178 pregnant women who presented to the delivery room of Gaziosmanpaşa University Training, Research, and Application Hospital. A Descriptive Data Form and the Childbirth Comfort Questionnaire (CCQ) were used to collect data.

**RESULTS:** It was determined that the median value of the number of VEs performed on pregnant women was two times in the latent phase, three times in the active phase, two times in the transitional phase, and eight times during the total labor period. The median value of the latent phase CCQ of pregnant women was significantly higher than that of the transitional phase CCQ ( $p < 0.05$ ). It was determined that spontaneous rupture of membranes developed in most pregnant women, maternal and fetal birth complications developed in the remainder, and fetal distress was the most common complication. The number of VEs of pregnant women who developed fetal birth complications with rupture of membranes during the VE was significantly higher ( $p < 0.001$ ). A positive, significant correlation was found between the frequency of VE, duration of delivery, and total hospital stay ( $p < 0.001$ ).

**CONCLUSION:** It was found that the frequency of VE was above the World Health Organization criteria but had a negative effect on mothers' birth comfort and maternal and fetal outcomes.

**Keywords:** Birth comfort, frequency of vaginal examination, maternal-fetal outcomes, normal birth

## INTRODUCTION

Vaginal examination (VE) is a significant midwifery intervention that is routinely performed to evaluate the progress of birth, detect risks, and intervene in risks earlier. In midwifery care, a woman in the birth process undergoes at least one VE, which can be repeated every 4 h or more often depending on the course of birth or the requirements of the maternity unit. Because the average birth time is between eight and twelve hours,

most women undergo VE at least two or three times during birth.<sup>1,2</sup> A VE that is performed in accordance with the procedures can be a superb compass for the birthing process. When it is not performed carefully, it can be perceived as a negative experience that causes psychological and physical pain as well as disrupts natural body rhythms and leads to psychological consequences. For this reason, VE should be questioned very well in terms of its significance in midwifery practices and its harms and benefits to women and labor.<sup>3-6</sup> Doctors and midwives must

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**ORCID IDs of the authors:** F.K. 0000-0002-6376-0280; Z.Y.E. 0000-0002-0495-9003.



**Address for Correspondence:** Zümrüt Yılar Erkek

**E-mail:** zumrut.yilar@gop.edu.tr

**ORCID ID:** orcid.org/0000-0002-0495-9003

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understand women's feelings and experiences during VE and perform it diligently only when necessary, without causing pain and discomfort. Contrary to these evaluations, some studies in the literature have shown that midwives are not careful about the frequency of VE, pain and stress management, provision of information for pregnant women, and their wishes.

The World Health Organization (WHO) recommends that vaginal was examined by the same practitioner every four hours. However, this number varies in clinics depending on the instructions of the institution and the person performing the VE. Although it is a widely used practice, evidence-based outcomes regarding its benefits/harms seem inadequate. According to existing research findings, there is a weak recommendation level and a very low quality of evidence.<sup>7-10</sup>

Childbirth is an unforgettable life experience for women. Having a positive experience of childbirth can strengthen women's self-confidence and satisfaction with the birth. The increase in women's satisfaction with birth is related to their perception of comfort during birth.<sup>11</sup> Comfortable birth may be achieved by overcoming physiological complaints and providing effective care during the birth process.<sup>12,13</sup> Midwives play an important role in providing and maintaining comfort during the birth process. Midwives must perform interventions in accordance with the procedures so that they can increase women's comfort during birth. Therefore, midwives and doctors should understand women's feelings and experiences during VE. When VE is needed to improve their own practices, healthcare professionals should perform the examination with care and minimal discomfort to women by encouraging them and preventing pain. Adhering to the best evidence includes performing VE at birth only when necessary and by the best practitioner possible.<sup>14</sup>

A review of the national literature indicated that there was no study investigating the frequency and requirement of cervical dilatation evaluation with vaginal touch at birth, its effect on maternal-fetal outcomes, and the opinions of women about VE. A systematic review of the Cochrane database showed that there was not much data on the duration of birth, maternal infections, and general views of women. Reflecting on these needs, this study was conducted to make an important contribution to the literature in the field of midwifery.

## MATERIALS AND METHODS

A descriptive research method was used.

