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Sleep Quality and Related Factors in Surgical Intensive Care Patients

Cerrahi Yoğun Bakım Hastalarının Uyku Kalitesi ve Etkileyen Faktörler

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Abstract

Objective: This study determined the sleep quality of surgical intensive care patients and the affecting factors.

Materials and Methods: This descriptive study was conducted from April 2021 to January 2022 in the surgical intensive care unit of the university hospital. One hundred participants who met the inclusion criteria were included. The researcher completed the patient descriptive form and The Richards-Campbell Sleep Questionnaire (RCSQ) by face-to-face interview.

Results: The RCSQ total score of the patients was 39.3±14.4. Age, type of surgical performed, pain severity, stress score and environmental factors (lights of the intensive care setting, device sounds, ambient odor, ambient temperature, voices of other patients, and conversations of the intensive care unit staff) affected the quality of sleep of patients.

Conclusion: Patients had poor sleep quality in the intensive care unit. Increasing the awareness of nurses and intensive care team members about the factors disrupting sleep quality and possible solutions, transferring the solutions to the clinic, and evaluating the results may improve the sleep quality of patients.

Keywords: Intensive care, nursing, quality of sleep, patient, surgery

Öz

Amaç: Bu çalışmada cerrahi yoğun bakım hastalarının uyku kalitesi ve etkileyen faktörlerin belirlenmesi amaçlanmıştır.

Gereç ve Yöntem: Bu tanımlayıcı çalışma, Nisan 2021-Ocak 2022 tarihleri arasında üniversite hastanesinin cerrahi yoğun bakım ünitesinde gerçekleştirildi. Dahil edilme kriterlerini karşılayan yüz katılımcı çalışmaya dahil edildi. Araştırmacı hasta tanıtım formu ve Richards-Campbell Uyku Anketi'ni (RCSQ) yüz yüze görüşme ile doldurdu.

Bulgular: Hastaların RCSQ toplam puanı 39,3±14,4 idi. Yaş, uygulanan ameliyatın türü, ağrı şiddeti, stres skoru ve çevresel faktörler (yoğun bakım ortamının ışıkları, cihaz sesleri, ortam kokusu, ortam sıcaklığı, diğer hastaların sesleri ve yoğun bakım personelinin konuşmaları) hastaların uyku kalitesini etkilemiştir.

Sonuç: Yoğun bakım ünitesinde yatan hastaların uyku kalitesi kötüydü. Hemşirelerin ve yoğun bakım ekibi üyelerinin uyku kalitesini bozan faktörler ve olası çözümler konusunda farkındalıklarının arttırılması, çözümlerin kliniğe aktarılması ve sonuçların değerlendirilmesi hastaların uyku kalitesinin iyileştirilmesine katkı sağlayabilir.

Anahtar Kelimeler: Yoğun bakım, hemşirelik, uyku kalitesi, hasta, cerrahi

Introduction

Intensive care units (ICUs) are settings where patients face many sources of stress both physically and psychosocially. It is indicated that these negative conditions experienced by patients in the ICU affect the immune system and disrupt sleep patterns (1).

Sleep is a basic need that regulates the immune system and homeostasis and supports cognitive and physiological functions (2). Through the physical and psychological healing effect of sleep, the immune system of patients is supported, the infection rate decreases, and the continuity of cognitive functions is provided (3,4). In the ICU, patients' sleep is interrupted due to sleep disorders (insomnia and parasomnias), medical conditions (chronic pain, respiratory dysfunction, obesity and congestive heart failure, loss of physical activity), patient care and treatment interventions, mechanical ventilation practice, drugs and psychological factors (stress, anxiety). Furthermore, the environmental conditions of ICUs are not considered ideal for healthy sleep (5-9). Due to the existing nature of ICUs, patients rarely complete a full cycle of sleep and usually experience light and disrupted sleep, and both the duration and quality of sleep decrease (4,7,10,11). It is reported in the literature that the sleep quality of patients in the surgical ICU is poor (12,13).

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Sleep problems lead to increased pain sensitivity, decreased respiratory capacity, delayed wound healing, suppression of immunity, disruption of neuroendocrine and metabolic functions, delirium in patients, and increased length of stay in the ICU and mortality (9,14). With regard to surgical patients, sleep problems also delay healing (15). Sleep quality is given importance for the recovery of intensive care patients, and the monitoring and promotion of sleep are considered the standard care components (5,16).

