JOURNAL OF
CONTEMPORARY MEDICINE

DOI:10.16899/jcm.1805650
J Contemp Med 2025;15(6):301-306

Original Article / Orijinal Araştırma

The Investigation of the Relationship between Nail Changes and Dermoscopy During Pregnancy and the Gestational Week and Systemic Diseases

Gebelikte Tırnak Değişiklikleri ile Dermoskopisinin, Gebelik Haftası ve Sistemik Hastalıklarla İlişkisinin İncelenmesi

Hanife Merve Sivas[1], Zuhal Metin[2], Serkan Akoğul[3]

[1]Department of Dermatology, Faculty of Medicine, Karamanoğlu Mehmet Bey University, Karaman, Türkiye
[2]Department of Dermatology, Faculty of Medicine, Ahi Evran University, Kırşehir, Türkiye
[3]Department of Statistics, Faculty of Science, Pamukkale University, Denizli, Türkiye

Abstract

Aim: The aim of this study is to investigate nail changes occurring during pregnancy, perform dermoscopic evaluations, measure nail thickness, and identify potential associations between these nail alterations and systemic diseases.

Material and Method: Pregnant women aged 18–45 years were included in the study. Nail findings of all participants were recorded and evaluated. For each participant, age, gestational week, presence of comorbidities, and medication use were documented. Vascular structures in the nail folds were examined using a handheld dermoscope (DermLite DL5). Thumbnail plate thickness was measured at the midpoint of the free edge using a micrometer device. A dermatological nail examination was performed for all participants, and the findings were systematically recorded.

Results: A total of 39 pregnant participants were included. Among the patients without comorbidities, 18 (69.2%) had normal dermoscopic findings, whereas 8 (30.8%) showed abnormalities. Among the 13 patients with comorbidities, 9 (69.3%) exhibited dermoscopic abnormalities, including 6 with avascular areas and 3 with capillary loss. No statistically significant differences were found between dermoscopic findings and age, gestational age, or nail thickness values ($p > 0.05$). The mean nail thickness was lower in participants with additional diseases.

Conclusion: Nail changes and dermoscopic findings during pregnancy may provide valuable clues regarding systemic diseases as well as physiological processes occurring throughout gestation.

Keywords: Pregnancy, nail changes, dermoscopy

Öz

Amaç: Bu çalışmanın amacı, gebelik sırasında ortaya çıkan tırnak değişikliklerini incelemek, dermoskopik değerlendirmeler yapmak, tırnak kalınlığını ölçmek ve bu tırnak değişiklikleri ile sistemik hastalıklar arasındaki olası ilişkileri belirlemektir.

Gereç ve Yöntem: Çalışmaya 18–45 yaş aralığında gebeler dahil edildi. Tüm katılımcıların tırnak bulguları kaydedildi ve değerlendirildi. Katılımcıların yaş, gebelik haftası, eşlik eden hastalıklar ve ilaç kullanımı bilgileri dokümante edildi. Tırnak kıvrımlarındaki vasküler yapılar elde taşınan bir dermoskop (DermLite DL5) ile incelendi. Başparmak tırnak plağı kalınlığı, serbest kenarın orta noktasından mikrometre cihazı kullanılarak ölçüldü. Tüm katılımcılara dermatolojik tırnak muayenesi yapıldı ve bulgular sistematik olarak kaydedildi.

Bulgular: Çalışmaya toplam 39 gebe dahil edildi. Eşlik eden hastalığı olmayan katılımcıların 18'inin (%69,2) dermoskopik bulguları normal iken, 8'inde (%30,8) anormallik saptandı. Eşlik eden hastalığı bulunan 13 gebeden 9'unda (%69,3) dermoskopik anormallik vardı; bunların 6'sında avasküler alan, 3'ünde ise kapiller kaybı gözlendi. Dermoskopik bulgular ile yaş, gebelik haftası ve tırnak kalınlığı değerleri arasında istatistiksel olarak anlamlı bir ilişki bulunmadı ($p > 0,05$). Ek hastalığı olan katılımcılarda ortalama tırnak kalınlığı daha düşük bulundu.

Sonuç: Gebelik sırasında ortaya çıkan tırnak değişiklikleri ve dermoskopik bulgular, sistemik hastalıklar ve gebelik sürecinde meydana gelen fizyolojik değişiklikler hakkında önemli ipuçları sağlayabilir.