### Sample

The universe of the study consisted of pregnant women admitted to the birthing room of Gaziosmanpaşa University Training, Research, and Application Hospital, where the research data were collected between July 10, 2020 and May 10, 2021. No sample calculation was performed in the study, and 178 pregnant women who met the research criteria and volunteered to participate were included in the study between the research dates. According to sampling criteria, pregnant women who had a gestational age of >37 weeks, were expected to have a normal birth, could speak and understand Turkish, had a low-risk or risk-free pregnancy, had a single fetus, were aged between 18 and 35 years, had no presentation-position anomaly, volunteered to participate in the study, and submitted a written consent form were included in the study. Pregnant women who developed complications during the birth process were not included in the study.

### Data Collection Tools

A descriptive data form and the Childbirth Comfort Questionnaire (CCQ) were used to collect the study data.

### Descriptive Data Form

This form was prepared by the researchers following a review of the literature.<sup>1-4,11,14,15</sup> It consists of three parts.

The first part has 15 questions about the sociodemographic and obstetric characteristics of pregnant women. Socio-demographic data include women's age, education level, occupation, residence, income status, etc., and obstetric data include the gestational week of the woman, number of pregnancy, births, miscarriages, mode of birth, etc.

The second part consists of records about the frequency and time of VE and the number of people who perform it.

The third part comprises data on fetal- maternal outcomes of pregnant women during and after birth. These data include the duration of birth, mode of birth, rupture status of membranes, maternal complications (bleeding, infection, laceration, etc.), fetal complications (meconium aspiration, cephalohematoma, fetal asphyxia, etc.), length of hospital stay, and status of antibiotic use. Data for evaluating the fetal- maternal outcomes of pregnant women during and after birth were collected using hospital records during birth and the early postpartum period (first 2 h postpartum).

### Childbirth Comfort Questionnaire

This scale comprises items about the views of pregnant women on their birth comfort during VE. The original name of the scale is "Childbirth Comfort Questionnaire." It was developed by Schuiling in 2003 inspired by Kolcaba's comfort theory. A Turkish validity and reliability study of the scale was conducted by Coskuner Potur et al.<sup>11</sup> in 2015. The Cronbach's alpha coefficient of the scale was found to be 0.75. This coefficient was calculated to be 0.72 in this study. The scale consists of 9 questions and has a five-point Likert-type evaluation structure. Responders are expected to evaluate the items on the scale considering their comfort in the birthing room. Each expression relates to a particular feeling of comfort (relaxation, relief, or superiority) and its dimensions (physical, environmental, psychospiritual, or social). Scores on the scale range between 9 and 45. High scores on the scale show an increase in comfort levels, whereas low scores show a decrease in the level of comfort.<sup>11</sup>

### Implementation of the Study

The study data were collected using the face-to-face interview technique after the researcher informed the pregnant women about the purpose of the research and the questionnaire. The first and second parts of the questionnaire form were applied by the researcher after the written and verbal consent of pregnant women was obtained during their admission to the maternity ward. The data about the frequency and time of VE and the person who performed it, which were in the second part of the questionnaire, were collected using the records of the "Birth and Labor Form" that was used for the monitoring of pregnant women during birth in the birthing room. The data of the third part of the questionnaire were collected from the hospital records by the researchers during birth and early postpartum (first 2 h postpartum). The CCQ was applied at the beginning of the latent phase of birth (1-3 cm cervical dilatation)<sup>11,16</sup> and during the transition phase of birth (8-10

cm cervical dilatation).<sup>17</sup> The scale was applied between contractions when the pregnant woman did not experience pain. To determine the functionality of the data collection forms, they were applied to the sample group after they had been piloted on 10 pregnant women who met the research criteria.

**Statistical Analysis**

Study data were analyzed using the SPSS for Windows 25.0 software package. Numbers, percentages, and minimum, maximum, median, mean, and standard deviation (SD) values were used in the analysis of descriptive data. The Kolmogorov-Smirnov test was used to determine the normality of data, and independent samples t-test and one-way analysis of variance (ANOVA) were used to evaluate these data. Mean and SD values were presented for data showing a normal distribution, and median, minimum, and maximum values were presented for data with non-normal distribution. Mann-Whitney U, Kruskal-Wallis variance, and Wilcoxon analyses were used to evaluate data that did not show a normal distribution. The chi-square test was used to determine the relationship between qualitative data, and Spearman correlation analysis was used to examine the relationship between two variables. In statistical tests, the confidence interval was taken as 95% and the significance level was taken as  $p < 0.05$ .

