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EFFECTS OF THE COVID-19 PANDEMIC ON SURGICAL CLINICS

COVID-19 PANDEMİSİNİN CERRAHİ KLİNİKLERE ETKİLERİ

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Abstract

Aim: This study aimed to reveal how surgical clinics were affected by the COVID-19 pandemic based on concrete data.

Methods: In this study, the outpatient clinics of surgical branches were examined in terms of the number of presenting patients, number of visits, patient age, number of patient revisits, number of appointments made, patients' time of arrival for their appointments, patient throughput times, number of patients that underwent surgery, and number of surgical operations performed during the COVID-19 pandemic.

Results: During the first year of the pandemic, concerning the number of presenting patients and number of visits, the most affected outpatient clinic was otorhinolaryngology and the least affected was gynecology and obstetrics. It was determined that the highest decrease in the mean age of patients presenting to outpatient clinics was in urology, and the lowest decrease in pediatric surgery. The patients who were the earliest to arrive for their appointments to undergo examinations were those that presented to the cardiovascular surgery clinic, while pediatric surgery patients arrived at the hospital closest to their appointment times. In the first year of the COVID-19 pandemic, the number of patients that underwent surgery decreased by 53% and the operations performed by 55% compared to the previous year.

Conclusions: With the effect of the pandemic, there was a decrease in the number of patients that presented to the outpatient clinics of surgical branches, number of visits to these clinics, appointments made, repeated visits, patients that underwent surgery, number of operations performed, and mean age of patients.

Keywords: COVID-19 Pandemic, outpatient clinics, surgical branches, surgery

Öz

Amaç: Bu çalışmada cerrahi kliniklerinin COVİD-19 pandemisinden nasıl etkilendiği somut verilerle ortaya konulmak istenmiştir.

Yöntemler: Bu çalışmada COVİD-19 pandemisi sürecinde polikliniğe başvuran hasta sayıları, polikliniğe yapılan başvuru sayıları, polikliniğe başvuran hastaların yaşları, polikliniğe yapılan mükerrer başvurular, polikliniğe alınan randevu sayıları, polikliniğe alınan randevuya geliş zamanları, poliklinik işlem süreleri, ameliyat olan hasta sayıları, yapılan ameliyat sayıları analiz edilmiştir.

Bulgular: Pandemi döneminde; polikliniklerine başvuran hasta sayıları ile bu polikliniklere yapılan başvuru sayıları açısından Kulak Burun Boğazın en fazla, Kadın Hastalıkları ve Doğumun en az etkilendiği görülmektedir. Polikliniklere başvuran hastaların yaş ortalamasındaki en fazla düşüşün üroloji hastalarında, en az düşüşün ise çocuk cerrahisinde olduğu görülmektedir. Poliklinik randevusuna en erken gelip muayene olan hastaların Kardiyovasküler Cerrahiye başvuranlar olduğu, randevu saatine en yakın muayene olanların ise Çocuk Cerrahisine başvuranların olduğu izlenmiştir. Pandeminin etkili olduğu yılda, önceki yıla göre, ameliyat olan hastaların sayısında %53, gerçekleştirilen cerrahilerde ise %55 düşüş izlenmiştir.

Sonuç: Pandeminin etkisiyle: cerrahi branş polikliniklerine başvuran hasta, bu polikliniklere başvuru, polikliniklere alınabilen randevu, mükerrer başvuru, cerrahi branşlara ameliyat olan hasta, gerçekleşen ameliyat sayıları ile polikliniklere başvuran hastaların yaş ortalaması azalmıştır. Polikliniklerindeki işlem süreleri genel olarak artmıştır.

Anahtar Kelimeler: COVID-19 Pandemisi, poliklinikler, cerrahi branşlar, cerrahi

Introduction

Due to the COVID-19 pandemic, all surgical specialties had to limit their surgical practices and regulate operations performed[1]. Increasing demands for ventilators, hospital areas, and staff during the pandemic reduced the surgical capacity and made it difficult to perform surgical operations[2,3]. The decreased number of patient presentations due to the cancellation of elective operations, reduction in the capacity of clinics providing patient care, and minimization of surgical teams to reduce their exposure to the virus and create labor force for other departments also led to a decline in surgical capacity[4]. In particular, the cancellation of elective surgery is expected to have cumulative devastating consequences for health systems around the world[2]. In a statement dated November 23, 2020, the American College of Surgeons stated the critical importance of providing basic surgical procedures, and in another statement dated October 27, 2020, it emphasized that delaying 'non-essential' surgical procedures resulted in significant delays[5,6].

Recommendations for reducing elective operations have been reported in many parts of the world during the COVID-19 pandemic[7,8]. In Turkey, the first case infected with COVID-19 was announced on March 11, 2021, through a press release. Subsequently, with the letter of the Turkish Ministry of Health entitled "Infection Control Precautions to be Taken in Operating Rooms during the Pandemic Period", it was recommended to postpone elective surgical and endoscopic procedures[9,10]. However, despite the normalization circular published on June 1, 2020, no statement was made concerning whether elective operations could continue to be performed throughout the country. In the normalization process, in addition to guidelines published by professional organizations and associations, hospitals also took their own decisions regarding the need for elective operations to be performed with certain precautions[11-13].

