Section: Medicine

Original Article

ISSN (0): 2347-3398; ISSN (P): 2277-7253

Accuracy of Computerised Tomography and its Usefulness as a Primary Diagnostic Modality in Patients with Intracranial Tuberculosis.

Kenny Thomas[1]

[1]Assistant Professor, Department of Medicine, Mount Zion Medical College, Chayalode, Ezhamkulam, Adoor.

Abstract

Background: Computed tomography (CT) is a very valuable method in early diagnosis and delineation of the pathologic process, complications and evaluates the effectiveness of treatment in TB meningitis. TB meningitis can be grade into three stage in terms of severity. **Subjects and Methods:** Early CT scanning with contrast enhancement identifies the stage and provides a very useful diagnostic and prognostic modality in this devastating disease. **Results:** Twenty two patients (about 71%) had hydrocephalus of which 8 had gross hydrocephalus and 7 had minimal or early hydrocephalus. 10 patients had communicating hydrocephalus. There was dilatation of only the lateral ventricles in 18 patients. The IIIrd ventricle was dilated in 10 and narrowed in 1patient. There was IVth ventricular dilatation in 9 patients. **Conclusion:** Both symptomatic and asymptomatic tuberculomas can be detected and their response to conservative medical therapy followed till cure.

Keywords: Computed tomography, TB meningitis, Intracranial tuberculosis.

Corresponding Author: Dr. Kenny Thomas, Assistant Professor, Department of Medicine, Mount Zion Medical College, Chayalode, Ezhamkulam, Adoor.

Received: December 2018
Accepted: January 2019

Introduction

Incidence of tuberculosis in India continues to be high. A large proportion of TB patients requesting hospitalization suffer from Neurotuberculosis, Tuberculous meningitis and tuberculoma being the two most important manifestations. Though incidence of tuberculoma is decreasing, tuberculous meningitis continues to be still prevalent. Tuberculous meningitis formed 82% of neurotuberculosis in an analysis by Udani et al. Tuberculous meningitis occurs by hematogenous dissemination of Mycobacterium tuberculosis from primary tuberculos lesions elsewhere. They form small granulomas with spill their contents into the cerebrospinal fluid causing diffuse or circumscribed granulomatous meningitis. The basal exudates can result in cisternal block and hydrocephalus, cranial nerve dysfunctions or pan arteritis with ischemic infracts. Clinical manifestation includes altered sensorium, seizures, progressive hemiparesis, visual defects, spinal arachnoiditis and compression. Tuberculomas may be supra or infratentorial, single or multiple or coexist with TB meningitis.[1]

If recognized and treated early this disease is curable with minimal residual neurological disability. Atypical manifestation of chronic localized forms may pose diagnostic and therapeutic problems often requiring surgical help.

Computed tomography (CT) is a very valuable method in early diagnosis and delineation of the pathologic process, complications and evaluates the effectiveness of treatment in TB meningitis. TB meningitis can be graded into three stage in terms of severity. Early CT scanning with contrast enhancement identifies the stage and provides a very useful diagnostic and prognostic modality in this devastating disease. In a series of 52 patients with suspected early tuberculous meningitis, 50% had ventricular enlargement, 42.3% periventricular lucency, 21.1% basal lucency, 17.3% basal enhancement, 14% parencehymal infiltration and 15 had no abnormality. Basal lucency and periventricular lucency carried a poor prognosis.

The advent of CT in India has helped in formulation of guidelines for the diagnosis and management of intracranial tuberculomas. On CT, edema and necrosis appear as low attenuation, organization of lesion shows high attenuation, contrast enhancement and calcification or ring shadows. Small immature lesions are missed by conventional neurobiological studies but enhanced by CT contrast.[2]

Thus, CT may be superior to all other diagnostic methods for definite diagnosis and evaluation of intracranial tuberculosis. Other conventional neuro radiological examinations may be completely avoided with this method .The pathological picture of tuberculous meningitis depend upon age of the patient, severity of infection, the patient's state of immunity or hypersensitivity, the duration illness, and the type of treatment received. Clinically and pathologically, it would be correct to designate the disease as meningo-encephalitis, rather than meningitis alone.