**RESULTS**

Table 1 shows the distribution of some sociodemographic characteristics of pregnant women. Table 2 shows the distribution of people who underwent VEs according to phases during the birth process and the count and total count of VEs. As shown in the table, 1,185 (77.1%) VEs were performed by midwives and 351 (22.9%) by physicians during the birth process. Examination of the frequency of VEs during birth indicated that the median value of the count of VEs was two in the latent phase of birth, three in the active phase, and two in the transition phase. The median value of the total count of VEs performed during the birth process was eight. In addition, it was determined that VE was performed 421 times in the latent phase, 679 times in the active phase, and 436 times in the transition phase, and a total of 1,536 VEs were performed.

Table 3 shows a comparison of the median values of pregnant women’s scores on the childbirth comfort scale at the beginning of the latent phase and the end of the active phase. Accordingly, it was determined that the median value of CCQ scores at the beginning of the latent phase (median: 32) was significantly higher than that of CCQ scores at the transition phase (median: 30) ( $p < 0.05$ ).

Table 4 shows a comparison of the frequency of VEs and maternal- fetal birth outcomes in pregnant women. Accordingly, the median value (median: 10) of the count of VEs during which a membrane rupture occurred was statistically significantly higher than the median value (median: 7) of the count of VEs during which a spontaneous membrane rupture occurred ( $p < 0.001$ ). Likewise, it was determined that the median value of the count of VEs (median: 10) performed on those who developed fetal birth complications was statistically significantly higher than the median value of the count of VEs (median: 7) performed on those who did not ( $p < 0.001$ ).

Table 5 presents the relationship between the frequency of VE and CCQ scores (transition phase), length of hospital stay during birth, and newborn Apgar scores. A significant positive relationship was found

between the frequency of VE and the duration of birth and total hospital stay. Accordingly, it was determined that as the number of VEs increased, the duration of birth increased ( $r = 0.798$ ;  $p < 0.001$ ) and the total length of hospital stay increased ( $r = 0.479$ ;  $p < 0.001$ ), as well. However, there was no statistically significant relationship ( $p > 0.05$ ) between the number of VEs and CCQ scores (transition phase), length of postpartum hospital stay, and Apgar scores.

**Table 1. Distribution of some socio-demographic characteristics of pregnant women (n=178)**

Variables	Median (minimum-maximum)	
Age (year)	25.97±4.24	
Length of marriage (year)	4.24±3.69	
	n	%
<b>Age groups</b>		
20-24	72	40.5
25-29	67	37.6
30-34	31	17.4
35-39	8	4.5
<b>Level of education</b>		
Primary school	76	42.7
High school	48	27.0
University and higher	54	30.3
<b>Working status</b>		
Working in a paid job	35	19.7
Not working in a paid job	143	80.3
<b>Marital status</b>		
Married	169	94.9
Single	9	5.1
<b>Education level of the spouse</b>		
Primary school	67	37.7
High school	51	28.7
University and higher	60	33.6
<b>Working status of the spouse</b>		
Working in a paid job	157	88.2
Not working in a paid job	21	11.8
<b>Health insurance</b>		
Yes	28	15.7
No	150	84.3
<b>Place of residence</b>		
Province	82	46.1
County	61	34.3
Town	10	5.6
Village	25	14.0
<b>Evaluation of the economic status</b>		
Income < expenses	47	26.4
Income = expenses	112	62.9
Income > expenses	19	10.7
<b>Family type</b>		
The core family	139	78.1
Extended family	39	21.9

