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COMPUTED TOMOGRAPHIC EVALUATION OF EPILEPTIC CHILDREN WITH EMPHASIS ON INTRACRANIAL SPACE OCCUPYING LESIONS [ICSOL]

V. V. Bhaskar Rao¹, K. M. Naicker², K. Adi Reddy³, Solomon Saawan P⁴, Krishna Kumari Agarwal⁵

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ABSTRACT: Epilepsy is a common clinical problem encountered in pediatric practice. However, etiology of a large percentage of various epilepsy cases remains undiagnosed.¹ Especially generalized clonic tonic seizures. In such instance, CT scan would be helpful to establish or rule out ICSOL. Intracranial space occupying lesions associated with morphological changes in the brain or the cranial cavity, are important causes of symptomatic epilepsy.² A properly planned plain and contrast CT scan is essential pre requisite for examination of epileptic children suspected of having ICSOL, where demonstration of lesion with mass effect is detrimental for etiological diagnosis and anatomical diagnosis³. Accurate pathological diagnosis is not always possible⁴. Aim of the study is to analyze the age and sex incidence, clinical features and etiology of ICSOLs in epileptic children. The advantage of CT scan in making early and specific diagnosis of ICSOL in epileptic children especially granulomatous lesions was also studied. This study focusses on CT findings which are more easily available in peripheries where MRI facilities are not available, though MRI may be better or additive.

KEYWORDS: ICSOL, Epilepsy, Vijayabhaskar, Tuberculoma, Neurocysticercosis.

INTRODUCTION:

Study Method: The study includes children less than 12 years of age coming to Pediatric Outpatient and Inpatient Department, Govt. General Hospital, Kakinada from December 2014 to May 2015. This is a Prospective study. The study includes 28 children.

RESULTS:

- The incidence of ICSOL was maximum in the age group 5-8 years [14 cases, 38.8%] and slightly less amount 9-12 years [12 cases, 33.3%] and 2 cases [7.6%] in less than 5yrs age group. Maximum number of cases were found during 12th year [6 cases], followed by 7th yr. [5 cases] and 8th yr. [4 cases] and 11th yr. [4 cases]
- Male and female ratio is almost equal with only a slight preponderance in females 16 cases [55%] compared to males 12 cases [45%]. Sex distribution of ICSOL in epileptic children: 2 children below 5 yrs. of age were girls. 13 cases female and 11 cases male were found between 6-12 yrs. of age
- Out of 28 cases studied, 14 cases had headache, 10 patients had vomiting, 3 had fever, and 1 had strabismus.
- Out of 28 cases studied, 10 cases presented with convulsions, head ache and vomiting, 14 cases presented with headache and convulsions, 4 cases presented with seizures as the only clinical feature.

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- Out of 28 cases with ICSOL, 11 cases [40%] presented with simple partial seizures [SPS], 11 cases [40%] had complex partial seizures (CPS) and 6 cases [20%] had generalized tonic clonic seizures [GTCS].
- Out of 11 cases with simple partial seizures, 6 cases have parietal lobe lesions [55%], 2 cases are fronto parietal lesions [18%], 1 case temporal lobe lesion [9%], 1 case frontal lobe lesion [9%] and 1 case multiple sites were involved [9%]. Out of 11 cases with complex partial seizures [CPS] 4 cases had parietal lobe lesion [36.5%], 4 cases are frontal [36.5%], 2 cases are occipital [18%] and one case fronto parietal lobe lesion [9%]. Out of 6 patients who had GTCS, 4 patients had parietal lobe lesions [66.8%], 1 patient had diffuse cerebral atrophy [16.6%] and one patient had hydrocephalus [16.6%].
- All 28 patients with ICSOL with convulsions had supratentorial lesions. Out of 28 cases studied, majority of patients had tuberculoma 15 cases (53.6%), followed by neurocysticercosis 10 cases (35.7%) and A.V Malformation, Diffuse cerebral atrophy, Hydrocephalus were found in 1 patient (3.6%) each.