While the major impact of the disease falls on the basal meninges, parenchymatous lesions of the brain due to direct extension of the inflammatory process or secondary to vascular changes are consistently encountered on most cases.[3]

C T is invaluable in comparison to all above in analyzing infectious conditions affecting the intracranial structure, especially when patients present with neurological deficit. C T scan resolve most of the problems with regard to ventricles and subarachnoid cisterns and is the most important neuro-radiologic tool in assessing ventricular size and diagnosing tuberculous masses. A tuberculous brain abscess shows a thin walled capsule with ring enhancement like other abscesses. Inflames meninges show up as basal enhancement of cisterns and enhancement along the tentorial edge.

C T scan is useful in delineating the extent of the pathological process, in detecting complications and evaluating the effectiveness of treatment. Although a definite diagnosis is not always possible on C T, the method is of value in determining the number, location and extent of lesions in TBM. It also helps in assessing the degree of hydrocephalus and evaluating the effectiveness of treatment. Basal enhancement may not be demonstrate if the dose of contrast is low.[4]

Calcification is seen in up to 48% patients who survived more than 15 months after the onset of disease. Price and Danziger studied 12 patients of cranial tuberculosis with C T. All the nine patients with TBM had hydrocephalus and in 3 patients follow up scans did not show significant reduction of hydrocephalus in spite of anti tuberculous therapy.

Bhargava et al studied sixty cases of tuberculous meningitis including both adults and children using C T and only three cases showed a normal scan. Severe hydrocephalus was present in 87% of children but in only 12% adults. The incidence of hydrocephalus increased with the duration of illness and decreased with age. Exudates in the basal cisterns were graded from mild to severe, the latter being seen only in children. Visible infarcts were seen in 28.33% cases. Ten percent showed associated parenchymal tuberculomas. Serial follow up scans indicated that patient with non-enhancing exudates had a good prognosis when medically treated whereas in those cases with enhancing exudates the prognosis was poor.5 In spite of medical treatment and surgical shunting they either succeed to their illness or were left with irreversible sequelae. C T thus proved sensitive in both diagnosis and prognosis of clinically suspected tuberculous meningitis.

Subjects and Methods

Criteria for selection of patients were the presence of one or more of the following:

i) Cerebrospinal fluid (CSF) picture suggestive of TB meningitis.
ii) Positive CSF smear/culture for AFB
iii) Evidence of extra cranial tuberculosis.
iv) C T Scan findings suggestive of intracranial tuberculosis.

In the following study patients were taken up from among those attending the Department of Medicine, Neuro-surgery and pediatrics at Medical College and Hospital. The study was partly retrospective and partly prospective.

All patients included in the study had a computed tomography head scan and were evaluated according to the attached protocol. Every patient selected underwent a complete neurological evaluation which consisted of a history and physical examination with special reference to the neurological findings. Fundoscopy, CSF examination, Chest and Skull X-ray, E.E.G etc.., were done whenever needed.

Results

Table 1: Clinical Presentation

No. of patients				
	Group I	**Group II**	**Total**	**%**
No.with past history of TB	1	6	7	11.7
History of TB contact	5	3	8	13.3
Evidence of extracranial TB	20	25	45	75.0
No. with raised ESR	5	15	20	33.3
No. with positive AFB,smear/culture	1	5	6	10.0
(CSF, Sputum or Gastric Aspirates)				
No. with abnormal E.E.G	13	3	16	26.7
No. with abnormal skull X-ray	4	1	5	8.3
Histopathology proven	-	1	1	1.7

The majority of patients with intracranial tuberculomas presented in the younger are group, the maximum being in the 0-9 year age group. In contrast most of the patients with tuberculous meningitis were older and majority of cases were in the age group above 30 years

Of the 31 cases of tuberculous meningitis, 5(16.13%) presented in stage I of the disease, 21 (67.74%) presented in the stage II, and 5(16.13%) in stage III as defined by the British Medical Council. (Riggs et al., 1956) As shown on the histogram in figure 3, there were 4 males and 1 female with stage I turberculous meningitis.10 males and 11 females with stage II and 5 males only in stage III of the discasc.

