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# Evaluation of the Last 15 Years of a Tuberculosis Dispensary

## Bir Verem Savaş Dispanserinin Son 15 Yılı'nın Değerlendirilmesi

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### Abstract

**Introduction:** According to the World Health Organization, tuberculosis (TB) is the deadliest infectious disease worldwide, inflicting illness to 10 million people and killing 1.5 million in 2018. This study aimed to contribute to the planning of future services and create a scientific resource for studies focusing on eliminating TB through precautions by examining the characteristics of patients receiving services from TB dispensaries.

**Materials and Methods:** This descriptive and cross-sectional study was performed between April 2020 and May 2020. All patients who started treatment in the dispensary between 2005 and 2019 were enrolled. Descriptive and analytical statistics were used for data analysis.  $P \leq 0.05$  was considered statistically significant.

**Results:** The data of 765 patients were included in the study. During the 15-year period that the study investigated, the number of patients receiving services from TB dispensaries decreased, and the average age increased. The overall treatment success was 90.6%. Regarding treatment success, no statistically significant difference was found between the groups according to gender, marital status, working status, and qualification of residence area.

**Conclusion:** In our study, the fact that there is no difference in treatment success between individuals with different socioeconomic and cultural characteristics has been identified as an indicator of easier access to healthcare services. It has been concluded that the activities for TB control should be developed by considering local epidemiological features and that financing of all treatment costs of TB patients by public resources should be practiced worldwide.

**Keywords:** Tuberculosis, dispensary, diagnosis, treatment, Turkey

### Öz

**Giriş:** Dünya Sağlık Örgütü'ne göre tüberküloz (TB), 2018 yılında 10 milyon kişinin hastalanmasına ve 1,5 milyon kişinin ölümüne sebep vermiş dünya çapında en bulaşıcı katildir. Tüberküloz, tüm dünya için olduğu gibi Türkiye için de önemli bir halk sağlığı tehditidir. Bu çalışmanın amacı, bir TB dispanserinden hizmet alan hastaların özelliklerini inceleyerek, gelecekte verilecek hizmetlerin planlanabilmesi ve alınacak önlemlerle TB'nin eliminasyonunu amaçlayan çalışmalara bilimsel bir kaynak oluşturmaktır.

**Gereç ve Yöntem:** Tanımlayıcı ve kesitsel nitelikteki çalışmamız, Nisan-Mayıs, 2020 tarihlerinde yapılmıştır. Hastaların bilgilerine hasta dosyaları ve elektronik tıbbi kayıtlar kullanılarak ulaşılmıştır. Dispanserde 2005-2019 yılları arasında tedavi başlanan her hasta çalışmaya alınmış ve örneklem seçimi yapılmamıştır. Toplanan veriler SPSS ile değerlendirilmiştir. Verilerin analizinde tanımlayıcı ve analitik istatistikler kullanılmıştır.  $P \leq 0,05$  istatistiksel olarak anlamlı kabul edilmiştir.

**Bulgular:** Çalışmada toplam 765 hastanın bilgilerine ulaşılmıştır. Çalışmanın yürütüldüğü 15 yıllık dönemde, TB dispanserinden hizmet alan hastaların sayısının azaldığı, yaş ortalamalarının arttığı görülmektedir. Ortalama tedavi başarısı %90,6 olarak bulunmuştur. Tedavi başarısı açısından hastanın cinsiyeti, medeni durumu, çalışma statüsü, ikamet bölgesinin niteliği gibi açılardan gruplar arasında istatistiksel olarak anlamlı bir fark bulunmamıştır.

**Sonuç:** Çalışmamızda, farklı sosyoekonomik ve kültürel özelliklere sahip bireylerde tedavi başarısı açısından fark bulunmaması, sağlık hizmetlerine ulaşımın kolaylaştırılmasının bir göstergesi olarak yorumlanmıştır. Tüberküloz kontrolü için yapılan çalışmaların yerel epidemiyolojik özellikler göz önüne alınarak şekillendirilmesi ve TB hastalarının tüm tedavi maliyetlerinin kamu kaynaklarınca finanse edilmesi uygulamasının dünya çapında yaygınlaştırılması gerektiği sonuçlarına ulaşılmıştır.