Health Sciences University Bursa Yuksek Ihtisas Training and Research Hospital is the largest and most equipped hospital with a capacity of 1,520 beds in the South Marmara Region of Turkey and accepts patients not only from Bursa where the hospital is located but also from many provinces nearby. As the effects of the pandemic became more serious, the hospital allocated certain staff (especially anesthesiologists and nurses) to COVID-19 units, which were created by converting existing clinics. Emergency measures were taken to reduce the use of inpatient beds, outpatient clinic rooms, and operating rooms in almost every department. The hospital's 32 operating rooms did not operate at full capacity even in the first year of the pandemic compared to the pre-pandemic period.

This study aimed to obtain concrete data to reveal how surgical clinics in a tertiary training and research hospital were affected by the pandemic. We consider that the analysis of these retrospectively obtained data will provide an insight into possible future pandemic waves or new pandemics.

Materials and Methods

The study was conducted after receiving approval from the Clinical Research Ethics Committee of Health Sciences University Bursa Yuksek Ihtisas Training and Research Hospital, with the protocol number 2011-KAEK-25 2021/02-04. The data used for the study were retrospectively obtained from the hospital information management system following the first anniversary of the first reported COVID-19 case in Turkey.

Within the scope of the study, the outpatient clinics of the surgical branches were evaluated in terms of the number of presenting patients, number of presentations, patient age, number of patient revisits, number of appointments made, patients' time of arrival for their appointments, patient throughput times, number of patients that underwent

surgery, and number of operations performed. The patient throughput time was calculated based on the time elapsed from the patients' arrival at the outpatient clinic to the completion of patient care when there was no other action left to be taken. Thus, this period did not only cover patient examination; it started with the patients' entrance into the outpatient clinic, included their registration with the hospital information management system in the outpatient room and necessary notes being taken or examinations being requested, and all the subsequent procedures undertaken until they left the clinic (laboratory and imaging tests, etc.).

The data were analyzed in three groups according to the evaluation period: Group A covering the one-year period starting from the first reported COVID-19 case in Turkey (March 11, 2020-March 10, 2021), Group B covering the year before the first reported case in Turkey (March 11, 2019-March 10, 2020), and Group C covering the year two years before the first reported case in Turkey (March 11, 2018-March 10, 2019).

- *Statistical analysis*

The data were analyzed using the Shapiro-Wilk test to determine whether they showed a normal distribution. The results were presented as mean ± standard deviation or frequency and percentage values. Normally distributed data were compared with the independent-samples t-test or one-way analysis of variance. The Bonferroni test was used as a multiple comparison test. Categorical variables were compared between the groups using Pearson's chi-square test and the Fisher-Freeman-Halton test. The significance level was accepted as $p < 0.05$. Statistical analyses were performed using IBM SPSS ver. 23.0 (IBM Corp. Release 2015. IBM SPSS Statistics for Windows, Version 23.0. Armonk, NY: IBM Corp.).

Results

The retrospective analysis of the data performed following the first anniversary of the first reported COVID-19 case in Turkey revealed that a total of 903,072 patients had presented to the surgical outpatient clinics over the three-year study period. The distribution of these patients according to Groups A, B, and C was 149,534, 374,730, and 378,808, respectively. Table 1 summarizes the differences between the surgical branch groups. Examining the ratios of the number of patients presenting to the outpatient clinics of surgical branches over the total number of patients in each group, there was a significant increase in the number of those presenting to the urology, orthopedics, gynecology and obstetrics, and ophthalmology outpatient clinics in Group A compared to Groups B and C. In contrast, this number significantly decreased for the neurosurgery, general surgery, otorhinolaryngology, and plastic, reconstructive and esthetic surgery outpatient clinics ($p < 0.05$). Concerning the number of patients presenting to the outpatient clinics, the otorhinolaryngology clinic was most affected and the gynecology and obstetrics clinic was least affected (Table 1).

The distribution of the total 1,804,481 presentations to the outpatient clinics of surgical branches was as follows: 288,567 for Group A, 758,736, for Group B, and 757,179 for Group C. The ratio of the number of presentations to the outpatient clinics over the total number of presentations in each group significantly increased for the urology, orthopedics, gynecology and obstetrics, and ophthalmology clinics in Group A compared to Groups B and C. On the other hand, there was a significant decrease in the ratio of patients presenting to the neurosurgery, general surgery, cardiovascular surgery, otorhinolaryngology, and plastic, reconstructive and esthetic surgery clinics during the pandemic period ($p < 0.05$).

Table 1. Distribution of the number of patients presenting to the outpatient clinics of surgical branches according to the groups (repeated presentations not included)