Anahtar Kelimeler: Gebelik, tırnak değişiklikleri, dermoskopi

Corresponding *(İletişim)*: Hanife Merve Sivas, Department of Dermatology, Faculty of Medicine, Karamanoğlu Mehmet Bey University, Karaman, Türkiye
E-mail *(E-posta)*: kayameyve@hotmail.com
Received *(Geliş Tarihi)*: 23.10.2025 **Accepted *(Kabul Tarihi)*:** 22.11.2025

INTRODUCTION

Pregnancy induces a series of hormonal, immunological, and metabolic adjustments that profoundly affect the female body. Altered circulating hormone levels, expansion of intravascular volume, and the mechanical impact of uterine enlargement collectively contribute to a wide spectrum of cutaneous and nail changes observed during gestation. For clinicians, distinguishing physiological alterations from pathological findings is therefore crucial.[1] Among the nail changes reported in pregnancy are transverse ridging, increased fragility, leukonychia, distal onycholysis, and hangnail formation; however, the underlying mechanisms of these alterations remain uncertain.[2] In nailfold dermoscopy, the term avascular area denotes the absence of two or more adjacent capillary structures in the distal row, representing a loss of capillary loops within the dermal papillae.[3] The present study aims to evaluate nail alterations occurring during pregnancy, perform dermoscopic assessments, measure nail thickness, and explore potential associations between these changes and systemic conditions such as hypertension, diabetes mellitus, hyperthyroidism, and hypothyroidism. Additionally, correlations between gestational week and the presence or severity of nail changes are investigated.

MATERIAL AND METHOD

We obtained approval for the study from the Ethics Committee of Karamanoğlu Mehmet Bey University Faculty of Medicine. (approval dated 05.10.2022, numbered 09-2022/06). All procedures were carried out in accordance with the ethical rules and the principles of the Declaration of Helsinki. All pregnant women participating in the study signed an informed consent form.

We included pregnant women aged 18–45 years in the study. Participants with severe anaemia, Dermatological diseases involving the nails, a history of chemotherapy use, a manicure within the last three months, active fungal nail infections, or multiple pregnancies were excluded. We recorded and evaluated the nail findings of the all participants. We recorded the age, gestational week, comorbidity and medication use of the entire population. We examined the vascular changes in the nail folds using a handheld dermoscope (Dermlite DL5). We measured the thumbnail plate thickness from the midpoint of its free edge with a micrometer device. We performed dermatological examination of the nails for all participants and recorded the results.

Statistical Analysis

We performed statistical analyses using the SPSS statistical software package (IBM SPSS Statistics, Version 27). We evaluated frequency tables and descriptive statistics for data interpretation. Continuous variables are expressed as mean±standard deviation (SD), whereas categorical variables are presented as percentages. For data not following a normal distribution, the Mann–Whitney U test was used for comparisons between two groups. For more than two groups, the Kruskal–Wallis H test was performed. The chi-square (χ^2) test was conducted for comparisons of categorical variables. A p-value less than 0.05 was considered statistically significant.

RESULTS

A total of 39 pregnant participants were enrolled. Data on dermoscopic features, comorbidities, medication use, and gestational age were collected and are presented in **Table 1**.

Table 1.Distribution of Clinical Characteristics and Dermoscopic Features Among Participants

Variable (n=39)	n	%
Dermoscopy findings		
Normal	22	56.4
Avascular area	12	30.8
Capillary loss	5	12.8
Presence of comorbidity		
None	26	66.7
Present	13	33.3
Type of comorbidity		
None	26	66.7
Hyperthyroidism	4	10.3
Gestational diabetes	6	15.4
Hypothyroidism	3	7.7
Medication use		
None	33	84.6
Present	6	15.4
Gestational week		
1st trimester (0–12 weeks)	6	15.4
2nd trimester (13–24 weeks)	8	20.5
3rd trimester (25–40 weeks	25	64.1

A summary of the patients' age, gestational week, and nail thickness (mm) parameters is presented in **Table 2**.

Table 2. Descriptive Statistics for Age, Gestational Week, and Nail Thickness

Parameters	Mean±SD	Median [Min-Max]
Age	29.90±5.22	30 [20-38]
Gestational week	25.36±10.33	29 [8-39]
Nail thickness (mm)	0.49±0.25	0.5 [0.2-1]

We observed leukonychia in three of the 39 participants, melanonychia in one, and distal onycholysis in one. No cases of transverse ridging or nail edge formation were identified.