**Anahtar Kelimeler:** Tüberküloz, dispanser, tanı, tedavi, Türkiye

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## Introduction

According to the World Health Organization (WHO), tuberculosis (TB) is the deadliest infectious disease worldwide, inflicting illness in 10 million people and killing 1.5 million in 2018. Tuberculosis, a communicable disease, is the leading cause of deaths induced by a single infectious agent and is one of the top 10 causes of death worldwide<sup>[1]</sup>. Tuberculosis is a treatable and preventable disease caused by *Mycobacterium tuberculosis*. However, not everyone who experiences TB infection gets ill. There is a 10% lifetime risk of becoming ill for people infected with TB bacteria. World Health Organization estimates that about one-third of the world's population has latent TB infection<sup>[2]</sup>.

TB is a global public health problem; however, it has become a bigger problem in countries with limited resources. Factors such as poverty and malnutrition increase the prevalence and burden of the disease in developing countries, making it difficult to control<sup>[3]</sup>. Consequently, TB is defined as the disease of poverty and inequality<sup>[4]</sup>. World Health Organization estimated the incidence of TB as 231 (100-257) per 100,000 in the African region and 28 (24-32) per 100,000 in the WHO European Region<sup>[5]</sup>. That is, in some parts of the world, TB incidence can be about 10 times higher than in other regions. However, inequalities can occur not only between WHO regions but also between countries, sometimes between the countries' internal regions or even between rural and urban areas of the same settlement. Therefore, it is crucial to evaluate the TB patients' access to health services at all levels because global socioeconomic inequalities, rapid urbanization, high level of population mobility, and population growth are among the key structural determinants of TB epidemiology<sup>[6]</sup>.

Turkey (TR) was identified as "the most affected area in WHO European Region" by WHO<sup>[7]</sup>. Thus, TB is a major public health problem in TR as in many parts of the world. The first TB dispensary of TR was established in 1924, and much progress has been achieved in TB control studies since then<sup>[8]</sup>. However, fighting against TB has not reached the desired level yet. The Republic of TR Ministry of Health collects all the data about studies on TB control in TR and publishes them for 2 years backward to wait for treatments to be completed. According to the latest TB report, in 2018, the incidence of TB in TR decreased to 15.3 per 100,000 in 2016 compared to 29.4 per 100,000 in 2005. However, in Kırklareli Province, where our study was conducted, TB incidence was 28.4 in 2016, approximately twice of TR and the third among 81 provinces of TR<sup>[9]</sup>.

This study aimed to contribute to the planning of future services and create a scientific resource for studies focusing in eliminating TB through precautions by examining the characteristics of patients receiving services from TB dispensaries.

## Materials and Methods

Our study was conducted in a dispensary in the biggest district of Kırklareli Province, Lüleburgaz which also serves other districts in its neighborhood. Kırklareli, in the northwest of TR, is one of the largest districts in the region of Thrace. Approximately 15% of the district's population lives in rural areas and their sources of income are mostly agriculture and animal husbandry<sup>[10]</sup>.

This descriptive study was carried out between April 2020 and May 2020 and patients who were followed up with TB diagnosis in a TB dispensary between 2005 and 2019 were retrospectively analyzed. Patients' records were accessed using patient files, Turkish National Tuberculosis Surveillance Study, and medical records in the Electronic Tuberculosis Management System. All patients who started treatment in the dispensary were included in the study, and no sample selection was made. Since this was a retrospective record review based study informed consent was not received.

Definitions used in this study were based on the "Tuberculosis Diagnosis and Treatment Guide (2019)" published by TR Ministry of Health. Patients were classified according to date of admission to dispensary. Regarding case definition, patients were classified into five classes: "new case," "transfer in," "relapse," "treatment after failure," and "treatment after loss to follow-up." In the dispensary where we assessed the records, a six-month standard TB treatment was performed. Treatment outcomes were categorized as treatment success (treatment completion or cure) and treatment abandonment (treatment failure or death).

### Statistical Analysis

The collected data were recorded with Microsoft Excel and evaluated with SPSS 20.0 software package. Descriptive statistics and the Kolmogorov-Smirnov, Kruskal-Wallis, Mann-Whitney U, Spearman correlation, and chi-square tests were used to analyze the data. P value of 0.05 and confidence interval of 95% were considered as statistically significant.