CONCLUSION: The incidence of ICSOL with epilepsy was high in 5 to 12 yrs. of age. There is no sex predilection. Ring enhancing lesion is commonest ICSOL in epileptic children.⁵ Granulomas most commonly presented as a convulsion. Granulomatous lesions are commonest in supra tentorial region. Parietal lobe commonly involved in supratentorial region.⁶

The most common lesion in all type of seizures involved parietal lobe. Parietal lobe commonly involved in GTCS. Tuberculoma is the commonest granuloma followed by neurocysticercoma⁷. There is no relation between nutritional status and tuberculoma lesions. Tuberculoma not associated with severe malnutrition.⁸ CT scan is important tool for diagnosis of granulomatous lesions.⁹

MATERIALS AND METHODS:

Source of Data: Children presenting with convulsions up to 12 yrs of age in Pediatrics Outpatient and Inpatient departments in Government General Hospital, Rangaraya Medical College, Kakinada from December 2014 to January 2015 were the source of cases for study.

SAMPLING METHOD:

Inclusion Criteria: The study includes children below 12 years of age with complaints of Convulsions, who showed evidence of ICSOL on CT scan.

Exclusion Criteria: Febrile seizures, Acute CNS insults and Neonatal seizures were excluded from the study.

Method of Collection of Data:

- A detailed history was taken with regard to the nature of the convulsions, time, post ictal events, and other associated features, response to anti-epileptics, family history, aggravating and precipitating factors. A meticulous clinical examination was done in every case. After arriving at a provisional diagnosis, these cases were investigated, later subjected to CT scan [plain and contrast] with proper precautions. The scans were evaluated for location of lesions, displacement of intracranial structures, and presence of ring shadows, hydrocephalus and surrounding edema.

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- For the diagnosis of tuberculoma, clinical data, nutritional and immunization status, history of contact with tuberculosis patients in the family, extra cranial evidence of tuberculosis infection, positive tuberculin or BCG test, radiological evidence of intra thoracic tuberculosis, microscopic examination of sputum and gastric aspirate, tuberculosis histology of the lymph nodes and CT characteristic of the lesion were taken into consideration.
- Small enhancing lesions on CT scan are a common finding among ICSOLs. Cysticercus granuloma and tuberculomas are the two common conditions to be considered in the diagnosis. Specific serological tests are not available in this institute for diagnosis of above conditions. So the diagnosis is mainly based on clinical and CT scan criteria based on the study conducted by Dr. V. Rajasekhar et al "Differentiating small cysticercus granulomas and tuberculomas in patients with epilepsy". According to Dr. V. Rajasekhar et al evidence of raised intra cranial tension and progressive focal neurological deficit are seen usually in patients with tuberculomas¹⁰. Tuberculomas are usually greater than 20mm in size and irregular in outline. Most of cysticercus granulomas are less than 20mm in size and regular in outline. Multiple lesions are usually associated with cysticercosis.¹¹

OBSERVATION AND RESULTS:

Age and Sex Distribution of ICSOLs in Epileptic Children:

- Age Distribution: Children less than 12 yrs. were studied. No cases were found below 2 years of age. The incidence of ICSOL below 5 yrs. is quite low comprising only 2 cases [7%]. After the age of 5 yrs. the incidence increased very much comprising 26 cases [93%]

The incidence of ICSOL was maximum in the age group 5-8 years [14 cases, 38.8%] and slightly less amount 9-12 years [12 cases, 33.3%].

Maximum number of cases were found during 12th year [6 cases], followed by 7th yr. [5 cases] and 8th yr. [4 cases] and 11th yr. [4 cases].

Sex Distribution: Male and female ratio is almost equal with only a slight preponderance in females 16 cases [55%] compared to males 12 cases [45%].

Sex Distribution of Icsol in Epileptic Children: 2 children below 5 yrs. of age were girls. 13 female cases and 11 male cases were found between 6-12 yrs. of age.

Clinical Features of ICSOL in Epileptic Children:

Symptoms: Out of 28 cases studied, 14 cases had headache, 10 patients had vomiting, 3 had fever, and 1 had strabismus.

10 cases presented with convulsions, head ache and vomiting.

14 cases presented with headache and convulsions.

4 cases presented with seizures as the only clinical feature.