When the relationship between dermoscopic findings and comorbidities was evaluated, 18 patients without comorbidities (69.2%) demonstrated normal dermoscopic appearances, whereas 8 (30.8%) exhibited abnormalities—6 presenting with avascular areas and 2 with capillary loss. Among the 13 patients with comorbidities, 9 (69.3%) showed dermoscopic abnormalities, including 6 with avascular areas and 3 with capillary loss. Of these 13 patients, 4 had hyperthyroidism, 6 had gestational diabetes, and 3 had hypothyroidism. In the hyperthyroidism group, 2 patients had normal dermoscopic findings, while 1 exhibited

avascular areas and 1 showed capillary loss. Among those with gestational diabetes, 2 patients had normal findings, 3 demonstrated avascular areas, and 1 exhibited capillary loss. In the hypothyroidism group, 2 patients presented with avascular areas and 1 with capillary loss.

Regarding medication use, among the 33 participants who were not using any medication, 20 (60.6%) had normal dermoscopic findings, whereas 13 (39.4%) demonstrated vascular abnormalities—10 with avascular areas and 3 with capillary loss. Of the 6 patients using medication, dermoscopic abnormalities were identified in 4. When dermoscopic findings were compared across gestational periods: In the first trimester (n=6), five patients (83.3%) demonstrated normal dermoscopic findings, whereas one patient (16.7%) exhibited capillary loss. In the second trimester (n=8), six patients (75%) had normal findings and two (25%) showed avascular areas. In the third trimester (n=25), 11 patients (44%) demonstrated normal dermoscopic patterns, while 10 (40%) exhibited avascular areas and 4 (16%) showed capillary loss. No significant association was identified between the presence of comorbidities or medication use and the distribution of dermoscopic findings. However, dermoscopic abnormalities were significantly more prevalent among pregnant women in the third trimester (**Table 3**).

According to the Kruskal–Wallis H test, no statistically significant differences were identified between dermoscopic findings and age, gestational age, or nail thickness values (p>0.05). When nail thickness was evaluated in relation to dermoscopic patterns, patients with normal dermoscopic findings exhibited greater nail thickness overall, whereas the lowest values were observed in those with avascular areas. Although no significant differences in nail thickness were detected across gestational week groups (p>0.05), the mean nail thickness was higher among pregnant women in the first trimester (**Table 4**).

No statistically significant differences were identified between the presence of additional diseases and either gestational week or nail thickness values (p>0.05). However, patients with comorbid conditions demonstrated lower mean nail thickness. Likewise, no statistically significant differences were observed between medication use and gestational week or nail thickness (p>0.05); nonetheless, the mean nail thickness was lower among participants who were using medication (**Table 5**).

Table 3. Analysis of the distribution of dermoscopic findings across categorical clinical variables

Variable	Dermoscopic findings						Total
	Normal		Avascular area		Capillary loss		
	n	%	n	%	n	%	
Presence of comorbidity							
None	18	69.2	6	23.1	2	7.7	26
Present	4	30.8	6	46.2	3	23.1	13
Type of comorbidity							
None	18	69.2	6	23.1	2	7.7	26
Hyperthyroidism	2	50	1	25	1	25	4
Gestational diabetes	2	33.3	3	50	1	16.7	6
Hypothyroidism	0	0	2	66.7	1	33.3	3
Medication use							
None	20	60.6	10	30.3	3	9.1	33
Present	2	33.3	2	33.3	2	33.3	6
Gestational week							
1st trimester (0-12 weeks)	5	83.3	0	0	1	16.7	6
2nd trimester (13-24 weeks)	6	75	2	25	0	0	8
3rd trimester (25-40 weeks	11	44	10	40	4	16	25

*Kruskal-Wallis H test *Chi-square test , p<0.001

Table 5. Association of study parameters with the presence of comorbid conditions and medication use

