

Clinicoradiological Correlation of Findings in Differential Diagnosis of Different Types of Meningitis In Pediatric Age Group 6 Months To 12 Years of Age Group.

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Abstract:

Background: Intracranial infections are among the most important problem in pediatric age. In about 30-35% of children we face diagnostic difficulty as whether the child has pyogenic, tubercular and, or viral meningitis. We will discuss clinical feature of meningitis and their radiological findings and correlation between them in this study.

Objective: Current study aims:

(a) To evaluate the clinical feature and radiological findings and their correlation in differential diagnosis off meningitis.

(b) To determine the changes occurring in CT/MRI scan in case of pyogenic, tubercular and viral meningitis and predict the outcome.

Material and methods: Eighty (80) consecutive cases admitted in a tertiary care centre in Jharkhand, with meningitis were studied by detailed history, thorough examination and stepwise investigation including blood count CSF exam, CT/MRI scan.

Results: The most common CT scan finding is basal enhancement 60 cases (75%) presents with fever, seizure, hemiplegia, unconsciousness; Hydrocephalous 50 cases (62.5%) with bulging fontanelle, vomiting, headache, cranial nerve palsy unconsciousness ; Tuberculoma 20 cases (25%) with seizure , fever ; Infraction 20 cases (25%) with seizure , hemiplegia cranial nerve palsy ; Periventricular lucency 15 cases (18.75%) with seizure ; Subdural effusion 3 cases (3.75%) with fever seizure , altered sensorium.

Conclusion: The high sensitivity and specificity of cranial CT scan finding in meningitis make us feel that it can provide useful information to effectively differentiate between pyogenic, tubercular and viral meningitis corroborated with clinical feature.

Keywords: Meningitis, seizure, CT scan.

I. Background

Pyogenic meningitis remains a very significant disease in antibiotic era. Risks of meningitis are highest among infants. 95% of cases occurred in between 1 month to 5 years of age. In India *S.pneumoniae* has been reported to be commonest organism (taneja et al 1955, paul 1960, kumar et al 1980). *H. influenzae* has been isolated in 12-18% of cases (achar et al 1953, reddy 1973) Non-specifically fever, poor feeding, headache, myalgia, vomiting, various cutaneous signs such as petechiae, purpura, maculopapular rashes may be present. Signs of meningeal irritation such as kernig sign, brudzinski sign and neck stiffness are present along with sign of increased intracranial pressure. Focal neurological sign due to vascular occlusion (10-20%) occurs. Seizures due to cerebritis infarction and electrolyte imbalance occurred in 20-30% of cases.

After Neuroimaging (CT/Mriscan) Various Findings Are Seen-

(a) Enlargement and enhancement of CSF spaces (*Bilanuk et al; 1978*) due to engorgement and dilatation of vein, abnormal blood brain barrier and leakage of contrast in subarachnoid space (*Waggener; 1974*).

(b) Ventriculomegaly (*Synder et al; 1978*) and its result from loss of brain tissue rather than increased pressure within ventricle. It is usually of communicating type due to adhesive arachnoiditis (*dodge et al 1965*)

(c) Ventriculitis

(d) Cerebritis - Non homogenous, low attenuating lesion with irregular margin and mass effect mostly by *H. influenzae* along with infarction (Well marginated low attenuating area without mass effect. (*Weisburg; 1980*)

(b) Brain abscess

Tuberculous meningitis in children is mostly related to hematogenous spread of primary complex. In a study done by Udani et al (1970) TBM comprised 29.02% of total cases of tuberculosis whereas Benakappa et al (1975) found 47.4% cases of TBM. The British Medical Research Council (1948) divides the clinical features in three stages:

Stage 1- no definite neurological symptoms on admission

Stage2- fever, headache, vomiting, neck rigidity, cranial nerve palsy, altered sensorium.

Stage3- Seizures, stupor, hemiplegia, paraplegia, involuntary movement and coma.

Ct/mri scan findings in tbm:

(a) Fy Hsieh et al ;1992 studied CT findings of cerebral infarction in Tuberculous meningitis. In about 75% of infarct occurred in TBM was in TB zone followed by ischaemic zone (11.1%). TB zone was region supplied by medial striate and thalamo-perforating arteries; head of caudate nuclei, anteromedial thalamus, and anterior limb of internal capsule. Similarly ischaemic zone was supplied by lateral striate, anterior choroidal and thalamo-geniculate arteries in lenticular nuclei, posterolateral thalamus posterior limb of internal capsule.