Out of 28 cases with ICSOL, 11 cases [40%] presented with simple partial seizures [SPS], 11 cases [40%] had complex partial seizures and 6 cases [20%] had generalized tonic clonic seizures [GTCS].¹²

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Type of Convulsions vs. Site of ICSOL: Simpler partial seizures[SPS]: Out of 11 cases with simple partial seizures, 6 cases have parietal lobe lesions [55%], 2 cases are fronto parietal lesions [18%], 1 case temporal lobe lesion [9%], 1 case frontal lobe lesion [9%] and 1 case multiple sites were involved [9%].

Complex Partial Seizures [CPS]: Out of 11 cases, 4 cases had parietal lobe lesion [36.5%], 4 cases are frontal [36.5%], 2 cases are occipital [18%] and one case fronto parietal lobe lesion [9%].

Generalized Tonic Clonic Seizures [GTCS]: Out of 6 patients who had GTCS, 4 patients had parietal lobe lesions [66.8%], 1 patient had diffuse cerebral atrophy [16.6%] and one patient had hydrocephalus [16.6%].¹³

All 28 patients with ICSOL with Convulsions had Supratentorial Lesions:

Ring enhancing lesions (Single)	23
Ring enhancing lesions(Multiple)	2
Diffuse cerebral atrophy	1
Hydrocephalus	1
A.V. Malformation	1
Total	28

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Head Ache: Out of 28 cases, 14 cases had headache. All are supratentorial lesions¹⁴.

Vomiting: Vomiting was seen in 10 cases. All are supratentorial lesions.

Fever: Fever seen in 3 cases. All have granulomatous lesions in supratentorial region.

Strabismus: Observed in 1 patient with granulomatous lesions in supratentorial lesions with midline shift.

Signs of ICSOL: There were no positive neurological signs observed in the present study except 6th nerve palsy in one patient with supratentorial granulomatous lesion and early papilloedema¹⁵ in that same patient.

Etiology of ICSOL with Epilepsy: Out of 28 cases studied, majority of patients had tuberculoma 15 cases (53.6%), followed by neurocysticercosis 10 cases (35.7%) and A.V Malformation, Diffuse cerebral atrophy, Hydrocephalus were found in 1 patient (3.6%) each.

Tuberculoma: 15 patients out of 28 positive CT findings with epilepsy had tuberculoma. 11 cases were BCG positive, 2 cases were mantoux positive, 2 cases were associated with hilar lymphadenopathy, 4 cases showed history of contact with a TB patient and one case had history of irregular treatment for pulmonary tuberculosis. Of these cases, CSF xanthochromia was seen in 1 case and in the remaining cases, CSF was normal. 1 case had early papilloedema, 2 cases were associated with cranial nerve involvement and 7 cases were unimmunized¹⁶. 4 cases had Grade I PEM (Protein energy malnutrition) and calcified lesions were seen in 2 patients. Ventricular enlargement in 2 cases and midline shift in 6 cases was seen. High ESR was seen in 9 cases. All lesions were in supratentorial region.

Non-immunized vs. Tuberculoma: Out of 15 patients with Tuberculoma, 7 cases (46.6%) were Non-immunized.

PEM vs. Tuberculoma: Out of 15 cases of tuberculoma, 4 cases are associated with grade I PEM according to IAP (Indian Academy of Pediatrics) classification.

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Neurocysticercosis: 10 patients out of 28 cases of ICSOL had neurocysticercosis based on CT findings. 3 cases had signs of raised intracranial pressure¹⁷. Solitary lesions were observed in 8 cases (80%),¹⁸ multiple lesions in 2 cases (20%). Positive stool culture was obtained in 3 cases.

Diffuse cerebral atrophy: Seen in 1 case out of 28 cases with generalized clonic tonic seizures with blurring of vision.

A.V. Malformation: Seen in 1 case out of 28 cases with simple partial seizures with vomiting. Lesions found in right temporo parietal region.

