

Incidental CT Findings of Patients Who Admitted to ER Following a Traffic Accident

Acil Servise Trafik Kazası Sonucu Gelen Hastaların Çekilen BT'lerindeki İnsidental Bulguların Değerlendirilmesi

Yavuz YIGİT,¹ Harun AYHAN²

¹Derince Training and Research Hospital, Kocaeli;

²Haydarpaşa Numune Training and Research Hospital, İstanbul

SUMMARY

Objective

The aim of this study was to investigate and analyze incidental CT findings of traffic injury patients discharged from the ER, and to determine overall notification rates.

Methods

All traffic injury-related patient records between 01.06.2013-01.03.2013 were obtained from Derince Training and Research Hospital Emergency Service using patient files and the hospital database. Brain, thorax and/or abdominal CT images of 340 patients aged between 0 to 84 years were included in the study. ER observation forms were investigated for the patients who had incidental findings on CT scanning and overall notification rates were recorded.

Results

Mean age of the 363 cases was 31.2 (SD 17.9, min 0, max 84) and 35.5% of patients were female (n=129) and 64.5% were male (n=234). A total of 537 CT scans were performed on 363 patients. 147, 319 and 71 CT scans were performed on the thorax, brain and abdominal, respectively. 27.3% (n=99) of scan results showed the presence of a coincidental pathology. The most common disease on scans were bone lesions (8%, n=29), followed by sinus abnormalities (7.7%, n=28). Incidental findings ratio in patients aged over 60 was 60.8%, while under 60 was 24.8%. It was found that seven patients (7.1%) were informed about the imaging results.

Conclusion

Most of the incidental findings were found to be benign; however, 16.5% of them were considered to require in-depth investigation. Further investigations are needed to understand the clinical relevance of these findings and their effects on patients.

Key words: Incidental findings, tomography.

ÖZET

Amaç

Bu çalışmada ki amacımız trafik kazası ile acil servise başvuran hastalardan taburcu olanların BT'lerindeki rastlantısal bulguların analizi ve bunların hastalara bildirim oranlarının incelenmesidir.

Gereç ve Yöntem

Çalışma 01.06.2013-01.03.2013 tarihleri arasında Derince Eğitim ve Araştırma Hastanesi Acil Servisi'nde trafik kazasına bağlı olarak takip edilen hastaların dosyalarından ve hastanemiz veri sisteminden elde edilen hasta bilgileri kullanılarak yapıldı. Çalışmaya beyin, toraks ve/veya abdominal BT görüntülemesi yapılan, 0-84 yaş arası 340 olgu alındı. Acil gözlem formları incelenerek rastlantısal bulgular saptanan hastalardan BT yorumlarının sonuçları hakkında bilgilendirilenler kaydedildi.

Bulgular

Üç yüz altmış üç olgunun yaş ortalaması 31,2 (SD17,9, min 0, maks 84) olarak bulunurken hastaların %35.5'i kadın (n=129), %64.5'i erkek (n=234) idi. 363 hastaya toplamda 537 BT görüntülemesi yapıldığı saptandı. Bunların 147'si toraks, 319'u beyin, 71'i abdominal görüntülemeydi. Tomografilerin %27.3'ünde (n=99) rastlantısal yakalanan bir patoloji vardı. En sık tespit edilen rastlantısal hastalık kemik patolojileri (%8, n=29), sonra sinüs anomalileridir (%7.7, n=28). Rastlantısal bulguların oranı 60 yaş üzerinde %60.8 olurken, 60 yaşın altında %24.8 olarak saptandı. Hastalardan yedisine (%7.1) görüntüleme sonucu hakkında bilgi verildiği saptandı.

Sonuç

Çalışmamıza alınan hastalarda saptanan rastlantısal bulgular daha çok benign olmakla beraber, hastaların %16.5'inde ileri araştırma gerektirebilecek görece ciddi rastlantısal bulgular saptanmıştır. Ancak bu bulguların klinik öneminin ve hastalar üzerindeki etkilerinin araştırıldığı daha çok çalışmaya ihtiyaç olduğu kanaatindeyiz.

Anahtar sözcükler: Acil servis; rastlantısal bulgular; tomografi.