Surgical branch	Group A		Group B		Group C		Total		p
	n	(%)	n	(%)	n	(%)	n	(%)	
Urology	19,250	(12.9)[a]	44,094	(11.8)[b]	43,302	(11.4)[c]	106,646	(11.8)	**<0.001**
Orthopedics	25,788	(17.2)[a]	53,702	(14.3)[b]	53,427	(14.1)[c]	132,917	(14.7)	
Brain surgery	11,524	(7.7)[a]	31,139	(8.3)[b]	31,905	(8.4)[c]	74,568	(8.3)	
General surgery	13,695	(9.2)[a]	38,053	(10.2)[b]	37,497	(9.9)[c]	89,245	(9.9)	
Cardiovascular surgery	8,608	(5.8)[a]	20,529	(5.5)[b]	22,094	(5.8)[a]	51,231	(5.7)	
Thoracic surgery	1,360	(0.9)[a]	2,909	(0.8)[b]	3,280	(0.9)[a]	7,549	(0.8)	
Otorhinolaryngology	16,225	(10.9)[a]	64,411	(17.2)[b]	66,900	(17.7)[c]	147,536	(16.3)	
Pediatric surgery	4,291	(2.9)[a]	6,519	(1.7)[b]	10,545	(2.8)[a]	21,355	(2.4)	
Obstetrics and gynecology	29,470	(19.7)[a]	63,829	(17.0)[b]	59,201	(15.6)[c]	152,500	(16.9)	
Plastic, reconstructive and esthetic surgery	2,346	(1.6)[a]	9,952	(2.7)[b]	13,759	(3.6)[c]	26,057	(2.9)	
Ophthalmology	16,977	(11.4)[a]	39,219	(10.5)[b]	36,887	(9.7)[c]	93,083	(10.3)	
Pediatric urology	-	-	374	(0.1)[b]	11	(0.0)[a]	385	(0.0)	
Total	149,534	(100.0)	374,730	(100.0)	378,808	(100.0)	903,072	(100.0)	

[a, b, c]: same letters indicate no statistically significant difference between the groups for the given surgical branch; i.e., different letters indicate that the difference between the groups is statistically significant ($p < 0.05$), **Group A:** March 11, 2020-March 10, 2021 (one-year period starting from the first reported COVID-19 case in Turkey), **Group B:** March 11, 2019-March 10, 2020 (the year before the first reported case in Turkey), **Group C:** March 11, 2018-March 10, 2019 (two years before the first reported case in Turkey).

Table 2. Distribution of the number of presentations to the outpatient clinics of surgical branches according to the groups (repeated presentations included)

Surgical branch	Group A		Group B		Group C		Total		p
	n	(%)	n	(%)	n	(%)	n	(%)	
Urology	37,471	(13.0)[a]	93,582	(12.3)[b]	89,031	(11.8)[c]	220,084	(12.2)	**<0.001**
Orthopedics	48,113	(16.7)[a]	102,173	(13.5)[b]	105,163	(13.9)[c]	255,449	(14.2)	
Brain surgery	19,769	(6.9)[a]	53,934	(7.1)[b]	57,703	(7.6)[c]	131,406	(7.3)	
General surgery	21,728	(7.5)[a]	70,488	(9.3)[b]	70,488	(9.3)[b]	162,704	(9.0)	
Cardiovascular surgery	13,596	(4.7)[a]	37,945	(5.0)[b]	39,736	(5.2)[b]	91,277	(5.1)	
Thoracic surgery	1,935	(0.7)[a]	4,984	(0.7)[a]	5,409	(0.7)[b]	12,328	(0.7)	
Otorhinolaryngology	20,535	(7.1)[a]	109,578	(14.4)[b]	114,836	(15.2)[c]	244,949	(13.6)	
Pediatric surgery	6,338	(2.2)[a]	10,783	(1.4)[b]	17,922	(2.4)[c]	35,043	(1.9)	
Obstetrics and gynecology	82,337	(28.5)[a]	179,122	(23.6)[b]	163,881	(21.6)[c]	425,340	(23.6)	
Plastic, reconstructive and esthetic surgery	4,028	(1.4)[a]	19,729	(2.6)[b]	28,076	(3.7)[c]	51,833	(2.9)	
Ophthalmology	32,717	(11.3)[a]	75,422	(9.9)[b]	64,921	(8.6)[c]	173,060	(9.6)	
Pediatric urology	-	-	996	(0.1)[b]	13	(0.0)[a]	1,009	(0.1)	
Total	288,567	(100.0)	758,736	(100.0)	757,179	(100.0)	1,804,481	(100.0)	

[a, b, c]: same letters indicate no statistically significant difference between the groups for the given surgical branch; i.e., different letters indicate that the difference between the groups is statistically significant ($p < 0.05$), **Group A:** March 11, 2020-March 10, 2021 (one-year period starting from the first reported COVID-19 case in Turkey), **Group B:** March 11, 2019-March 10, 2020 (the year before the first reported case in Turkey), **Group C:** March 11, 2018-March 10, 2019 (two years before the first reported case in Turkey).

Table 3. Age distribution of patients presenting to the outpatient clinics of surgical branches by groups

Surgical branch	Group A (mean ± SD)	Group B (mean ± SD)	Group C (mean ± SD)	Total (mean ± SD)	p
Urology	46.83 ± 17.86[a]	50.08 ± 19.00[b]	50.02 ± 19.27[b]	49.47 ± 18.95	**<0.001**
Orthopedics	38.82 ± 20.22[a]	40.85 ± 21.56[b]	41.18 ± 21.29[c]	40.59 ± 21.21	**<0.001**
Brain surgery	44.36 ± 17.35[a]	47.15 ± 17.55[b]	46.97 ± 17.48[b]	46.64 ± 17.52	**<0.001**
General surgery	45.26 ± 15.99[a]	46.85 ± 16.07[b]	47.15 ± 16.05[c]	46.73 ± 16.07	**<0.001**
Cardiovascular surgery	53.30 ± 15.39[a]	55.23 ± 15.53[b]	55.45 ± 15.80[b]	55.00 ± 15.64	**<0.001**
Thoracic surgery	47.00 ± 16.89[a]	50.55 ± 17.82[b]	48.85 ± 16.89[c]	49.17 ± 17.39	**<0.001**
Otorhinolaryngology	33.70 ± 22.92[a]	35.62 ± 23.11[b]	34.78 ± 23.13[c]	35.03 ± 23.10	**<0.001**
Pediatric surgery	7.82 ± 6.59[a]	8.21 ± 5.70[b]	8.91 ± 5.46[c]	8.48 ± 5.79	**<0.001**
Obstetrics and gynecology	33.74 ± 11.33[a]	36.24 ± 12.29[b]	36.65 ± 12.10[c]	35.92 ± 12.08	**<0.001**
Plastic, reconstructive and esthetic surgery	36.22 ± 19.17[a]	38.00 ± 20.13[b]	37.35 ± 19.21[c]	37.50 ± 19.57	**<0.001**
Ophthalmology	40.79 ± 21.61[a]	42.06 ± 23.73[b]	41.95 ± 23.55[b]	41.78 ± 23.29	**<0.001**
Pediatric urology	-	9.09 ± 4.69	8.64 ± 3.80	9.07 ± 4.66	0.242
Total	39.51 ± 19.48[a]	41.70 ± 20.52[b]	41.37 ± 20.69[c]	41.20 ± 20.43	**<0.001**