Table 2: Age and Stage of TB

Stage	**0-9 yrs**		**10-19 yrs**		**20-29 yrs**		**30 yrs & above**		**(% age)**
	M	F	M	F	M	F	M	F	
Stage I	2	-	1	-	1	-	-	1	5 (16.13)
Stage II	1	1	3	1	2	2	4	7	21 (67.74)
Stage III	-	-	2	-	1	-	2	-	5 (16.13)
Total	3	1/4	6	1/7	4	2/6	6	8/14	31 (100%)

Cerebrospinal fluid examination was done in all the 31 patients of tuberculous meningitis and in the 12 patients with tuberculomas, two of whom subsequently developed tuberculous meningitis. Among the patients with tuberculous meningitis only one patient had a normal CSF. This patient was already on anti-tuberculous treatment. 4 patients had atypical CSF picture initially with predominant polymorphs but shortly after; the CSF reverted to the typical picture of tuberculous meningitis in three, and ΛBF smear was positive in the other. All the rest of the CSF's examined i.e., 26 out of 31 (83.87%) reflected a typical tuberculous pattern with pleocytosis and lymphocytic predominance, elevated CSF proteins and low sugars. AFB culture was positive in 4 out of the 31 patients (12.9%).

CSF examination was done in 12 patients of tuberculomas. Only three of these showed a normal picture and one was atypical. It was suggestive of neurotuberculosis in the remainder (66.7%).

Residual neurological disability was seen in 19 patients with tuberculous meningitis (61.29%) while it was seen in 7 patients (24.14%) with intracranial tuberculoma.

Cerebrospinal fluid drainage procedure was done in 9 patients who showed hydrocephalus on C.T. Three had ventriculoatrial shunt, five had ventriculoperitoneal shunt and one had a ventriculostomy done.

Table 3: Outcome.

	Tuberculomas			Tuberculous Meningitis			Total
	Survived	Died	Lama	Survived	Died	Lama	
V.A. Shunt	1	-	-	2	-	-	3
V.P Shunt	-	-	1	3	1	-	5
Ventriculostomy	-	-	-	-	1	-	1
Total	1	-	1	5	2	-	9

As described earlier, computerized tomographic scanning has become one of the most ideal noninvasive and accurate neurodiagnostic tools in the evaluation of intracranial.

In the study, C.T. head scan was performed in all the patients at presentation and serially whenever needed or feasible.

The C.T. head scan findings of each case was individually analyzed and correlated with the Clinical pictures. For easier analysts the C.T. scan findings in patients with intracranial tuberculoma and tuberculous meningitis are described separately.

Of the 29 patients, 23 had single tuberculoma and 6 cases had multiple tuberculomas on computerized tomography of the head. The multiple tuberculomas were present in 20.7% patients.

A total of 42 tuberculomas were present in these 29 patients. Three patients had 2 tuberculomas each on C.T. two had 4 each had 5 tuberculonas.

Table 4: Age Distribution of Patients with Multiple Tuberculoma ON C.T.

Age Group	No of patients	No. of tuberculomas in each patients
0 – 9 yrs.	1	4
10 – 19 yrs.	1	2
20 – 29 yrs.	1	4
30 yrs. And above	3	9
Total	6	19

In both the patients with 4 tuberculoma each, all the lesions were hyper dense and coalesced together to form an irregular mass which enhanced well with contrast. Patient No. 7 with 5 multiple tuberculomas had 4 hypodense lesions in cerebellum and brainstem with marginal ring enhancement and one hyperdense lesion in the left temporal area. Three of these patients with multiple tuberculoma were in the age group above 30 years and there was one patient in each of the other three age group. This is represented in table 14 with the number of tuberculomas found in each of them.

The patients in the older age group developed multiple tuberculomas more frequently. Patient No. 7 with 5 tuberculomas, had immature and mature lesions coexisting at the same time.

Only 2 patients had infratentorial tuberculomas, one having multiple tuberculomas in the cerebellum and brainstem and the other patient having a solitary mixed attenuation lesion located in the brainstem causing blockage of the fourth ventricle.

The tuberculomas could be detected and localized fairly accurately with the use of C.T. scanning.

Table 5: C.T. Localisation on the Tuberculomas

No. of pts. in each age GP					
Site of Tubeculoma	0-9 yrs	10-19 yrs	20-29 yrs	30 & above	Total
Fronatal Lobe	-	1	3	4	8
Parietal Lobe	4	-	1	2	7
Occipital Lobe	5	-	1	-	6
Temporal Lobe	1	1	-	1	3
Frontoparietal Area	1	1	-	-	2
Temporoparietal Area	1	1	-	-	2
Brainstem	1	-	-	1	2
Subependymal					
(near lat,Ventricles)	-	-	-	1	1
Parasaggital	-	-	-	1	1
Cerebellum	-	-	-	1	1

Tuberculomas were located on practically all sites of the brain but were maximum in the frontal and parietal areas. In 2 patients, tuberculomas were subcortical or superficial in location.