The sleep quality of patients should be determined with valid and reliable tools since it is affected by many factors (6). According to the results of the study evaluating the sleep state of patients objectively or subjectively, it is recommended to take measures for sleep regulation (4,5). This study aimed to determine the sleep quality of surgical intensive care patients and the affecting factors.

Materials and Methods

Study Design and Sample

This descriptive study was conducted between April 2021 and January 2022 with the participation of 100 surgical intensive care patients.

Sample size calculation was performed using the G*Power (3.1.9.4) computer program. Based on the study results of Simons et al. (17) and considering α error =5%, power (1-β) =80%, the effect size of 0.320 and 79 patients were required in this study.

Inclusion and Exclusion Criteria

Adults who declared in writing that they volunteered to participate in the study or were unable to sign themselves and therefore signatures were obtained from their relatives, who were monitored in the surgical ICU after surgery and on postoperative day 2, had no diagnosis of psychological illness, had mental ability, and had no communication problems in Turkish were included in the study.

Patients who were mechanically ventilated, stayed for less than 24 hours in the ICU, underwent cranial surgery, had a glasgow coma scale score of 12<, had diseases that might affect sleep (chronic organ failure, sepsis, sleep disorder, psychiatric illness, drug or substance abuse, etc.), personally reported that they had hearing loss, and used hearing aids were not included in the study.

Setting

Thirty-eight physicians and thirty nurses worked in the ICU of a tertiary care unit with 23 beds, where the research data were collected. Neurosurgery, urological surgery, orthopedics and traumatology, gynecology and general surgery patients are served in the surgical ICU. The institution has separate ICUs for cardiovascular and thoracic surgery patients. The ratio of nurses to patients was 1:2 at night. Lighting was restricted in the intensive care setting at night.

Data Collection Forms

Data on the socio-demographic characteristics of the patients were collected with a patient descriptive form. Sleep quality that patient experienced were evaluated by the Richards-Campbell Sleep Questionnaire (RCSQ), according to self-report of the patient.

Patient Identification Form

It consists of a total of 27 items examining the individual variables of the patient. The survey questions were prepared by the researchers in accordance with the literature (4,5,10,18).

The Richards-Campbell Sleep Questionnaire

RCSQ was developed by Richards (19) for patients intensive care. A study on the validity and reliability of the scale in the Turkish language was conducted by Karaman Özlü and Özer (20). Five 100-mm visual analog scales (VAS) are included in the RCSQ: Sleep depth, sleep latency, awakenings, returning to sleep, and quality of sleep. The better the sleep, the higher the score. Participants must mark a "X" along each VAS to indicate the quality of that sleep domain for the previous night on the questionnaire. The distance from 0 mm to the X along each VAS was measured, and the RCSQ total score was calculated by averaging all 5 scales to arrive at the RCSQ total score, which was then reported as "average sleep score". This questionnaire contained a sixth scale that rated noise levels from very quiet to very loud (20). The RCSQ is considered an appropriate tool for assessing the sleep of patients in the ICU (4). Cronbach's α value of the scale developed by Richards (19) was found to be 0.82 (20). In the study, Cronbach's alpha value of the scale was 0.96.

Data Collection

Patients who met the inclusion criteria for sampling were informed about the study by the researcher (researcher 3, intensive care nurse). The patients who gave written consent to participate in the study were asked questions on the patient information form and RCSQ at the bedside. After recording the patients' responses on the forms and obtaining the necessary medical information from the medical records, the data collection process was terminated. The data were collected by the researcher using the face-to-face interview method between 09:00-10:00 in the morning on postoperative day 2, and the process lasted for approximately 10-15 minutes.

Statistical Analysis

In the study, International Business Machines (IBM) statistical package for the social sciences (IBM, Armonk, NY, USA) version 22.0 was used for data analysis. Descriptive data of the study were analyzed through numbers, percentages, means and standard deviation. Kolmogorov-Smirnov test was used to test the compatibility of the data to normal distribution. Mann-Whitney U, Kruskal Wallis-H test, and spearman correlation analysis were used in analyzing the data. Results were accepted to be statistically significant when p-value was less than 0.05.

