

Evaluation of Incidental Findings in Brain CT Scans of Mild Head Trauma Patients (GCS: Thirteen to Fifteen)

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Abstract

Background: To determine the prevalence of incidental findings on brain CT scan in mild head trauma patients.

Methods: From November 2005 to April 2006, we evaluated 732 CT Scans of cases with mild head trauma (Glasgow Coma Scale Score of thirteen, fourteen, and fifteen), whom referred to our university affiliated hospital. In this study, we evaluated incidental findings on brain CT of our patients, as well as size of the cistern magna.

Results: Five hundred (68.3%) of our patients were male and 232 (31.7%) were female. The mean age of our cases were 27.4 ± 19.2 (one month to 89 years old). Incidental findings were found on 22 cases (3.1%). Among these, there were five tumors (0.7%), eight arachnoids cysts (1.1%), and five bones lesions (0.7%). Large cisterna magna ($>10 \text{ cm}^3$) was seen in four cases. Incidental findings in males were seen in ten cases (45%) and in females were seen in 12 cases (55%) ($P=0.019$). The mean age of cases with incidental findings were 37.2 ± 20.6 years and in cases without incidental findings were 27.1 ± 19.1 years ($P=0.011$).

Conclusion: In this study we found that arachnoid cyst was the most common incidental finding, and brain tumor and bone lesions were next common ones.

Keywords: Incidental Findings, Computerized Tomography, Head Injury

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Received: 14 Oct. 2009
Accepted: 1 Dec. 2009
IJCP 2010; 1: 32-35

Introduction

Advances in neurons imaging, Computed Tomography (CT) and Magnetic Resonance Imaging (MRI), have increasingly led to the identification of patients with incidental brain lesions.

The evaluation of patients with head trauma frequently includes CT scan that can reveal non-injury related lesions. These incidental findings have been reported in different clinical settings [1-3]. For example; pituitary tumors as an incidental finding were described by Aaron, Feldkamp, Moltich, Nishizawa, Tomita, and their co-workers in different articles [4-8].

Nakamura et al, in their study on 47 asymptomatic patients, were evaluated the natural history of meningiomas as incidental finding [9]. Harrington and his colleagues in their study described the significance of the incidental finding of basal ganglia calcification on computed tomography in 42 of 7000 patients who underwent brain CT scan [10]. The largest study about brain incidental findings, conducted by Eskandary and et al, in Iran [11].

These incidental findings show that when an imaging for any indication is reviewed, whole image should be evaluated carefully besides to the obvious pathological findings. In this study we used mild head trauma patients (GCS: thirteen to fifteen) for the evaluation of brain incidental findings.

We aimed to evaluate the incidental findings that detected on brain CT scan of mild head trauma patients.

Materials and Methods

From November 2005 to April 2006, we prospectively evaluated 732 CT scans of cases with mild head trauma (Glasgow Coma Scale score of thirteen, fourteen, and fifteen), who referred to our university affiliated hospital.

All brain CT scans were performed on spiral CT scanner (Shimatsu 7800/Japan) during the first 24 hours after trauma.

The slice thickness of films was 5 mm in posterior fossa and 10mm in supratentorial from the base of skull through the vertex.

The CT scans were reported by two radiologists. In this study, we evaluated incidental findings on brain

Table 1. Incidental findings detected on CT scan

No	Lesion	Age	Sex	Location	Size(mm)	others
1	Meningioma	51	Female	Left Pare Sellar	-	Hyper dense
2	Meningioma	42	Male	Right Temporal	-	Hyper dense
3	Meningioma	74	Male	Frontal	-	Hyper dense
4	Craniopharyngioma	65	Female	Supra Sellar	20×50×60	-
5	Macro-Adenoma	65	Female	Pituitary	-	Iso-dense
6	Arachnoids Cyst	7	Male	Temporal	25×45×50	Hypo dense
7	Arachnoids Cyst	35	Male	Temporal	20×40×10	Hypo dense
8	Arachnoids Cyst	59	Male	Sylvian Fissure	30×40×20	Hypo dense
9	Arachnoids Cyst	38	Female	Sylvian Fissure	40×50×3.5	Hypo dense
10	Arachnoids Cyst	19	Male	Temporal	-	Hypo dense
11	Arachnoids Cyst	30	Female	Temporal	10×15×8	Hypo dense
12	Arachnoids Cyst	15	Male	Temporal	-	Hypo dense
13	Arachnoids Cyst	4	Male	Pineal	-	Hypo dense-Induced obstructive hydrocephalus
14	Subdural Hygroma	28	Male	Frontal	-	-
15	Subdural Hygroma	50	Female	Frontal	-	-
16	Ossifying Fibroma	15	Female	Clinoid	-	-
17	Osteoma	55	Female	Ethmoid	-	-
18	Osteoma	30	Female	Ethmoid	-	-
19	Osteoma	39	Female	Ethmoid	-	-
20	Hyperostosis	65	Female	Frontal	-	-
21	Dermid Cyst	27	Female	quadric geminate cistern	-	-
22	Agenesis	17	Male	corpus callosum	-	-

CT scan of our patients, as well as size of the cisterna magna. Statistical analysis was performed by using SPSS version 11.5. Type I statistical error was set at 0.05.

