



ORIGINAL RESEARCH PAPER

General Medicine

"CLINICAL AND RADIOLOGICAL CORRELATION IN PATIENTS OF MENINGITIS ATTENDING TERTIARY CARE UNIT AT GMC, BHOPAL- AN OBSERVATIONAL STUDY"

KEY WORDS: meningeal enhancement, hydrocephalus, acute infarct, tuberculomas.

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ABSTRACT

Background: Meningitis is considered to be one of the most serious causes of hospital admissions in India, of which, tuberculous meningitis is the most common presentation.

Objectives: To study correlation between the clinical signs and symptoms of meningitis with contrast enhanced CT scan findings.

Methodology: This was an observational study carried out on 150 patients presented with signs and symptoms of meningitis at GMC, Bhopal over period of April 2017 to September 2018.

Results & conclusion: It was observed that out of total patients of tubercular meningitis, 24.6%, 33.9%, 41.5% are in stage I, II, & III respectively. 19(65.5%) patients among stage I had Meningeal Enhancement. 37(44.5%), 33(39.7%), 11(13.2%) and 2(0.02%) patients among stage II had Meningeal Enhancement, Hydrocephalus, Acute Infarct and Tuberculomas respectively. 43(34.9%), 42(34.1%), 16(13%) and 22(17.88%) patients among stage III had Meningeal Enhancement, Hydrocephalus, Acute Infarct and Tuberculomas respectively.

INTRODUCTION:

Meninges are thin membranous coverings of the brain and spinal cord and its inflammation is potentially fatal.^[1] Its cause could be infectious (bacterial, viral, fungal) or non infectious (cancer-related, systemic lupus erythematosus, drug induced, head trauma and brain surgery).^[1] Mostly meningitis is either pyogenic (bacterial) meningitis or tuberculous meningitis (TBM).^[1]

Meningitis is considered to be one of the most serious causes of hospital admissions in India. Today, meningitis poses a diagnostic problem. It was found that the diagnostic difficulty faced in our patients with meningitis, often resolved after a CT scan.

Computed tomography (CT) has been a diagnostic utility by identifying exudates in the basal cisterns and basal meningeal inflammation on contrast enhanced CT scans. Its important contribution in meningitis, is detection and assessment of associated complications such as hydrocephalus (communicating or non-communicating), cerebral infarcts and tuberculomas.

Therefore this research was conducted to study correlation between the clinical signs and symptoms of meningitis with contrast enhanced CT scan findings

MATERIAL AND METHODS:

Study design: Observational (cross-sectional), prospective, hospital based study. **Study area:** Hamidia Hospital which is affiliated to Gandhi Medical College, Bhopal. **Study subjects:** All patients aged >12 years presenting with clinical symptoms and signs of meningitis at the time of admission. **Study duration:** April 2017 to September 2018. **Study tool:** Tool I- detailed history of presenting complaints were recorded, Tool II- investigations (CSF examination, contrast enhanced CT Head, fundus examination). **Methodology:** Institutional ethical clearance was attained for the study. Written consent was taken after explaining the purpose of study to the participants. Patients aged >12 years presenting with clinical symptoms and signs of meningitis (i.e. Fever, Headache, Vomiting, and Neck Rigidity) at the time of admission were included. On the basis of CSF findings, cases were divided into two subgroups acute meningitis (those having short history of illness and CSF shows mainly polymorphs cell type & ADA <10) and chronic meningitis (those whose CSF findings shows lymphocytic predominance and has ADA >10), assuming all the cases of chronic meningitis to be tubercular (in India). Chronic meningitis (Tubercular meningitis) was further subdivided into three stages as

per British Medical Research Council (BMRC) Classification^[2]:

Stage I - Patients with early non-specific symptoms, minimal signs of meningeal irritation, no focal signs, fully conscious and in good general condition.

Stage II - Altered consciousness but patient is not comatose or delirious, signs of meningeal irritation, focal neurological deficits, isolated CN palsies and involuntary movements.

Stage III - Patients is comatosed, decorticate or decerebrate posturing, seizures, severe neurological deficits, irregular pulse or respiration.

Statistical analysis: All the data analysis was performed using IBM SPSS ver.20 software. Frequency distribution and cross tabulation was used to prepare tables. Categorical data is expressed as percentage.

RESULTS:

A total of 150 cases participated in the study. Out of 150 cases, majority i.e. 118 (78.7%) were suffering from chronic meningitis while the rest 21.3% were suffering from acute meningitis.(Figure 1)

Figure 2 shows stage-wise distribution of 118 (78.7 %) cases of chronic meningitis based on BMRC classification. It was observed that 49 (41.5%) cases were classified as stage III followed by 40 (33.9%) cases as stage II and only 29 (24.6%) cases as stage I.

Table 1 shows various findings on contrast enhanced CT head at the time of presentation. Maximum cases i.e. 115 (42.28%) revealed meningeal enhancement while 78 (28.68%), 29 (10.66%) and 24 (8.82%) cases reported hydrocephalus, acute infarct and tuberculomas respectively. On the other hand, 26 (9.56 %) cases reported normal findings.

Table 2 shows relation between stages of TBM and their corresponding CT findings. It was observed that out of 29 cases in stage I, 19 (65.5) patients had meningeal enhancement. While, out of total cases in stage II 37 (44.5), 33 (39.7), 11 (13.2) and 2 (.02) patients had meningeal enhancement, hydrocephalus, acute infarct and tuberculomas respectively. And out of total cases in stage III 43 (34.9), 42 (34.1), 16 (13) and 22 (17.88) patients had meningeal enhancement, hydrocephalus, acute infarct and

tuberculomas respectively.