Phases	The person performing VE	Total, n (%)	Median (min.-max.)	Mean ± SD
Latent phase, (n=421)	Physician	159 (37.8)	1 (1-3)	1.22±0.49
	Midwife	262 (62.2)	2 (1-8)	2.28±1.59
Active phase (n=679)	Physician	115 (16.9)	1 (1-9)	1.67±1.43
	Midwife	564 (83.1)	3 (1-12)	3.22±1.97
Transition phase, (n=436)	Physician	77 (17.7)	1 (1-3)	1.49±0.72
	Midwife	359 (82.3)	2 (1-9)	2.23±1.23
Total, (n=1536)	Physician	351 (22.9)	1 (1-9)	1.39±0.90
	Midwife	1185 (77.1)	2 (1-12)	2.60±1.68
	<b>Total count of VEs (1536)</b>		<b>Median (min.-max.)</b>	<b>Mean ± SD</b>
Latent phase	421		2 (1-9)	2.37±1.69
Active phase	679		3 (1-13)	3.84±2.29
Transition phase	436		2 (1-9)	2.48±1.20
Total	1536		8 (4-16)	8.63±2.97

min.: Minimum, max.: Maximum, SD: Standard deviation, VE: Vaginal examination.

CCQ application	n	Median (minimum-maximum)	Z	p
Latent phase (1-3 cm)	178	32 (22-41)	-7.450	0.001
Transition phase (8-10 cm)	178	30 (20-39)		

Z: Wilcoxon test, CCQ: Childbirth Comfort Questionnaire.

	n	Frequency of VEs median (min.-max.)	Test and p-value
<b>Episiotomy application</b>			
Yes	122	8 (4-16)	KW=5.490 p=0.064
No	34	7 (4-16)	
Laceration	22	7.50 (4-16)	
<b>Rupture of the membranes</b>			
Spontaneous	118	7 (4-16)	U=2396.500 p=0.001
During VE	60	10 (5-16)	
<b>Maternal birth complications</b>			
Yes	12	9.50 (5-13)	U=796.500 p=0.244
No	166	8 (4-16)	
<b>Fetal birth complications</b>			
Yes	38	10 (4-16)	U=1885.500 p=0.006
No	140	7 (4-16)	

KW: Kruskal-Wallis test; U: Mann-Whitney U test, CCQ: Childbirth Comfort Questionnaire, VE: Vaginal examination.

Variable		CCQ scores (transition phase)	Duration of birth	Length of postpartum hospital stay	Total length of hospital stay	Apgar score (1 <sup>st</sup> minute)	Apgar score (5 <sup>th</sup> minute)
Frequency of the VE	r	-0.006	0.798*	-0.099	0.479*	-0.008	-0.005
	p	0.931	0.001	0.189	0.001	0.911	0.943

\*r= Spearman correlation analysis, CCQ: Childbirth Comfort Questionnaire, VE: Vaginal examination.

## DISCUSSION

This study was conducted to determine the effect of the frequency of VE performed during birth on birth comfort and maternal and fetal outcomes. The findings of this study were discussed in line with the results of similar studies in the literature.

The WHO and NICE recommend that the VE of a pregnant woman should be performed by the same health personnel during birth.<sup>18,19</sup> In this study, VEs were performed by two practitioners, including a midwife and a physician, and mostly by midwives (Table 2). This result shows that normal births are managed by midwives in the hospital where the research was conducted because most women in our country receive reproductive health services such as pregnancy, childbirth, and puerperium from a physician. Only 28.6% of births in health institutions and 15.9% of births in other places are performed by midwives.<sup>20</sup> There are findings in the literature similar to ours. For example, Küçük and Çalık<sup>21</sup> reported that pregnant women were mostly evaluated by two to three different healthcare professionals. Hatamleh et al.<sup>22</sup> stated that more than half of the women in their study were examined by both a midwife and a doctor. EL-Moniem and Mohamady<sup>2</sup> stated that as the duration of birth increased, both the number of examinations and the number of staff who performed them increased. Hassan et al.<sup>14</sup> reported that only 12% of pregnant women were examined by one person and that 41% were examined by “many” healthcare professionals during birth. It is thought that many VEs cause inconsistency between findings on the progression of birth and that women lose their confidence in healthcare providers. Tuffnell et al.<sup>23</sup> argued that an inaccuracy rate of more than 50% in cervical measurements increased cesarean section rates.<sup>1</sup> Therefore, it is recommended that examinations should be performed as carefully as possible, when necessary, and by the same person. VE is an extremely necessary application for monitoring the progress of birth and detecting and intervening in high-risk situations earlier. However, frequent VEs and lack of care during this application cause pain, discomfort, anxiety, and feelings, such as fear, shame, guilt, and powerlessness, and decrease the satisfaction of women with childbirth.<sup>3-6</sup> It is recommended that VEs should be routinely performed at fixed 4-h intervals in the first stage of birth.<sup>18,24</sup> The duration of birth is expected to be last 6-12 h in the first stage and 7-15 h in total.<sup>25,26</sup> Considering the duration of birth and the frequency of VE that is deemed appropriate, it is expected that VEs will be performed two to three times in the first stage and four to six times in total. The median value of the birth time was found to be 150 min in the latent phase in the first stage, 180 min in the active phase, and 30 min in the transition phase, with the total time being 685 min. According to these data, the count of VEs performed was higher than that suggested by the WHO. A review of the relevant literature indicated that the average number of VEs during birth varied between 2.8 and 5.6 (1-15 times).<sup>2,14,22,27-30</sup> Shepherd and Cheyne<sup>30</sup> found that approximately half of the women had three or more VEs during birth, and almost 70% of them had more VEs than expected when the WHO every four hours criterion was considered. They stated that data, as in this study, were obtained from the records of the midwives using the routine practice hours recorded in the case files. Similarly, EL-Moniem and Mohamady<sup>2</sup> reported that vaginal was examined very frequently.<sup>5-12</sup> Hassan et al.<sup>14</sup> found the average number of VEs performed during childbirth to be 4.24 and stated that approximately 36% of women said that they had a “potentially high” number of VEs during childbirth. Stuart emphasized that there was little research evidence to determine the average rate of vaginal exams in normal birth or what it really needed to be.<sup>30</sup> The

