

Covid-19 Pandemisinin Pediatrik Acil Travmalarda Bilgisayarlı Tomografi Değerlendirmelerine Etkisi

The Effect of Covid-19 Pandemic on Computed Tomography Evaluations in Pediatric Emergency Traumas

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ÖZ

Amaç: Bu çalışmada pandemi sırasında acil servise travma nedeniyle başvuran pediatrik hastaların bilgisayarlı tomografi (BT) tetkik sayılarını ve patolojilerini pandemi olmayan aynı zaman dilimi ile karşılaştırarak pandeminin pediatrik acil travmalara etkisini tartışmayı amaçladık.

Materyal ve Metot: Retrospektif olarak 1-30 Nisan 2020 ve 1-30 Nisan 2019 tarihlerinde hastanemiz acil servisine travma ile başvuran 0-18 yaş arasındaki hastaların tüm BT görüntüleri değerlendirildi.

Bulgular: Nisan 2020'de acil servise travma nedeni ile 0-18 yaşlarında 448 hasta başvurdu ve bu hastaların 138'i-ne (%30,8) BT çekildi. Nisan 2019'da 2416 hasta başvurdu ve 463 (%19,1) hastaya BT çekildi. Her iki yılda çekilen BT'ler arasında cinsiyete göre bakıldığında anlamlı farklılık saptanmazken ($p=0,324$) yaş gruplarına göre bakıldığında anlamlı farklılık bulundu ($p<0,001$).

Sonuç: Bu, dünyanın karşılaştığı ne ilk ne de son pandemidir. Pandemiler esnasında hasta dağılımlarındaki farklılıkları belirleyerek pandemiler esnasında kullanılacak protokoller ve kılavuzlar hazırlamak oldukça önemlidir.

Anahtar Kelimeler: Bilgisayarlı tomografi, pandemi, pediatrik travma

ABSTRACT

Objective: The aim of this study was to compare the number of computed tomography (CT) examinations and pathologies of the pediatric patients admitted to the emergency department due to trauma during the pandemic with the compatible non-pandemic time period.

Materials and Methods: This study was a retrospective study of the patients aged 0-18 years, who admitted to the emergency department due to trauma and had CT imaging in 1-30 April 2020 and 1-30 April 2019.

Results: In April 2020, 448 patients applied to the emergency department due to trauma. CT scans were performed to 138 of these 448 (30.8%) patients. In April 2019, 2416 patients applied to the emergency department due to trauma. CT scans were performed to 463 of these 2416 (19.1%) patients. No statistically significant difference was found between the patients, who underwent CT in April 2020 and 2019 by gender ($p=0.324$). A statistically significant difference was found between 2020 and 2019 by the age groups ($p<0.001$).

Conclusion: This is neither the first nor the last pandemic the world has ever faced. It is very important to determine the differences in patient distribution and to prepare protocols and guidelines to be used during pandemics.

Keywords: Computed tomography, pandemic, pediatric trauma

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INTRODUCTION

In December, 2019, a series of pneumonia cases of unknown cause emerged in Wuhan, Hubei, China, with clinical presentations greatly resembling viral pneumonia. Later, it was understood that the pneumonia factor was Covid-19.¹ In the following days, with the increase in the number of patients and

deaths outside of China, the World Health Organization (WHO) declared a pandemic on March 11, 2020. In our country, the first Covid-19 case was detected on March 11, 2020, and after a short time, some serious preventions were taken to minimize social life to prevent the spread of this disease. Indi-

viduals over the age of 65 and under the age of 20 were restricted from going out to the streets, schools were closed, and places such as cinemas, theaters and shopping malls were closed. In hospitals, non-urgent surgeries were postponed and patients were informed not to go to the hospital unless necessary. As a secondary result of all these preventions taken to keep the pandemic under control, health problems such as sports injuries, falls from heights and traffic accidents, especially children experienced in schools and playgrounds, have decreased in all countries.² Pediatric traumas, especially brain traumas, are among the most common causes of acquired death in childhood and they are one of the most common reasons for admission to hospital emergency services.³ Computed Tomography (CT) is the most commonly used diagnostic method for trauma patients in emergency departments due to its ability to provide rapid imaging. This feature of CT devices has increased with the development of technology especially in recent years.⁴ On the other hand, the use of CT has many disadvantages related to the radiation. Especially, children younger than 2 years old are much more sensitive to radiation than adults.⁵ Therefore, it is important to use CT according to the correct indication in emergency departments, especially in the pediatric age group.