Our study was approved by the Kırklareli Provincial Health Directorate Research Applications Examination and Evaluation Commission (dated March 10, 2020, and numbered 2020/16) and Kırklareli University Institute of Health Sciences Ethics Committee (dated May 04, 2020, and numbered 2020-17).

### Results

About 25.4% (n=194) of 765 patients whose data were accessed from the records were women and 74.6% (n=571) were men (p<0.001). The ages of the patients ranged from 1 to 91 years, and the mean age was 45.4±17.9. The average age was 42.5±19.2 for women and 46.3±17.4 for men (p=0.004). The most frequent age group was 65 years and older (15.7%, n=120). The distribution of the number and average age of the patients by years is shown in Figure 1.

Moreover, 67.5% (n=516) of the patients were married, and 32.5% (n=249) were not married (single, divorced, widowed, etc.). When asked about their profession, the two most frequent answers were retired and housewife, with 15.8% (n=121) and 15.2% (n=116), respectively. Approximately, 11.1% (n=85) of the patients declared that they were unemployed. Furthermore, as regards the patients' residence addresses, it was determined that 65.5% (n=501) lived in urban, 7.3% (n=56) in semi-urban, and 27.2% (n=208) in rural areas, and 3.3% (n=25) of the patients reported that they never smoked, 16.1% (n=123) quit smoking, and 23.3% (n=178) were currently smoking. The smoking status of 439 (57.4%) patients is unknown. Additionally, 37.9% (n=290) of the patients stated that they did not consume alcohol, whereas 11.4% (n=87) declared that they did. The use of alcohol status of 388 (50.7%) patients is unknown. It was noted that the dispensary was visited mostly in the spring months (p=0.05).

Moreover, it was found that 40.0% (n=306) of the patients had Bacillus Calmette-Guérin (BCG) scars and 15.9% (n=122) did not have BCG scars, and 44.1% (n=337) had no BCG scar data. About 54.2% (n=166) of the patients with BCG scar were found

to be younger than the group mean age (p=0.024). In terms of presence of BCG scars, there was no statistically significant difference in respect of patients' residence in rural or urban areas (p=0.883) or gender (p=0.068). Tuberculosis contact history rate among patients was 14.1% (n=108). The distribution of patients according to the reasons of admissions and case definition are presented in Table 1.

About 11.6% (n=8) of the recurrent patients were females and 88.4% were males (p=0.006). There was no difference between new diagnosis and relapse in terms of treatment success (p=0.317). As regards new diagnosis or relapse of the disease, no relation was found between the unemployed and employed (p=0.136). Clinical and radiological findings were evaluated in the diagnosis of TB; in addition, various laboratory methods have been used. Treatment success was found to be 90.6% (n= 667). Distribution of diagnostic findings by periods is shown in Table 2.

The most frequent coexisting findings were clinical and radiological findings, with 20.8% (n=159). In the patients, pulmonary TB was determined in 74.4% (n=569), extra-pulmonary TB in 22.5% (n=172), and both pulmonary and extra-pulmonary TB in 3.1% (n=24). Pulmonary TB cases were 57.7% (n=112) in women and 80.0% (n=457) (p<0.001) in men. The most common locations of extra-pulmonary TB were the pleura 10.5% (n=80) and lymph nodes 6.8% (n=52).

According to records, directly observed treatment (DOT) has been applied to all patients since August 2006 under the supervision of health personnel. Directly observed treatment coverage for our study period was calculated as 82.5% (n=631). The overall treatment success was found to be 90.6% (n=667). The distribution of some information about the treatments of the patients by periods is shown in Table 3.

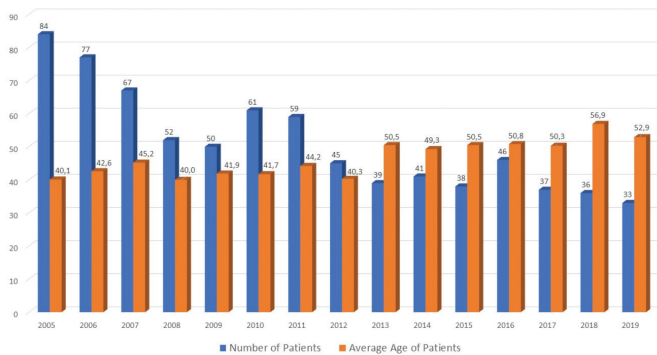


Figure 1. Number and average age of patients

Table 1. Distribution of patients according to the reasons for admission and case definition

