

The role of CT scan in the diagnosis of epilepsy

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Abstract

Background: Neuroimaging has an important application in the diagnosis and treatment of patients with seizures and epilepsy.

Aims: To determine the diagnostic yield of CT scan in children with Epilepsy and recurrent seizures.

Patients and Methods: A total of 100 patients with epilepsy referred for CT scan of the brain in Al-Yarmouk general hospital in Baghdad from November 2008 to January 2010, with an age of patients in between 2 days to 15 years. (M 68: F32).

Results: Fifty one (51%) had abnormal neuro imaging of which 13 (13%) were found to have possible treatable causes and lesions requiring intervention.

A high yield of positive scans distained in children with the presence of abnormal neurological examination focal EEG abnormalities and a history of neonatal seizures.

Conclusions: Computed tomography is the standard clinical practice for a child with recurrent seizures, especially with the presence of abnormal neurologic examination and focal EEG changes.

Keywords: Epilepsy, CT scans, children

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INTRODUCTION

Epilepsy has been defined as recurrent seizures caused by partial or generalized epileptogenic discharges in the cerebrum. It is a group of diseases where recurrent seizures represent their principal manifestation.

It is a common clinical problem in pediatrics with an overall incidence of 49 per 100,000.^[1, 2]

CT scan a method used in the diagnosis of epilepsy, it is safe even if it is needed to be repeated several times over the years.^[3, 4] It is the technique of choice in children especially when MRI is not widely available.^[5]

Computed tomography has a significant role in detecting structural abnormalities of the brain ex. (hemorrhage, cyst) ventricular pathologies. Infarctions and lesions with underlying calcification.^[6, 7] it is still crucial in

emergency situations because of its relative easy availability.^[8, 9, 10, 11]

PATIENTS AND METHODS

A total of 100 patients with epilepsy referred for brain CT scan. Out of these 68 male and 32 female. Their ages range between 2 days → 15 years. Brain neuro imaging was done in Al-Yarmouk general hospital in Baghdad, in the radiological department. The decision to perform CT evaluation, was based on the clinical judgment of the referring pediatrician, cases of febrile convulsion were excluded, as CT scan of the brain seldom yield abnormal results of any clinical significance for purpose of analysis, the study sample were divided in to 5 groups according to age:

1. Neonate, (1-30 day).

2. Infants (30 day → 1 year).
3. Preschool age and toddlers (1-6 years).
4. Primary grade 6 - 12 years.
5. Secondary grade (12-13 years).

Examination Technique

Utilizing the spinal CT scan somatom plus 4 models 1999, KV 140, MAS 120, minute 39 seq.

Patient positioning with the head first, slice thickness 5mm, were undertaken from below upwards.

RESULTS

Table 1. Referrers to the distribution of study sample according to age.

Age	No.	%
1 1-30 day	5	5
2 30 day → 1 year	25	25
3 1-6 years	35	35
4 6-12 years	20	20
5 12-15 years	15	15

The bulk of cases fall in the age group of preschool and toddlers.

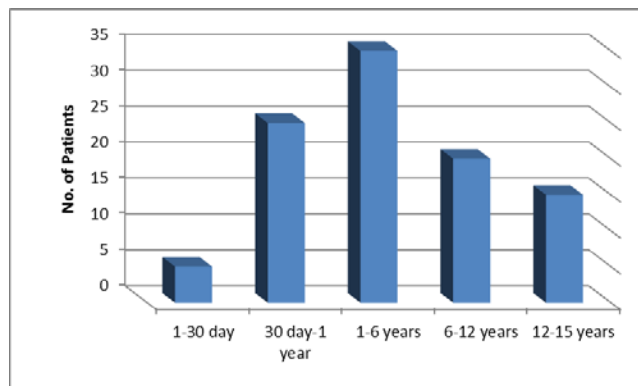


Figure 1. Showing the distribution of group of study sample according to age.

Table 2. Referrers to Finding of CT scans in both male and female in the study sample.

Finding on CT Scan	Male	Female
1 No Findings	9	16
2 Tumor	2	5
3 Abscess	-	1
4 AVM	-	1
5 Infarction	7	6
6 Hematoma	-	1
7 Hydrocephalus	1	-
8 SAH	-	1

In the study group, no findings observed in 49%, next to, is cerebral atrophy and hydrocephalus being 26% and 9% respectively.

Total No. of patients seen in the primary group was 20 patients of which, 14 did not have abnormal CT findings. In the infants and preschool children. The No. of cases was 25 and 35 respectively, and eleven atrophic changes seen in each group. These were considered as non specific cerebral atrophy.

In 13 patients, possible treatable causes were identified these being, 1 Encephalitis, 1 SAH supra -tentorial brain tumor and 1 epidural hematoma as well as nine patients presented with bilateral ventricles. Figure 2 one of the patients who presented with a large head was a case of Achondroplasia seventy four patients had standardized EEG, in 61 patients, EEG abnormalities seen among these, 32 patients had abnormal neuro imaging (52.4 %), which reflect a high yield positive scan in children with focal EEG changes. This is also true with the neonate; only five cases included in the study all had abnormal neuro imaging (100%) Twenty nine patients had associated neurologic deficits other than epilepsy including cerebral palsy (12 patients), mental retardation (11 patients), microcephaly (4 patients) and two patients with unusual facies of these 18 had abnormal neuro imaging, (62 %). A positive outcome of neuro imaging increases with associated neurologic syndromes.