[a, b, c]: same letters indicate no statistically significant difference between the groups for the given surgical branch; i.e., different letters indicate that the difference between the groups is statistically significant ($p < 0.05$), **Group A:** March 11, 2020-March 10, 2021 (one-year period starting from the first reported COVID-19 case in Turkey), **Group B:** March 11, 2019-March 10, 2020 (the year before the first reported case in Turkey), **Group C:** March 11, 2018-March 10, 2019 (two years before the first reported case in Turkey).

Table 4. Distribution of repeated visits to the outpatient clinics of surgical branches according to the groups (only patients that presented to the outpatient clinic more than once in each period were included in the evaluation)

Surgical branch	Group A		Group B		Group C		p
	Mean ± SD	(min-max)	Mean ± SD	(min-max)	Mean ± SD	(min-max)	
Urology	3.10 ± 2.23	(2-35)[a]	3.26 ± 2.24	(2-34)[b]	3.21 ± 2.21	(2-33)[c]	**<0.001**
Orthopedics	3.36 ± 2.39	(2-40)[a]	3.24 ± 2.18	(2-39)[b]	3.37 ± 2.32	(2-45)[a]	**<0.001**
Brain surgery	2.65 ± 1.33	(2-18)	2.64 ± 1.36	(2-24)	2.67 ± 1.42	(2-22)	0.366
General surgery	2.94 ± 1.60	(2-18)[a]	3.12 ± 1.71	(2-26)[b]	3.19 ± 1.81	(2-29)[c]	**<0.001**
Cardiovascular surgery	3.08 ± 2.20	(2-29)	3.10 ± 1.87	(2-22)	3.14 ± 2.18	(2-36)	0.234
Thoracic surgery	2.70 ± 1.32	(2-11)[a]	3.14 ± 1.91	(2-18)[b]	2.90 ± 1.74	(2-18)[a]	**<0.001**
Otorhinolaryngology	2.34 ± 0.83	(2-13)[a]	2.80 ± 1.63	(2-28)[b]	2.81 ± 1.69	(2-30)[b]	**<0.001**
Pediatric surgery	2.96 ± 1.51	(2-14)[a]	2.90 ± 1.5	(2-16)[a,b]	3.01 ± 1.52	(2-23)[a,c]	**0.040**
Obstetrics and gynecology	3.75 ± 2.45	(2-26)[a]	3.81 ± 2.57	(2-26)[b]	3.94 ± 2.70	(2-30)[c]	**<0.001**
Plastic, reconstructive and esthetic surgery	3.03 ± 2.02	(2-21)[a]	3.26 ± 2.04	(2-26)[b]	3.43 ± 2.01	(2-28)[c]	**<0.001**
Ophthalmology	4.49 ± 4.45	(2-36)[a]	4.48 ± 4.12	(2-36)[a]	4.10 ± 3.49	(2-33)[b]	**<0.001**
Pediatric urology	-	-	3.79 ± 2.31	(2-13)	-	-	

[a, b, c]: same letters indicate no statistically significant difference between the groups for the given surgical branch; i.e., different letters indicate that the difference between the groups is statistically significant ($p < 0.05$), **SD:** standard deviation, **Group A:** March 11, 2020-March 10, 2021 (one-year period starting from the first reported COVID-19 case in Turkey), **Group B:** March 11, 2019-March 10, 2020 (the year before the first reported case in Turkey), **Group C:** March 11, 2018-March 10, 2019 (two years before the first reported case in Turkey).

Table 5. Distribution of the number of appointments made for the outpatient clinics of surgical branches according to the groups