	2005-2009 n (%)	2010-2014 n (%)	2015-2019 n (%)	Overall n (%)	p*
<b>Reasons of application</b>					
Individual	326 (98.8)	241 (98.4)	183 (96.3)	750 (98.0)	0.004
Contact	1 (0.3)	2 (0.8)	7 (3.7)	10 (1.3)	
For report	3 (0.9)	2 (0.8)	0 (0)	5 (0.7)	
<b>Case definition</b>					
New case	299 (90.6)	213 (86.9)	165 (86.8)	677 (88.5)	<0.001
Relapse	30 (9.1)	23 (9.4)	16 (8.4)	69 (9.0)	
Treatment after failure	0 (0)	0 (0)	2 (1.1)	2 (0.3)	
Transfer in	1 (0.3)	8 (3.3)	7 (3.1)	16 (2.1)	
Treatment after default	0 (0)	1 (0.4)	0 (0)	1 (0.1)	
<b>Total</b>	<b>330</b>	<b>245</b>	<b>190</b>	<b>765</b>	

\*Kruskal-Wallis test was used (Kolmogorov-Smirnov p<0.001).

During the study period, it was observed that the treatment of 21 patients lasted between six months and one year, whereas the treatment of 28 patients lasted for more than one year. It was determined that 61.2% of these patients had pulmonary (n=30), 30.6% extra-pulmonary (n=15), and 8.2% (n=4) both pulmonary and extra-pulmonary TB. Furthermore, it was found that 8.2% (n=4) of 49 patients whose treatment lasted longer than six months had resistance to at least one drug. During the study period, resistance to at least one drug was calculated as

4.3% (n=33), with 0.9% (n=7) of these as multi-drug resistant-TB cases.

The most frequent diagnosis in the patients whose treatment was started but discontinued due to absence of TB was non-TB pneumonia, with 41.6% (n=10). Regarding treatment success, there was no statistically significant difference in terms of presence of BCG scar (p=0.066), gender (p=0.376), and marital status (p=0.538) and whether their settlement was rural or

**Table 2. Distribution of diagnostic findings by periods**

Diagnostic method	2005-2009 n (%)	2010-2014 n (%)	2015-2019 n (%)	Overall n (%)	p*
Smear (acido-resistant bacilli) positivity	201 (26.3)	108 (14.1)	64 (8.4)	373 (48.8)	<0.001
Clinical findings	100 (13.1)	130 (17.0)	115 (15.0)	345 (45.1)	<0.001
Histopathologic findings	58 (7.6)	41 (5.4)	46 (6.0)	145 (19.0)	0.100
Culture positivity	90 (11.8)	85 (11.1)	87 (11.4)	262 (34.2)	<0.001
Radiological findings	65 (8.5)	89 (11.6)	93 (12.2)	247 (32.3)	<0.001
GeneXpert assay	0 (0)	0 (0)	2 (0.3)	2 (0.3)	-

\*Single sample chi-square test was used.

**Table 3. The distribution of some information about the treatments of the patients by periods**

	2005-2009 n (%)	2010-2014 n (%)	2015-2019 n (%)	Overall n (%)	p
<b>Institution (initiating treatment)</b>					
Public	329 (99.7)	222 (90.6)	149 (78.4)	700 (91.5)	<0.001*
Private	1 (0.3)	23 (9.4)	41 (21.6)	65 (8.5)	
<b>Treatment period</b>					
Less than 6 months	39 (11.8)	27 (11.0)	32 (16.8)	98 (12.8)	<0.001*
Six months	273 (82.7)	206 (84.1)	135 (71.1)	614 (80.3)	
Between 6 months and 1 year	8 (2.4)	5 (2.0)	8 (4.2)	21 (2.7)	
1 year and over	10 (3.0)	7 (2.9)	11 (5.8)	28 (3.7)	
Treatment continues	0 (0)	0 (0)	4 (2.1)	4 (0.5)	-
<b>Treatment success (n=737)<sup>†</sup></b>					
Completion of treatment	197 (60.2)	157 (65.4)	93 (54.7)	447 (60.7)	<0.001 <sup>‡</sup>
Cured	109 (33.3)	59 (24.6)	52 (30.6)	220 (29.9)	<0.001 <sup>‡</sup>
<b>Treatment abandonment (n=737)<sup>†</sup></b>					
Giving up the treatment	6 (1.8)	2 (0.8)	1 (0.6)	9 (1.2)	-
Treatment failure	0 (0)	1 (0.4)	2 (1.2)	3 (0.4)	-
Transferred out	7 (2.1)	10 (4.2)	6 (3.5)	23 (3.1)	0.568 <sup>‡</sup>
Death	8 (2.4)	11 (4.6)	16 (9.4)	35 (4.7)	0.247 <sup>‡</sup>
Subtotal	327	240	170	737	<0.001 <sup>‡</sup>
Not TB	3 (0.9)	5 (2.0)	16 (9.1)	24 (3.2)	0.002 <sup>‡</sup>
Treatment continues	0	0	4	4	-
Total	330	245	190	765	<0.001 <sup>‡</sup>