Twelve patients underwent a repeat C T head scan, mostly a couple of months after starting antiuberculous chemotherapy.

Two of these patients showed marked improvement with decrease in size and attenuation of the tuberculomas. Eight showed total disappearance of the tuberculomas on medical therapy. Two patients showed static granulomatous lesions with no increase in the size of tuberculomas on treatment.

Table 6: Repeat Scan Characterstics of Tuberculomas on Anti-Tuberculous Therapy

	0-9 Yrs	10-19 Yrs	20-30 Yrs	30 & above	Tatal Pts.
Complete disappearance of Tuberculomas	5	2	-	1	8
Decrease in size of attenuation of lesion	1	1	-	-	2
No change in the lesion		-	2	-	2
Total	6	3	2	1	12

On plain scan, the lesions were categorized into four groups viz:

i) Ring lesions with increased density at the periphery and the central part being either isodense on slightly more dense then the brain.
ii) Hypodense lesions where the lesions were less dense than the surrounding brain parenchyma.
iii) Hyperdense lesions which were of higher density than the surrounding brain and included densely calcified tuberculomas.
iv) Isodense lesions with equal density or mixed attenuation lesions which had different densities within the lesions itself.

These reflects the various stages in the evolution of intracranial tuberculomas as described by price and danziger (1987 and hyperdense lesions Kalyanaraman (1985). Hyperdense lesions coexisted in patient No. 7, who had 4 hypodense and 1 hyperdense lesions simultaneously on C.T.

On plain C.T. 15 patients manifested the ring lesions which included both the small discs and rings and larger rings described by Bhargava and Tendon (1980). Thirteen patients had uniformly hyperdense image, 4 had hypodense lesions and 2 had isodense or mixed attenuated lesions.

Eleven patients showed perilesional focal edema manifesting mostly as hypodense halos around the tuberculomas.

Four patients demonstrated mass effect on C T, in the form of compression of the ventricular horns or shift of ventricles and other midline structures.

Three patients had associated hydrocephalus. As shown in Table 13 above, procedures was done in 2 of them and both improved remarkably.

B.S. (patient No.29) was on regular followup 2 ½ years after the V.A. shunt. S.K (patient No.3) left against medical advice 22 days after the V.P. shunt wasinserted. The third patient had early hydrocephalus and improved on conservative medical therapy.

On administration of I.V. contrast, enhancement was seen in 24 lesions out of 42 (57.14%).

Thirteen manifested ring enhancement, seven had generalized enhancement of the lesion and four scans revealed the "target sign" with a central speck of enhancement.

Miscellaneous C T findings:

The tuberculomas were superficial and subcortical in location in 2 patients; they appeared as minute calcified spots in 2 patients and were found to erode the base of the middle cranial fossa and the petrous pyramid of the sphenoid bone in one patient.

Scan Features in the 31 Cases of Tuberculous Meningitis

As mentioned above, 26 out of the 31 patients presented in either stage II or stage III of the disease.

Twenty two patients (about 71%) had hydrocephalus of which 8 had gross hydrocephalus and 7 had minimal or early hydrocephalus. 10 patients had communicating hydrocephalus. There was dilatation of only the lateral ventricles in 18 patients. The IIIrd ventricle was dilated in 10 and narrowed in 1patient. There was IVth ventricular dilatation in 9 patients.

Associated cerebral lesions were seen in 11 patients. Three patients had hypodense lesions suggestive of cerebral infraction, One of whom had 2 such lesions in the same scan. Thus evidence of infraction was seen in 12.9% cases. Seven patients showed hyperdense lesions of which 2 enhanced on contrast administration. One patient had a mixed attenuation lesions on plain scan.

Associated cerebral oedema was present in 6 patients, five of whom demonstrated generalized massive oedema akin to the picture described in tuberculous encephalopathy by Dastur and Udani (1966). The patients with minimal edema showed either basal or periventricular lucency.

Contrast enhancement of the basal exudates (excluding those with cerebral lesions) was seen in 7 patients. Three had cisternal enhancement mainly of the cistern magna which was enlarged in two patients. Four patients had meningeal enhancement.

Five patients showed associated tuberculomas on the scan. In two patients calcified tuberculomas was seen on the falx cerebra.

