

Intracranial Tuberculoma - A Retrospective Study in a Tertiary Care Centre in South India

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Abstract: ***Background:** Tuberculoma are rare intracranial space occupying lesions usually associated with a primary focus elsewhere in the body most commonly in lungs. They present late and are associated with significant mass effect. The diagnosis is achieved by surgical excision of the lesion and histopathological examination of the specimen. **Objective:** The objective of this study is to examine the various demographic factors, clinical presentation, intracranial location, surgical intervention and outcome of intracranial tuberculoma. **Material and Methods:** This is a retrospective study conducted in the institute of neurosurgery, madras medical college from January 2021 to February 2023. A total of 20 patients were included in this study. **Results:** All patients underwent surgical excision of the lesion followed by histopathological confirm of diagnosis. One patient had prior history of pulmonary tuberculosis which was treated. 2 patients with cerebellar tuberculoma presented with obstructive hydrocephalus and needed ventriculoperitoneal shunting. None of the patients in our study group were HIV positive or had associated communicating hydrocephalus. All patients were started on standard WHO antitubercular drug regime for extrapulmonary tuberculosis. Two patients died during the period of hospital stay. **Conclusion:** Intracranial tuberculoma are rare lesion, often presenting with late with signs of mass effect. The diagnosis in most cases is made after histopathological examination of space occupying lesion. A high index of suspicions is needed especially in endemic countries like India.*

Keywords: Tuberculoma, hydrocephalus, antitubercular drugs, steroids

1. Introduction

Though rare tubercular infection of CNS can present as either tuberculoma or tubercular meningitis. Intracranial tuberculomas are space - occupying masses of granulomatous tissue that result from haematogenous spread from a distant focus of tuberculous infection, usually the lung. Histologically tuberculomas consist of a necrotic caseous centre surrounded by a capsule that contains fibroblasts, epithelioid cells, Langhans giant cells and lymphocytes. Liquefaction of the caseous centre may result in a tuberculous abscess. Most of these are managed with surgical intervention¹. This study focuses on the epidemiology and outcomes of intracranial tuberculoma in a tertiary care hospital

2. Materials and methods

This was a retrospective study conducted from January 2021 to February 2023. The clinical data of patients admitted with intracranial mass lesion who were taken up for surgery and whose histopathological examination revealed tuberculoma were included. Their age, clinical presentation, location of lesion, presence of hydrocephalus and need for shunting and outcome were analyzed. All of the patients were evaluated for tubercular lesion in lung and elsewhere.

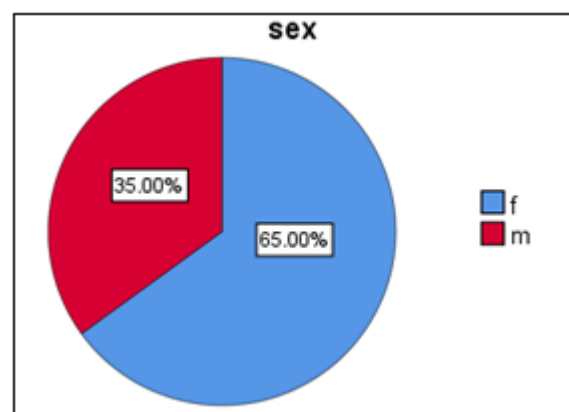
3. Results

A total of 20 patients were included in this study. Among them 65% (n=13) were females and 35% (n=7) were males. The majority of the patients were in the 20 - 30 age group with a mean age of 32 years. The youngest and oldest patient in our study were 15 and 55 years respectively. Only one patient had a prior history of pulmonary tuberculosis for which he had completed treatment. Among symptomatology

headache (n=15) was the commonest followed by signs of elevated ICP (n=6), seizures (n=5), focal neurological deficit (n=3) and fever (n=2). Most of the lesions were located in supratentorial region especially in frontal lobe (n=5), while one patient had multiple lesions. All the posterior fossa lesions were located in cerebellum (n=5). Among these cerebellar lesions two patients had obstructive hydrocephalus and underwent ventriculoperitoneal shunting. None of the patients in our study group were HIV positive or had associated communicating hydrocephalus. All patients underwent craniotomy and excision of space occupying lesion. Once the diagnosis of tuberculoma was made all were started on standard antitubercular drug regime. The mean duration of hospital stay was 16 days. Two patients died during the course of hospital stay.