\*Kruskal-Wallis test was used (Kolmogorov-Smirnov p<0.001).

<sup>†</sup>After removing cases that are not TB and still in treatment.

<sup>‡</sup>Single sample chi-square test was used.

TB: Tuberculosis

urban ( $p=0.988$ ). However, the success of treatment was 94.0% ( $n=359$ ) in patients younger than the study population's mean age, whereas it was found to be 86.6% ( $n=298$ ) in the older ones ( $p=0.001$ ). In addition, no statistically significant difference was found as regards treatment success ( $p=0.855$ ) or treatment period ( $p=0.609$ ) in terms of the patients' working status being unemployed, active or inactive. Lastly, no correlation was found between age and duration of treatment ( $p=0.744$ ).

## Discussion

According to WHO, TB was seen in 57% of men over the age of 15 in 2018<sup>[1]</sup>. The TR Ministry of Health reported a 57.4% TB incidence in men in TR in 2016<sup>[9]</sup>. Additionally, several studies conducted in TR have reported that the incidence of TB was higher in men than in women<sup>[11-13]</sup>. In our study cohort, the incidence of TB in men was found to be at 74.6%. When this finding is evaluated together with other local studies, it is seen that the incidence of TB is higher in men but the rates vary regionally across the country. Another remarkable finding is that the average age of female patients is lower than that of men, indicating that women get TB disease at a younger age compared to men at a statistically significant level. In contrast, it was observed that men were statistically significantly higher in relapsed patients. Consequently, it is thought that the studies for TB control should be directed to considering the local epidemiological features, as in the slogan "think globally, act locally".

Treatment success in total cases in our study cohort was found to be at 90.6%. This ratio is 85.0% in TR<sup>[9]</sup>. According to WHO, the global treatment success rate is 85% as of 2017<sup>[1]</sup>. Thus, it can be concluded that treatment results of the TB dispensary that we investigated were more successful than those of TR and the world average treatment results. However, the dispensary is located in the region where TB incidence is above the average of that of TR. Considering the high success of the treatment and the high incidence of TB together, it is seen that the problem is not the treatment of the disease, but preventing individuals from getting ill.

It has been reported that the increase in the average age of TB patients over the years indirectly indicates that TB control has increased in that region<sup>[14]</sup>. While the average age of patients in our study cohort was 40.3 in 2005, it was calculated as 52.9 in 2019. Additionally, the number of patients decreased from 84 in 2005 to 33 in 2019. This could be due to the reactivated cases rather than new contamination. The low level of contact cases which is 14% further strengthens this interpretation. However, all these findings evaluated together, it can be said that TB control studies were successful in the dispensary region where our study was conducted. Another finding supporting this claim is the fact that the incidence of BCG scar in those younger than

the group average age was statistically significantly higher than the older ones, because this finding shows that BCG vaccination rates have increased over the years. The absence of a statistically significant difference in terms of gender and residential areas in respect of the presence of BCG scar is an indication that there is no problem in accessing vaccination services.

Directly observed treatments implementation in TR, first by the Ministry of Health after starting in a few regions selected as pilot, has been implemented across the country in 2006<sup>[15]</sup>. It is considered to be a crucial finding that all patients were included in DOT coverage since 2006. In a study conducted in the Republic of South Africa, it was reported that DOT coverage was less than 30% in 14 out of the 30 health facilities included in the study; seven had between 30 and 60% and five had more than 60%, and treatment success rates were higher in regions with high DOT coverage<sup>[16]</sup>.

