



## Solitary Small Ring Enhancing Computerized Tomographic Lesions – A Clinical Study

### KEYWORDS

SSECTL, cysticercus , AEDs

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**ABSTRACT** *Single small enhancing CT (SSECTL) lesions typically are small (often < 20 mm), enhancing as a ring lesion or a disc and with varying amounts of surrounding edema. These lesions have been very commonly encountered in clinical practice. This study reveals that most of the cases of SSECTL are likely to be due to Neurocysticercosis. Most SSECTL present as focal seizures. Once the diagnosis of SSECTL and likely to be a solitary cysticercus lesion is made, the patient is given appropriate AED (anti-epileptic drug) therapy. Depending on the resolution pattern on repeat imaging performed at intervals not less than six months if patient remains asymptomatic, cysticidal therapy is instituted along with AEDs. Any deviation from the classical clinical or radiological patterns needs further evaluation and other etiologies described for the SSECTL will need to be ruled out, including that of tuberculosis. Largely these lesions resolve and the clinical condition remains benign and in most patients AEDs can be withdrawn in two to three years period.*

### INTRODUCTION

Single small enhancing computed tomography lesions (SSECTL) have been very commonly encountered in clinical practice, ever since they were discovered in the late 1970s following the advent of computed tomography (CT) of the brain. These lesions typically are small (often <20 mm) enhancing as a ring lesion or a disc and with varying amounts of surrounding edema. Usually there is neither any significant midline shift nor enhancing exudates. Very often a concentric dot representing the scolex is visible. The core is hypodense and represents a cystic fluid. Although initially thought to be tubercular in etiology, their spontaneous resolution without antitubercular treatment raised questions regarding their true identity. Therefore, although not necessarily most SSECTL turn out to be neurocysticercus in nature.

The prevalence rates of epilepsy are 2 to 25 times higher than the average prevalence of 6 per 1,000 in developed countries. Epidemiological studies in India have revealed the prevalence rate between 2.2 and 9 per 1,000. The higher incidence of epilepsies in Tropical countries including India, is contributed in part by the high prevalence of infectious diseases, among which Tuberculosis and Neurocysticercosis are the common causes for recurrent seizure disorders.

With florid manifestations, differentiation between Tuberculomas and Neurocysticercosis may not be that difficult, when compared to a situation where a seizure disorder is alone a manifestation, where all conventional investigations being normal and CT producing often solitary, small enhancing lesion. To differentiate, whether this SSECTL is due to Neurocysticercosis or due to Tuberculoma, it was very difficult until the work of Dr.V.Rajasekhar et al, who after doing biopsies of these lesions could formulate certain guidelines to differentiate the two.

In our area, we are coming across many such SSECTL during the work up of seizure disorders, with an ambiguity of whether to manage such patients with cysticidal therapy or with antituberculous therapy, with or without steroids.

With the guidelines given by V.Rajasekhar et al, cases with SSECTL were managed without resorting to biopsy. To see whether therapy is successful or not, repeat CT scans were taken after 12 weeks.

With this background, this study is undertaken to study the magnitude of the problem and to evaluate the usefulness of V.Rajasekhar criteria and to formulate certain guidelines for management of such cases in our area.

### MATERIALS AND METHODS

A total of 50 patients were studied with solitary small ring enhancing CT lesion in the Department of General Medicine at Govt. General Hospital, Kurnool during the period of 2yrs, from March 2013- February 2015 Patients coming from various places, in and around Kurnool were studied.

All patients coming with seizure disorder, either partial or generalized, were evaluated with all necessary investigations, including CT Scan brain and skull. Those patients with solitary small ring enhancing CT lesions were included under study.

All the patients who were selected for the study group were examined in detail and investigated as needed. Details of all the patients were recorded in the proforma given at the end of this section.

When SSECTL was diagnosed, criteria<sup>(1,2)</sup> given by Dr.V.Rajasekhar et al, was utilized to make a CT diagnosis of either Tuberculoma or Cysticercus granuloma or otherwise.

The CT criteria used<sup>(1)</sup>:

1. The lesion should be solitary.
2. The lesion should enhance after contrast injection.
3. The lesion should measure <20 mm in maximum dimension.
4. Edema may or may not be present around the lesion and should not cause midline shift.