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Correspondence: Dr. Yavuz Yiğit. Derince Eğitim ve Araştırma Hastanesi, Derince, Kocaeli, Turkey.

e-mail: dryavuzyigit@gmail.com

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Introduction

The use of computed tomography (CT) in the Emergency Room (ER) is increasing with its growing availability and diagnostic success. The impact of CT on ER physician has had undeniable success such as rapid diagnosis and efficiency in the treatment process. There are many publications that emphasize the importance of CT scans which may lead to significant changes in the treatment of patients with multiple traumas.^[1-8]

Along with the potential benefits of CT scans, risk factors are associated with the use of this technique such as the potential of high-doses of radiation and contrast-induced nephropathy.^[9,10] With this in mind, CT scans constitute 13% of radiological diagnostic methods used in the United States and is 70% of radiation source given to the patients.^[11,12] The estimated cancer rates due to one-time whole body CT scan is fairly low at 0.08%, while in cases of annual CT scans this rate increases to approximately 2%.^[13-16]

Another potential issue related to CT scans is incidental findings. Their advantages and disadvantages of incidental findings remain a topic of debate. Many publications have come to fruition due to the incidental findings, independent from the patient's main complaint.^[17-23] Some of these publications indicated that incidental findings often result in unnecessary tests and spending.^[18,23,24] Other publications reported that, in many cancer cases, further analysis of incidental findings lead to early stage cancer diagnosis.^[20,25,26] The studies that examined incidental findings in the CT scans of trauma patients reported the rate of incidental findings to be between 34-43%.^[17,27,28] The patient notification rates of the detection of incidental findings varied between 21-27%.^[19,29]

CT has become one of the more essential tools commonly used in the ER. The breadth of incidental pathologies have not been examined sufficiently in the literature. In addition, the issues on how to manage patients with these incidental findings needs clarity. The aim of this study was to investigate the incidental pathologies observed in CT scans. The frequency and notification rate in discharged patients admitted to the emergency department due to traffic accidents are discussed.

Materials and Methods

This retrospective study was conducted by using files and patient information obtained from our hospital's data processing system regarding patients admitted and followed at the ER of Derince Training and Research Hospital Emergency Service due to traffic accidents from January 2012 to January 2013. The study included 363 patients between the ages

of 0-84 whose brain, chest, and/or abdominal CT scans were taken. Patient ER observation forms and files from the hospital data processing system were screened and their age, gender, type of imaging, circumstances of hospital admission (referral or direct), post-treatment status (admission to another department, discharge or mortality during the follow-up), and comments on CT scans (made by hospital's expert radiologists) were recorded. Findings from the CT scans that were considered to be unrelated to traffic accident injuries (bone changes, sinus changes, nephrolithiasis, renal simple cyst, hepatic steatosis, ovarian simple cyst, abdominal hernia, hiatal hernia, cholelithiasis, diverticulum, accessory spleen, hemangiomas, pulmonary fibrosis, pulmonary nodule, atherosclerosis, arachnoid cysts, aortic dilatation, hepatomegaly, hepatic mass, splenomegaly, hydronephrosis) were recorded under the heading of incidental findings. The incidental findings were divided into two groups according to their severity based on the classification proposed by Barrett et al.^[30] Group 1 included incidental findings that did not require urgent intervention, but patients were still required to be notified, whereas Group 2 included findings that should be intervened immediately. The information from the CT review results of patients whose incidental findings were detected by examining the ER observation forms was recorded. The status of patient incidental finding notification was determined by looking at the records from the ER forms and consult notes. The cases in which notification status was not recorded were considered as not informed.

Patients that were (1) hospitalized or transferred to any other department, (2) who lost their lives during the follow-up, (3) whose ER observation forms or hospital information system records were incomplete, or (4) who were referred to our department from another center were excluded from the study.

The SPSS 16.0 software was used for statistical analyses of the data. The normally distributed continuous variables were expressed as mean and standard deviation (\pm), minimum (min) - maximum (max) values in brackets, while the qualitative variables were expressed as numbers and percentages (%).

The ethics committee approved our study.

Results

When the records of a total of 947 patients who were admitted to our ER due to traffic accident were examined, we determined the following: the CT scan was not done for 278 patients, 182 patients were hospitalized to another department, the records of 83 patients were incomplete, 37 patients were referred to our emergency service from another center, and 4 patients passed away during the follow-up in emergency service (Figure 1).

