

ORIGINAL ARTICLE

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Comparison of neurosurgery, polyclinic and clinical applications with the last 5 years during the pandemic period**ID**Serhat Yildizhan, **ID**Mehmet Gazi Boyaci, **ID**Adem Aslan, **ID**Usame Rakip, **ID**Ihsan Canbek, **ID**Lokman Kiran*Afyonkarahisar Health Science University, Faculty of Medicine, Department of Neurosurgery, Afyonkarahisar, Turkey*

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**Abstract**

The effects of the Covid-19 pandemic, which has been on the world agenda since January 2020, began to be seen in our country in the second half of March, and its impact has been increasing day by day. Many restrictions were imposed due to the pandemic rules announced during this period. While healthcare professionals struggling with pandemic-related diseases, they also had to continue the treatment of diseases related to their branches. Significant reductions were observed in the number of hospital admissions and surgery as a result of the reduction in the number of clinical beds, the effect of restrictions and the patients delaying their admission to health institutions due to the concern of getting a virus. The most obvious effects were observed in April and May. With the relaxation of the restrictions and the belief that the disease was decreasing in June, an increase was observed in hospital admissions. As a result, there was an increase in the number of operations. With this study, it was aimed to compare the applications to the Neurosurgery clinic and the operations performed during the pandemic periods with the last 5 years and to reveal the reasons that affect patient behavior.

Keywords: Neurosurgery, surgery, pandemic, polyclinic**Introduction**

Pandemic; It is the general name given to epidemic diseases that are seen in more than one country or continent in the world, spread over a wide area and have an effect. Definition of the World Health Organization accordingly, three criteria are sought in general terms for a disease to be a pandemic. These can be counted as being a new virus or a mutated factor, being easily passed on to humans, easily and continuously transmitted from person to person. In late December 2019, a new severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) disease was reported as a result of numerous studies conducted in a seafood market in Wuhan,

China's Hubei province, after a large number of pneumonia patients with unknown cause were reported. and the disease was named "Coronavirus-19" (COVID-19) by Chinese scientists [1,2]. The COVID-19 outbreak was declared a Public Health Emergency of international concern on January 30, 2020 [3]. Cases have started to appear in our country since March 2020. Like all sectors affected by the epidemic, the health system had to cope with many difficulties in itself. While struggling with the epidemic on the one hand, on the other hand, each branch was struggled with the treatment of its own patient groups. As a department, Brain and Nerve Surgery encounters a wide range of patients from neonatal patient group to geriatric age groups. The vast majority of cases are in the emergency surgery class. Permanent neurological damage and death are encountered in possible treatment delays. For this reason, during the pandemic period, people stay away from outpatient clinics with the effect of restrictions or the concern of disease transmission, increasing our possibility of encountering late cases in the following months. In this study, we aimed to evaluate the causes of patient behavior by comparing the number of outpatient clinic patients and the reasons for their application with the averages of the last 5 years of surgical interventions performed in the same period during the pandemic period.

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Materials and Methods

The study was conducted with the approval of the Afyonkarahisar Health Science University Clinical Research Ethics Committee on 03.04.2020 and with the protocol number 2020/354. . During the pandemic period, the number of outpatient clinic admissions, the number of clinical admissions, the number of operations and the diagnoses of the surgeries performed were found from the hospital information technology system. All these data were compared with the patient data of the last 5 years (2015-2019). The differences that occurred and the reasons for these differences and the relationship and effects of these reasons with the pandemic were investigated.

Results

During the pandemic period, at least outpatient clinic applications were made in April and a total of 198 patients applied to the outpatient clinic. Looking at the last 5 years, the average of April was 944.6 patients, and the number of patients decreased by about 80.1%. With the decrease in the number of cases and the reduction of the restrictions, the number of outpatient clinics started to increase as of June. 584 patients applied to outpatient clinics in August, and the decrease was 50.8% in the least affected month compared to the last 5 years (Table 1).