Surgical branch	Group A		Group B		Group C		Total		p
	n	(%)	n	(%)	n	(%)	n	(%)	
Urology	16,772	(14.6)[a]	56,796	(14.7)[a]	57,654	(14.3)[b]	131,222	(14.5)	**<0.001**
Orthopedics	19,532	(17.0)[a]	48,629	(12.6)[b]	48,764	(12.1)[c]	116,925	(12.9)	
Brain surgery	9,935	(8.6)[a]	34,185	(8.8)[a]	35,430	(8.8)[a]	79,550	(8.8)	
General surgery	10,504	(9.1)[a]	42,873	(11.1)[b]	45,409	(11.2)[b]	98,786	(10.9)	
Cardiovascular surgery	6,036	(5.3)[a]	19,138	(4.9)[b]	23,372	(5.8)[c]	48,546	(5.4)	
Thoracic surgery	1,414	(1.2)[a]	3,919	(1.0)[b]	3,956	(1.0)[b]	9,289	(1.0)	
Otorhinolaryngology	10,576	(9.2)[a]	61,438	(15.9)[b]	55,932	(13.8)[c]	127,946	(14.1)	
Pediatric surgery	4,268	(3.7)[a]	5,948	(1.5)[b]	11,921	(3.0)[c]	22,137	(2.4)	
Obstetrics and gynecology	28,206	(24.5)[a]	82,040	(21.2)[b]	82,895	(20.5)[c]	193,142	(21.3)	
Plastic, reconstructive and esthetic surgery	1,946	(1.7)[a]	9,548	(2.5)[b]	18,040	(4.5)[c]	29,534	(3.3)	
Ophthalmology	5,745	(5.0)[a]	21,768	(5.6)[b]	20,511	(5.1)[a]	48,024	(5.3)	
Pediatric urology	0	(0.0)[a]	574	(0.1)[b]	8	(0.0)[a]	582	(0.1)	
Total	114,934	(100.0)	386,856	(100.0)	403,893	(100.0)	905,683	(100.0)	

[a, b, c]: same letters indicate no statistically significant difference between the groups for the given surgical branch; i.e., different letters indicate that the difference between the groups is statistically significant ($p < 0.05$), **Group A:** March 11, 2020-March 10, 2021 (one-year period starting from the first reported COVID-19 case in Turkey), **Group B:** March 11, 2019-March 10, 2020 (the year before the first reported case in Turkey), **Group C:** March 11, 2018-March 10, 2019 (two years before the first reported case in Turkey).

Table 6. Distribution of patient arrival times at the outpatient clinics of surgical branches according to the groups

Surgical branch	Group A Mean ± SD	Group B Mean ± SD	Group C Mean ± SD	p
Urology	-0:11:47 ± 1:03:30[a]	-0:20:14 ± 1:24:43[b]	-0:15:39 ± 1:29:19[c]	**<0.001**
Orthopedics	-0:10:22 ± 1:08:40[a]	-0:10:03 ± 1:08:37[a]	-0:08:14 ± 1:12:15[b]	**<0.001**
Brain surgery	-0:10:09 ± 1:15:56[a]	-0:03:24 ± 1:05:09[b]	0:02:42 ± 1:11:40[c]	**<0.001**
General surgery	-0:01:12 ± 0:58:38[a]	-0:02:36 ± 1:02:06[a]	0:02:26 ± 1:00:17[b]	**<0.001**
Cardiovascular surgery	-0:18:08 ± 1:14:13[a]	-0:12:40 ± 1:10:03[b]	-0:07:21 ± 1:08:57[c]	**<0.001**
Thoracic surgery	-0:06:06 ± 0:55:45[a]	-0:16:28 ± 0:59:06[b]	-0:19:19 ± 1:25:16[b]	**<0.001**
Otorhinolaryngology	-0:05:51 ± 1:02:55[a]	-0:04:37 ± 0:52:23[a]	-0:03:31 ± 0:54:41[b]	**<0.001**
Pediatric surgery	0:00:15 ± 1:03:42[a]	-0:14:04 ± 1:30:35[b]	-0:00:39 ± 1:06:15[a]	**<0.001**
Obstetrics and gynecology	-0:04:27 ± 0:58:35[a]	-0:09:04 ± 1:10:28[b]	-0:02:07 ± 1:04:00[c]	**<0.001**
Plastic, reconstructive and esthetic surgery	-0:07:02 ± 1:00:44[a]	0:04:16 ± 0:52:07[b]	-0:00:00 ± 0:53:13[c]	**<0.001**
Ophthalmology	-0:12:10 ± 1:00:01[a]	-0:14:25 ± 1:30:49[a]	0:02:12 ± 1:01:32[b]	**<0.001**
Pediatric urology		0:02:51 ± 0:33:37	0:06:15 ± 0:21:01	0.775

'-' indicates arrival at the clinic before the appointment time (data given in 'hours:minutes:seconds'), **[a, b, c]: same letters indicate no statistically significant difference between the groups for the given surgical branch; i.e., different letters indicate that the difference between the groups is statistically significant ($p < 0.05$), **SD:** standard deviation, **Group A:** March 11, 2020-March 10, 2021 (one-year period starting from the first reported COVID-19 case in Turkey), **Group B:** March 11, 2019-March 10, 2020 (the year before the first reported case in Turkey), **Group C:** March 11, 2018-March 10, 2019 (two years before the first reported case in Turkey).

Table 7. Distribution of patient throughput times of the outpatient clinics of surgical branches according to the groups

