FREQUENCY OF COMMON CT SCAN FINDINGS IN ADULTS WITH TUBERCULOUS MENINGITIS

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ABSTRACT

Objective: To determine the frequency of Common CT Brian Scan findings in adults with Tuberculous Meningitis presenting in Tertiary Care Hospital.

Materials and Methods: It was a cross-sectional study carried out at Hayatabad medical complex, Peshawar Pakistan from November 2018 to May 2019 and comprised patients who suffered tuberculous meningitis between the age of 18 to 70 years.

Results: The study participants had a mean age of 35.5 ± 8.9 years. Of the 255 patients included in the study, there were 68.6% male patients and 31.4% female patients. The mean duration of symptoms was 2.4 ± 0.9 weeks. On CT, meningeal enhancement was observed in 25.1%, hydrocephalus in 34.1% and tuberculoma in 18.4%.

Conclusion: Hydrocephalus is the most common CT abnormality found in patients with TBM, followed by meningeal enhancement and tuberculomas. They strongly affect the treatment outcome and morbidity in patients with TBM. We recommend more studies particularly clinical trials to identify the risk factors and early treatment outcomes of these CT scan abnormalities before future recommendations may be developed.

Key Words: Tuberculosis, tuberculous meningitis, meningeal enhancement, hydrocephalus, tuberculoma, computed tomography.

INTRODUCTION

Tuberculosis (TB) caused by Mycobacterium tuberculosis (MTB) results in significant morbidity and mortality globally. One of the incapacitating complications of TB is tuberculous meningitis (TBM), accounting for over 0.1 million new cases annually[1]. Tuberculous meningitis remains a serious health threat in both developed and developing countries. Tuberculous meningitis has the highest mortality and morbidity rate compared to other forms of TB[2].

Tuberculous meningitis is the result of spillover of infected material from tuberculoma into the subarachnoid space. Basal meninges are predominantly affected leading to hydrocephalus, cranial nerve palsies, and ischemic brain injury. Pulmonary TB is the usual site of primary infection. Owing to the non-specific nature of initial symptoms (fever, headache, vomiting), the diagnosis of TBM is often delayed.[3] The importance of early diagnosis of TBM and exceptional response to well-timed treatment cannot be overemphasized. Diagnosis of TBM relies on combination of clinical features, suggestive cerebrospinal fluid (CSF) findings, typical radiological abnormalities, and microbiological evidence of MTB infection of CSF. Moreover, a response to antituberculous therapy may also imply a diagnosis of TBM.[4]

Findings on computed tomography (CT) in cases of TBM may range from a completely normal CT to enhancement of meninges with contrast, tuberculomas, and hydrocephalus, either alone or in combination. Computed tomography (CT) of brain has been indispensable in identifying complications of TBM.[5]

Yaşar et al. (2012) in a study reported the frequency of Hydrocephalus to be 21 % among Turkish adults with Tuberculosis meningitis[6]. Amir et al. (2012) in a recent study reported the frequency of Hydrocephalus to be 27.9% among Pakistanis children[7].

In the light of this evidence, tuberculous meningitis appears to be a frequent neurology complications in adults and thus there is need for routine diagnosis of adults to be suffering from tuberculous meningitis based on WHO guidelines and by radiological confirmation in such adults on presentation and during treatment to timely identify and treat this neurology complication so that the anticipated neurology disease can be avoided with its associated morbidity as mentioned above. However, at the moment the evidence is limited to a single international study, and to the best of our understanding, there is no other international or local published material on this topic. Therefore, this study aims to determine the frequency of Common CT Scan findings in Pakistani adults presenting with Tuberculosis meningitis at a tertiary care hospital in Khyber Pakhtunkhwa. The results of the present study will give an insight into the

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magnitude of problem and will provide local baseline statistical data for further research in this regard.

MATERIALS AND METHODS

This was a cross-sectional study performed at Hayatabad medical complex, Peshawar Pakistan from November 2018 to May 2019 and comprised patients who suffered tuberculous meningitis. Sample size of 255 was calculated for the study (considering 95% confidence level, 5% margin of error and frequency of hydrocephalus as 21% among patients with TBM).[6] Consecutive sampling technique was employed in this study. The study was carried out following approval from institutional ethical committee. Both male and female aged 18 to 70 years presenting with Tuberculosis meningitis were included. Only newly diagnosed cases with in previous 6 months were included. Adults having other diseases with Tuberculous meningitis e.g. pyogenic meningitis, encephalitis, brain abscess, subdural hematoma were excluded. After taking informed written consent, a thorough history was taken from patient/attendant. Base line investigations along with CSF examination and CT scan was performed. All the patients will have tuberculous meningitis profile and was labelled as per operational definition. To curtail bias, all the labs were carried out at hospital laboratory. Exclusion criteria was used to control confounding factors. Patient's demographic details like age, gender and duration of disease along with presence or absence of tuberculous meningitis was recorded into the attached proforma by the candidate. All the collected data were analyzed in SPSS version 20. Descriptive statistics were performed for study variables. Mean ± SD were calculated for age and duration of illness. Frequencies and percentages were estimated for categorical variables like gender and CT scan findings. Data was stratified into age groups, gender, and duration of disease to deal with effect modifiers. Chi-square test was used to assess the significance of differences, taking $p \leq 0.05$ as significant.