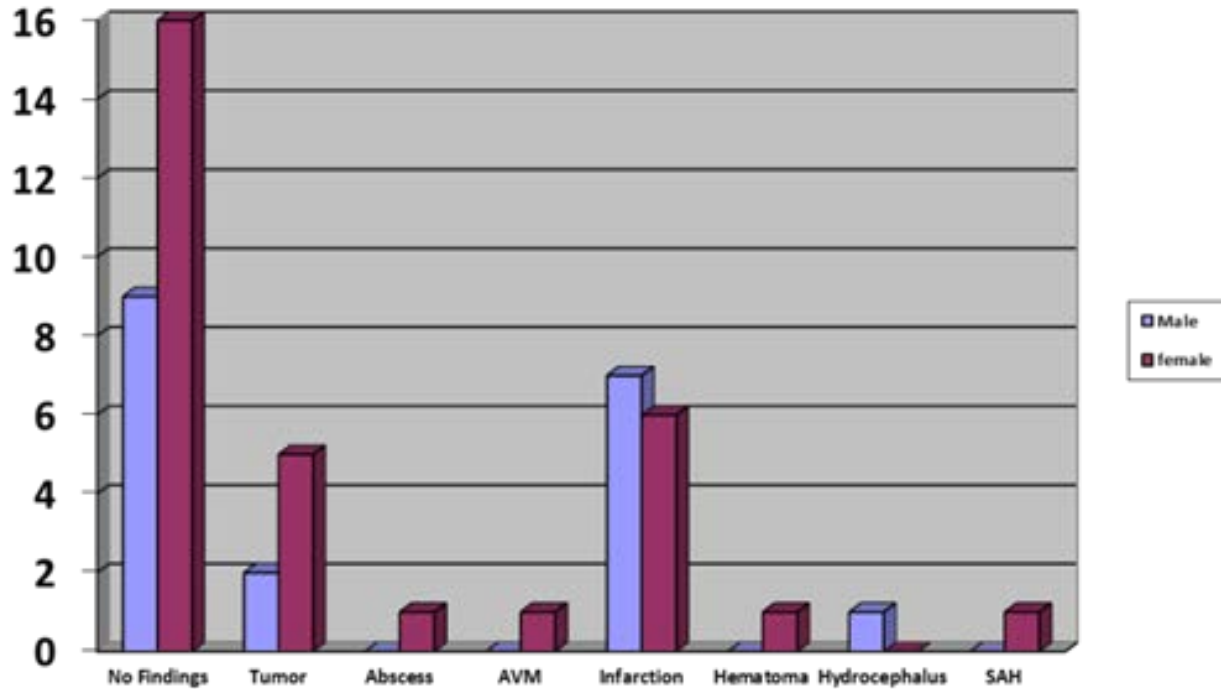


Figure 2. Refers to the study sample according to Neuro imaging findings.

DISCUSSION

The aim of investigating a child with epilepsy is to reach an etiologic diagnosis. Neuroimaging provides useful diagnostic

information in a relatively high percentage of epileptic children it is used to reveal the structure of the brain, in identifying tumors, cysts, scar tissue, abnormal spinal fluid circulation and other structural abnormalities.^[4, 12] The sensitivity of neuro imaging in this cohort with 51% rate of positivity is slightly lower than that reported by sussova (67 %) and colleagues, and even much lower than the 88.5% reported by author studies^[2, 13]

However, the most common CT abnormality in the current study as well as in the other studies was cerebral atrophy followed by hydrocephalus. The higher positive scan is seen in the previous mentioned neuro imaging studies is due to the selection of epileptic children with cerebral palsy which were more likely to have lesions on CT scan.

In this cohort, fourteen cases of infantile spasm seen, of these only three were presented without abnormal CT scan, in the remaining eleven cases abnormal neuro

imaging (80%) seen, these figures are similar to the findings of other studies.^[14]

In some Indian series, CT scan showed lesions in 49% of patients, but non of the clinical or EEG features were helpful in predicting the presence of abnormalities in neuro imaging although these findings are comparable to our work which reflect 51% abnormal brain neuro imaging with cerebral atrophy and hydrocephalus are the commonest, but they do not confirm the ring lesions of tuberculoma and cysticercoids' in the study of sunit singh and colleagues.^[15, 16]

Different conclusions between our series and the Indian study can be explained by the fact of more common tuberculosis and other parasitic infestation in some geographic areas in India.

In some western countries, the CT positivity rate have varied from 22 → 39% being lower than cranial CT seen in our study^(17, 18, 19, 20) this can be attributed possibly to the selected neurologically normal children after an initial non febrile seizures in conclusion, CT scan can provide a helpful early clue in making an etiological diagnosis. Abnormal CT scans finding is valuable in differentiating symptomatic seizures from an idiopathic

one, an underlying cause of the seizure may prompt an invasive investigation for diagnosis and treatment. An imaging study is indicated for the child with recurrent seizures under several circumstances in the presence of abnormal neurologic examination, focal EEG abnormalities and with a history of neonatal seizures whether imaging studies are also indicated for children who by history and examination do not fulfill these criteria, it is a matter of individual judgment.

We recommend CT scan the standard clinical practice in children with recurrent seizures because of its speed, safety and relative availability.

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