Parameters	Presence of comorbidity	Mean±SD	Median [Min-Max]	Statistical analyses *
Gestational week	None	23.85±10.74	26.5 [8-39]	Z=1.28
	Present	28.38±9.12	29 [10-39]	p=0.21
Nail thickness (mm)	None	0.54±0.29	0.5 [0.2-1]	Z=-1.15
	Present	0.39±0.10	0.3 [0.3-0.5]	p=0.28
Parameters	**Medication use**	**Mean±SD**	**Median [Min-Max]**	**Statistical analyses ***
Gestational week	None	25.85±10.41	29 [8-39]	Z= -0.72
	Present	22.67±10.43	21.50 [10-38]	p=0.48
Nail thickness (mm)	None	0.51±0.26	0.5 [0.2-1]	Z= -1.15
	Present	0.36±0.10	0.3 [0.3-0.5]	p=0.29

*Mann-Whitney U Test

Table 4. Relationship between gestational week, dermoscopic findings, and nail thickness

Parameters	Dermoscopic findings	Mean±SD	Median [Min-Max]	Statistical analyses*
Age	Normal	29.55±1.25	29.5 [20-39]	H=1.02 p=0.59
	Avascular area	29.75±1.09	29.5 [23-37]	
	Capillary loss	31.80±5.85	32 [23-38]	
Gestational week	Normal	22.18±10.50	23 [8-38]	H=4.91 p=0.09
	Avascular area	29.33±7.43	30 [16-39]	
	Capillary loss	29.80±12.56	36 [8-39]	
Nail thickness (mm)	Normal	0.56±0.28	0.5 [0.2-1]	H=2.98 p=0.23
	Avascular area	0.42±0.21	0.3 [0.2-1]	
	Capillary loss	0.49±0.25	0.3 [0.3-1]	
Parameters	**Gestational week**	**Mean±SD**	**Median [Min-Max]**	**Statistical analyses***
Nail thickness (mm)	1st Trimester (0-12 weeks)	0.54±0.10	0.5 [0.5-0.75]	H= 2.65 p=0.27
	2nd Trimester (12-24 weeks)	0.44±0.24	0.3 [0.3-1]	
	3rd Trimester (24-40 weeks)	0.49±0.28	0.3 [0.2-1]	