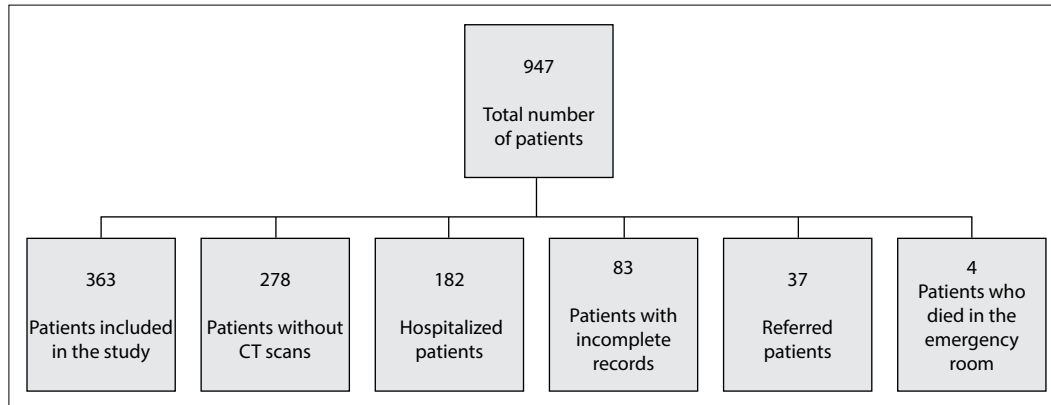


Figure 1. Inclusion/exclusion criteria for patients in the study.

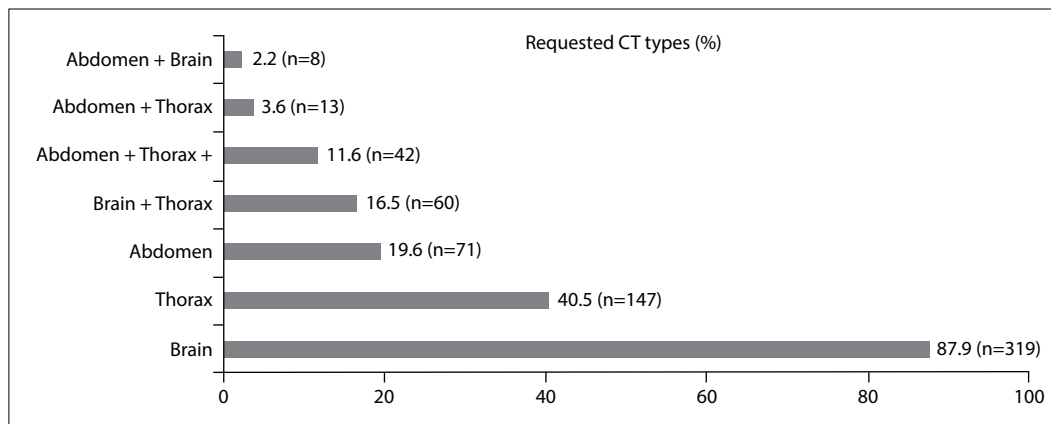


Figure 2. The distribution of CT scans requested from the emergency service.

The mean age of 363 patients whose CT scans were taken in the ER that showed incidental findings was 31.2 ± 17.9 (min 0, max 84). Of those 363 patients, 35.5% were female ($n=129$), while 64.5% were male ($n=234$). A total of 537 CT scans (147 thorax, 319 brain, and 71 abdominal) were taken for 363 patients included in the study.

There were incidentally caught pathologies in 27.3% ($n=99$) of tomography analyses. There was a single pathology in 17.1%, while multiple pathologies were determined in 10.2% ($n=37$) of the tomography reports. The most commonly detected incidental disease was bone pathology (8.0%, $n=29$) followed by the sinus abnormalities (7.7%, $n=28$).

Group 1 incidental findings included bone changes, sinus changes, nephrolithiasis, renal simple cyst, hepatic steatosis, ovarian simple cyst, abdominal hernia, hiatal hernia, cholelithiasis, diverticulum, accessory spleen, and hemangioma. They constituted 55.8% ($n=76$) of all incidental findings and were observed in 20.9% ($n=76$) of patients (Table 1). All of the bone change cases in Group 1 findings were benign changes (osteophytic changes accompanied by or not accompanied by spinal stenosis) according to Barrett et al.'s

classification. None of the patients had bone cyst, lytic bone lesions, or bone masses. The other Group 1 findings did not require immediate intervention according to Barrett et al.'s classification. None of the Group 1 incidental findings were reported to the patients.

Meanwhile, Group 2 findings accounted for 44.2% of all incidental findings and were observed in 16.5% of the patients ($n=60$). Only 11.7% of Group 2 incidental findings were reported to patients (Table 2).

When the relationship between the age and incidental findings was examined, the rate of incidental findings in patients over 60 years of age was 60.8% compared with the rate of 24.8% in patients under the age of 60.

According to the ER observation among the patients with incidental findings in the CT scans, only 7 patients (7.1%) were informed about the results of the imaging. The aortic dilatation was determined in 1 of these patients (50.0%), pulmonary nodule in 3 patients (23.0%), hepatic masses in 1 patient (16.6%), hydronephrosis in 1 patient (20.0%) and pulmonary fibrosis in 1 patient (5.50%).