results of the study by Bergstrom et al.<sup>31</sup> were quite remarkable. They reported that the number of VEs performed during birth was between 2 and 17 and that women were given a VE after each contraction. On the other hand, Küçük and Çalık<sup>21</sup> determined that VE was mostly performed 1 to 4 times and that an average of  $4.05 \pm 1.721$  VEs (1-12 times) was performed during birth. The frequency of VE was higher than the count recommended by international organizations in this study, which is thought to be because women often presented to the birthing service in the latent phase and therefore the time spent in birth was prolonged. In addition, more than half of the pregnant women (50.6%) were found to give birth for the first time, which can be counted among the factors that may cause this situation because the duration of birth differs between primiparous and multiparous pregnant women. While the first phase lasts for 8-12 h in primiparas, this period decreases to 6-8 h in multiparas.<sup>32</sup>

It is crucial that midwifery practices support birth comfort. It is thought that especially positive birth experiences can break the negative thoughts and prejudices of women about birth and help gain positive opinions on normal birth. Therefore, birth comfort should be considered during the birth process. It was determined that the median value of pregnant women's scores on the CCQ at the beginning of the latent phase was significantly higher than the median value of their scores in the transition phase (Table 5). In the literature, it is stated that non-pharmacological methods applied to relieve pregnant women's pain during birth increase birth comfort.<sup>17,33,34</sup> In this study, nothing was applied to reduce the pain experienced by pregnant women. Accordingly, it is thought that there was no change in the pregnant women's comfort related to the frequency of VE. Although the count of VEs was higher than the count recommended by the WHO, it was a pleasing finding that pregnant women's birth comfort was above the average (Table 3). This can be attributed to the high-quality care provided by midwives to pregnant women in the hospital environment during birth. Midwifery practices, which are performed in physical, sociocultural, psychospiritual, and environmental dimensions and are especially aimed at relieving pregnant women's pain, increase comfort by providing relief and relaxation and helping overcome their problems.<sup>11,17</sup>

Although there is no research providing evidence on the relationship between the frequency of VE performed during childbirth and maternal and neonatal infection, it has been stated that VEs performed more frequently than four-hour intervals may increase the risk of infection for both the mother and newborn.<sup>10</sup> In addition, frequent VEs can cause genital puerperal infection, postop-endomyometritis, and chorioamnionitis.<sup>3</sup> As a result of this study, it was determined that although the count of VEs was high, this situation did not cause infection in either the mother or the newborn. In the study of Küçük and Çalık<sup>21</sup>, similar to the results of this study, it was determined that the frequency of VE was within normal standards and that it did not cause any infection in the mother and newborn. The WHO recommends the rate of episiotomy to be 20% at most.<sup>21</sup> In this study, it was determined that episiotomy was performed in most pregnant women and that this situation was not related to the frequency of VE. In studies conducted in our country, the rates of episiotomy vary between 50% and 75%.<sup>35</sup> This difference can be attributed to the fact that hospitals do not meet the criteria for mother-friendly hospitals and that the majority of pregnant women in the study were nulliparous. In the study, it was determined that membrane rupture developed spontaneously in most pregnant

women, maternal and fetal birth complications developed in very few of them, and that most complications were fetal distress.

