

Tuberculoma Brain and its Early Radiological Presentation; Descriptive Analytical Study

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ABSTRACT

OBJECTIVE: To highlight the radiological presentation of tuberculoma brain in association with clinical features of the disease

METHODOLOGY: As Descriptive analytical nature of study, it was held in Radiology Department of Liaquat University Hospital Hyderabad from June 2018 to December 2018. The cases were referred from medicine and neurosurgery ward to the radiology department for MRI and CT scans. The fillings of questionnaire and co relation of its radiological findings with clinical aspect were examined by evaluating patients file and diagnosed on clinical suspicion, CSF findings, improvement on empirical treatment, diagnosis of exclusion and multi discipline discussion.

RESULTS: Total numbers of 20 patients were included, mostly younger age were affected with male preponderance. Mostly cases were presented with meningitis (80%), seizures (60%) and history of tuberculosis (60%). On CT and MRI brain scan, the most common findings were multiple lesions (95%) showed central hyper-intensity on T2 (55%) with meningeal enhancement (80%), fluid- attenuate inversion recovery (FLAIR) signals (35%) and hypo-intense core with hyper-intense rim (30%) reflecting the most of cases with early non caseating nature of tuberculoma. Ring like lesions (80%) and irregular shape (45%) with (25%) target like lesions were found and associated with edema (55%) and calcifications (10%).

CONCLUSION: The presentation of tuberculoma is no more a rare manifestation of infective CNS disease. Early identification on scans with characteristics of early non caseating granuloma can help in prompt diagnosis and treatment which in turn decreased the disabling nature of disease and its progression.

KEYWORDS: Tuberculoma, Radiology, Caseation.

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INTRODUCTION

Tuberculosis, being one of the oldest and deadliest diseases, is still the major health concern of developing countries especially Pakistan i.e. 267 cases per 100,000 populations, besides it also showed the stabilization of incidence with increase in successful treatment rate and decrement of mortality¹. Lungs are the most affected organ but other organs can be involved in up to one- third of cases and least of all is Central nervous System manifestation, which can present as meningitis, cerebritis and tuberculomas. Intracranial Tuberculoma is rare manifestation i.e. 1% with 15-33% present as a multiple lesions^{2,3}. Previously a single 10 year, retrospective study showed the total of 202 cases with tuberculoma associated with CNS tuberculosis as compared to two year prospective study, which included 93 patients with 28.6% had radiological characteristics of tuberculoma, showing the increment in manifestation of tuberculoma involving central

nervous system in Sub-continent region^{4,5}.

The presentation of Tuberculoma is usually depends upon nature, distribution, site, number and rate of its increasing size, in adults supratentorial location is common as compared to children where infratentorial is much more prevalent⁶⁻⁸. For the detection and assessment of lesion extension, neuro-imaging like conventional CT scan and MRI is the cornerstone with some definite limitation for the attainment of specificity and confidentiality in the diagnosis of tuberculoma^{9,10}. Due to higher negative predictive value of CT scan than MRI, MRI is considered to be better modality for anatomical delineation of tuberculoma, which shows irregular shape, ring-like shapes, open rings, lobular patterns, target like lesions, iso-intense or hypo-intense with a hyper-intense rim and fluid-attenuated inversion recovery (FLAIR) images^{7,11,12}. Tuberculosis with variable presentation like tuberculoma, which is the rare manifestation of disease is started to appear despite aggressive treatment plans and it holds the disastrous

consequences of disability or morbidity and mortality. The early identification of disease, being utterly important, with proper attainment of diagnosis without doing invasive procedures like biopsy, is needed to prevent fire from destroying the forest of young ones.

METHODOLOGY

As descriptive nature of study, the sample of patients included in the studies is usually referred from medicine and neurosurgery ward to the Radiological Department of Liaquat University Hospital Hyderabad for the computed tomography (CT) and magnetic resonance imaging (MRI) from the tenure of June 2018 to December 2018. The cases were gone through CT and MRI scans with and without contrast and radiological reports were created. The inclusion criteria of patients were those who have positive CSF findings, been on Anti Tuberculosis medication before and positive history of tuberculosis. Exclusion of other space occupying lesion etiologies, Patient with immune compromised states like acquired immune deficiency syndrome, toxoplasmosis, neurocysticercosis were the exclusion criteria of the patients. The fillings of questionnaire and co relation of findings with clinical aspect were done by asking and evaluating patients file. The diagnosis was purely made on the clinical suspicion, Cerebrospinal fluid findings, involvement of other systemic organs like lung, improvement on empirical treatment and diagnosis of exclusion. Multi disciplines approached were conducted and discussions with concerned department medical personals also considered in non typical cases.

RESULTS

Total number of 20 patients presented to radiological department from June 2018 to December 2018, the demographic presentation are shown (Table I)

The manifestation of male (60%) is more than female (40%) and mostly the young individuals less than 25 years of age were presented. There was no any presentation of age greater than 45 years and it usually shows the preponderance of tuberculoma is much more likely in young individuals.

Apart from demographic presentations, the Clinical presentations of cases are shown. (Table II)

The 60% patients had the history of Tuberculosis affecting other organs like lungs and gastrointestinal tract with first degree positive family history or previous history of tuberculosis and its incomplete treatment. On presentation and clinical examination, 80% patients had associated tuberculosis Meningitis, 60 % patient with seizures, which includes focal and partial type. The cases were associated with more than one presentation and mixed picture of signs and symptoms.

The radiological findings on CT scans and MRI with and without contrast are shown (Table III).

