

PAPER DETAILS

TITLE: INVESTIGATION OF RADIOLOGICAL AND CLINICAL FEATURES OF BRAIN COMPUTED TOMOGRAPHY FINDINGS OF PATIENTS IN THE EMERGENCY DEPARTMENT Acil Servisteki

Hastaların Beyin Bilgisayarlı Tomografi Bulgularının Radyolojik ve Klinik Özelliklerinin Arastirilmesi

AUTHORS: Mehmet Cihan YAVAS,Muhammed ALPASLAN

PAGES: 15-20

ORIGINAL PDF URL: <https://dergipark.org.tr/tr/download/article-file/1451315>

INVESTIGATION OF RADIOLOGICAL AND CLINICAL FEATURES OF BRAIN COMPUTED TOMOGRAPHY FINDINGS OF PATIENTS IN THE EMERGENCY DEPARTMENT

Acil Servisteki Hastaların Beyin Bilgisayarlı Tomografi Bulgularının Radyolojik ve Klinik Özelliklerinin Araştırılması

Mehmet Cihan YAVAŞ¹, Muhammed ALPASLAN²

ÖZET

Amaç: Çalışmamızın amacı klinik tanı ile uyumlu acil servise giriş yapan hastaların çektikleri beyin bilgisayarlı tomografisi sonuçlarını göstermektir.

Gereç ve Yöntemler: Bu çalışma, acil servisten 1 Ocak 2018 ile 30 Haziran 2018 tarihleri arasında bilgisayarlı tomografi taraması geçirmiş, yaş ve cinsiyet arasında bir ayrım gözetmeyen tüm hastaları içermektedir. Hastalar acil servise baş ağrısı, baş dönmesi, trafik kazası ve serebrovasküler olay (SVO) gibi şikayetleri ile kabul edildi. Hastaların yaş, cinsiyetleri ve beyin tomografi bulgularının sayı ve yüzde bulguları analiz edildi.

Bulgular: Toplam altı ayda, 16428 hastanın 3975'inin beyin BT görüntüsü vardı. Çalışmamızda erkek hasta 2018 (% 51), kadın hasta 1957 (% 49) ve yaş ortalaması 45,40 ± 24 idi. Baş ağrısı, baş dönmesi, travma ve SVO şikayeti ile acilden radyolojiye sevk edilen hastalar dahil edildi. Çalışmada, rapor bulgularının 735'si (% 19) anlamlıydı ve 3240 (% 81) hastada önemsizdi.

Sonuç: Rapor bulgularının büyük ölçüde temiz olması, bu kadar çok BT görüntüsünün neden yapıldığı sorusunu ortaya koymaktadır.

Anahtar Kelimeler: *Beyin Görüntüleme; Bilgisayarlı Tomografi; Acil Servis; Klinik Tanı*

ABSTRACT

Objective: The aim of our study is to show the results of brain computed tomography (CT) taken by patients who entered the emergency department (ED) compatible with clinical diagnosis.

Material and Methods: This study included all patients who underwent computed tomography scans from the emergency department between January 1, 2018 and June 30, 2018, without any distinction between age and gender. The patients were admitted to the emergency department with complaints such as headache, dizziness, trauma (traffic accident) and cerebrovascular accident (SVO). Age, gender, and number and percentage findings of brain tomography findings were analyzed.

Results: In a total of six months, 3975 of 16428 patients had brain CT images. In our study, the male patient was found to be 2018 (51 %), the female patient was 1957 (49 %) and the overall age was 45.40±24 years. Patients referred from emergency to radiology with the complaint of headache, dizziness, trauma and SVO were included. In the study, 735 (19 %) of the report findings were significant and insignificant in 3240 (81 %) patients.

Conclusion: The fact that the report findings are largely clean suggests the question of why so many CT images are made.