Although the frequency of VE performed on pregnant women was high in the study, it was observed that this situation did not adversely affect postpartum maternal and fetal outcomes to a large extent. This pleasing situation can be attributed to the skills of practitioners and the fact that VEs were carefully performed in the hospital when necessary, with minimal discomfort to pregnant women, and by encouraging them and preventing them from suffering pain. On the other hand, in the present study, it was determined that the count of VEs in pregnant women who developed membrane rupture and fetal birth complications during VE was significantly higher ( $p < 0.001$ ) (Table 4). When the application of vaginal touch every 2 h and every 4 h was compared, no difference was found in terms of birth time, epidural analgesia administration, cesarean section, spontaneous vaginal birth, and surgical vaginal birth.<sup>7-9</sup> In a review in which four studies were analyzed, it was reported that VEs administered every 4 h increased the number of vaginal deliveries, had little or no effect on chorioamnionitis, neonatal infection, or admission rates to the neonatal intensive care unit, and that outcomes such as positive birth experience or maternal pain had not been evaluated at all.<sup>36</sup> The findings of this study are consistent with those in the literature. The frequency of VE that is seven times and above raises concerns about the increased risk of infection, and it has been reported that it is related to chorioamnionitis, which occurs in 8-12 women per 1000 births.<sup>4,14</sup> In another study, it was stated that five or more VEs during delivery were associated with an increased risk of intrapartum and peripartum febrile morbidity and severe perineal trauma and that the increase in the number of staff performing VE was a risk factor for the development of neonatal infection.<sup>37</sup>

A significant positive relationship was found between the frequency of VE and the duration of birth and total hospital stay. Accordingly, it was determined that as the number of VEs increased, the duration of birth and the total length of hospital stay also increased (Table 5). This was an expected result. The prolongation of the birth period also increases the frequency of VEs performed during the follow-up of birth.

## CONCLUSION

In conclusion, VE was applied to pregnant women eight times by two practitioners, including midwives and physicians, mostly by midwives, during birth in the present study. This frequency is above the standards. It was observed that the frequency of VE did not affect birth comfort, maternal and fetal birth complications developed in a few pregnant women, and that the majority of these complications were fetal distress. It was determined that the count of VEs in pregnant women who developed fetal birth complications due to rupture of membranes during VE was high and that the length of hospital stay was prolonged as the number of VEs increased. In line with these results, it is recommended that VE performed during birth should be performed only when necessary or routinely every 4 h and, if possible, by the same health personnel, and that the study should be repeated in a larger population.

## MAIN POINTS

- Vaginal examinations during birth should be applied in accordance with the criteria of the World Health Organization.

- The frequency of vaginal examination does not affect birth comfort.
- The high number of vaginal examinations may adversely affect maternal (rupture of membranes, prolonged hospital stay) and fetal (fetal distress) outcomes.

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## ETHICS

**Ethics Committee Approval:** This study was approved by the University of Health Sciences Türkiye, Gaziosmanpaşa University Faculty of Medicine Non-Interventional Ethics Committee (approval number: 83116968/437-20 KAİK-061).

**Informed Consent:** Verbal and written consent was obtained from all participants.

**Peer-review:** Externally peer-reviewed.

## Authorship Contributions

Surgical and Medical Practices: F.K., Z.Y.E., Concept: F.K., Z.Y.E., Design: F.K., Z.Y.E., Data Collection and/or Processing: F.K., Z.Y.E., Analysis and/or Interpretation: F.K., Z.Y.E., Literature Search: F.K., Z.Y.E., Writing: F.K., Z.Y.E.

## DISCLOSURES

**Conflict of Interest:** No conflict of interest was declared by the authors.

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