Ethical Considerations

The Declaration of Helsinki, Good Clinical Practice guidelines, and the local ethics committee requirements were taken into account during the study process. Permissions have been received from the Trakya University Ethics Committee (date: 01.02.2021 protocol number: 2021/56 and desicion

number: 03/18) and institue (date: 08.03.2021 and number: 2021/30374). Before the study, patients were informed about the study and a written, informed consent has been obtained.

Results

The mean patient age was 58.9±15.6 years, and 71.0% were male. It was determined that 40% of the patients underwent non-oncologic abdominal surgery and 72% of them had at least one chronic disease. It was found that the patients' sleep score at home was 7.8±1.6 (Table 1).

RCSQ total score of patients was 39.3±14.4 (13-81). It was revealed that the type of surgical performed affected the RCSQ total score of patients (p<0.005). A positive and weak correlation was found between age and the RCSQ total score (p=0.033 r=0.213). A negative and weak correlation was found between pain severity and stress score and the RCSQ total score (p=0.455, r= -0.000 and p=0.00, r= -0.523) (Table 2).

It was determined that sleep was adversely affected by factors such as the lights of the intensive care setting, device sounds, ambient odor, ambient temperature, voices of other patients, conversations of the ICU staff, nurse and physician visits, and care and treatment practices (p<0.005) (Table 3).

Table 1. Patients' characteristics (n=100)

Characteristics		**n (%)**
Age_{year}	**Min-max 18-90**	**Mean ± SD 58.9±15.6**
Gender	Female	29 (29)
	Male	71 (71)
Companion support	Yes	96 (4)
	No	96 (4)
Comorbidity*	No	28 (28)
	Hypertension	64 (64)
	Diabetes	34 (34)
	Cardiovascular diseases	12 (12)
Surgery performed	Orthopedic surgery	32 (32)
	Oncological surgery	28 (28)
	Non-oncological abdominal surgery	40 (40)
Type of surgery performed	Emergency	18 (18)
	Elective	82 (82)
Use of analgesic drugs**	No	12 (12)
	Paracetamol	9 (9)
	Opioid	12 (12)
	Paracetamol + opioid	67 (67)
Use of inotropic drugs**	No	12 (12)
	Beta blocker	47 (47)
	Epinephrin	6 (6)
Use of sedative drugs**	No	49 (49)
	Propofol	51(51)
	Min-max	**Mean ± SD**
Pain severity	0-9	5.2±2.0
GCS score	13-14	13.4±0.4
Stress score	0-9	5.4±2.1
Ohers problems (vomiting, dyspnea etc.)	0-10	1.8±2.0
Sleep score at home***	1-10	7.8±1.6

*More than one option is ticked, **Data covers the last 24 hours, ***Visual analog scale (0-10)

ICU: Intensive care unit, GCS: Glaskow coma scale, n: Number of patient, SD: Standard deviation, Min-max: Minimum-maximum

Discussion

The study revealed that patients had good sleep scores at home; however, their sleep quality was poor in the ICU. Likewise, Stewart et al. (21) and Caruana et al. (12) found that the sleep quality of patients in the ICU decreased compared to that at home. Previous studies (22,23) have indicated that the sleep quality of patients in the ICU is disrupted with similar scores (respectively RCSQ=40.47, RCSQ=34.41, RCSQ=33.50). In their study, Seid Tegegne and Fenta Alemnew (24) examined postoperative sleep quality and determined that 64.9% of patients had a poor sleep quality. The study results revealed that the sleep quality of patients was disrupted in the intensive care setting.

A positive and weak correlation was found between age and the RCSQ total score in this study. In their study with patients who underwent cardiac surgery, Navarro-García et al. (13) revealed that patients aged 65 years and older had a higher mean sleep quality score on the first night in the ICU. In their study, Seid Tegegne and Fenta Alemnew (24) reported that patients aged 25-54 years were 15.2 times more likely to have sleep disorders in the postoperative period compared to elderly patients. Contrary to our result, Bernat Adell et al. (25) determined that older age was associated with poorer sleep quality. Liao et al. (26) indicated that age was an individual factor affecting sleep quality in patients undergoing cardiac surgery and that age should be taken into account in studies on sleep. It was determined that as the age of patients increased, they fell asleep more quickly, woke up less frequently and slept better with a shorter duration of staying awake.