Keywords: *Brain Imaging; Computed Tomography; Emergency; Clinical Diagnosis*

¹Kırşehir Ahi Evran University
Faculty of Medicine
Department of Biophysics
Kırşehir/Türkiye

²Kırşehir Ahi Evran University
Faculty of Medicine
Department of Radiology
Kırşehir/Türkiye

Mehmet Cihan YAVAŞ, Dr. Öğr. Ü.
(0000-0002-2923-050X)

Muhammed ALPASLAN, Dr. Öğr. Ü.
(0000-0003-4630-7959)

İletişim:

Dr. Öğr. Ü. Mehmet Cihan YAVAŞ
Kırşehir Ahi Evran University
Faculty of Medicine
Department of Biophysics
Kırşehir/Türkiye
Telefon: +90 386 280 2504
e-mail: mcihanyavas@ahievran.edu.tr

Geliş tarihi/Received: 17.10.2019

Kabul tarihi/Accepted: 17.04.2020

DOI: 10.16919/bozoktip.633906

Bozok Tıp Derg 2020;10(4):15-20

Bozok Med J 2020;10(4):15-20

INTRODUCTION

Computed tomography (CT) has become an indispensable imaging modality in the clinical routine. Today, the use of whole-body scans and imaging is increasing (1). However, the quality and speed of imaging have increased with technological development. There is biological and epidemiological evidence that CT increases the risk of cancer and that ionized radiation exposure is associated with cancer, even if it does not show directly (2). The number of CT studies is rapidly increasing in developing countries and emergency departments. Since CT scans contain higher radiation doses than traditional radiological shots, there has been a significant increase in radiation exposure in the community. Epidemiological studies have highlighted that even two to three CT scans lead to a significant increase in the risk of cancer, especially in children (3).

Physicians' defensive medicine approaches, the risk of not missing a diagnosis, medical-legal risk, contrast risk and patient requests may have been effective (4). Nevertheless, CT continues to be the decisive factor because it increases diagnostic accuracy in potential patient management (5, 6).

In recent years, the number of CT scans has been increasing by emergency departments and other clinics. In our study, we investigated the hypothesis that radiological images of the patients in the emergency department were normal or not. Therefore, our research question was to determine the number and percentage of tomography scans at the end of the examination of patients presenting to the emergency department with different symptoms, the results of the report findings, and the concerns about radiation risk with numerical data.

MATERIAL AND METHODS

This study included the data of the patients who applied to the emergency department of Kırşehir Ahi Evran University Education and Research Hospital for 6 months between January 1, 2018 and June 30, 2018. Sample size was determined according to population rate. Since the population of Kırşehir province is approximately 240000, the hospital emergency department has reached 6.8 % of the population. Of the 16428 patients referred for total radiology (CT, MR and

USG) for six months, 3975 (24 %) who underwent brain CT were included in the study. Of these, 2018 were male and 1957 were female. No exclusion factor was used in the study. Patient and physician identity were kept confidential. Since our data are hospital archive data, standardization and repeatability of measurements are always available. As this study was a retrospective study, hospital radiology information management system was used to file a file archive. Kardelen Medical software was used (Software, Version: 1.0.23.142, Turkey). The study was initiated by the hospital ethics committee (15/3/2019-13389610-806.99) and Kırşehir Ahi Evran Medical Faculty Ethics Committee (2018-24/204). The study (year of manufacture: 11.11.2014, Toshiba, Alexion series, Japan) tomography device was used.

Statistical Analysis

Descriptive data in the study, number and percentage values, mean, SD, min, max, kurtosis and skewness values and column charts were created. Chi-square test was used for age distribution among groups. p value of <0.05 was considered statistically significant. SPSS 21.0 IBM Corp., USA Package Program was used for the analysis of statistical data.

RESULTS

The characteristics of the tomography device used in the study, the maximum scanning area diameter: 50 cm, scanning distance: 155-165 cm, section thickness: 5 mm, computed tomography dose index (CTDIvol): 46.34 mGy, DLP: 704.43 mGy.cm. Diagnostic reference dose levels for the European Union (EU) head: CTDIvol (mGy): 60, DLP (mGy.cm): 1050. According to these values, the dose limit values in our study were below the reference level.

During the study period, 16428 patients underwent CT, USG and MRI withdrawal from the ED within 6 months. 3975 (24 %) patients had only brain CT. Of the patients in the emergency department, 781 (20 %) had headache, 320 (8 %) had dizziness, 339 trauma (traffic accident (8 %), and 2535 (64 %) cerebrovascular event (CVE). The mean age of the patients was the lowest in fall/stroke and the highest in CVE. The patients who were admitted to the ED were mostly due to CVE, but also the number of patients with headache and traumatic reasons was significantly higher. Age distribution was

Table 1. The clinical status and mean values of the number and age of patients in the emergency department.