The number of the pediatric patients admitted to the hospital due to trauma during the Covid-19 pandemic had decreased. Therefore, the number of CT scans performed due to trauma had also decreased. The aim of this study was to compare the number of CT examinations and pathologies of the pediatric patients admitted to the emergency department due to trauma during the pandemic with the compatible non-pandemic time period.

MATERIALS AND METHODS

The present study was performed under the 1964 Helsinki Declaration of Good Clinical Practice, and also approved by the Ethics Committee of Malatya Clinic Ethics Committee (Date: 03/02/2021, decision no: 2021/23).

This study was a retrospective study of the patients aged 0-18 years, who admitted to the emergency department due to trauma and had CT imaging in 1-30 April 2020 and 1-30 April 2019. The month of April was chosen since the prevention restrictions were most strictly applied in our country in this month. The CT reports were examined through the PACS (Picture Archiving and Communication Sys-

tems). All reports were evaluated by 2 specialist physicians, one pediatric radiologist and one radiologist. Our patients were grouped into 3 groups. The patients were 0-4 years old in the group 1. The patients were 5-14 years old in the group 2 and 15-18 years old in the group 3. Trauma causes examined were motor vehicle accidents and other blunt traumas.

CT reports were grouped as brain CT, cervical CT, abdominal CT, extremity CT, thorax CT and other (maxillofacial, temporal, vertebra, orbit, paranasal). CT scans of the patients were performed with a multi-slice device (16-slice multidetector CT-Philips Medical System MX-16). The CT device applied appropriate doses for each region according to the size (age and weight) of the children.

Statistical analyses: SPSS v.22 (SPSS Inc., Chicago, IL, USA) was used for statistical analysis. Chi square test was used for comparison of groups. All tests were two-sided and the significance level was accepted as $p < 0.05$.

RESULTS

In April 2020, 448 patients applied to the emergency department due to trauma. CT scans were performed to 138 (30.8%) patients and 93 (67.4%) of these 138 patients were male. In April 2019, 2416 patients applied to the emergency department due to trauma. CT scans were performed to 463 (19.1%) patients and 300 (64.8%) of these 463 patients were male. No statistically significant difference was found between the patients, who underwent CT in April 2020 and 2019 by gender ($p=0.324$). While only for 9 (6.5%) patients over 15 years old were performed CT in April 2020, the number of these patients was 95 (20.5%) in April 2019. While 47.1% ($n=65$) of the total patients were in the 0-4 age group in April 2020, this rate was found to be 22% ($n=102$) in 2019 (Table 1). A statistically significant difference was found between 2020 and 2019 in the age groups ($p < 0.001$). Percentage distribution of the patients who underwent tomography according to age, gender and cause of trauma is given in Table 1.

The number of radiologic records reported as normal and pathological according to years and age groups are given in Table 2. In both 2020 and 2019, the most common examination was the brain CT, 118 patients (85.5%) in 2020 and 343 patients (74.1%) in 2019. Although the number of brain CT scans in 2019 was approximately 3 times the number of brain CT scans in 2020, calvarial fractures were seen in 10

Table 1. Percentage distribution of the patients, who underwent CT according to age, gender and trauma.

	2019 n(%)	2020 n(%)	P
0-4 years	102(22.0)	65(47.1)	P<0.001
5-14 years	266(57.5)	64(46.4)	
15-18 years	95(20.5)	9(6.5)	
Female	163(35.2)	45(32.6)	0.324
Male	300(64.8)	93(67.4)	
Motor Vehicle Accident	12(2.6)	0(0.0)	0.056
Other Blunt Traumas	451(97.4)	138(100)	

n: Number of patients. p values were calculated with chi-square test.

Table 2. The number of radiological records reported as normal and pathological according to years and age groups.