Discussion

In the present study 29 cases with intracranial tuberculoma and 31 cases with tuberculous meningitis were analysed. A large proportion of patients with tuberculoma presented with history of convulsions (82.76%). Fifteen out of patients with this complaint (62.5%) had focal seizures and majority belonged to the paediatric age group. Kalyanaraman (1983) had found that 63.16% of children with tuberculoma had focal seizures in contrast to 42% of adults. Only 2 of the 9 patients with generalised seizures were below 10 years of age.

In another study from our hospital in 1987, where 62 children who presented with focal seizures were investigated using C T, tuberculoma was the second most common C T scan abnormality, seen (Shah et al., 1987).

Only 32.26% of patients with tuberculous meningitis presented with seizure disorder. Most of them presented with fever (74.19%), altered sensorium, (70.97%) or diffuse headache (64.5%).

Kalyanaraman (1983) studied 69 children and adults with tuberculoma and found neurological deficit in 56.52% . In our study neurological deficits were seen in 48.28% cases of tuberculoma in contrast to 83.87% cases with tuberculous meningitis. This finding is easily explained by the more serious and diffuse nature of disease and higher frequency of various complications seen with tuberculous meningitis (Tandon, 1983).

Fourteen out of 19 males (73.7%) with tuberculous meningitis presented with duration of illness less than 1 month in contrast to 4 out of 12 females (33.3%). This reflects the prevailing social practice in that women are brought for medical care only after the disease has advanced.

Cranial nerve involvement was the most common neurological deficit seen in 51.66% of our cases. It was involved in 23 patients with tuberculous meningitis (74.2%) while in only 8 with tuberculoma (27.6%). Thomas et al (1977) reviewing 232 cases of tuberculous meningitis found a similar incidence of 65.9%.

Cranial nerve involvement in tuberculous meningitis is due to raised intracranial pressure, exudative process a base of the brain or nuclear involvement secondary to arteritis. The facial nerve was most commonly affected (45.8%) followed by the abducent in 18.7%. Mehrotra et al (1982) had observed that bilateral 6th never palsy and combined 3rd and 6th nerve palsies were associated with higher mortality. In our study 5 out of 6 patients with combined 3rd and 6th nerve palsy expired. Only 1 patient had bilateral 6th nerve palsy and she also expired.[6]

Hemiparesis was seen in 16 patients (26.66%). Eleven patients with tuberculous meningitis (35.48%) had hemiparesis in this study while it was seen in only 18.53% by Thomas et al (1977). Five of our patients with tuberculoma (17.29%) had this feature while it was observed in 31.88% by kalyaarama (1983).

This higher incidence of hemiplegia and cranial nerve palsies in patients with tuberculous meningitis explains the higher mortality of 32.26% that we encounter, in comparison to 18.7% by Mehrotra et al., (1982).

Papilloedema was found in 22.6% of our cases with tuberculous meningitis. Similar incidence (22%) was reported by Mishra et al (1985) though Thomas et al (1977) reported a higher incidence of 33.6%.

Papilloedema was found in 13.8% of our cases with tuberculoma while kalyanaraman (1983) reported an incidence of 20.3%.

A high incidence of sequelae and residual neurological disability (61.29%) was seen in our patients with tuberculous meningitis, who survived. It was see in 88% by Agarwal and Kumar (1969) and in 48.23% by Thomas et al (1977). All these figures, which are higher than those quoted from the west (38%) reflect the late stages of presentation in India and emphasize the necessity of early diagnosis. Majority of our patients were in stage II and III of the disease at presentation.[7]

In the present study tuberculous CSF pattern was seen in 83.87% patients with tuberculous meningitis while Thomas et al., (1977) observed this in 66.82% of their patients. Bacteriological confirmation form CSF was obtained in 12.9% patients. Bhargava and Tandon (1980) also failed to obtain bacteriological confirmation in the majority of their 57 patients with tuberculous meningitis and said that it was a problem repeatedly highlighted in most series from Inida.

Boshburg et al (1986) had reported central nervous system tuberculosis occurring in 3 patients with AIDS and 7 patients with AIDS related complex. Nine of these were I.V. drug abusers.

Tuberculous encephalopathy described as a clinical entity by Dastur and Udani (1966) and then reported by sinh et al., (1973) in three cases, was seen in two patients of the present series. Tendon (1983) did not encounter any such case causing raised intracranial pressure.