Age Number (n)	Headache	Dizziness	Trauma:Traffic accident	CVE
n	781	320	339	2535
Mean ± SD	46.67± 20.52	54.20± 21.67	35.55± 19.36	45.27±24.28
Min	2	1	2	0.00
Max	96	97	86	107
Skewness	0.102	-0.312	0.132	0.680
Kurtosis	-0.770	-0.706	-0.610	0.550
Df	89	85	77	96
P	0.000			

significant among the groups. The number of clinical cases is shown in Table 1.

In our study, when we look at the age range, there is a significant increase in CVE. This situation is seen in Figure 1.

In this study, the gender of the patients who were referred from the ED to the radiology department were found. According to gender; headache: male 337 (43 %), female 444 (57 %); dizziness: male 115 (36 %), female 205 (64 %); traffic accident: male 217 (64 %), female 122 (36 %); and CVE: male 1349 (53 %), female 1186 (47 %) numbers and rates were found. Patients came to the radiology service with clinical findings and tomography results of the patients were analyzed for any pathological findings. Analysis findings were given as numbers and percentages. The report findings of the patients with headache were examined. There were pathological findings in 154 (20 %) of them and no pathological findings in 627 (80 %) of them. The report findings of patients with dizziness were examined. Of these, 18 (6 %) had pathological findings and 302 (94 %) had no pathological findings. The report findings of patients with trauma complaints were examined. It was determined that 105 (31 %) of them had a pathological finding and 234 (69 %) of them did not have a pathological finding. The report findings of the SVO patients were examined. Pathological findings

were found in 458 (18 %) of them and no pathological findings in 2077 (82 %).

In Figure 2, there is a diagram of the findings according to whether the findings are clinical findings or not. In addition, brain CT results of all patients included in the study were reported by the radiologist. The results of the report showed that 735 (% 18) patients had an important finding and 3240 (% 82) patients did not find anything significant.

DISCUSSION

Adults with headache complaints account for up to 4.5 % of emergency service visits. The causes of life-threatening headache are distinguished by diagnostic accuracy with advanced computerized tomography (7). The prevalence of migraine headaches is high, leading to ED visits (8). In our study, the rate of patients who had a CT scan with the complaint of headache was % 20. As a result of the scan, % 80 of the report findings were found to be normal.

Dizziness/vertigo is one of the most common complaints in the emergency department. The evaluation of this is decided by computed tomography (9). Dizziness corresponds to % 4 of the symptoms in the emergency department (10). In our study, the rate of dizziness symptom rate was % 6 for the patients who applied to the emergency department. % 94 of the

report findings were found to be normal.

Whole body tomography is performed in traumatic patients. This issue is the subject of debate due to increased radiation dose (11). As the first CT scan after trauma best represents the clinical situation, the researchers state that Stockholm and Helsinki CT scores (admission Glasgow Coma Scale, glucose level, and hemoglobin level, etc.) are more accurate (12). In our study, the number of patients with traumatic symptoms (n = 339, 8 %) was found. There are no pathological findings in the report findings of 234, 69 % patients.

Because of different cerebrovascular events, patients come to the emergency department. The major risk factors are stroke, and there are different risk factors such as bleeding, cardiac events, epilepsy, and depression (13). Researchers reported that migraine headaches might be associated with an increased risk of prolonged cardiovascular and cerebrovascular events. This effect was due to increased risk of myocardial infarction (both hemorrhagic and ischemic) and stroke (14). Unnecessary CT scans are performed in children with minor head trauma. Instead, more economical

diagnostic tests without radiation risk can be used (15). In our study, the number of patients admitted to ED due to cerebrovascular events was found to be quite high. Age-related health problems have led to an increase in the use of patients' emergency services. In our study, we evaluated especially acute level CVE patients. When we examined the brain CT results, atrophic changes with age, calcifications, nasal septum to the left and right deviation, and similar minor findings were excluded.

Brain CT scans of patients presenting to the ED with different symptoms were abnormal in 735 (19 %) patients and normal in 3240 (81 %) patients. The fact that the patients' brain CT scan results reports are highly clear suggests that there are unnecessary tomography scans. However, the dialogue between the patient and the physician, the physician's initiative, clinical status, defensive medicine approach, patient demand and other reasons may have been effective.