Surgical branch	Group A Mean ± SD	Group B Mean ± SD	Group C Mean ± SD	Total Mean ± SD	p
Urology	0:20 ± 0:55[a]	0:18 ± 1:11[b]	0:13 ± 0:47[c]	0:16 ± 1:00	**<0.001**
Orthopedics	0:38 ± 1:07[a]	0:18 ± 0:47[b]	0:15 ± 0:39[c]	0:21 ± 0:49	**<0.001**
Brain surgery	0:25 ± 0:53[a]	0:21 ± 0:55[b]	0:18 ± 0:45[c]	0:21 ± 0:51	**<0.001**
General surgery	0:20 ± 0:47[a]	0:21 ± 1:08[b]	0:12 ± 0:36[c]	0:17 ± 0:53	**<0.001**
Cardiovascular surgery	0:09 ± 0:25[a]	0:14 ± 1:11[b]	0:07 ± 0:28[c]	0:10 ± 0:50	**<0.001**
Thoracic surgery	0:25 ± 0:43[a]	0:40 ± 1:06[b]	0:42 ± 1:07[b]	0:39 ± 1:04	**<0.001**
Otorhinolaryngology	0:34 ± 0:58[a]	0:18 ± 0:45[b]	0:15 ± 0:37[c]	0:18 ± 0:43	**<0.001**
Pediatric surgery	0:09 ± 0:30[a]	0:14 ± 0:54[b]	0:08 ± 0:31[a]	0:10 ± 0:40	**<0.001**
Obstetrics and gynecology	0:33 ± 0:52[a]	0:34 ± 1:11[a]	0:29 ± 1:03[b]	0:32 ± 1:04	**<0.001**
Plastic, reconstructive and esthetic surgery	0:10 ± 0:27[a]	0:11 ± 0:35[a]	0:08 ± 0:24[b]	0:09 ± 0:29	**<0.001**
Ophthalmology	0:43 ± 1:05[a]	0:35 ± 1:01[b]	0:40 ± 1:07[c]	0:39 ± 1:04	**<0.001**
Pediatric urology	-	0:07 ± 0:21	0:07 ± 0:06	0:07 ± 0:21	0.996
Total	0:30 ± 0:56[a]	0:24 ± 1:02[b]	0:19 ± 0:49[c]	0:23 ± 0:56	**<0.001**

Data given in 'hours:minutes', [a, b, c]: same letters indicate no statistically significant difference between the groups for the given surgical branch; i.e., different letters indicate that the difference between the groups is statistically significant ($p < 0.05$), **SD:** standard deviation, **Group A:** March 11, 2020-March 10, 2021 (one-year period starting from the first reported COVID-19 case in Turkey), **Group B:** March 11, 2019-March 10, 2020 (the year before the first reported case in Turkey), **Group C:** March 11, 2018-March 10, 2019 (two years before the first reported case in Turkey).

Table 8. Distribution of operated patients according to the groups

Surgical branch	Group A		Group B		Group C		Total		p
	n	(%)	n	(%)	n	(%)	n	(%)	
Urology	998	(6.6)[a]	3,030	(9.3)[b]	2,965	(9.6)[b]	6,993	(8.9)	**<0.001**
Orthopedics	1,619	(10.7)[a]	2,788	(8.6)[b]	2,589	(8.4)[b]	6,996	(8.9)	
Brain surgery	1,189	(7.8)[a]	2,125	(6.5)[b]	2,250	(7.3)[a]	5,564	(7.1)	
General surgery	1,253	(8.3)[a]	3,991	(12.3)[b]	4,453	(14.5)[c]	9,697	(12.4)	
Cardiovascular surgery	797	(5.2)[a]	2,044	(6.3)[b]	2,118	(6.9)[c]	4,959	(6.3)	
Thoracic surgery	129	(0.8)[a]	370	(1.1)[b]	362	(1.2)[b]	861	(1.1)	
Otorhinolaryngology	86	(0.6)[a]	1,500	(4.6)[b]	1,596	(5.2)[c]	3,182	(4.1)	
Pediatric surgery	992	(6.5)[a]	1,825	(5.6)[b]	2,477	(8.0)[c]	5,294	(6.7)	
Obstetrics and gynecology	4,828	(31.8)[a]	6,410	(19.7)[b]	6,247	(20.3)[b]	17,485	(22.3)	
Plastic, reconstructive and esthetic surgery	304	(2.0)[a]	2,457	(7.6)[b]	3,626	(11.8)[c]	6,387	(8.1)	
Ophthalmology	2,986	(19.7)[a]	5,934	(18.3)[b]	2,114	(6.9)[c]	11,034	(14.1)	
Pediatric urology	0	(0.0)[a]	26	(0.1)[b]	1	(0.0)[a]	27	(0.0)	
Total	15,181	(100.0)	32,500	(100.0)	30,798	(100.0)	78,479	(100.0)	

[a, b, c]: same letters indicate no statistically significant difference between the groups for the given surgical branch; i.e., different letters indicate that the difference between the groups is statistically significant ($p < 0.05$), **Group A:** March 11, 2020-March 10, 2021 (one-year period starting from the first reported COVID-19 case in Turkey), **Group B:** March 11, 2019-March 10, 2020 (the year before the first reported case in Turkey), **Group C:** March 11, 2018-March 10, 2019 (two years before the first reported case in Turkey).