World Health Organization reported that conditions such as HIV positivity, smoking, and alcohol abuse are major risk factors for TB<sup>[17]</sup>. HIV positivity, was not detected in any patient. According to a study conducted by the TR Ministry of Family, Labor, and Social Services, the rate of still smokers or those who quit smoking was 44% in TR and the ratio of those who stated that they use alcohol in amounts ranging from "only on special days" to "everyday" was 26%<sup>[18]</sup>. The average of the current records may seem no different from that of TR; however, for the high rate of lack of notification in the records we examined, it is thought that it is unfeasible to comment on smoking and alcohol abuse for our study population.

TB is a social disease and cannot be controlled only with drug therapy without investigating its social determinants. According to WHO, poverty is a strong determinant of TB<sup>[17]</sup>. In our study, no specific feature was found in the epidemiological characteristics of patients, with the exception of male gender and age. The most remarkable example of this was that the employment status of the patients was evaluated and it was found that being unemployed was not a factor negatively affecting the success of the treatment. In addition, no relation was found between the employment status of unemployed and employed in terms of new diagnosis or relapse of the disease. In a study conducted in TR from 1985 to 2014, it was reported that the overall unemployment rate of TB patients was 6.2%. In our study population, the proportion of patients who declared unemployed was 11.1%<sup>[19]</sup>. Nevertheless, it is thought that the finding which the patients' unemployment does not adversely affect the success of the treatment may be related to the socioeconomic measures taken for TB control in TR. All kinds of treatment expenses related to TB, including TB drugs, are within the scope of General Health Insurance in TR. In addition, patients with low socioeconomic status are provided with cash assistance of about half of the minimum wage during their

treatment<sup>[20]</sup>. In the literature research, it is seen that there are no similar practices in all countries<sup>[21-23]</sup>. For example, in a study conducted in Indonesia, it was reported that health insurance programs were comprehensive for TB control services; however, concerns were about the quality of diagnostic tests, medicines, and contact tracing services<sup>[24]</sup>. In another study covering the Western Pacific Region, it was found that households affected by TB were exposed to "catastrophic costs" equivalent to 20% or more of their total annual income<sup>[25]</sup>. Another study describing the impact of TB disease on the household as "catastrophic costs" was conducted in Nigeria, and it has been reported that TB treatment corresponds to 14% of the annual income of the household<sup>[26]</sup>. Further, in a study conducted in China, it was determined that "catastrophic health expenditures" corresponded to 10% of the total annual income of households and exceeded 40% of non-food expenditures<sup>[27]</sup>.

This study had some limitations. First, the study was conducted in a single center. However, according to the data of the Ministry of Health, there were 177 TB dispensaries in TR as of the end of 2017<sup>[9]</sup>. Therefore, increasing such studies will contribute to the accumulation of knowledge to determine local policies in the fight against TB disease. Second, patients who received financial aid due to their low socioeconomic levels were not compared with the others.

## Conclusion

In our study, it was understood that the struggle with the social determinants of TB should be emphasized. Local strategies should be developed at micro level according to socioeconomic and cultural characteristics of each region. For this purpose, increasing the studies at the local level is extremely crucial in terms of determining the problem. The treatment component of the fight should certainly not be forgotten. It was concluded that financing all treatment costs of TB patients with public resources is important for the control and elimination of the disease and that this practice should be expanded worldwide.

## Acknowledgments

We would like to thank the District Health Directorate staff who shared their experiences with us in the conduct of the study.

## Ethics

**Ethics Committee Approval:** Our study was approved by the Kırklareli Provincial Health Directorate Research Applications Examination and Evaluation Commission (dated March 10, 2020, and numbered 2020/16) and Kırklareli University Institute of Health Sciences Ethics Committee (dated May 04, 2020, and numbered 2020-17).

**Informed Consent:** Since this was a retrospective record review based study informed consent was not received.

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

## Authorship Contributions

Surgical and Medical Practices: A.Ö.P., Ç.C., Concept: A.Ö.P., Ç.C., Design: A.Ö.P., Ç.C., Data Collection or Processing: A.Ö.P., Ç.C., Analysis or Interpretation: A.Ö.P., Ç.C., Literature Search: A.Ö.P., Ç.C., Writing: A.Ö.P., Ç.C.

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

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