Hydrocephalus: Patient presented with generalized tonic clonic convulsion without any abnormality of brain except hydrocephalus.¹⁹

Distribution of ICSOL in different Lobes of Brain in Epileptic Children:

Number of cases presented with abnormal CT lesions: 28

Number of cases presented with parietal lesions: 14

Number of cases presented with frontal lobe lesions: 5

Number of cases presented with fronto-parietal lesions: 3

Number of cases presented with occipital lobe lesions: 1

Number of cases presented with temporal lobe lesions: 1

Multiple or other sites were involved: 2

Parietal lobe Lesions: Out of 14 patients with parietal lobe lesions 6 cases (44%) had simple partial seizures 4 cases (28%) had complex partial seizures and 4 cases (28%) had generalized seizures.²⁰

Frontal lobe Lesions: Complex partial seizures were found in 4 cases (80%), Simple partial seizures in 1 case (20%).

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Fronto parietal Lesions: Simple partial seizures were found in 2 cases (80%), Complex partial seizures found in 1 case (20%).

Multiple Sites: Simple partial seizures were seen in 2 cases (100%)

Temporal Lobe: Simple partial seizures were found in 1 case (100%)

Occipital Lobe: Complex partial seizures found in 1 case (100%)

Lateralization of ICSOL: Out of 28 patients with ICSOL 15 case had right sided lesions and 13 cases had left sided lesions.

5 Yr. Child IP NO 132309 with GTCS Seizures

4 Yr. Mch Child IP NO 132556 with GTCS Seizures

11 Yr. Fch Child IP NO 132744 with Partial Seizures

Disc Enhancing lesion in Left High Parietal with peritumoral edema - Tuberculoma

Two Disc Enhancing lesion in Right periventricular region with minimal edema and mass effect granulomas - Tuberculomas

DISCUSSION: No case of ICSOL were detected below the age of 2 yrs. among epileptic children. Maximum number of cases were in the age group of 5-8 yrs. There is no definite sex predilection for ICSOL in epileptic children. In the present study all cases of convulsion with abnormal CT findings had supratentorial lesions. So convulsions as presenting symptom is more common with supra tentorial lesions. Epilepsy is the most common clinical presentation of Tuberculoma and Neurocysticercosis. Lesions involving parietal lobe usually presenting with simple partial seizures.

Majority of ICSOLs in the present study are granulomatous lesions in etiology. An interesting feature in the present study is the presence of Ring enhancing lesions in epileptic children which are either Tuberculoma or neurocysticercomas²¹. Such lesions are a common CT findings in cases of seizure disorder in Indian subcontinent.²²

These lesions are usually slow growing and act as space occupying lesions and leave an epileptogenic scar on healing.²³

CONCLUSION: The incidence of ICSOL with epilepsy was high in 5 to 12 yrs. of age. There is no sex predilection. Ring enhancing lesion is commonest ICSOL in epileptic children. Granulomas most commonly presented as a convulsion. Granulomatous lesions are commonest in supra tentorial region. Parietal lobe commonly involved in supratentorial region. The most common lesion in all type of seizures involved parietal lobe. Parietal lobe commonly involved in GTCS. Tuberculoma is the commonest granuloma followed by neurocysticercoma. There is no relation between nutritional status and Tuberculoma lesions. Tuberculoma not associated with severe malnutrition. CT scan is important tool for diagnosis of granulomatous lesions.

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AUTHORS:

1. V. V. Bhaskar Rao
2. K. M. Naicker
3. K. Adi Reddy
4. Solomon Saawan P.
5. Krishna Kumari Agarwal

PARTICULARS OF CONTRIBUTORS:

1. Assistant Professor, Department of Pediatrics, Rangaraya Medical College, Kakinada.
2. Assistant Professor, Department of Pediatrics, Rangaraya Medical College, Kakinada.
3. Junior Resident, Department of Pediatrics, Rangaraya Medical College, Kakinada.

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COMPETING INTERESTS: None

4. Junior Resident, Department of ENT, Rangaraya Medical College, Kakinada.
5. Junior Resident, Department of Pediatrics, Rangaraya Medical College, Kakinada.

NAME ADDRESS EMAIL ID OF THE CORRESPONDING AUTHOR:

Dr. K. Adi Reddy,
Junior Resident,
Department of Pediatrics,
Rangaraya Medical College,
Kakinada.
E-mail: adi9949844121@gmail.com

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