Table 1. Group 1 incidental findings and their frequency

Disease	Number	Percentage (%)
Bone changes (osteophytic changes accompanied by or not accompanied by spinal stenosis)	29	8.0
Sinus changes (sinusitis, sinus cysts)	28	7.7
Nephrolithiasis	5	1.4
Renal simple cyst	4	1.1
Hepatic steatosis	3	0.8
Ovarian simple cyst	1	0.3
Abdominal hernia	1	0.3
Hiatal hernia	1	0.3
Cholelithiasis	1	0.3
Diverticulitis	1	0.3
Accessory spleen	1	0.3
Hemangioma	1	0.3

Table 2. Group 2 incidental findings and their frequency

Disease	Number	Percentage (%)
Pulmonary fibrosis	18	5.0
Pulmonary nodule	13	3.6
Atherosclerosis	10	2.8
Arachnoid cyst	6	1.7
Aorta dilation	2	0.5
Hepatomegaly	2	0.5
Hepatic mass	1	0.3
Splenomegaly	1	0.3
Hydronephrosis	1	0.3

Discussion

The rate of the incidental findings in patients included in our study was found to be 27.3%. In previously conducted similar studies, this rate has been reported to vary between 30.6-35.0%.^[17,27,31] Therefore, the rate of incidental findings in our study is consistent with previous studies.

In our study, the rate of patient notification regarding the incidental findings was determined as 6.30%. In a similar study by Thompson et al., this rate was 9.80%, in Munk et al.'s study it was 21.0%, while it was 27.0% in Messersmith et al.'s study. When compared to these studies, the notification rates from our study are low. Messersmith and Mink studies both included hospitalized patients. A longer stay in the hospital might have increased the chances of patient notification. Similar to our study, Thompson et al. did not include

hospitalized patients for analysis and their notification rates were more similar our notification rates.

In our study, we determined whether the patients had been notified about the incidental findings from the ER observation forms. The possibility of not recording the verbal notification of patients in the observation forms constitutes a limitation to our study as well as other similar studies.

Another possible cause of the low rate of notification might be that the ER physicians did not think that incidental findings were significant enough to be reported. Both in our study as well as in other similar studies, the notification rates of relatively more significant incidental findings were higher. Mink et al. divided the incidental findings into three groups according to their severity. The group that had the most severe findings (possible fatal symptoms such as bone me-

tastasis, metastatic lung mass, and abdominal aortic aneurysm) was group 3. Although the notification rate of patients from group 3 was higher than the general notification rate (21.0%), it still was only 40.9%. Similarly in our study, the notification rates for relatively significant findings were higher than the overall notification rates. However, with the exception of aortic dilatation, they did not exceed 23.0% (lung nodules 23.0%, aortic dilatation 50.0%). On the other hand, Messersmith et al.'s study also classified incidental findings into three groups based on their severity. They did not find a significant difference between those three groups in terms of patient notification. As a result, it does not seem to be possible to create a definite opinion on this issue.

There are several suggestions for increasing the patient notification rates. Ekeh et al.^[27] proposed to notify discharged patients about incidental findings by mailing a letter. Another method is to directly inform the family physician rather than the patient regarding the detected incidental findings. With this method, family physicians will follow-up with the patient for the possibility to reduce unnecessary anxiety.

Messersmith et al.^[19] reported that, among all the patients that were notified about the incidental findings, only 11 patients (18.0%) later came for follow-up. No major diseases were detected in the follow-up of these patients. This shows that the path that emergency physicians choose to follow when informing patients is essential. Overburdening the patients may lead to negative consequences such as increasing the workload and developing complications during further tests. On the other hand, seriousness of the findings should be emphasized so that patients do not delay their follow-ups.

Limitations

In our study, we determined whether the patients were notified about the incidental findings by evaluating the ER observation forms. The possibility of not recording the verbal notification of patients into the observation file creates a limitation of our study and other similar studies. Therefore, based on our work it is not possible to reach a definitive conclusion about the patient notification rates.

In addition, there is a need for a prospective study that would evaluate the contents of notifications, patient reactions to these notifications, and their efficacy. These considerations could not be assessed in this study.

Conclusion

Most of the incidental findings detected in the patients included in our study were benign, however incidental findings detected in 16.5% of the patients were relatively serious and required further investigation. Nonetheless, more studies are needed to determine the clinical importance on these incidental findings and their effect on patients.

Conflict of Interest

The authors declare that there is no potential conflicts of interest.

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