(b) Ventriculomegaly or communicating hydrocephalous. Kingsley et al ; 1987 studied CT manifestations of Tuberculous meningitis in 25 patients. Hydrocephalous was present in 18 patients on admission and developed later in 3 patients (total 84%). Bhargava et al;1982 observed hydrocephalous as most common CT finding in children (71.42%).

(c) Periventricular lucency.

(d) Basal enhancement and lucency.

Viral meningitis is an acute inflammation of meninges and caused by RNA viruses (most commonly enterovirus, measles, mumps, rubella) DNA viruses (herpes simplex, Epstein barr virus, CMV)ARTHROPOD borne(Japanese encephalitis ,west Nile fever, equine fever) ,HIV ,rabies, dengue, slow viruses, prion infection. It manifest from mild self limiting meningitis to brain involvement as severe encephalitis. Fever, headache, vomiting, nausea, rashes presents within 18-36 hours followed by seizures and altered sensorium and coma. CT/MRI Scan findings in viral meningoencephalitis. (a) HSV-1: temporal lobe hypodense lesion with a small interspersed hyperdense region and this hyperdense component represent hemorrhagic and mass effect seen in all cases. Kaufman DM et al;1979 showed in early CT findings, that low density was noted in medial portion of temporal lobe with extension into the island of Reil. Sparing of lenticular nucleus was observed in all cases.

(B) Japanese Encephalitis: bilateral thalamic infarct or enhancement as PANDAS sign.

II. Material And Methods

The study was done on 80 consecutive cases, admitted in paediatrics ward in a Tertiary Care Centre in Jharkhand to know the various clinic-radiological findings in children. Children less than 1 month and more than 12 years of age, cases with toxicological causes were excluded.

The following investigations were done stepwise depending on the clinical presentation.

- a) Complete blood counts including haemoglobin, TLC, DLC, platelet count, ESR, PBS.
- b) Lumbar puncture for CSF analysis) CT scan (plain and contrast) MRI as and when required
- d) Electroencephalograph
- e) JE serology, dengue serology
- f) Metabolic screening mainly serum calcium, serum glucose.

III. Statistical Analysis

We have studied this in 80 patients and following are the end result of different types of meningitis.

Ct Scan/Mri Findings	Clinical Feature	Number Of Cases
(A) Basal Enhancement	Fever, Seizure, Headache, Hemiplegia, Unconsciousness.	60 (75%)
(B) Hydrocephalous	Bulging Fontanelle, Headache, Vomiting, Cranial Nerve Palsy, Unconsciousness.	50 (62.5%)
(C) Tuberculoma	Fever, Seizure	20 (25%)
(D) Infarction	Fever, Seizure, Hemiplegia, Cranial Nerve Palsy, Unconsciousness.	20 (25%)
(E) Periventricular Lucency	Seizure	15(18.75%)
(F) Subdural Effusion	Fever, Seizure, Irritability, Altered Sensorium.	3(3.75%)
(G) Mca Involvement	Hemiplegia, Loss Of Cortical Sensation, Conjugate Gaze Palsy.	11(13.75%)

IV. Discussion

The present study comprises 80 patients from 6 months to 12 years of age. The major differential diagnosis of intracranial infections are pyogenic, tubercular, and viral meningitis. The proper detailed history

from mother or close relatives with complete neurological examination, CSF analysis along with neuro-imaging were important aspect of this study.

It was observed that incidence of Tbm Is Two Times Higher Than Pyogenic And Viral Meningitis In Infancy. The Most Common Ct Scan Finding Was Basal Enhancement 60 Cases (75%) Presents With Fever, Seizures, Hemiplegia And Unconsciousness; Hydrocephalous 50 Cases(62.5%) With Bulging Fontanelle, Headache, Vomiting, Cranial Nerve Palsy, Seizure; Tuberculoma 20 Cases (25%) With Fever, Seizure; Infarction 20 Cases (25%) With Fever , Seizure , Hemiplegia, Cranial Nerve Palsy, Unconsciousness; Periventricular Lucency 15 Cases (18.75%) With Seizure; Subdural Effusion 3 Cases (3.75%) With Fever, Irritability, Seizure, Altered Sensorium; MCA Involvement With Loss Of Cortical Sensation, Hemiplegia, Aphasia , Conjugate Gaze Palsy.

V. Conclusion

We observed that computed tomography is a non-invasive technique with high degree of sensitivity in differentiating different types of meningitis. CT scan can visualise the various pathological changes occurring in pyogenic, tubercular and *H.simplex* encephalitis which can be corroborated with their clinical picture. Our results indicate that CT scan findings in TBM are much more distinct and specific than pyogenic and viral.

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