Results

Five hundred (68.3%) of our patients were male and 232 (31.7%) were female.

The mean age of our cases were 27.4 ± 19.2 (between one month to 89 years). Incidental findings were found on 22 cases (3.1%). Among these, there were five tumors (0.7%) (Three meningiomas, one craniopharyngioma and one macro adenoma), eight arachnoids cyst (1.1%), and five bone lesions (0.7%) (Table1). We evaluated size of cisterna magna in 23 cases and large cisterna magna ($>10 \text{ cm}^3$) was seen in four cases (Table2).

Incidental findings in males were seen in ten cases (45%) and in females were seen in 12 cases (55%)

($P=0.019$). The mean age of cases with incidental findings were 37.2 ± 20.6 years and in cases without incidental findings were 27.1 ± 19.1 years ($P=0.011$).

Discussion

Incidental findings vary from trivial lesions to major pathologic lesions. They have diagnosed in patients evaluated for trauma in the widespread use of CT scan. Many of these findings require early management or referral to specialty physicians.

Incidental findings in these cases might cause a significant challenge for trauma centers and an organized approach needed for successful management and follow-up.

In katzman and et al. study, about evaluation of incidental findings on brain MRI from 1000 asymptomatic volunteers (age range, 3-38 years; 54.6% male) found that the prevalence of brain tumors was 0.2% [12].

The prevalence of intracranial incidental findings in our series were significantly higher than one similar study that conducted in 3000 mild head trauma patients ($p=0.0001$).

Arachnoids cysts are more common in males and the incidence of these lesions is about 4% in USA [13, 14]. Although these could be detected in routine imaging studies of asymptomatic patients, they are often detected as an incidental finding. Reported frequencies of arachnoids cysts (as an incidental finding) have showed a relatively wide range from 0.3% to 1.4% [12, 15-19]. In our study this frequency was 1.1%, this could be partly due to different clinical settings of patients' selection. It seems that in studies that have been done on neurological patients, the frequencies of arachnoids cysts are higher.

In one study of 3000 cases with non-specific symptoms and normal neurological exam, Weisberg found 28 focal intracranial lesions; among these, 6 cases had intracranial neoplasm (0.2%) (These included 2 meningiomas, 3 gliomas, and 1 chromophobe adenoma)[2]. Other 22 incidental findings had different lesions mainly vascular related problems; including 8 infarctions, 3 intracerebral hematoma and 3 chronic subdural hematoma. Remaining 8 patients were 5 cases of focal atrophy, and 3 cases of focal calcification [2].

In our study, the incidence of intracranial tumor was 0.7% (5 in 732) that is higher than previous study. Most incidentally found tumor lesions in different studies were pituitary adenomas [4-6]. In our study we detected only one macro adenoma. Eskandary et al haven't reported any adenoma in their study [11]. This could be related to high incidence of these adenomas, compared too many other brain tumors.

Meningiomas most commonly diagnosed sixth and eighth decades of life; however patients with symptomatic meningiomas commonly are seen in the fifth decade of life [3, 9]. The average age of patients with meningiomas in our series was 55.6 years that was near to Eskandary cases (60 years) [11].

Agensis of the corpus callosum is a rare congenital abnormality. In most patients, it is diagnosed within the first two years of life. In mild cases, symptoms such as seizures, repetitive speech or headaches might not appear for years [20]. We found one case of corpus callosum agenesis (age: 17 years) in our study, there was no other report about this anomaly as an incidental finding in literature.

Large cisterna magna occurs in approximately 0.3% to 0.7 % of all brain images [15, 16, 21].

This has been associated with infarction, inflammation and infection, particularly.

Cytomegalovirus and chromosomal abnormalities.

In absence of those above, a large cisterna magna is not clinically significant [22]. We measured the size of cisterna magna in our cases, so the incidence of large cisterna magna ($>10 \text{ cm}^3$) was 0.5% similar to the medical literature.

One limitation of this study was that it conducted at a single trauma centre, so generalization of results is limited. One important point in this article is the mean age of our cases is lower than normal population and we could not refer our results to general population. In this study we found that arachnoids cyst was the most common incidental finding, and brain tumor was next in frequency.

Acknowledgment

None

Conflicts of Interest

There were no conflicts of interest in this article.

Author's Contribution

S M developed the idea, reviewed CT scans and conducted the study. HH reviewed CT scans, SM collected the data and controlled the quality of study. JAH wrote the paper and ED analyzed the data.

Table 2. Age and sex distribution of large cisterna magna ($>10 \text{ cm}^3$)

Num	Age	Sex
1	10	Male
2	2	Female
3	35	Male
4	3	Female

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