RESULTS

A total of 255 patients were part of the study. The study participants had a mean age of 35.5 ± 8.9 years. We divided the age in 3 different groups. Out of 255 patients included in the study, there were 68.6% male patients and 31.4% female patients.The mean duration of symptoms was 2.4 ± 0.9 weeks. (See table 3 for categories of duration of symptoms). On CT, meningeal enhancement was observed in 25.1%, hydrocephalus in 34.1% and tuberculoma in 18.4%. (Table 4) We stratified the common CT findings with regards to different age groups, gender and duration of symptoms (Table 5-13)

DISCUSSION

Tuberculosis (TB) caused by Mycobacterium tuberculosis (MTB) results in significant morbidity and mortality globally. One of the incapacitating complications of TB is tuberculous meningitis (TBM), accounting for over 0.1 million new cases annually[1].Tuberculous meningitis remains a serious health threat in both developed and developing countries. Tuberculous meningitis has the highest mortality and morbidity rate compared to other forms of TB[2]

In our study we included a total of 255 patients with tuberculous meningitis while **Ömer** E et al[8] conducted a study on 16 patients. The difference can be explained by the fact that mycobacterium tuberculous infection is very common in this part of the world. Out of 255 patients included in the study, there were 68.6% male patients and 31.4% female patients. Which is in accordance with study conducted by S G Srikanth.[9] Hydrocephalous was the most common CT finding in our study i.e 34.1 % compared to a retrospective review of CT findings in 289 patients with tuberculous meningitis revealed 204 patients had hydrocephalus (70 %), which

Table 1: Age Wise Distriution of the (n=255)

Age Groups	Frequency	Percent
20 to 30 years	98	38.4
> 30 to 40 years	75	29.4
> 40 to 50 years	82	32.2
Total	255	100.0

Table 2: Gender Wise Distriution of the Sample (n = 255)

	Frequency	Percent
Male	175	68.6
Female	80	31.4
Total	255	100.0

Table 3: Duration of Symptoms (n = 255)

	Frequency	Percent
1-2 weeks	124	48.6
> 2 - 4 weeks	131	51.4
Total	255	100.0

Table 4: Common CT Findings (n = 255)

		Frequency	Percent
Meningeal Enhancement	Yes	64	25.1
	No	191	74.9
Hydrocephalus	Yes	87	34.1
	No	168	65.9
Tuberculoma	Yes	47	18.4
	No	208	81.6

has prognostic implications.[10] Hydrocephalus has been observed in 12% to 77% cases of TBM in children while its frequency in adult patients with TBM has ranged from 12% to 32%.[11-14]

Another study has also stated a higher frequency of hydrocephalus in pediatric age groups as compared to adults.[10]

Meningeal enhancement was seen in 25 % of our patient compared to 21 % in retrospective review of CT findings in 289 patients with tuberculous meningitis.[10] Tuberculoma was seen in 18 % of our patients with tuberculous meningitis while Mei-Ling Sharon TAI et al[15] reported 53.7 % tuberculomas in patients with tuberculous meningitis. Tuberculomas, often multiple, are one of the most common differential diagnoses of intracranial mass lesions. They account for 5 – 34 % of all intracranial mass lesions and are predominantly found in frontal and parietal lobes, and the basal ganglions.[18, 19]

In the light of this evidence, tuberculous meningitis appears to be a frequent neurology complications in adults and thus there is need for routine diagnosis of adults to be suffering from tuberculous meningitis based on WHO guidelines and by radiological confirmation in such adults on presentation and during treatment to timely identify and treat this neurology complication so that the anticipated neurology disease can be avoided with its associated morbidity as mentioned above. However, at the moment the evidence is limited to a single international study, and to the best of candidate's understanding there is no such other international or local published material on this topic. Therefore, the aim of current research was to determine the frequency of common CT Scan findings in Pakistani adults presenting with Tuberculosis meningitis at a tertiary care hospital in Khyber Pakhtunkhwa. The results of the present study will give an insight into the magnitude of problem and will provide local baseline statistical data for further research in this regard.

CONCLUSION

Hydrocephalus is the most common CT abnormality found in patients with TBM followed,by meningeal enhancement and tuberculoma. They strongly affect the treatment outcome and morbidity in patients with TBM. We recommend more studies particularly clinical trials to identify the risk factors and early treatment outcomes of these CT abnormalities before future recommendations may be developed.

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