

Original Article

CT Scan Incidental Findings in Head Trauma Patients - Yazd Shahid Rahnemoun Hospital, 2005–2015

Seid Kazem Razavi-Ratki, MD^{1,2}; Zoheira Arefmanesh, MD²; Nasim Namirani, MD³; Somaye Gholami, MSc³; Mohammad Sobhanardekani, MD²; Amin Nafisi Moghadam⁴; Reza Nafisi Moghadam, MD^{3*}

¹Department of Radiology, Faculty of Medicine, Shahid Sadoughi University of Medical Sciences, Yazd, Iran

²Department of Radiology, Shahid Sadoughi University of Medical Sciences, Yazd, Iran

³Yazd Diabetes Research Center, Shahid Sadoughi University of Medical Sciences, Yazd, Iran

⁴Medical Students, Yazd Azad University of Medical Sciences, Yazd, Iran

⁵Department of Radiology, Shahid Sadooghi University of Medical Sciences, Yazd, Iran

Abstract

Background: Incidental findings are presented in radiology reports. Many of these findings do not require further investigation; however, some require further investigation and repeated imaging. The aim of this study was to determine the frequency of incidental findings on CT scans of patients with head trauma from 2005 to 2015.

Methods: This analytical cross-sectional study was conducted in years on 5,193 CT scan reports referred to Shahid Rahnemoun hospital in Yazd, Iran. The images were evaluated by consensus agreement of two radiologists. The relationship between age, sex and incidental findings was analyzed using the SPSS 20 software.

Results: A total of 5,193 subjects with a mean age of 34.16 ± 21.17 were examined. About 64% of cases were male. The frequency of incidental findings was 10.9%. The most common finding was calcification with a frequency of 3.3% and the least was Dandy Walker finding at 0.02%. There was no relationship between age, sex and the frequency of incidental findings. No significant trend was found between IFs frequency during ten years.

Conclusion: The results of this study indicated that most incidental findings were related to benign findings, but also malignant findings were diagnosed.

Keywords: CT scan, Head Trauma, Incidental Findings

Cite this article as: Razavi-Ratki SK, Arefmanesh Z, Namirani N, Gholami S, Sobhanardekani M, Nafisi Moghadam A, et al. CT scan incidental findings in head trauma patients - Yazd Shahid Rahnemoun hospital, 2005–2015. Arch Iran Med. 2019;22(5):252–254.

Received: February 8, 2018, Accepted: October 7, 2018, ePublished: May 1, 2019

Introduction

Brain injury due to trauma is one of the most important causes of death and disability around the world.^{1,2} Also, most brain trauma patients are younger than 30 years old and healthy. Most existing reports focused on pituitary tumors and other incidental findings (IFs) were neglected. Considering the above mentioned and lack of a similar study in this region on this topic, the present study was carried out to determine the prevalence and range of IFs on brain CT scans on a large sample size.

Materials and Methods

This analytical cross-sectional study was conducted on 5,193 head trauma patients who were referred to the Shahid Rahnemoun hospital in Yazd, Iran during 2005–2015. The studied sample was entered into the study by the census method. The age range restriction was not considered in this study.

The exclusion criteria consisted of: All brain CT scans with no brain trauma imaging indication, the technical

aspects which limit the exact report.

IFs on CT scan including: neoplasm, dandy walker, atrophy, calcification, infarct, leukomalacia and arachnoid syndrome, scalar and opacity lesions of mastoid were an indication of sclerosis. Generally, IFs were divided into 2 benign (without clinical signs) such as pineal calcification and a group with clinical symptoms such as intracranial masses.

The findings were reviewed by 2 independent radiologists. If there were disagreements, a third radiologist reported the findings based on the first 2 radiologists reports. Patient demographic information was extracted from electronic patients' records and CT scan of patients using the picture archiving and communication (PACS) system and reported by the radiologist. The IFs of the report and the frequency distribution of incidental CT scan findings in patients with head injury were reported based on other variables including age, sex and type of imaging. For patients with IFs requiring further investigation, information was obtained by telephone follow-up.

Statistical Analyses

In the descriptive analysis section, tables, graphs and descriptive methods were used. Chi-square test was used for analytical analysis. The level $P < 0.05$ was taken as the cutoff value for significance. All of the calculations were statistically analyzed using the Statistical Package for the Social Sciences (SPSS) version 20.

Results

A total of 5193 brain CT scan cases were studied during ten years. Gender distribution was 3324 (64%) male and 1869 (36%) female. The male/female ratio was 2/1. The gender distribution was significantly different among studied patients (P value: 0.001). The mean age (\pm standard deviation) of patients was 34.16 ± 21.17 years. The minimum of age was 1 month and the maximum was 98 years. Due to the wide distribution of data, the skewness of age distribution was equal to 0.475.