In this study, 8 patients (27.58%) with tuberculous meningitis had transient hyponatremia (less than 120 meq/L). It was seen in 3 out of 5 patients by Newman et al (1980) which got corrected while on antituberculous therapy. It was seen in 7.5% of children in a series by parekh and Udani et al., (1973).

Blindness is one of the tragic sequelae of tuberculous meningitis. Sinh et al., (1973) encountered 10 patients (5.29%) who had become blind among 189 cases of intracranial tuberculosis and felt that it was due to three factors viz, raised intracranial pressure due to hydrocephalus, vascular endarteritis affecting the blood vessels at the base of the brain and chiasmatic adhesions and compression of the optic pathways. We had found a similar incidence of 5% (3 patients) who developed optic atrophy while Mishra et al (1985) noted a higher incidence of 18%.[8]

C T head scans were carried out in all the 29 patients with tuberculoma and the 31 patients with tuberculous meningitis. Normal C T scan was seen in 4 patients with tuberculous meningitis (12.9%) while it was seen in only 5% of 60 patients studied by Bhargava and Tandon (1982).

In the pre scan era, more than one investigation was necessary to establish the diagnosis and in some cases even after the procedures the accuracy of localisation and diagnosis remained inadequate. In a series of 26 patients with intracranial infections, correct diagnosis and accurate localisation could be made in 24 cases (92.3%) using C T (Claveria et al., 1976).

Prior to the advent of C T, available neuroradiological investigations provided only limited data about the morphological changes in various stages of evolution of intracranial infection. The C T in contrast permits repeatable investigation of these disorders at any time of the diseases without any risk to the patient (Bhargava and Tandon, 1980).[9]

Although a definite diagnosis any not be possible in all cases C T is of value in determining the number, location and extent of lesions, it is helpful in assessing the degree of hydrocephalus and evaluating the effectiveness of antituberculous therapy (Price and Dansiger,1978), (Naishin Chu, 1980).

Multiple tuberculomas were seen in 20.7% of our patients which corresponds with the incidence of 25% by Whelan and Stern (1981). Kalyanaraman (1983), Castro and Leppe (1963) ad Arseni (1958) reported multiple tuberculoma in 11.5%, 16.6% and 16% of their patients respectively. The incidence in most surgical series has varied from 10-32% (Tandon, 1983), (DeAngelis, 1981).[10]

In contrast, Bhargava arid Tendon (1980) found multiple masses in 50-60% of their patients with tuberculoma on the basis of C T which were either clustered around at one place restricted mostly to one hemisphere or widely scatted involving both supra and infratentorial regions. Price and Dansiger (1978) also described 60% of tubereuloma as being Multiple and supratentorial. 5 of the 6 patients with multiple tuberculoma in the present study had supratentorial lessios only and were restricted to one hemisphere predominantly. The other patient had multiple tuberculomn

in the cerebellum, brainstem and temporal lobe. Price and Danziger had stated that cerebellar lesions are usually single but this patient had 3 lesions in the left cerebellar hemisphere and vermis.[11]

Almost 84% of the 31 patients with tuberculous meningitis presented in stages II and III of the disease. The most frequent C T finding was ventricular dilatation or hydrocephalus seen in 70.96%. This corresponds with the incidence of 76%, 80% and 83% observed by Bullock and welchman (1982), Newman et al (1980) and Bhargava and Tandon (1980). Price and Danziger (1978) had observed this feature in all their nine patients. Singhal et, al (1975) observed an incidence of only 48.3% in 58 patients based on lumber or ventricular manometric study.

Bhargava and Tandon (1982) studying 60 cases of tuberculous meningitis in both adults and children had observed that incidence of hydrocephalus increased with the duration of illness (Bharucha et al., 1969) and decreased with age. Serial follow up scans indicated that patients with non-enhancing exudates had a good prognosis when medically treated whereas in those cases with enhancing exudates the prognosis was poor in spite of medical treatment and surgical shunting and that they either succumbed to their illness or were left with irreversible sequelae. C T had thus proved sensitive in both the diagnosis and Prognosis in clinically suspected tuberculous meningitis. Hydrocephalus was found to be more common in children (Bhargava and Tandon, 1982). All the 4 children below 10 years in this study had hydrocephalus of which 3 had gross hydrocephalus. One had V P shunt and all the 4 survived.

The degree of enlargement of the anterior horn varied with the severity of hydrocephalus.