*Kruskal-Wallis H test

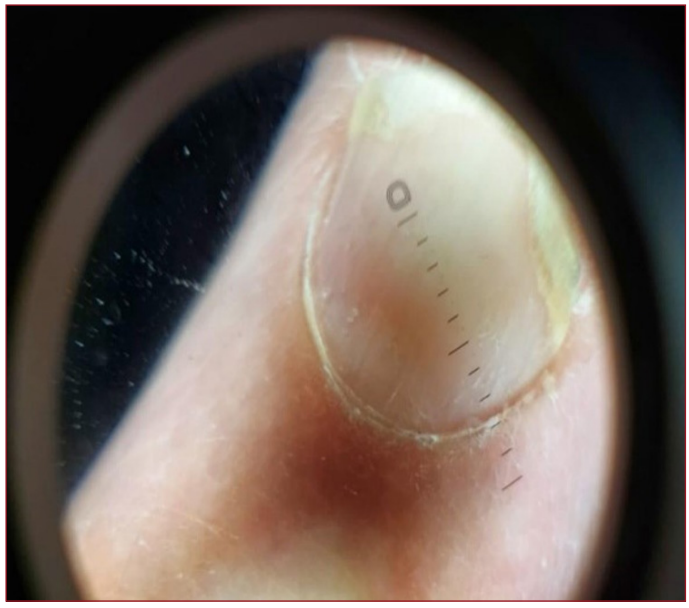

Figure 1. Normal dermoscopy

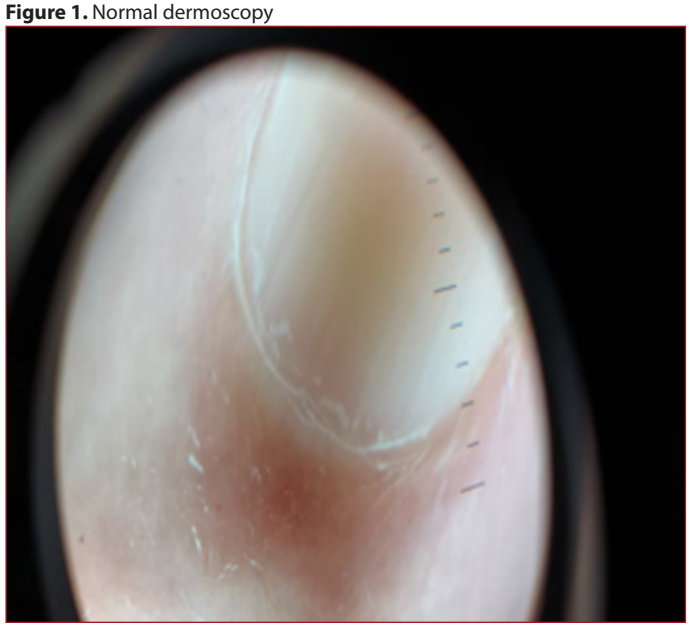

Figure 2. Capillary loss

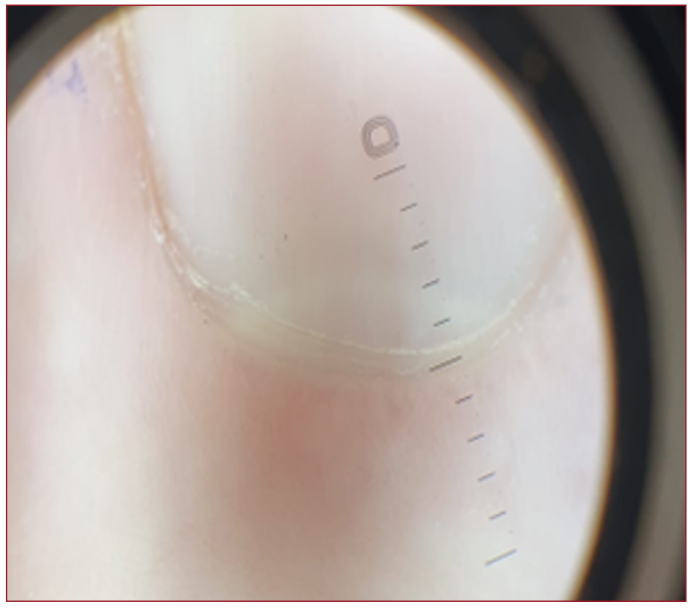

Figure 3. Avascular area

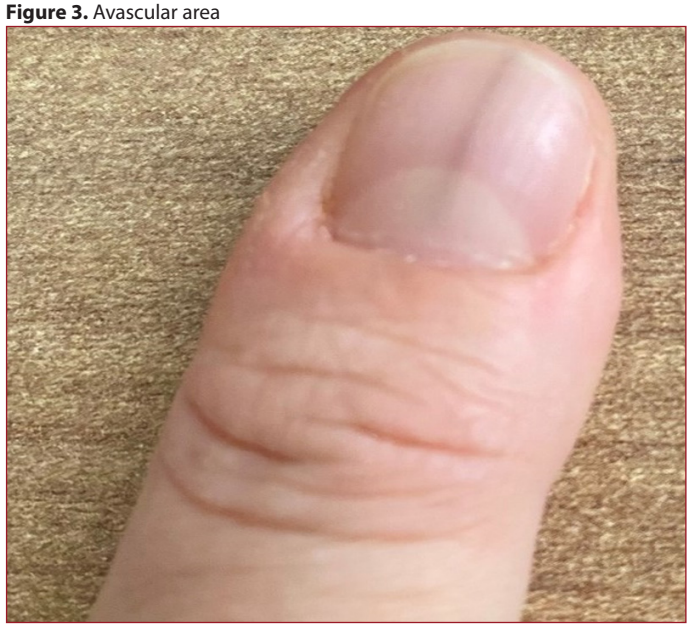

Figure 4. Melanonychia

DISCUSSION

In this study, we examined nail changes and dermoscopic findings associated with pregnancy and aimed to identify potential relationships between these nail alterations and systemic diseases. The nail plate, located on the nail bed, is a hard, semi-transparent, and convex structure formed by the nail matrix, with a primary protective function. Nail plate thickness varies according to age and sex, with average measurements reported as 0.5 mm in women and 0.6 mm in men.[4] In an observational study by Altan et al. involving 94 pregnant patients and 82 healthy non-pregnant women, pregnancy did not alter nail growth rate or morphology but was associated with increased nail thickness.[5] Consistent with these findings, the mean nail thickness in our study was 0.49±0.25 mm. Although earlier studies have reported increased nail growth rates in pregnant women compared to controls, there are also data suggesting reduced growth rates.[6,7] This variability in the literature suggests that hormonal, metabolic, and nutritional differences among pregnant populations may influence nail physiology, and therefore nail growth rates may not be uniform across all trimesters. Dermoscopy is a non-invasive technique enabling visualization of skin structures not visible to the naked eye and allows detailed examination of the surface and subsurface features of lesions.[8] In our study, pregnant women with normal dermoscopic nail curvature tended to have greater nail thickness, suggesting a possible association between structural features and growth dynamics. Similar associations between nail curvature and thickness have been highlighted in dermoscopic studies of healthy individuals, underlining the

