Original Article

Clinical spectrum of small ring enhancing lesions on computerised tomography in Jammu region

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Abstract

Background: Single small enhancing computed tomography lesions may occur in several infections and neoplastic diseases of the central nervous system and are most common radiological abnormality seen in patients with focal seizures in India and many other developing countries. Similar CT documented lesions have also been reported in the developed world where these lesions are often considered to be caused by neoplasm or tuberculoma. Histopathological studies in India revealed that neurocysticercosis (NCC) is the most likely cause of these lesions provided they fulfil a rigid set of clinical and radiological criteria. **Aims and objectives:** To study the clinical and radiological spectrum of small ring enhancing CT lesions in Jammu region. **Materials and methods:** in the present study total 100 cases of multiple or single small enhancing CT lesions with no neurologic deficit on clinical examination were selected. A detailed sociodemographic and seizure history was elicited and a complete physical and neurologic examination was performed in all patients and recorded on a prestructured proforma. A complete clinical assessment was done. Haemogram, Erythrocyte sedimentation rate (ESR), Mantoux test, Chest radiography and Cysticercus serology (using ELISA) were done in all cases. The follow up contrast enhanced CT head scan was obtained. All CT scans were assessed by a Radiologist. The site and size of the lesion and the presence of edema were recorded. The collected data was entered in Microsoft excel and was presented by using appropriate table and graphs. **Results:** It was observed that majority of the patients in the study were young and were in the age group of 21 to 50 years. In our present study there were 58 males and 42 females. The most common presenting symptom reported by patients with small ring enhancing CT lesions was focal seizures (50%) followed by generalized seizures (35%). In the present study the CT scan findings revealed scolex in only 17 patients, perilesional edema in 87 patients, hydrocephalus in 6 patients, coalescing lesions in 5 patients, non-coalescing lesions in 95 patients, solitary lesions in 56 patients, multiple lesions were seen in 44 patients. On CT scan thin wall was seen in 82 patients, thick wall in 13 patients, irregular wall seen in 5 patients and calcification was seen in 2 patients. Most commonly the lesions were located in the parietal lobe (23%) followed by occipital lobe (13%), temporal Lobe (12%), parietotemporal lobe (12%). The NCC was the most common lesion among these small ring enhancing CT lesions and was seen in 80 patients out of 100 patients studied. **Conclusion:** On the basis of above results and discussion we conclude that majority of the small ring enhancing lesion were neurocystecercosis. Focal seizure in younger age was the most common presentation. Thin walled Solitary lesion with Peilesional edema in the partial region was the most common CT finding.

Key Words: Small ring enhancing lesion, focal seizures, Peilesional edema.

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Single small enhancing computed tomography lesions (SSECTL) may occur in several infections and neoplastic diseases of the central nervous system and are most common radiological abnormality seen in patients with focal seizures in India and many other developing countries. Similar CT documented lesions have also been reported in the developed world where these lesions are often considered to be caused by neoplasm or tuberculoma. Histopathological studies in India revealed that neurocysticerocsis (NCC) is the most likely cause of

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these lesions provided they fulfill a rigid set of clinical and radiological criteria[1]. When Neurocysticercosis involves the brain, a variety of symptoms may be manifested. The common symptoms are: seizures (focal or generalized); headache, nausea, vomiting, lethargy, focal neurological deficits (hemiparesis, visual field defects and dementia)[2,3,4]. Since SSECTL is a clinic-radiological entity, the diagnostic dilemma begins when either on asymptomatic or symptomatic patient (usually with focal seizures) shows caharacteristic small (<20mm) lesion on CT which enhances with contrast. The characteristic lesion on plain CT of neurocysticercosis is a small high attenuation lesion surrounded by perilesional edema[5] At times, it may show only low attenuation lesion depicting focal edema. The lesion enhances with contrast as a ring, disc, or target lesion. The shape may be ovoid, doughnut like or bi-labed in some cases. There is no specific site of predilection however most of these lesions are situated a gray-white matter junction[6] These lesions are as a rule smooth and regular in outline. In a study of biopsy proven lesion, Chandy and Rajshekhar V *et al*[7] reported that amongst 31 consecutive cases of ring enhancing lesions (25 of them were cysticerci, and 6 tuberculomas), all cysticercus granulomas were less than 20mm in size. In comparison, all tuberculomas were greater than 20mm in size. Moreover 96% of cysticerci had a regular outline with no mass effect or midline shift, contrasting 5 out of 6 tuberculomas which were irregular in outline and 4 of 6 had evidence of midline shift on CT. presence of calcification and perifocal edema was seen in both and were not a differentiating feature. Thus the present study was undertaken to study the clinical and radiological features of small ring enhancing lesions diagnosed in Jammu region.