In the present series 7 patients (22.6%) had enhancing exudates on contrast which partly accounts for the mortality rate of 32.25/5. These exudates were seen in 60-82% by Bhargava and Tandon (1982) in the different cisterns. This difference in the incidence of demonstrable exudates was because contrast scans were done in only a few of the patients with tuberculous meningitis in this study.[12,13]

Basal exudates appear as non visualisation of the cisterns but with contrast they are densely enhanced and appear as sizable plaques outlining the anatomy of the cisterns. This feature was seen in 3 of our 7 patients who manifested basal enhancement. Meningeal enhancement over the convexities may also be seen. Bullock and Welchman (1982) suggested that the most important prognostic factor for patients with tuberculous meningitis was the delay prior to initiation of antituberculous therapy after the onset of symptoms.. Bullock and welchman evaluated 34 patients with a definite diagnosis of severe tuberculous meningitis using C T with a 9 month follow up and felt that early C T scanning with contrast enhancement provided a very useful diagnostic and prognostic modality in this devastating disease. They found that basal lucency and periventricular lucency carried a poor prognosis. Two of our patients demonstrated periventricular lucency and both of them expired.

Conclusion

C. T. has proved invaluable in the evaluation of Neurotuberculosis. Advent in C T in India has helped in formulation of guidelines for the diagnosis and management of intracranial tuberculomas.

It is of great clinical importance that no other current diagnostic procedure is capable of documenting the oedema and / or gliosis and the multiplicity of foci of tuberculomas. In addition, small immature lesions (even upto 2-3 mm) can be discerned by C T and enhanced by contrast. Conventional neuroradiological investigations which are less sensitive and will not pick-up such lesions are invasive, cumbersome and not repeatable. These can be completely avoided by use of C. T.

C T has proved sensitive in the early diagnosis, delineation of the pathologic process, detection of complications and in evaluating the response to therapy in patients with tuberculous meningitis. Early C T scanning with contrast provides a very useful prognostic modality in this disease.

References

1. Bhargava S., Tandon P.N.: Intracranial Tuberculomas – a C T study. Br. J. Radiol. 1980, 53: 935-45.
2. Bullock M.R.R., Welchman J.M.:Diagnostic and prognostic features of tuberculous meningitis on C T scanning.J. Neurol. Neursurg Psychiatry 1982,45:1098-101.
3. Chambers A.A. Lukin R.R., Tomsick T.A. :Cranial and Intracranial tuberculosis.Seminar Roentgenol 1979, 14:319-24.
4. Dastur H.M ., Desai A.D.:Comparative study of brain tuberculomas and gliomas based upon 107Case records of each.Brain 1965,88:375-96.
5. Lincol E.M, Sordillo S V R., Davies P A.,:Tuberculous meningitis in Children.J. pediat 1960,57:807-10.
6. Nai Shin Chu.:Tuberculous meningitis- Computerised Tomographic Manifestations.Arch. Neurol 1980,37:458-60.
7. Price H. T., Danziger A.:Computed tomography in cranial tuberculosis.Amer.J. Roentgenol. 1978,130:769-71.
8. Ramamurthi B., Tandon P.N .:Tuberculous meningitis.In Text Book of Neurosurgery Vol.1, p. 437-53.National Book Trust of India 1980, New Delhi.
9. Ramamurthi B., Varadarajan M.G.:Diagnosis of tuberculoms of brain.J. Neurosurg. 1961,18:1-7.
10. Rovira M., Romero F., torent O., Ibarra B.: Study of tuberculous meningitis by C.T. Neuroradiology 1980, 19:137-41.
11. Singhal B.S., Bhagwati S N., Syed A H., Laud G W.: Raised intracranial pressure in tuberculous meningitis. Neurology (India) 1975,23:32-9.
12. Udani P.M , Parekh U C., Dastur D.K.: Neurological and related syndromes in CNS tuberculosis Clinical features and pathogenesis. J. Beurol. Sci. 1971.14:341.
13. Vengsarkar U S., Pispaty R P., Parekh B. et al.,:Intracranial tuberculoma and the C T scan.J. Neurosurg. 1986,64:568-74.

How to cite this article: Thomas K. Accuracy of Computerised Tomography and its Usefulness as a Primary Diagnostic Modality in Patients with Intracranial Tuberculosis. Asian J. Med. Res. 2018;7(4):ME06-ME12.
DOI: dx.doi.org/10.21276/ajmr.2018.7.4.ME2

Source of Support: Nil, **Conflict of Interest:** None declared.