potential value of dermoscopy in assessing nail biomechanics. Erpolat et al.[9] reported rapid nail growth between 29 and 42 weeks (P=0.047) and identified leukonychia as the most common nail change during pregnancy, with melanonychia occurring in 3.2% of cases . Melanonychia is caused by melanin accumulation in the nail matrix and may occur due to hormonal fluctuations during pregnancy. Similarly, in our study, leukonychia was detected in three patients and melanonychia in one. Other studies have also shown that estrogen and progesterone surges can stimulate melanocyte activity in the nail matrix, further supporting the observation of pregnancy-related melanonychia.[10] The capillaries of the nail bed consist of arterial and venous plexuses and an apical arch. These capillary loops run parallel to the skin surface. Dermoscopy of the proximal nail fold enables in vivo evaluation of superficial papillary dermal vasculature. [3] Normally, nail bed capillaries appear parallel, smooth, and sharply curved.[11] The presence of avascular areas indicates loss of adjacent capillary structures, while the absence of loops is defined as capillary loss.[3] Capillaroscopic abnormalities are widely used in rheumatology and systemic disease monitoring, and pregnancy represents a unique physiological model in which capillary adaptation becomes especially dynamic. Evaluation of a pregnant woman's microvascular system may provide insight into cardiovascular and placental function and the mechanisms underlying hypertensive complications of pregnancy.[12] Pacini et al.[13] observed progressive increases in capillary neoangiogenesis and decreases in capillary dilation ($p<0.05$) in pregnant women, with no associations found between capillaroscopic changes and pregnancy outcomes . In our study, avascular areas and capillary loss were identified in 17 of 39 women, and abnormalities were more frequent in the third trimester. This may reflect increased blood volume and vascular remodeling. Previous studies have similarly shown that microcirculatory adaptations peak in late pregnancy, supporting our findings that dermoscopic alterations become more pronounced during the third trimester.[14] Hypothyroidism can lead to nail thickening, increased brittleness, and slower growth. [15] Interestingly, the mean nail thickness in our study was lower among women with additional medical conditions, potentially due to the higher prevalence of hyperthyroidism in this subgroup. Hypothyroidism disrupts microvascular autoregulation,[16] and we observed avascular areas in 2 of 3 hypothyroid patients, with capillary loss in one. Thyroid dysfunction is known to influence endothelial stability and peripheral microcirculation, which may explain the vascular changes observed in our study cohort.[17] Thakur et al.[18] reported significantly increased capillary loss and avascular areas in diabetic patients . In our study, 3 of 6 gestational diabetes patients showed avascular areas and one showed capillary loss, supporting this relationship. Gestational diabetes is associated with endothelial dysfunction and impaired microvascular perfusion, which likely contributes to these nailfold findings.[19] Taken together, our findings highlight the potential of nail dermoscopy as a supplementary, non-invasive tool for evaluating systemic changes during pregnancy. The increased vascular abnormalities in the third trimester may reflect physiological hemodynamic changes, while altered dermoscopic patterns in endocrine or metabolic disorders suggest that nailfold assessment may provide clinically relevant diagnostic clues.

CONCLUSION

Nail changes and dermoscopic findings during pregnancy may offer important clues regarding systemic diseases and physiological processes occurring during gestation. The limitations of our study include its single-centre design, small sample size, and lack of longitudinal follow-up throughout pregnancy. In addition, the absence of a healthy, non-pregnant control group limits the ability to distinguish pregnancy-related nail changes from those occurring in the general population. Therefore, larger, multicentre studies with broader sample sizes and appropriate control groups are needed to confirm and expand upon our findings.

ETHICAL DECLARATIONS

Ethics Committee Approval: Ethical approval was obtained from the Karamanoğlu Mehmet Bey University Faculty of Medicine Ethics Committee (Date: 05.10.2022, Decision No: 09-2022/06).

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.

Financial Disclosure: The author declared that this study has received no financial support.

Author Contributions: All of the authors declare that they have all participated in the design, execution, and analysis of the paper, and that they have approved the final version.

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