	2019		2020		2019		2020		2019		2020	
	0-4 age		0-4 age		5-14 age		5-14 age		15-18 age		15-18 age	
	N %	P %	N %	P %	N %	P %	N %	P %	N %	P %	N %	P %
Brain	75 76.5	23 23.5	39 61.9	24 38.1	162 83.1	33 16.9	37 74.0	13 26.0	47 94.0	3 6.0	5 100	0 0
Cervical	9 100	0 0	14 100	0 0	34 100	0 0	12 100	0 0	9 100	0 0	1 100	0 0
Exremity	1 100	0 0	4 100	0 0	37 82.2	8 17.8	4 57.1	3 42.9	22 88.0	3 12.0	1 100	0 0
Thoraks	2 100	0 0	3 75.0	1 25.0	20 90.9	2 9.1	5 100	0 0	18 94.7	1 5.3	1 33.3	2 66.7
Abdomen	1 100	0 0	2 100	0 0	7 100	0 0	3 100	0 0	2 100	0 0	3 100	0 0
Other	2 100	0 0	1 100	0 0	18 85.7	3 14.3	0 0	4 100	11 78.6	3 21.4	1 50.0	1 50.0
Total	90 79.6	23 20.4	63 71.6	25 28.4	278 85.8	46 14.2	61 75.3	20 24.7	109 91.6	10 8.4	12 80.0	3 20.0

N: The number of normal radiologic reports; P: The number of pathological radiologic reports; Other: Maxillo facial, temporal, vertebra, orbit, paranasal.

patients in 2019 and in 6 patients in 2020. No statistically significant difference was found in terms of fracture in both periods (p=0.267)

Unlike brain CT, the number of extremity CT was low in the 0-4 age group in both years. Only 4 (0.86%) patients had extremity CT in April 2019 in this group, no extremity CT was performed in 2020. The age group with the most frequent extremity CT scan and the most pathology was found was 5-14 years. While fractures were detected in 25.0% (n=3) of the extremity CT scans in April 2020, fractures were detected in 15.5% (n=11) in 2019.

While pathology was detected in 25% (n=3) of thoracic CT scans in 2020, this rate was found to be 6.9% (n=3) in 2019.

All abdominal CTs applied in both periods were normal.

While no motor vehicle accident was detected in the etiology of any of the patients who were admitted to the pediatric emergency department due to trauma and had a CT scan on April 2020, this rate was 2.6% (n=12) in 2019.

DISCUSSION AND CONCLUSION

Most of the emergency departments in our country are very crowded and admission to emergency departments for non-urgent reasons are quite frequent.⁶ During the pandemic period, there was a significant change in the number of patients and the patient profile admitted to the emergency department in our

country. We found that, the number of CT scans due to trauma were decreased 70% in pediatric emergency departments during the pandemic period in our study. In a study conducted in China, it was reported that emergency department patient admissions decreased by 30-40% during the pandemic period.⁷ In another study conducted in Italy, the rate of decrease was reported as 50%.⁸ These studies also included the adult patient group. We can explain the reason of the high rate in our study by the higher social life restriction rules for the pediatric age group compared to adults.

In the study of Sheridan et al.,⁹ the number of pediatric trauma patients were found to be decreased in the first 4 weeks of the pandemic period when compared with the same period in 2019. In addition, this study reported that the most important factor in the decrease in the number of patients was the decreased number of school days. During the time of our study, schools were closed due to the pandemic, and there were no school days during the study period. In another study conducted on pediatric fractures, it was found that the fractures during the pandemic period decreased by approximately 60% when compared with the previous two years, and the age of the patients having fractures were also statistically different.² Similarly, in another study conducted on pediatric trauma patients in Iran, it was observed that there was a significant decrease in fractures during the pandemic period, especially in girls and in some age groups.¹⁰ In Italy, one of the countries with the highest number of patients in the first periods of the epidemic, a 78% decrease was observed in the number of patients admitted to the pediatric emergency departments in the first period of the pandemic. The results of our study were found similar with the studies on pediatric patients in the literature. 184 CT examinations were performed to 138 patients during the pandemic period in our study, of which only 12 were extremity CT scans. The number of extremity CTs were decreased 83% compared to the previous year. Also, the highest descent seen in the number of CT scans was extremity scans. We can explain it that sports activities were mostly carried out in schools by school age and adolescent children, and schools were closed during this period. Since extremity fractures in our hospital were often diagnosed by direct radiography, we did not statistically evaluate whether there was any difference in the presence of extremity fractures between the two periods.