Table 1. Comparison of the number of neurosurgery outpatient clinic admissions, clinical admissions and operations in 2020 with the average number of 2015-2019

		March	April	May	June	July	August	September	October	November	December
Policlinic	2020	728	198	263	482	549	584	592	586	491	496
	2015-2019	982	994	966	1132	1420	1186	1224	1380	1364	1320
Clinic	2020	92	23	31	68	66	72	74	68	64	60
	2015-2019	108	118	126	132	128	136	116	108	110	96
Surgery	2020	38	17	14	43	43	35	44	39	34	28
	2015-2019	47	44.8	50.4	55.4	53	54.2	55.6	59.8	52	54.2

Considering the number of operations, it was seen that the least operations were performed with 14 patients in May (Table 1). Compared to the last 5 years, a decrease of 72.3% was noted. With the reduction of restrictions, there was an increase in the number of surgeries in June 2020 and after, approaching the numbers of previous years. The number of operations was 43 in June and July, and 44 in September. Looking at the averages of the last five years, it was found to be close to normal with a decrease of 18.9% in July.

Considering the clinical hospitalization rates, significant decreases drew attention in April and May. 23 patients in April and 31 patients in May were admitted to the clinic and treated. The average of April for the last 5 years was 118 patients. With the reduction of restrictions, hospitalization rates started to increase and the highest number was reached with 72 hospitalizations in August (Table 1).

Considering the diagnoses of the operated patients, it was seen that trauma-induced surgeries showed a significant decrease in the first months of the epidemic. The highest proportional decrease was seen in 3 operations and spinal trauma operations in June. The average of operations due to spinal trauma in June of the last 5 years was 11.3 and the decrease was 73.5% (Table 2). An increase was observed in the month of June, when the restrictions were eased in the operations of patients diagnosed with spinal stenosis, and it exceeded the averages of the last 5 years (Table 2). Various neurological deficits were detected at the time of admission in all patients hospitalized with a diagnosis of disc or spinal stenosis. It was learned that these patients had complaints for at least a month before applying to the hospital.

Table 2. Comparison of the 2020 diagnoses of Neurosurgery surgery with the averages of 2015-2019

		March	April	May	June	July	August	Sep	Oct	Nov	Dec
Cranial trauma	2020	6	2	2	4	6	5	6	5	6	4
	2015-2019	8.4	6.2	6.2	7	6.5	8.3	7.4	4	8.4	6
Spine trauma	2020	5	2	2	3	6	8	5	6	6	6
	2015-2019	6.6	8.4	9.3	11.3	10	10	9.2	8.2	8.2	10
Hernie	2020	5	3	3	10	7	6	8	10	7	6
	2015-2019	8.2	8	11.2	9	10.2	9.2	10	11.4	9.8	9.4
Spine Stenosis	2020	7	1	3	14	10	6	12	10	8	7
	2015-2019	9.8	10	8	10.5	8.4	9.6	10.8	12	12	10
Congenital anomalies	2020	4	2	2	7	6	5	6	4	3	2
	2015-2019	6	5	6.4	7	6.3	7	8	10	9.6	8.2
Peripheral entrapments	2020	-	-	-	2	2	1	1	1	-	-
	2015-2019	2	1.8	3	3.2	2.2	2.1	3	4	2.4	4
Tumor surgery	2020	5	7	2	3	6	4	6	3	4	3
	2015-2019	5	6	6.3	7.4	8.4	8	7.2	8.2	7.6	6.6
Total	2020	32	17	14	43	43	35	44	39	34	28
	2015-2019	47	44.8	50.4	55.4	53	54.2	55.6	59.8	52	54.2

Abbreviations : Sep: September, Oct:October, Nov:November, Dec:December

Discussion

The effects of the Covid-19 pandemic, which has been on the world agenda since January 2020, began to be seen in our country in the second half of March, and its impact was increasing day by day. Many restrictions were imposed due to the pandemic rules announced during this period. The World Health Organization has published a series of provisional guidelines highlighting the need for intensive care unit (ICU) capacity for all countries on how to prepare for the pandemic [4]. Governments and hospitals had to reorient resources to expand ICU capacity and meet growing demand. In our hospital, as a result of these guidelines, the number of service and intensive care beds was reduced and only emergency operations were performed. Cerebral hemorrhages (subarachnoid and intraparenchymal), acute hydrocephalus, tumors at risk of intracranial hypertension, spinal cord compressions with or without neurological deficits, traumatic cranial and spinal trauma operations were identified as urgent [5].