It was found that patients operated under elective conditions could sleep better than patients operated under emergency conditions. In the study by Seid Tegegne and Fenta Alemnew (24) in which postoperative patients constituted the sample, it was revealed that operation under emergency conditions caused a higher risk of reduced sleep quality by 2.46 times. It is considered that patients' sleep quality is adversely affected due to acute physiological changes and comorbidities (27), which are more common in patients operated under emergency conditions.

It was found that patients experienced worse sleep as the severity of pain increased. Likewise, it was reported that 32.1% of intensive care patients experienced poor sleep due to pain (21). Previous studies have indicated a negative correlation between pain and sleep quality (10,23,28) and reported that pain was in the first place among the barriers that prevented sleep (13,22,29). In their study, Seid Tegegne and Fenta

Table 2. Comparison of patients' sociodemographic characteristics according to Richards-Campbell Sleep Questionnaire (n=100)						
Variables	**Sleep depth**	**Sleep latency**	**Awakenings**	**Returning to sleep**	**Sleep quality**	**Total score**
Mean ± SD	47.2±15.6	37.0±15.9	36.1±15.0	35.7±15.4	40.6±17.7	39.3±14.4
	Mean rank	**Mean rank**	**Mean rank**	**Mean rank**	**Mean rank**	**Mean rank**
Age$_{year}$	r^S=0.188 p=0.061	r^S=0.241 p=0.016	r^S=0.244 p=0.014	r^S=0.216 p=0.031	r^S=0.165 p=0.100	r^S=0.213 p=0.033
Gender Female Male	43.79	48.53	52.83	53.29	49.17	49.22
	53.24	51.30	49.55	49.36	51.04	51.02
	U=835.00 p=0.135	U=972.500 p=0.662	U=962.000 p=0.603	U=948.000 p=0.536	U=991.000 p=0.768	U=992.500 p=0.779
Companion support Yes No	50.70	50.93	50.78	50.60	50.63	50.80
	45.75	40.13	43.75	47.38	47.38	43.25
	U=173.000 p=0.754	U=150.500 p=0.480	U=165.000 p=0.653	U=179.500 p=0.832	U=179.500 p=0.832	U=163.000 p=0.629
Comorbidity Yes No	44.14	44.95	46.43	46.70	50.13	46.68
	52.97	52.66	52.08	51.98	50.65	52.06
	U=830.000 p=0.167	U=852.500 p=0.229	U=894.000 p=0.375	U=901.500 p=0.410	U=997.500 p=0.935	U=895.500 p=0.388
Surgery performed Orthopedic surgery Oncological surgery Non-oncological abdominal surgery	41.08	46.69	46.19	46.19	45.48	44.80
	52.18	52.04	52.52	54.52	50.70	51.75
	56.86	52.48	52.54	51.14	54.38	54.19
	KW=5.506 p=0.064	KW=0.831 p=0.660	KW=1.069 p=0.586	KW=1.281 p=0.527	KW=1.695 p=0.428	KW=1.937 p=0.380
Type of surgery performed Emergency Elective	29.50	29.53	33.67	30.19	27.14	28.36
	55.11	55.10	54.20	54.96	55.63	55.36
	U=360.000 p=0.001	U=360.500 p=0.001	U=435.000 p=0.006	U=372.500 p=0.001	U=317.500 p=0.000	U=339.500 p=0.000
Use of analgesic drugs Yes No	58.58	59.75	52.08	56.63	58.79	60.79
	49.40	49.24	50.28	49.66	49.37	49.10
	U=431.000 p=0.298	U=417.000 p=0.235	U=509.000 p=0.838	U=454.500 p=0.432	U=428.500 p=0.288	U=404.500 p=0.190
Use of inotropic analgesic drugs Yes No	57.58	53.28	52.96	54.39	54.42	54.51
	42.51	47.36	47.72	46.12	46.07	45.98
	U=870.000 p=0.009	U=1098.000 p=0.304	U=1115.000 p=0.361	U=1039.500 p=0.152	U=1037.500 p=0.148	U=1033.000 p=0.142
Use of sedative drugs Yes No	52.06	49.14	48.98	49.10	47.96	48.66
	48.88	51.92	52.08	51.96	53.14	52.42
	U=1170.000 p=0.580	U=1180.000 p=0.629	U=1172.000 p=0.588	U=1178.000 p=0.620	U=1120.000 p=0.368	U=1155.500 p=0.517
Pain severity	r^S= -0.493 p=0.000	r^S= -0.452 p=0.000	r^S= -0.335 p=0.001	r^S= -0.397 p=0.000	r^S= -0.493 p=0.000	r^S= -0.485 p=0.000
GCS score	r^S=0.050 p=0.623	r^S=0.176 p=0.079	r^S=0.133 p=0.187	r^S=0.150 p=0.136	r^S=0.162 p=0.108	r^S=0.161 p=0.109
Stress	r^S= -0.459 p=0.000	r^S= -0.503 p=0.000	r^S= -0.422 p=0.000	r^S= -0.489 p=0.000	r^S= -0.501 p=0.000	r^S= -0.523 p=0.000
Other problems (vomiting, dyspnea etc.)	r^S=0.115 p=0.256	r^S=0.011 p=0.915	r^S= -0.003 p=0.974	r^S= -0.038 p=0.705	r^S= -0.079 p=0.437	r^S= -0.003 p=0.972
Sleep score at home	r^S=0.187 p=0.063	r^S= 0.009 p=0.928	r^S= -0.061 p=0.549	r^S= -0.014 p=0.890	r^S= -0.002 p=0.980	r^S=0.032 p=0.753