CT is a very important and sometimes life-saving

diagnostic method in diagnosis and follow-up in emergency departments, especially when used with updated technological devices for dose reduction and appropriate shooting protocols adapted to the pediatric patient, as well as appropriate indication.¹¹ However, unnecessary use of CT is a potential risk for cancer, especially in children later in life.¹² Brain damage was found in less than 10% of CT scans of children with minor head trauma in the literature.¹² In addition, from the perspective of the healthcare system, unnecessary use of CT can extend the length of stay in emergency departments and increase the cost of healthcare services. It has been shown in the literature that almost a quarter of CT scans were not necessary in the general population.¹³ For these reasons, studies have been conducted by various groups and professional societies to reduce the use of CT in pediatric patients in recent years.¹² As a result, although the number of patients admitted to the emergency department increased after 2010, a decrease was observed in pediatric CT scans, and this decrease was observed mostly in children younger than 3 years.^{11,14}

In our study, more than half of the total number of CT scans were in the 5-14 age group in 2019. During the pandemic period, CT was performed most frequently in children at 0-4 years of age, and only 6.5% of the patients were in the 15-18 age group. Although, it has been shown that CT is performed more in pediatric patients in the older age group compared to young people in some studies,¹⁵ in some studies it was stated that CT was performed most frequently in the 0-1 age group and the second most frequently in the 13-17 age group.¹³ Since the schools being closed during the pandemic period affected school-age children and adolescents more, the difference between age groups in our study compared to the previous year may be explained.

Brain and abdominal CTs constitute the majority of CT scans performed in the pediatric emergency department.¹⁴ In our study, the most frequently performed CT examination in pandemic was brain CT (85.5%). Calvarial fractures were seen in 10 (2.9%) patients in 2019 and 6 (5.0%) patients in 2020. Calvarial fractures were nondisplaced, and no patient required surgical intervention, except for one patient who developed an epidural hematoma in 2019. No complications occurred in the follow-up of the other patients. When both periods were examined in terms of pathology, no significant difference was found ($p=0.267$). This may be due to the fact that head injuries are frequently seen at the age of 0-2 and the

behavior of this age group is not affected by the restrictions.

As seen in our study, the number of CT scans applied in the emergency department during the pandemic period decreased significantly compared to the previous year. However, when compared with the number of patients, while CT was performed to 30.1% of the patients admitted to the emergency department during the pandemic period, this rate was found to be 19.1% in the nonpandemic period. Pathology was detected in 27.1% of brain CTs during the pandemic period, while this rate was found to be 14.6% in the nonpandemic period. We explained the change in these rates with the decrease in the number of patients, who previously applied to the emergency department with unnecessary reasons. During the pandemic period, patients applied to the hospital only if they were really sick, with the fear of getting Covid-19 infection. We clearly see the results of this from the CT withdrawal rates and pathology rates of patients admitted to the hospital. So Covid-19 reduced indirectly the number of admissions to the emergency department and relatively the number of the CT scans. Covid-19 reduces indirectly the number of admissions to the emergency department and relatively the number of the CT scans.

Our study had some limitations. It was a retrospective study and the number of some CT scans were quite limited, since it included a short time frame. We think that multi-center studies on this subject can show the changing patient profile in the emergency departments during the pandemic in more detail and accurately.

In conclusion, the Covid-19 pandemic has caused an increase in health problems and deaths all over the world. As a result of limitations in social life and behavioral changes of individuals in order to prevent these, the number of pediatric trauma cases and tomography scans decreased. This is neither the first nor the last pandemic the world has ever faced. It is very important to determine the differences in patient distribution during pandemics and to prepare protocols and guidelines to be used during pandemics. In addition, unnecessary CT indications and radiation side effects will decrease if the pediatricians and emergency physicians use evidence-based guidelines and pediatric protocols in cooperation with radiologists.

Ethics Committee Approval: This retrospective study received approval from Malatya Clinic Ethics Committee (Date: 03/02/2021, decision no:

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

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