MATERIALS AND METHODS

The present study was conducted in the Department of Neurosurgery and Department of Radiology and Imaging, Govt. Medical College Jammu. For the purpose of study total 100 cases of multiple or single small enhancing CT lesions with no neurologic deficit on clinical examination were selected. Approval from the institutional ethical committee and informed written consent from all patients included in the study was duly obtained. A detailed sociodemographic and seizure history was elicited and a complete physical and neurologic examination was performed in all patients and recorded on a prestructured proforma. The socioeconomic status of the family was calculated according to a modified Kuppuswamy scale[8] A complete clinical assessment was done. Hemogram, Erthrocyte sedimentation rate (ESR), Mantoux test, Chest radiography and Cysticercus serology (using ELISA) were done in all cases. The follow up contrast enhanced CT head scan was obtained. All CT scans were assessed by a Radiologist. The site and size of the lesion and the presence of edema were recorded. The collected data was entered in Microsoft excel and was presented by using appropriate table and graphs.

RESULTS

Table 1: Distribution according to Sociodemographic variable

Sociodemographic variable		No. of Patients (n=100)
Age group	< 10	15
	11-20	27
	21-30	15
	31-40	13
	41-50	21
	51-60	7
	61-70	2
Sex	Male	58
	Female	42
Socioeconomic Status	Lower Middle Class	59
	Middle Class	35
	Upper Class	6

It was ob served that majority of the patients in the study were young and were in the age group of 21 to 50 years. In our present study there were 58 males and 42 females. 59 patients were belonging to lower middle class, 35 patients to Middle class whereas only 6 patients were from rich class.

Table 2: Distribution according to presenting symptom and CT scan characteristics

	Variable	No. of Patients
Symptoms	Generalized seizures	35
	Focal seizures	50
	Headache and Vomiting	5
	Other (weakness, visual and behaviour problems, incontinence, fever etc.)	10
CT characteristics	Scolex Visualisation	17
	Perilesions Edema	87
	Thick Wall thickness	13
	Thin Wall thickness	82
	Irregular wall	5
	Solitary	56
	Multiple	44
	Calcification	2
Location	Parietal Area	23
	Parietoccipital	10
	Parietotemporal	12
	Frontoparietal Area	11
	Occipital Area	13
	Temporal Area	12
	Frontal Area	11
	Basal ganglia	2
	Both Hemispheres	6

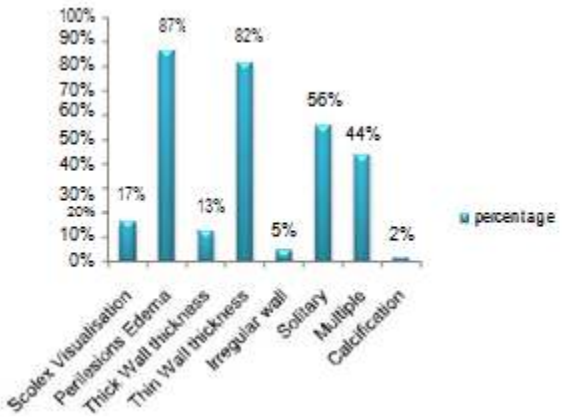

Figure 1: CT characteristics of lesions

The most common presenting symptoms reported by patients with small ring enhancing CT lesions was focal seizures (50%) followed by generalized seizures (35%). Other symptoms noted in these patients were headache and vomiting (5%) other i.e. weakness, visual and behaviour problems, incontinence, fever (10%). In the present study the CT scan findings revealed scolex in only 17 patients, perilesional edema in 87 patients, hydrocephalus in 6 patients, coalescin g lesions in 5 patients, non-coalescing lesions in 95 patients, solitary lesions in 56 patients, multiple lesions were seen in 44 patients. On CT scan thin wall was seen in 82 patients, thick wall in 13 patients, irregular wall seen in 5 patients and calcification was seen in 2 patients. It was observed that most of these small ring enhancing lesions were located in the parietal lobe (23%) followed by occipital lobe (13%), temporal Lobe (12%), parietotemporal lobe (12%). Other areas occupied by these ring enhancing lesions in decreasing order of frequency w ere frontal lobe (11%), parictoccipital Lobe (10%), both hemispheres (6%) and basal ganglia (2%).

Table 3: Distribution of small ring enhancing lesions

Lesion	No. of Patients	Percentage
Neurocysticercosis	80	80.00
Tuberculoma	10	10.00
Pyogenic Abscess	4	4.00
Glioma	5	5.00
AV Malformation	1	1.00

It was observed that that the NCC was the most common lesion among these small ring enhancing CT lesions and was seen in 80 patients out of 100 patients studied. Tuberculoma was the next most common presentation of these small ring enhancing lesions and was seen in 10 patients on CT scans. Other lesions found in decreasing frequency were Gliomas (5%), Pyogenic abscess (4%) and AV malformation (1%).