All the patients who were diagnosed as Tuberculomas are managed with Antituberculous therapy and those with Cysticercus granuloma were managed with cysticidal<sup>(3,4)</sup> drug therapy along with supportive therapy.

All patients were followed regularly with weekly once reviews and repeat CT scan for those who can afford was taken after a period of 3 months after the initiation of therapy. Those people who were showing resolution were considered as responding to the therapy that is given.

**RESULTS**

A total of 50 patients were studied. Among which, 29 were males and 21 were females accounting for 58% and 42% cases respectively.

When cases are considered in relation to various age groups, it is seen that only 12 cases were seen in age group of <12 yrs. This is probably because the study is mostly oriented towards the adult population. Hence these figures are not truly representative. In the remaining 38 patients, i.e., in the age group of >12 yrs, it is seen that 32 out of 38 cases were between 12-40 yrs, age group. This results are statistically significant.

**TABLE: 1 – SHOWING CASE IN RELATION TO PRESENTING COMPLAINTS**

S.No	Presenting Complaints	Number of Patients	%
1	Partial Seizures Motor	3	6%
2	Partial Seizures Sensory	3	6%
3	Partial Seizures with SGS	44	88%
<b>TOTAL</b>		<b>50</b>	<b>100%</b>

Table 1 showing presenting complaints, reveals that 6 patients have presented with simple partial seizures accounting for 12%, where as all the remaining 44 patients have presented with partial seizures becoming secondarily generalized, accounting for 88%. these values are statistically significant. Out of the 6 cases who presented with simple partial seizures three was with motor phenomenon and the other with sensory phenomenon accounting for 6% each.

**TABLE:2 – SHOWING CASES IN RELATION TO PORK EATING**

Sl.No	Pork Eating	Number of patients	%
1	Present	3	6%
2	Absent	47	94%
<b>Total</b>		<b>50</b>	<b>100%</b>

The table 2 reveals that pork eating habit is present only in three out of 50 patients (6%), when compared to absent pork eating habit in 47 out of 16 patients (i.e.94%).

**TABLE:3– SHOWING CASES IN RELATION TO LOCATION OF RING ENHANCING LESION ON CT**

Sl.No	Location of Ring enhancing lesion on CT	Number of patients	%
1	Parietal	31	62%
2	Frontal	16	32%
3	Occipital	3	6%
4	Temporal	0	0
<b>Total</b>		<b>50</b>	<b>100%</b>

Table 3 reveals that 47 out of 50 cases (94%), the ring enhancing lesion is present in parieto-frontal lobes whereas only 3 out of 50 cases (6%) is located in occipital lobe.

**TABLE:4– SHOWING CASES IN RELATION TO CT DIAGNOSIS BASED ON V.RAJASEKHAR ET AL CRITERIA**

Sl.No	CT diagnosis	Number of patients	%
1	Cysticercus granuloma	47	94%
2	Tuberculoma	3	6%
<b>Total</b>		<b>50</b>	<b>100%</b>

Based on the table 4 , it is seen that 47 out of 50 cases, accounting for 94%, were cysticercus granulomas as compared to 3 out of 50 cases, i.e., 6% is Tuberculoma.

**TABLE:5 – SHOWING CASES IN RELATION TO RESOLUTION OF SSECTL WITH CYSTICIDAL THERAPY ON REPEAT SCAN**

Sl.No	CT scan finding	Number of cases	%
1	Disappearance of Ring enhancing lesion	22	88%
2	Conversion into disc Lesion	3	12%
<b>Total</b>		<b>25</b>	<b>100%</b>

Table 5 is showing cases in relation to resolution of ring enhancing lesion after Cysticidal therapy reveals that 22 out of 25 cases have responded completely in the form of total disappearance of lesion on repeat scan, accounting for 88%. the remaining three showed conversion of ring enhancing lesion to disc lesion, accounting for 12%, which is also considered a response to Cysticidal therapy. Thus response of SSECTL to Cysticidal therapy alone is 100%.