Table 9. Distribution of the number of operations according to the groups

Surgical branch	Group A		Group B		Group C		Total		p
	n	(%)	n	(%)	n	(%)	n	(%)	
Urology	2,136	(9.8)[a]	5,987	(12.3)[b]	6,008	(12.7)[b]	14,131	(12.0)	
Orthopedics	2,283	(10.5)[a]	3,840	(7.9)[b]	3,564	(7.5)[b]	9,687	(8.2)	
Brain surgery	2,130	(9.8)[a]	3,757	(7.7)[b]	3,914	(8.3)[c]	9,801	(8.3)	
General surgery	1,627	(7.5)[a]	5,017	(10.3)[b]	5,640	(11.9)[c]	12,284	(10.4)	
Cardiovascular surgery	1,719	(7.9)[a]	4,801	(9.9)[b]	4,839	(10.2)[b]	11,359	(9.7)	
Thoracic surgery	180	(0.8)[a]	481	(1.0)[a,b]	517	(1.1)[b]	1,178	(1.0)	**<0.001**
Otorhinolaryngology	129	(0.6)[a]	2,856	(5.9)[b]	2,899	(6.1)[b]	5,884	(5.0)	
Pediatric surgery	1,493	(6.9)[a]	2,427	(5.0)[b]	3,440	(7.3)[a]	7,360	(6.3)	
Obstetrics and gynecology	6,261	(28.8)[a]	8,994	(18.5)[b]	8,586	(18.1)[b]	23,841	(20.3)	
Plastic, reconstructive and esthetic surgery	424	(2.0)[a]	3,880	(8.0)[b]	5,318	(11.2)[c]	9,622	(8.2)	
Ophthalmology	3,334	(15.4)[a]	6,568	(13.5)[b]	2,599	(5.5)[c]	12,501	(10.6)	
Pediatric urology	0	(0.0)[a]	32	(0.1)[b]	1	(0.0)[a]	33	(0.0)	
Total	21,716	(100.0)	48,640	(100.0)	47,325	(100.0)	117,681	(100.0)	

[a, b, c]: same letters indicate no statistically significant difference between the groups for the given surgical branch; i.e., different letters indicate that the difference between the groups is statistically significant ($p < 0.05$), **Group A:** March 11, 2020-March 10, 2021 (one-year period starting from the first reported COVID-19 case in Turkey), **Group B:** March 11, 2019-March 10, 2020 (the year before the first reported case in Turkey), **Group C:** March 11, 2018-March 10, 2019 (two years before the first reported case in Turkey).

Concerning the number of presentations made to the outpatient clinics, the otorhinolaryngology clinic was most affected, and the gynecology and obstetrics clinic was least affected (Table 2).

The mean ages of the patients presenting to the outpatient clinics of surgical branches were found to be 39.51, 41.70, and 41.37 years for Groups A, B, and C, respectively. It was observed that the mean age of the patients significantly decreased during the pandemic period compared to the previous years ($p < 0.05$). The highest decrease in the mean patient age was determined for the urology clinic and the lowest decrease for the pediatric surgery clinic (Table 3).

When repeated (more than one) patient visits were evaluated, the mean number of repeated visits for Groups A, B, and C was 3.36, 3.32, and 3.32, respectively. In Group A, the number of repeated visits increased, and this difference was statistically significant compared to Groups B and C ($p \leq 0.001$). The highest decrease in the number of repeated visits was seen in the otorhinolaryngology clinic and the highest increase in the ophthalmology clinic (Table 4).

The number of appointments made to the outpatient clinics of surgical branches decreased by approximately 70% during the pandemic period. The evaluation of their ratio over the total number of appointments within each group revealed that the highest increase was in the orthopedics clinic and the highest decrease was in the otorhinolaryngology clinic (Table 5).

The patients generally arrived at the hospital within 15 min before their appointment times. When these data were further examined according to the outpatient clinics, it was determined that the patients that arrived for their appointments earliest to undergo examination were those that presented to the cardiovascular surgery clinic, while those that made appointments with the pediatric surgery clinic arrived at the hospital closest to their appointment times (Table 6).

The mean patient throughput times of the outpatient clinics of surgical branches was found to be 30 min, 24 min, and 19 min for Groups A, B, and C, respectively, indicating a statistically significant difference between the groups ($p \leq 0.001$). With the effect of the pandemic, the patient throughput times of the outpatient clinics generally increased. During the pandemic period, the patient throughput time increased most in the orthopedics clinic and decreased most in the thoracic surgery clinic (Table 7).

The number of patients undergoing surgery was determined as 15,181 for Group A, 32,500 for Group B, and 30,798 for Group C. The ratio of the number of patients that underwent surgery in each outpatient clinic over the total number of operated patients in each group significantly differed between Group A and Group B for all the outpatient clinics of surgical branches. The highest decrease in this ratio was observed in the plastic, reconstructive and esthetic surgery clinic and the highest increase in the obstetrics and gynecology clinic (Table 8).

The number of operations performed was 21,716, 48,640, and 47,325 for Groups A, B, and C, respectively. With the effect of the pandemic, the number of operations decreased by more than half compared to the pre-pandemic period. The ratio of the number of operations performed in each clinic over the total number of operations undertaken in each group statistically significantly differed between Group A and Group B for all clinics except thoracic surgery. The highest decrease in this ratio was seen in the otorhinolaryngology clinic and the highest increase in the obstetrics and gynecology clinic (Table 9).

Discussion

With the beginning of the COVID-19 pandemic, a series of measures were taken in hospitals in Turkey, as in many countries across the world. In our hospital located in Bursa, which is among the top five big cities in Turkey, the following measures were taken during this period: The bed capacities of clinics were reduced to provide potential inpatient beds for patients with COVID-19. For all patients that visited the emergency

department with the suspicion of COVID-19 disease, symptoms were questioned, and evaluations were made in a separate unit reserved for COVID-19 cases within this department. All clinical and preclinical physicians in the COVID-19 unit of the emergency department contributed to the management of the pandemic process. Following the increasing exposure of the anesthesia team and growing number of personnel infected with the virus, the number of operating rooms was reduced. Due to the insufficiency of intensive care units reserved for patients with COVID-19, the emergency observation areas were converted to areas providing intensive care. Lastly, as of January 14, 2021, with the start of the vaccination process in our hospital, an inpatient clinic was reserved for vaccination.