CONCLUSION

We think that increased tomography shots can be the result of defensive medical approaches and patients'

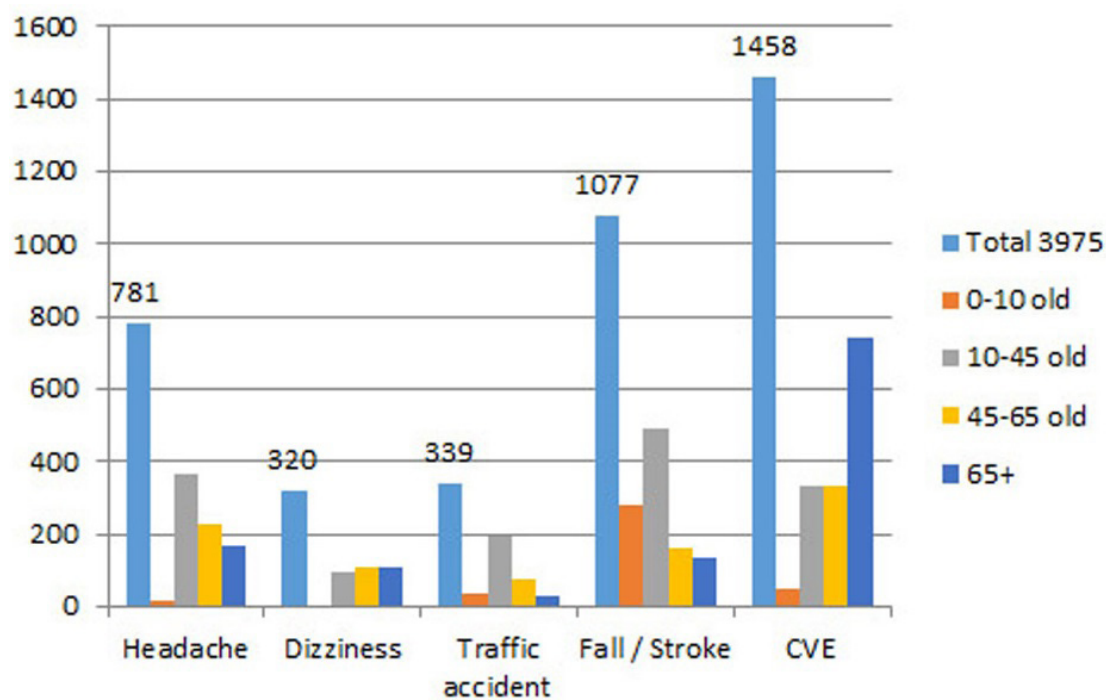


Figure 1. Age distribution intervals of patients according to clinical situation

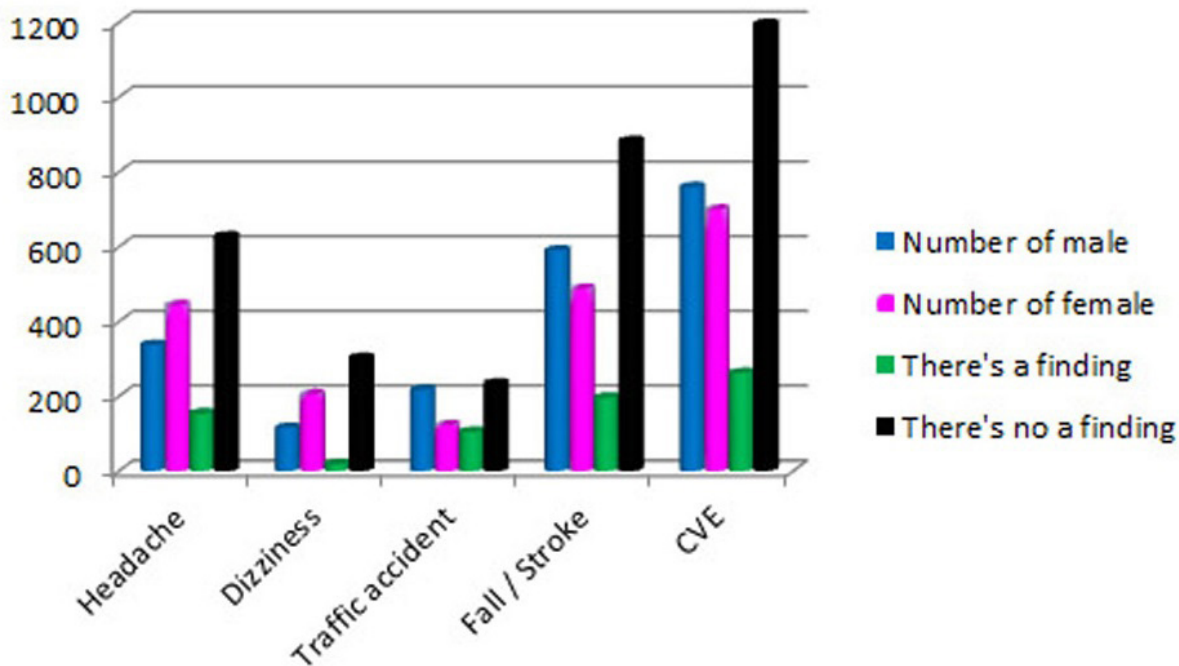


Figure 2. Diagram showing whether there is a report finding by gender and clinical situation

insistence. This study report includes evaluating the results of brain CT scans of patients admitted to the emergency department in six months. As our results are limited to a single province hospital of a province, generalization to other countries and hospitals cannot be made.

REFERENCES

1. Buzug T.M. Computed Tomography. In: Kramme R., Hoffmann KP., Pozos R.S. (EDS) Springer Handbook of Medical Technology. Springer Handbooks. Springer, Berlin, Heidelberg, 2011.
2. Rebecca SB. Is computed tomography safe? N Engl J Med. 2010;363:1-4.
3. Brenner DJ, Hall EJ. Computed tomography - an increasing source of radiation exposure. N Engl J Med. 2007;357:2277-84.
4. Kadhim-Saleh A, Worrall JC, Taljaard M, Gaten M, Perry JJ. Self-awareness of computed tomography ordering in the emergency department. CJEM. 2018;20(2):275-83.
5. Abujudeh HH, Kaewlai R, McMahon PM, Binder W, Novelline RA, Gazelle GS, et al. Abdominopelvic CT increases diagnostic certainty and guides management decisions: a prospective investigation of 584 patients in a large academic medical center. AJR. 2011;196(2):238-43.
6. Broder J, Fordham LA, Warshauer DM. Increasing utilization of computed tomography in the pediatric emergency department, 2000–2006. Emerg Radiol. 2007;14:227-32.
7. Pines JM, Hollander JE, Isserman JA, Chen EH, Dean AJ, Shofer FS, et al. The association between physician risk tolerance and imaging use in abdominal pain. Am J Emerg. 2009;27:552-7.