r^S: Spearman correlation analysis, ICU: Intensive care unit, SD: Standard deviation, U: Mann-Whitney U test, KW: Kruskal Wallis-H test

Table 3. Environmental factors affecting sleep quality (n=100)						
Factors	**Sleep depth**	**Sleep latency**	**Awakenings**	**Returning to sleep**	**Sleep quality**	**Total score**
Light	r^S= -0.432 p=0.000	r^S= -0.414 p=0.000	r^S= -0.339 p= 0.001	r^S= -0.371 p=0.000	r^S= -0.418 p=0.000	r^S= -0.429 p=0.000
Device sounds	r^S= -0.427 p=0.000	r^S= -0.504 p=0.000	r^S= -0.377 p=0.000	r^S= -0.355 p=0.000	r^S= -0.447 p=0.000	r^S= -0.483 p=0.000
Ambient odor	r^S= -0.282 p=0.004	r^S= -0.279 p=0.005	r^S= -0.263 p=0.008	r^S= -0.196 p=0.051	r^S= -0.282 p=0.005	r^S= -0.290 p=0.003
Ambient temparature	r^S= -0.237 p=0.018	r^S = -0.280 p=0.005	r^S= -0.158 p=0.118	r^S= -0.193 p=0.054	r^S= -0.305 p=0.002	r^S= -0.274 p=0.006
Voice of other patients (cough etc.)	r^S= -0.440 p=0.000	r^S= -0.380 p=0.000	r^S= -0.354 p=0.000	r^S= -0.323 p=0.001	r^S= -0.370 p=0.000	r^S= -0.402 p=0.000
Conversations of the ICU staff	r^S= -0.462 p=0.000	r^S= -0.499 p=0.000	r^S= -0.399 p=0.000	r^S= -0.451 p=0.000	r^S= -0.497 p=0.000	r^S= -0.530 p=0.000
Nurse and physician visits	r^S= -0.527 p=0.000	r^S= -0.549 p=0.000	r^S= -0.438 p=0.000	r^S= -0.462 p=0.000	r^S= -0.518 p=0.000	r^S= -0.575 p=0.000
Care and treatment practices, diagnostic procedures	r^S= -0.556 p=0.000	r^S= -0.542 p=0.000	r^S= -0.424 p=0.000	r^S= -0.429 p=0.000	r^S= -0.497 p=0.000	r^S= -0.564 p=0.000

r^s: Spearman correlation analysis, ICU: Intensive care unit

Alemnew (24) detected that moderate to severe pain reduced the sleep quality of patients. Mouch et al. (30) indicated in their study that very few of the patients who underwent elective surgery stated that pain affected their sleep quality. They emphasized that this might have occurred since they applied appropriate and long-acting pain management practices. The study results showed that the sleep quality of patients decreased as their pain became more severe and that appropriate pain management might reduce sleep interruptions due to pain.