Table 1 shows the frequency of incidental brain and skull findings on brain CT scan.

Totally, 464 cases (8.9%) were detected with at least one or more IFs on the CT scan and 4728 cases (91.1%) had no IF on CT scan.

Gender distribution of patients with IFs is described in Table 2. There was no significant difference between the 2 genders in IF prevalence on CT scan (P value: 0.471). There is no ascending or descending trend in ten years prevalence of IFs. (P value for trend: 0.443)

The mean age of individuals with and without IFs on CT after a traumatic brain injury is different. In the case group (with positive IFs), the mean age was 50.69 ± 24.9 years and on the normal CT scan, the mean age was 33.6 ± 19.79 years, which significantly differed from the other groups (P value: 0.001).

Discussion

The results of this study showed the frequency of IFs on CT scans after brain trauma was about 8.9%, which is less than previous studies.³⁻⁵ The most frequent cases were calcification (basal ganglion and pineal), sinusitis, mega cisterna and infarction, respectively. One of the most important IFs is cancer, with 0.7% frequency, with the most common cancer being meningococcal tumors. The frequency of IFs in different studies varies according to different methods of traumatic imaging modalities. In terms of the type of IFs, this study can be compared with other studies. In our study, the highest frequency is related to calcification (basal ganglion, phallus and pineal gland), atrophy, sinusitis, mega cisterna and infarction. A remarkable point in other studies is the follow-up of calcification cases, which was not done in our study. Malignant calcification is related to tuberculosis which was not demonstrated in our study.⁶ Also worth mentioning, some forms of intracranial calcification like sclerosing tuberculosis can lead to seizure and epilepsy,

Table 1. Frequency of Incidental Brain and Skull Findings in CT Scan

Findings	No. (%)	95% CI
Cancer		
Meningioma	22 (0.40)	0.23–0.57%
Lipoma	13(0.30)	0.15–0.45%
Pituitary adenoma	1(0.02)	0–0.06%
Pineal tumor	1(0.02)	0–0.06%
Medulloblastoma	1(0.02)	0–0.06%
Total	38(0.73)	0.47–0.93%
Arachnoid cyst	25 (0.48)	0.29–0.67%
Infarction	54 (1)	0.73–1.27%
Large cisterna magna ¹	63 (1.20)	0.9–1.5%
Leukomalacia	16 (0.20)	0.08–0.32%
Ventricular hydrocephalus	31(0.60)	0.39–0.81%
Dandy Walker	1 (0.02)	0–0.06%
Calcification		
Basal ganglion	22 (0.40)	0.23–0.57
Pineal	103 (2)	1.61–2.39%
Temporal horn	45 (0.90)	0.64–1.16%
Total	170 (3.30)	2.81–3.79%
Sinusitis	83 (1.60)	1.25–1.95%
Mastoid tumors	12 (0.20)	0.08–0.32%
Multiple myeloma	2 (0.03)	0–0.08%
1- larger than 10 cm ³		

Table 2. IFs Frequency between Male and Female

IFs in CT scan	Female	Male	Total
Negative, No. (%)	1674 (32.2%)	2954 (56.9%)	4628
Positive, No. (%)	194 (3.7%)	370 (7.1%)	564
Total, No. (%)	1868 (36%)	3324 (64%)	

which itself increases traumatic problems to the head and can be referred as a bias. The above findings in our study and other studies that investigated head injury other than traffic accidents can limit the findings. One of the other limitations mentioned in other studies is the remission of biopsy, which is also evident in our study. Of course, this bias does not work with random CT scans. Of course, in the case of examining the patient's outcomes and follow-up, it might have been possible that this section did not work in our study.

In conclusion, the results of this study showed that the prevalence of IFs on CT scans after brain trauma was about 8.9%. The most frequent cases were calcification (basal ganglion, falx, and pineal), sinusitis, mega cisterna and infarction, respectively. One of the most important IF is cancer, with an incidence of 0.7%, with the most common being meningococcal tumors.

Authors' Contribution

SKRR, ZA, MS and RNM carried out collect samples and wrote the final manuscript. NN participated in the design of the study, performed the statistical analysis and conceived of the study, and participated in its design and coordination and helped to draft the manuscript. ANM and SG carried out supervision stages of project and conceived of the study, and participated in its design and coordination and helped to draft the manuscript as well. ANM,

RNM and SKRR conceived of the study, and participated in its design and coordination and helped to draft the manuscript as well. All authors read and approved the final manuscript.

Conflict of Interest Disclosures

The authors have no conflicts of interest.

Ethical Statement

Department of Internal Medicine of Shahid Sadoughi University of Medical Sciences has confirmed this research with the thesis number 4571. The patients were informed about the objective and nature of the study, and each participant provided written consent prior to the study.

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