8. Burch RC, Loder S, Loder E, Smitherman TA. The prevalence and burden of migraine and severe headache in the united states: updated statistics from government health surveillance studies. Headache. 2015;55:21-34.
9. Chuang PC, Huang YS, Chiang CY, Zhang EW, Cheng FJ. Effectiveness of peer pressure on computed tomography use for dizziness/vertigo patients. Medicine. 2019;98(11):e14887.
10. Kontorinis G. The imaging of the dizzy patient: computed tomography versus magnetic resonance imaging. European Radiology. 2018;28:2914-5.
11. Sierink JC, Treskes K, Edwards MJ, Beuker BJ, den Hartog D, Hohmann J, et al. Immediate total-body CT scanning versus conventional imaging and selective CT scanning in patients with severe trauma (REACT-2): a randomised controlled trial. Lancet. 2016;388: 673-83.

12. Thelin EP, Nelson DW, Vehviläinen J, Nyström H, Kivisaari R, Siironen J, et al. Evaluation of novel computerized tomography scoring systems in human traumatic brain injury: An observational, multicenter study. *PLOS Medicine*. 2017;14(8): e1002368.
13. Conrad J, Pawlowski M, Dogan M, Kovac S, Ritter MA, Evers S. Seizures after cerebrovascular events: Risk factors and clinical features. *Seizure*. 2013;22:275-82.
14. Mahmoud AN, Mentias A, Elgendy AY, Qazi A, Barakat AF, Saad M, et al. Migraine and the risk of cardiovascular and cerebrovascular events: a meta-analysis of 16 cohort studies including 1 152 407 subjects. *BMJ Open*. 2018;8(3):e020498.
15. Çıkrıklar Hİ, Ekici MA, Coşan DT, Ekici A, Üstündağ Y, Karaali M, et al. May the level of serum glial fibrillary acidic protein be alternative to cranial tomography in children with minor head injury?. *Bozok Med J*. 2014;4(1):6-12.