ROLE OF CT SCAN IN PARTIAL SEIZURES IN CHILDREN

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ABSTRACT

50 consecutive cases of partial seizures hospitalised over a period of 2 years, were studied. CT Scans were done once at presentation and thereafter cases were followed up with repeat CT scans to evaluate treatment response wherever a treatable cause was found. CT scan diagnosis was correlated with clinical signs and other baseline investigations including an EEG. CT scan abnormality was detected in 66% cases. Single or multiple tuberculomas were noted in 24% cases, cortical atrophy in 14% cases, focal calcification in 10%, haemorrhage in 3% and subdural effusions in 2%. With positive clinical signs, 81% of CT scans were abnormal. 20% of patients with partial seizures having no clinical signs and normal base line investigations including an EEG, had a CT scan abnormality mainly a tuberculoma.

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KEY WORDS : Partial seizures; CT Scan.

Introduction

A seizure disorder broadly termed as epilepsy from the Greek word *epilepsia* meaning "taking hold of" was first described by Hughling Jackson in 1873 [1]. This disorder has a social stigma attached to it, and to a young child it may cause long term psychological damage. Therefore it becomes important to arrive at an etiological diagnosis whenever possible to aid specific therapy. Almost 30% of patients with a seizure disorder are children [2] and the seizure type is partial in 23-66% of children [3-5]. Routinely used methods including the EEG in most cases cannot localise the lesion. Moreover at times it is difficult to record and interpret the EEG in children. However, diagnostic yield with CT scans is higher and various anomalies as detected on CT scanning patients with partial seizures range from 30-70% [6-9]. This prospective study was undertaken, to analyse the etiological factors responsible for partial seizures in the paediatric age group, and the role of CT scan in their identification.

Material and Methods

50 consecutive cases of partial seizures as defined by the International League Against Epilepsy (ILAE) who were admitted to our hospital during the period of this study were included. The upper limit of age was 10 years. This was in keeping with the service protocol for admission to paediatric ward. A detailed history including that of birth trauma, kernicterus, tuberculosis and a family history of seizures or tuberculosis was noted. Clinical examination included a thorough general examination to look for lymphadenopathy, neurocutaneous markers, vital parameters; a detailed neurological examination including fundus, and examinations of other relevant systems. Investigations consisted of complete blood count and ESR, Mantoux test, CSF studies, X-ray skull and chest and other investigations as deemed necessary. EEG was carried out in all cases with a time gap of at least 2 weeks after a seizure. A CT scan skull with and without contrast enhancement was done in all cases within a few days of admission. A follow up scan was done after 12

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weeks when a treatable cause was detected and managed specifically. Scans were performed on a Toshiba TCT 80-A scanner and urograffin was the contrast used.

Results

Of the total of 50 patients, 29 were males and 21 females. Patients were broadly divided as neonates (0-28 days) -3, infants (28 days - 1yr) -8, preschool (1-5 yrs) -19, and school children (5-10 yrs) -20. The maximum number of normal CT scans were seen in the age group 5-10 years and the maximum abnormal CT scan results were seen in the age group 1-5 years. Thirty three scans out of 50 were abnormal. Thus the incidence of positive results was 66%. Tuberculoma (Fig 1) was seen in 12 cases, cortical atrophy/porencephalic cyst (Fig 2) in 7, calcification (Fig 3) in 5, meningoencephalitis and vascular problem/haematoma (Fig 4) in 4 each and a subdural effusion in 1 (Table 1).

Fig 1: Tuberculoma

Fig 2: Porencephalic cyst

Fig 3: Calcified granuloma

The incidence of tuberculoma was highest among school age - whereas meningoencephalitis was the common cause for partial

TABLE 1

Comparison of CT results with age (n = 50)

Age Group	CT SCAN RESULTS							Total Abnormal
	Normal	Tuberculoma	Vascular	Calcification	Meningitis	Effusion	Atrophy	
Neonates	2(4%)	-	-	-	-	1(2%)	-	1(2%)
Infants	1(2%)	-	2(4%)	2(4%)	3(6%)	-	-	7(14%)
Preschool	6(12%)	4(8%)	2(4%)	1(2%)	1(2%)	-	5(10%)	13(26%)
School Age	8(16%)	8(16%)	-	2(4%)	-	-	2(4%)	12(24%)