The characteristic features on CT and MRI scans with contrast, showed enhancement of lesions, even to those lesions which were not visible during non contrast phase, besides ring like lesions were the most prominent finding as compared to other lesion morphology. Due to low predictive value of CT scans, the findings of it are merged into the MRI scan findings. The presentation of multiple lesions was more often as compared to solitary ones, besides enhancement of meninges were also noted in larger prospective. The associated radiological pathologies on both modalities are shown (Table IV).

The associated finding of cerebral edema is found to be more prevalent as compared to cortical and sub cortical infarct, calcification and hydrocephalus.

TABLE I: DEMOGRAPHIC PRESENTATION

Gender		Age		
Male	Female	<25	25-35	>35
12	8	16	2	2

TABLE II: CLINICAL PRESENTATION

History of TB		TBM*		Seizures	
Yes	No	16	No	Yes	No
12	8	16	4	12	8

*TBM: Tuberculosis meningitis

TABLE III: RADIOLOGICAL CHARACTERISTICS

Findings	Frequency	Percentage
Solitary lesions	02	10%
Multiple lesions	18	90%
Non Contrast visibility of lesions	17	85%
Enhancement of lesions with contrast	20	100%
Irregular Shape of lesions	09	45%
Ring like lesions	16	80%
Lobular pattern of lesion	03	15%
Target like lesion	05	25%
Meningeal Enhancement	16	80%
Mass effect/ midline shift	03	15%
Hypo-intense core with hyper-intense rim on T2	06	30%
Central hyper-intensity on T2 weighted	11	55%
FLAIR* Signals	07	35%

*FLAIR: Fluid - attenuated inversion recovery

**TABLE IV:
ASSOCIATED RADIOLOGICAL FINDINGS**

Findings	Frequency	Percentage
Hydrocephalus	05	25%
Calcifications	02	10%
Edema	11	55%
Cortical and Sub cortical infarct	02	10%

DISCUSSION

In developing nations, where tuberculosis is still an endemic, there resides considerable morbidity and mortality of 27 per 100,000 cases and it is creating the hike of economical expenditure on disease burden, it also started to change its manifestation by involving other organs .i.e. Central Nervous System (CNS) with or without primary organ involvement, which seems to be considered a least presentation^{1,3}. The association of HIV/ AIDS is currently responsible for rising prevalence of tuberculosis worldwide but in Pakistan this factor seems to be a negligible entity besides tuberculosis is the most common infectious cause of CNS space-occupying lesion¹³⁻¹⁷. As concordance with previous studies, the presentation of tuberculoma is increased many folds, if it has been seen in relation to time duration, Wasay M et al⁵ highlighted 202 cases in 10 years and Synmon B et al⁴ included 28.6% out of 93 included patients in two years, in contrast to this study which reported 20 cases in six months. Younger age patients mostly male preponderance are highly susceptible to tuberculoma and it mostly associated with meningitis (80%), seizures (60%) and history of tuberculosis (60%) which includes primary organ involvement .i.e. lungs with history of affected family member or already treated for tuberculosis before^{3,5,6,18}.

Early recognition of tuberculoma can lead to prompt treatment with better prognosis. Imaging modality like CT and MRI scan revolutionized the diagnostic compatibility and exclusion of invasive procedures. As the evolving nature of granuloma showed as low intensity lesions with or without central hyper-intensity on T2 and hypo to iso-intense on T1 weighted images, besides one study showed iso-intense or hypo-intense core with hyper-intense rim on T2 and fluid-attenuated inversion recovery (FLAIR) images as a common presentation but in this study with the most presentation of multiple lesions associated with non-contrast visibility which was ultimately enhanced by the contrast, showed central hyper-intensity on T2 (55%) with meningeal enhancement (80%), FLAIR signals (35%) and hypo-intense core with

hyper-intense rim (30%) reflecting the most of cases with early non caseating nature of tuberculoma^{7,12,16,19}. As an enhancement may show different types of shape but in this study the most common is ring like lesions (80%) and irregular shape (45%) with (25%) target like lesions were shown^{3,7}.

In regard to the associated radiological pathologies of tuberculoma, previous studies showed hydrocephalus, infarcts and edema which is concordance in this study which is the validation of pure presentation of these factors, especially edema (55%) and calcifications (10%), which is considered a rare phenomenon of tuberculoma^{4,5,20}. As this study included the cases which seem to be tuberculoma and diagnosed on the basis of high suspicion, empirical treatment, evaluation of patient with detailed examinations, CSF findings, diagnosis of exclusion and multi discipline discussions for non typical cases but this only represents the cases that were referred for advance investigations. The definitive diagnosis usually confirmed by biopsy, which was not conducted in this study because of unwilling of patient attends, young individuals and post biopsy complications. More specific trials with proper infrastructure of variables for attainment of proper diagnosis of tuberculoma without doing invasive procedure are highly recommended. On the other hand this study doesn't justify the nature and phase of tuberculoma because it lacks biopsy procedures which can significantly correlate with its defined radiological appearances, as this study is highlighting the correlation of factors .i.e. clinical, radiological and improvement of patients on treatment regimen.

CONCLUSION

The presentation of tuberculoma is no more a rare manifestation of infective CNS disease. It mostly affects young individuals with male preponderance. Early identification with contrast visibility, hyper-intensity on T2 with meningeal enhancement and hypo-intense core with hyper intense rim mostly indicates the early non caseating nature of tuberculoma that can lead to much disastrous effects, if not treated promptly. Early halt in the process of the infection can prevent the disable nature and progression of disease.

RECOMMENDATIONS

More specific trials with proper infrastructure of variables for attainment of proper diagnosis of tuberculoma without doing invasive procedure are highly recommended. Creation of diagnostics criteria should be compared with current protocol guidelines to assess the sensitivity and specificity of innovative procedure.

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