Also, among acute (pyogenic) meningitis (n=32), 16 (50%) patients had meningeal enhancement. (Not shown in table)

Figure 1

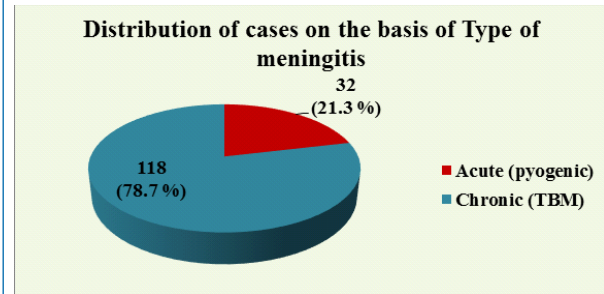


Figure 2

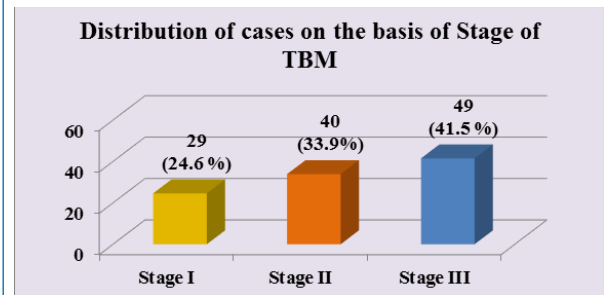


Table 1: Distribution of cases on the basis of findings on CT head

S. No.	CT Head findings*	Number	Percentage
1	Normal	26	9.56
2	Tuberculomas	24	8.82
3	Acute infarct	29	10.66
4	Hydrocephalous	78	28.68
5	Meningeal enhancement	115	42.28
	Total	272	100

*Multiple choices

Table 2: Stages of TBM and percentage of CT findings comparison

Stages of TBM	Normal	Meningeal Enhancement	Hydrocephalus	Acute Infarct	Tuberculomas	Total
I	10 (34.4)	19 (65.5)	0 (0)	0 (0)	0 (0)	29
II	0 (0)	37 (44.5)	33 (39.7)	11 (13.2)	2 (.02)	83
III	0 (0)	43 (34.9)	42 (34.1)	16 (13)	22 (17.88)	123
Total	10	99	75	27	24	235

DISCUSSION:

In present study, we found that most of the cases have tubercular meningitis i.e.118 cases out of total 150 cases (78.7%) whereas acute (pyogenic) meningitis comprises of 32 cases out of total 150 cases (21.3%). Similar findings were observed in studies, **Rashmi Kumar et.al** (1995) where they found tubercular meningitis in 61.03% whereas pyogenic meningitis in 33.7%^[3], **Rev. Soc et.al** (2014) which shows that tubercular meningitis from 2001 to 2010 in Brazil comprises of 1.2% out of all other causes of meningitis.^[4] This difference in prevalence of tubercular meningitis is because of very high prevalence of tuberculosis in India.

Patients of tubercular meningitis were graded into three stages according to British Medical Research Council Classification. In our study most of patients of tubercular meningitis (TBM) comes under stage III, followed by stage II and stage I. Similar to studies, **Misra et. al** (2000) where 83% of patients presented with severe disease^[5], **Sharma et. al** in a similar study involving 92 patients reported that at the time of admission, 26.09% of patients were in stage-I whereas 41.30% were in stage II and 32.61% were in stage III of the disease^[2], **Khalid Sher et.al** (2011) found majority of patients was in stage III at the time of presentation followed by stage II then I patterns respectively.^[6] This difference is possible because in tertiary health care center (i.e. Hamidia hospital) most of the patients referred to this in stage III.

In present study of CT of Head revealed that most common finding was meningeal enhancement followed by hydrocephalus, acute infarct and lastly tuberculomas. **Wani et. al** (2008) reported abnormal CT findings in 73.52% patients as basal enhancement in 36%, hydrocephalus in 28%, tuberculomas in 52%, infarcts in 12.0%, cerebral oedema in 8.0%, and more than 1 finding in 32.0% of the patients.^[7] In agreement to present study **De Castro et. al** (1995) also found meningeal enhancement, hydrocephalus, parenchymal granulomata and infarcts as the typical imaging features.^[8] CT scan finding at the time presentation reported by **Lone et. al** showed that out of total 56 subjects 12 (19.70%) were in stage I (meningeal involvement only), 29 (47.50%) were in stage II (parenchymal involvement only) and 15 (24.60%) wherein stage III (both parenchymal and meningeal involvement).^[9]

Comparison of Stages of TBM and CT findings had shown various findings in different stages. Similar results were observed in studies, **Sharma et. al** where proportion of patients having hydrocephalus, tuberculomas or infarcts increased with advancing stage of disease.^[2] This is similar to observations made by other study groups also. (**Kingsley et al**)^[10] **Sharma et. al** also reported that 16.67% of patients had hydrocephalous in stage I which increased to 73.33% in stage III.^[2]

CONCLUSION:

In this study we concluded that computed tomography is non-invasive test to differentiate types of meningitis and to visualise various pathological changes occurring in tubercular and pyogenic meningitis. And our result shows that CT scan findings in tubercular meningitis are much more specific and distinct than pyogenic meningitis.

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