DISCUSSION

The present study was conducted in the Neurosurgery and neurology Department of GMC Jammu with the objective to study the clinical spectrum of small ring enhancing lesion on Computerized Tomography. It was observed that majority of the patients in the study were young and were in the age group of 21 to 50 years. Thus we can state that the lesions are common in young individuals. Similar findings were also reported by Rudresh K *et al*[9] and Wadia *et al*[10]. In present study the number of males was more than females which were comparable to figures reported by Jena A *et al*[11], Mukherjee A *et al*[12] and Sanchetee PC *ET AL*[13]. Out of total 100 patients, 59 were belonging to lower middle class, 35 patients to Middle class whereas only 6 patients we e from rich class. It was observed that patients with small ring enhancing CT lesions were presented with various symptoms. Out of them focal seizures (50%) was the commonest symptom followed by generalized seizures (35%). Other symptoms noted in these patients were headache and vomiting (5%) other i.e. weakness, visual and behaviour problems, incontinence, fever (10%). In a study conducted by Sotelo J *et al* (1985) on 753 patients of SSECTL observed that epilepsy and headache were the commonest presenting symptoms. In a series by Ramirez- Lassepas *et al*[14] it was found that 45% presented with generalised seizures, 40% with focal, and 15% with complex partial seizures. Rudresh K *et al*[9] in their study observed that seizure was the most common presenting symptoms in the patents. Out of them 65% patients presented with a secondarily generalized seizure, 18% had a primary generalized seizure, 12% had a complex partial seizure, and 5% presented with a simple partial seizure. The CT scan findings were studied in all the study patients. Scolex was observed in only 17 patients, perilesional edema in 87 patients, hydrocephalus in 6 patients, coalescing lesions in 5 patients, non-coalescing lesions in 95 patients, solitary lesions in 56 patients, multiple lesions were seen in 44 patients. On CT scan thin wall was seen in 82 patients, thick wall in 13 patients, irregular wall seen in 5 patients and calcification was seen in 2 patients. Small ring enhancing lesion is a clinicoradiological entity. i.e. to confirm the diagnosis clinical and radiological findings are taken in to consideration. The characteristic lesion on a plain CT of neurocysticercosis is a small high attenuation lesion surrounded by peri-lesional oedema[15]. At times, it may show only low attenuation lesion depicting focal edema. The lesion enhances with contrast as a ring, disc, or target lesion. The shape may be ovoid, doughnut-like or bi-lobed in so e cases. There is no or minimal mass effect. There is no specific site of predilection; however, most of these lesions are situated at the gray-white matter junction [16]. In the present study it

was observed that most of these small ring enhancing lesions were located in the parietal lobe (23%) followed by occipital lobe (13%), temporal Lobe (12%), parietotemporal lobe (12%). Other areas occupied by these ring enhancing lesions in decreasing order of frequency were frontal lobe (11%), parietoccipital lobe (10%), both hemispheres (6%) and basal ganglia (2%). Rudresh K *et al*[9] in their study observed that parietal lobe was the commonest site (in 45.2% of the cases). Lesions in frontal lobe constituted 32.9% and occipital lobe lesions were seen in 15%. Temporal lobe lesions were the least forming 6.9% of cases. It was observed that NCC was the most common lesion among these small ring enhancing CT lesions and was seen in 80 patients out of 100 patients studied. Tuberculoma was the next most common presentation of these small ring enhancing lesions and was seen in 10 patients on CT scans. Other lesions found in decreasing frequency were Gliomas (5%), Pyogenic abscess (4%) and AV malformation (1%). Rudresh K *et al*[9]also observed NCC as the most common lesion in their study. These lesions are as a rule smooth and regular in outline. In a study of biopsy proven lesions, Chandy and Rajshekhar[7] reported that amongst 31 consecutive cases of ring enhancing lesions (25 of them were cysticerci, and 6 tuberculomas), all cysticercus granulomas were less than 20 mm in size. In comparison, all tuberculomas were greater than 20 mm in size. Moreover, 96% of cysticerci had a regular outline with no mass effect or midline shift, contrasting 5 out of 6 tuberculomas which were irregular in outline and 4 of 6 had evidence of midline shift on CT. Presence of calcification, and perifocal edema was seen in both, and was not a differentiating feature.

CONCLUSION

On the basis of above results and discussion we conclude that majority of the small ring enhancing lesion were neurocystecercosis. Focal seizure in younger age was the most common presentation. Thin walled Solitary lesion with Peilesional edema in the partial region was the most common CT finding.

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