In a study evaluating data obtained from the urology clinics of six large hospitals in Istanbul over the first three months of the pandemic, it was determined that the number of operations performed, and outpatient clinic presentations decreased by approximately 75% compared to the same period of the previous year[14]. In a study including the data of orthopedics clinics in Hong Kong comparing the two-month period in the first quarter of 2020 with the previous four years, it was observed that the operations of this branch decreased by 44.2% and those of outpatients by 29.4%[15]. In another study conducted by the neurosurgery department of Washington University, the number of outpatients decreased by up to 75%[16]. In the current study, similar to previous studies, during the pandemic, there was a 60% decrease in the number of patients that presented to the outpatient clinics of our hospital and a 62% decrease in the number of presentations made, regardless of the surgical branch, compared to one and two years before the pandemic. This is an important finding since it implies that patients who required surgery may have postponed their visits to the hospital, which may have led to the progression of their diseases.

In our study, the mean age of the patients who presented to the outpatient clinics of surgical branches was 41.7 years in the pre-pandemic period and 39.5 years in the first year of the pandemic. The reason for the younger age of the patients visiting outpatient clinics during the pandemic period may be the curfews implemented for citizens aged 65 years and over, representing one of the populations that was most affected by strict isolation methods that entered our lives with the effect of the pandemic. This is further supported by the decrease in the mean age of the patients who presented to the urology outpatient clinic compared to the other surgical branches.

Another important finding of this study is that when the surgical branches were separately examined, the repeated visits of the patients to the same branch were observed to have generally decreased during the pandemic, with the highest decrease being observed in the otorhinolaryngology clinic. While this finding can be positively interpreted, possibly indicating that patients did not need to revisit their doctors, it may also be unsettling considering the generally low health literacy rate of individuals in Turkey. As a result, some patients may have presented to the hospital only when they felt pain or their condition was unbearable, avoiding hospital visits other times despite the need for follow-up.

In the first year of the pandemic, through the efforts of all physicians, the treatment of patients diagnosed with COVID-19 was provided. Physicians working in surgical branches were on duty in many COVID-19 services and intensive care units that were newly opened for these patients. This additional workload adversely affected the capacity of outpatient appointments, which is part of the routine operations of surgical branches. Concerning the number of appointments made to the outpatient clinics, there was a 70% decrease in the first year of the pandemic compared to the previous year. This finding raises concerns that some patients may not have been able to find an

appointment to visit the hospital although they needed to, and this may have delayed their diagnosis and treatment. In this study, it was observed that among the surgical branches, the otorhinolaryngology clinic was most negatively affected in terms of outpatient appointment services. Due to this dramatic difference, after the normalization process, the need for outpatient applications is likely to increase in all surgical clinics, but mostly in this branch.

During the pandemic, some surgical clinics asked patients to arrive at the hospital close to the scheduled appointment time and stated that if they arrived early, they would not be allowed into the waiting area[17]. In our study, it was observed that during the pandemic, the arrival times of the patients at the hospital differed between the surgical branches. Among the patients who made an appointment for the surgical branches in our hospital, those that most strictly followed their appointment times were those that presented to the pediatric surgery clinic. We consider that in future pandemics, when patients need to go to hospital appointments, the time they spend in the hospital should be minimized. They should have a scheduled appointment time and be advised not to arrive early.

Another important finding of this study is that the patient throughput times increased in the outpatient clinics of surgical branches during the first year of the pandemic. This increase was mostly observed in the orthopedic clinic. In order to evaluate the reason for this situation, further comprehensive studies should examine the outpatients of surgical branches in more detail.

Researchers suggested that surgical care that was not essential or time-critical could be delayed and postponed to a later date when the pandemic subsided[18,19]. In our study, there was a 53% decrease in the number of patients that underwent surgery, and a 55% decrease in the number of operations performed during the first year of the pandemic compared to the previous year. It was determined that among the surgical branches, gynecology and obstetrics was the clinic that was least affected in terms of the number of operated patients and number of operations performed. One of the most important reasons for this finding may be that this clinic mostly serves obstetric cases whose care and treatment cannot be postponed.

The most important limitation of our study is its single center and retrospective design. Another limitation is that since our hospital was a COVID-19 reference center in Bursa, some patients may have preferred to visit hospitals in the province due to the fear of contracting the virus. Despite these limitations, this is a large-scale study that examined the effects of the COVID-19 period on all surgical branches, included a very large number of patients, and covered a long period of time. In addition, it contributes to the literature in terms of offering an idea about the situation in surgical branches after the normalization process and in future COVID-19 waves or other possible pandemics.

Conclusion

In the first year of the COVID-19 pandemic, there was a decrease in the number of patients that presented to the outpatient clinics of surgical branches, number of presentations to these clinics, number of appointments made, mean age of patients, number of repeated visits, number of operated patients, and number of operations performed, while the patient throughput times of surgical branches generally increased. This study provided data on the extent to which surgical branches were affected by the COVID-19 pandemic at the level of outpatient clinics and surgical operations. The findings of the study should be supported by future multicenter and comprehensive studies evaluating surgical branches separately.

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Author contributions

All authors contributed to the study conception and design. All authors read and approved the final manuscript.

Conflict of interest

The authors declare that they have no conflict of interest.

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Ethical approval

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