TABLE 2

Correlation of CT scans with other investigations and clinical signs (n = 50)

CT Scan Observation	Number	Other investigations normal		Other investigation abnormal	
		No signs	With signs	No signs	With signs
Normal	17	6	1	8	2
Tuberculoma	12	7	1	3	1
Other abnormalities	21	3	2	4	12

Fig 4: Extradural haematoma

seizures in infancy. CT scan results were correlated with other modalities of investigations including EEG and clinical signs (Table 2). 10 cases (20%) with no clinical signs and all other investigations normal revealed a CT scan abnormality. The commonest being the ring enhancing lesion suggestive of a tuberculoma. Of the 12 cases of tuberculoma seven were diagnosed only on the basis of an abnormal CT scan, the most common abnormality being the ring enhancing lesion (Fig 1). The clinical features and investigations in patients with this lesion are listed in Table 3.

Discussion

This study was undertaken with a view to determine the role of CT scan in children with a partial seizure disorder. The yield of positive results was 66% which is in the range of 30-70% as quoted by various authors [6-9]. The positive results using various neurodiag-

TABLE 3

Clinicopathological associations with ring enhancing lesion (n = 50)

Features	%	
	Positive	Negative
Loss of consciousness	50	50
Cluster of fits	41.7	58.3
March of events	25	75
Postictal neuro deficit	16.6	83.4
Raised ESR	16.6	83.4
Mantoux test	16.6	83.4
X-ray skull	-	100
X-ray chest	-	100
CSF studies	-	100
EEG	50	50

nostic approaches including an EEG and other invasive procedure in the pre CT scan era were very low leaving a large group of "idiopathic epilepsy" patients.

In diagnostic terms, the CT scan was found to have two enormous advantages. Demonstration of normal structures with ability to diagnose atrophy and demonstration of space occupying lesions, their position and nature to a certain extent, specially solid and cystic masses, tumours, abscesses, haemorrhages and infarctions.

The incidence of tuberculomas was 24% (Fig 1) of total scans as determined by a ring enhancing lesion with a CT morphology as described by Bhargava *et al* [10]. Follow up scan for these patients was done after 12 weeks of treatment with ATT in all cases and a clearance or an improvement of the lesion noted. The incidence of tuberculoma among space occupying lesions as reviewed in literature had been 21.5-26% [7,11,12].

Facilities for special immunological tests

for neurocysticercosis are not always available and corroborative tests in our patient like X-ray thigh were negative. One patient having multiple ring enhancing lesions suggestive of neurocysticercosis was given a course of praziquantel. However, ATT was also given as tuberculosis could not be ruled out completely.

The ring enhancing lesion has also been described as a post-ictal manifestation which may disappear without treatment [13]. However inability to differentiate it with certainty from a potentially dangerous tuberculoma prompted us to give ATT in all our cases.

Porencephalic cyst (Fig 2) or cerebral atrophy was seen in 21% of abnormal scans and mostly in the preschool children who gave a history of meningitis or birth asphyxia. In a study conducted by Yang P *et al*, 17 out of 34 children with partial seizures had an abnormal CT, the commonest being atrophy [14]. Five cases had focal calcification (Fig 3) on CT of which two had a history of having been treated for tuberculosis and in one there were multiple calcification suggestive of healed granulomas. Four cases had a vascular problem of which two were intracranial bleeds due to haemorrhagic diseases of the newborn, one was a case of haemophilia with extradural haematoma (Fig 4) and one child had vasculitis. Sumi and Teasdall reported an incidence of 30% vascular pathology in partial seizures [15].

In 20% of patients with partial seizures no definite diagnosis was arrived at because of paucity of clinical features and normal investigations including an EEG. All these had an abnormal CT scan, the commonest lesion being a ring enhancing lesion suggestive of a tuberculoma and the patients were treated accordingly.

Though the MRI is more specific in detecting certain focal anomalies its expense and non-availability make CT scan an adequate

initial screening procedure. Thus every child with a partial seizure should be subjected to a CT scan to determine the underlying etiology and offer specific treatment.

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