It was determined that the sleep quality of the participants decreased as their stress scores increased. In the study by Stewart et al. (21), patients reported that stress (26.8%) was a factor that prevented sleep in the ICU. Liao et al. (26) revealed that anxiety after cardiac surgery led to sleep disorders. Due to the nature of the disease (trauma, surgery, etc.), patients may experience stress, and stress may lead to interruptions in sleep (31). Nurses can encourage their patients to sleep by helping them to cope with stress.

It was found that sleep was adversely affected by environmental factors such as the lights of the intensive care setting, device sounds, ambient odor, ambient temperature, voices of other patients, and conversations of the ICU staff. Younis et al. (28) determined that light and sleep quality were negatively correlated. Bani Younis et al. (32) reported in their study that high sound and light levels adversely affected the sleep quality of patients. The study by Stewart et al. (21) determined that patients in the ICU were prevented from sleeping due to noise (53.6%) and light (23.2%). In the study by Simons et al. (17), patients indicated that the factors that made it difficult to sleep were monitor/equipment alarms, the conversations of the staff, etc. In the qualitative study by Astin et al. (18), patients indicated that they could not sleep well due to the coughing, snoring, and vomiting of other patients. Carrera-Hernández et al. (10) found that conversations of the staff and device noises led to an interruption in sleep. The study by Navarro-García et al. (13) reported that the noise caused by the voice of the intensive care staff was among the factors that affected the sleep quality of patients. Many previous studies (22,28,29,33) have determined noise as a factor that negatively affects the sleep quality of intensive care patients. Alsulami et al. (23) indicated that noise was in the first place among the external factors that disrupted sleep quality. Bernat Adell et al. (25) reported that ambient temperature was a factor affecting sleep quality. In the study by Bakr and Ahmed (33), it was revealed that the sleep of 85.7% of intensive care patients was affected by the ambient temperature. It can be said that environmental factors have a dominant effect on sleep. It is important to raise awareness of the intensive care team about environmental measures and practices to ensure sleep quality.

It was determined that patients' sleep was adversely affected due to nurse and physician visits and care and treatment practices. This result is in parallel with the results of the study confirming that care activity and treatment practices (repositioning, breathing exercise etc.) are among the factors that negatively affect sleep quality in ICU patients (22,25,29,33). According to the results of a systematic review, night-time nursing interventions are a minor factor that disrupts sleep quality (34). Younis et al. (28) found that nursing interventions and sleep quality were negatively correlated. Although nurse and physician visits and care and treatments in the ICU are inevitable, it is important to minimize and group the visits and interventions by the intensive care team as much as possible.

Study Limitations

This study has certain limitations. The results of our study cannot be generalized to patients who could not be included in the study due to the exclusion criteria. The study only evaluated sleep quality on postoperative day 2. The results can be interpreted in accordance with these criteria. Patients may

not remember their sleep experiences. However, the patients who developed delirium, underwent neurosurgical surgery, had existing psychiatric diseases and sleep disorders were excluded in order to minimize this bias.

Conclusion

The results of the study reveal the factors affecting the sleep quality of surgical patients. It was determined that sleep quality, affected by many factors, was poor in intensive care patients. Patients who are young, painful, stressed and operated under emergency conditions are at risk of having sleep disorders. Environmental factors, medical visits, and care and treatment practices lead to interruptions in night sleep. Considering that the deterioration in sleep quality negatively affects surgical recovery, solutions can be produced to improve the sleep quality of nurses in light of the study findings. Increasing the awareness of nurses and intensive care team members about the factors disrupting sleep quality and possible solutions (reducing sound and light levels at night, pain control, improving coping skills, etc.), transferring the solutions to the clinic, and evaluating the results may contribute to improving the sleep quality of patients.

Ethics

Ethics Committee Approval: The Declaration of Helsinki, Good Clinical Practice guidelines, and the local ethics committee requirements were taken into account during the study process. Permissions have been received from the Trakya University Ethics Committee (date: 01.02.2021 protocol number: 2021/56 and desicion number: 03/18) and institue (date: 08.03.2021 and number: 2021/30374).
Informed Consent: Before the study, patients were informed about the study and a written, informed consent has been obtained.
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Authorship Contributions

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