Traumas; It is an important source of morbidity and mortality, especially in the young population [6,7]. Except for the first year of life, the most common cause of death in the young age group is trauma [8]. Cranial injuries emerge as the group with the highest mortality. During the pandemic period, due to curfews and travel restrictions, there was a significant decrease in the number of applications and surgeries due to head trauma. During the pandemic period, the least surgeries caused by cranial trauma were performed in April and May with 2, while the decrease compared to the last 5 years was 67.8% (Table 2). With the easing of the restrictions, the number of surgeries has increased especially since July and it was seen to be above the average in October.

Spinal injuries are common in patients with polytrauma, and radiological early and accurate diagnosis is vital. 1/3 of all spine injuries occur in the cervical region [9]. Thoracolumbar injuries come second, due to the different anatomical and biochemical structure. Since the region we are in is located on the highways, the patient group due to trauma is frequently encountered. In this period, the least surgical operations were observed with 2 patients in April and May, while a decrease of 73.5% was observed in June when the average of the last 5 years was considered (Table 2).

The first diagnosis of brain tumors can be made in the applications made to the outpatient clinic or in the emergency service applications. Conditions requiring urgent treatment in brain tumors include mass effect and related herniation syndromes, increased pressure effect as a result of bleeding into or around the mass, and hydrocephalus as a result of compression on the ventricular foramina. 50% of all brain tumors are accompanied by headache at the time of initial diagnosis [10,11]. During the pandemic period, the number of surgeries due to cranial and spinal tumors varied. Although there was less decrease in the number of cranial and spinal tumor surgeries compared to other etiological reasons, neurological losses were observed in these patients due to admission delays.

Intervertebral discs are located between vertebral bodies and connect them. As the disc ages, it dehydrates and loses its height. During these changes, the nucleus pulposus and annulus fibrosis overflow into the spinal canal, forming a disc hernia [12,13]. Emergency decompression is the gold standard in the treatment

of disc herniation causing acute myelopathic symptoms [14]. During the pandemic period, the least surgery was performed with 3 patients in April and May due to disc herniation. Compared to the last 5 years, a decrease of 73.3% was observed in May. Especially with the easing of the restrictions, the number of surgeries increased above the average in June and continued in this way. The striking feature of this patient group is that although there was a significant decrease in the number of surgeries in the first 3 months, neurological loss was detected in the majority of the patients admitted in June and after.

When a single operation was performed in April for spinal stenosis, a 90% reduction was observed. With 14 surgeries performed in June, the average of the last 5 years was exceeded.

Due to congenital anomalies such as meningocele and hydrocephalus, at least 2 operations were performed in April, May and December during the pandemic period. Compared to other periods, a decrease of 67.8% was detected in May. Since the restrictions were not expected to affect the reduction in this disease group directly, two possibilities were considered as the cause of this decrease. The first is that the number of applications outside the province has decreased due to restrictions, and the other is that sick parents avoid admission to the hospital until the last moment due to fear of the virus.

Conclusion

As a result; Many restrictions were imposed due to virus prevalence and pandemic, and many sectors were affected by these decisions. In hospitals, the number of beds in clinics was reduced and elective surgeries were restricted due to the virus. As a result, a significant decrease was observed in the number of outpatient clinic admissions, clinical hospitalizations and surgeries, and hospitals faced a serious loss of income. At the beginning of the pandemic period, especially in April and May, both the effects of the restrictions and the fear of getting the virus decreased significantly, while the applications and the number of operations increased significantly in June. As a result of the applications made after June, neurological sequelae were observed in many patients due to late admission, and the need for physical therapy and rehabilitation arose after surgery.

Conflict of interests

The authors declare that they have no competing interests.

Financial Disclosure

All authors declare no financial support.

Ethical approval

The study was conducted with the approval of the Afyonkarahisar Health Science University Clinical Research Ethics Committee on 03.04.2020 and with the protocol number 2020/354.

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