**TABLE:6 – SHOWING CASES IN RELATION TO SEIZURE CONTROL WITH PHENYTOIN Vs CARBAMAZEPINE**

Sl.No	Type of AED	Total No.of patients	Patients with Seizure control	% of Seizure Control
1	Phenytoin	20	20	100%
2	Carbamazepine	30	30	100%
<b>Total</b>		<b>50</b>	<b>50</b>	<b>100%</b>

This table reveals that 20 patients treated with Phenytoin and 30 patients treated with Carbamazepine were totally seizure free upto the end of the study period, giving seizure control rates of 100% with any of these drugs.

**DISCUSSION**

Once the diagnosis of SSECTL and likely to be a solitary cysticercus lesion is made, the patient is given appropriate AED therapy. CT is repeated at 6 months' interval or earlier if there are unexplained recurrences of seizures, headaches, or other features. The extent of resolution is gauged in the repeat CT. If the resolution is at least 50% and above, no further change in treatment is done and AED therapy is continued. CT is repeated at the end of 6 months. If the lesion if resolved or continues to show more than 50% resolution from previous scan, no further therapy is added and AED is continued. The next CT can be performed at the end of 1 year. The AED therapy can be tapered at the end of 2 or 2.5 years period of seizure-free interval and stopped. In majority of cases, the lesion fully resolves or leaves a calcified spot.

V.Rajasekhar et al<sup>(5)</sup> did a retrospective study of 31 patients with SSCTEL. Among which, 28 are in parietal lobe and 3 in the frontal lobe.

Del Brutto et al<sup>(6)</sup> analysed 203 patients with epilepsy

due to Neurocysticercosis. 121 patients (60%) had tonic-clonic generalized partial seizures. 70 out of the 78 patients with simple partial seizures had motor symptoms, 5 had somato-sensory symptoms and the remaining 3 patients had elementary visual manifestations.

In a study of Sotelo et al<sup>(7)</sup>, 153 patients with a single intracranial calcification due to Neurocysticercosis and partial seizures were observed and analysed. Sixty patients (39%) had a frontal lobe lesion. 38 (29%) had parietal lobe lesion, 26 (17%) had a temporal lobe lesion and 29 (19%) had occipital lobe lesions.

If at the end of 6 months, the repeat CT does not show resolution or is less than <50%, it is termed as "persistent lesion". A course of albendazole is given in such cases (15 mg/kg/day for 1 month in divided doses; gradually increase the dose over 1 week). A short course of steroids<sup>(8)</sup> is recommended with albendazole or primed before initiating albendazole to prevent headaches or seizures, which can happen on account of increased inflammation due to the dying cyst. The further follow-up will remain similar as described above.

Any deviation from the classical clinical or radiological patterns needs further evaluation and other etiologies described for the SSECTL will need to be ruled out, including that of tuberculosis. At each review, patients should be assessed carefully for new symptoms and signs, especially for raised intracranial pressure or focal neurological deficits or systemic features such as fever, cough, or anorexia. Presence of any of these mandates a repeat fresh evaluation for other etiologies of these lesions. Surgical therapy is rarely required for these patients. Current indications include an enlarging lesion or a persistent lesion with difficult to control seizures.

Del Brutto et al<sup>(6)</sup> studied 203 patients with epilepsy due to Neurocysticercosis. 50 patients were lost to follow up. Among the remaining 153 patients, 122 had ring enhancing lesions and 31 had calcifications. Anticonvulsants were

started in all patients at the first visit. The 31 patients with calcifications remained free of seizures. 95 of 122 patients with cysts were also treated with Cysticidal drugs. Of these, 79 (83%) had control of seizures. In contrast, only 7 (26%) of 27 patients who did not receive Cysticidal drugs had control of seizures, indicating a strong correlation between the use of Cysticidal drugs and control of seizures.

## CONCLUSION

This study reveals that most of the cases of SSECTL are likely to be due to *Cysticercus granuloma* in our area and response to cysticidal therapy along with steroids is excellent. Carbamazepine and Phenytoin are equally effective. Number of cases in the study group is limited and there are no control groups. Hence the values obtained may not be truly representative. In a typical case of SSECTL which is an SCCG (solitary cerebral cysticercus granuloma), spontaneous resolution of the lesion is the rule, but the rate of resolution is highly variable in individual patients. The seizure outcome is good with >90% of patients remaining seizure-free even after discontinuation of AEDs. A more recent study showed a combination of albendazole with praziquantel to be statistically comparable to albendazole alone in resolution of the lesions<sup>(9)</sup>.

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