Age distribution in our study

Age	Incidence
10 to 20	3
21 to 30	7
31 to 40	6
41 to 50	1
>50	3



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Pie diagram showing sex distribution in study subjects

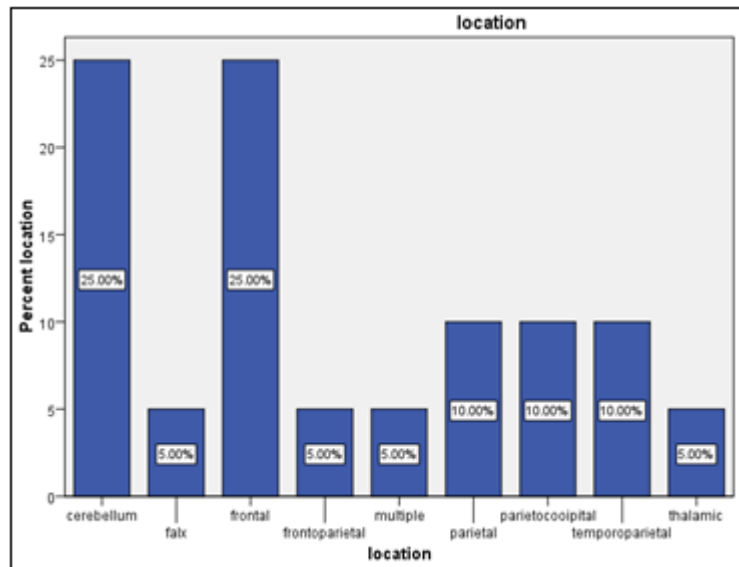
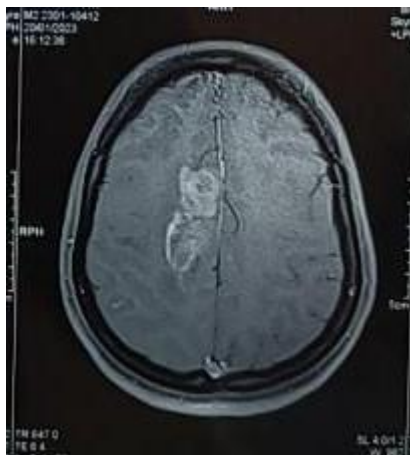


Chart showing various location of intracranial tuberculoma in our study



Ring enhancing lesion in right medial frontal lobe

Glasgow outcome scale	Incidence
1	2
4	5
5	13

4. Discussion

Tuberculosis is a major public health problem in developing countries, particularly in India. The manifestations of tuberculosis of central nervous system are: tuberculous meningitis which is the most frequent, followed by the tuberculoma and the cerebral abscess². Tuberculomas still represent 5 to 30% of the intracranial expansive processes in developing countries. The intracranial spread may be by haematogenous or direct extension of a meningeal or vertebral TB. Tuberculomas are most often supratentorial, the most common site being cerebral hemispheres. The symptoms are not specific depending on the localization, the size and the number of lesions. The general signs in the weeks preceding the neurological signs are inconstant. Hemispheric tuberculomas, which account for 50% of cases, are tolerated for a long time before presenting as seizures or

a deficit syndrome, often by mass effect. They are more frequently located in left parietal lobe, in line with the hypothesis of anhematogenous spread of the infection more frequent in the dominant hemisphere. Cerebral tuberculomas are usually associated with another tuberculous location, usually pulmonary. The pulmonary tuberculosis may be occult but responsible for the hematogenous spread to the brain parenchyma. Posterior fossa tuberculoma can obstruct the fourth ventricle and present an obstructive hydrocephalus which has a very good outcome compared to communicating tubercular meningitis secondary to the rupture of a tuberculoma in the arachnoid space.

Radiological aspects of the cerebral tuberculoma are not specific. The CT reveals the tuberculoma as an isodense or hyperdense lesion in the calcified forms with ring enhancement after contrast injection. The presence of calcifications on CT with a ring enhancement called the target sign is considered by some authors like specific of tuberculoma³. MRI is more sensitive than the scan for the detection of small tuberculomas and those located in the brain stem. They have intermediate or low signal intensity on T1 weighted images with a ring enhancement after injection of gadolinium. On T2 weighted sequences, they usually have low signal intensity with surrounding oedema. Basing on a series of 18 patients (ten of them were HIV positive), different aspects of tuberculomas on the MRI are described according to the evolutionary stage of the lesion⁴. Small tuberculomas may appear like disseminated lesions with varying signal intensity, whereas mature tuberculomas are more voluminous, have a hypo - intense centre and are surrounded by oedema; The lesions at this stage may show nodular or ring enhancement, hence the difficulties in differential diagnosis with other tumour pathologies with the same radiological aspect like metastasis. The differential diagnosis of tuberculomas include mainly the tuberculous abscess and the tumour lesions (glioma, metastasis) when they are encapsulated and have necrotic centre⁵. Differential diagnosis is different in HIV+ patients. Toxoplasmosis and lymphoma should be considered in this case⁶. The definitive diagnosis of tuberculoma is made by identifying tubercle

bacillus in bacteriological samples or by a histological analysis showing a tuberculoid granuloma⁷.

The management of intracranial tuberculomas includes symptomatic treatment, medical treatment with anti-tuberculosis medication, and possibly the surgical resection of the lesion. Glucocorticoids, such as dexamethasone, are clinically recommended to reduce the risk of inflammation, alleviate cerebral oedema, and decrease the intracranial pressure¹⁴. The initial regimen of anti-tuberculosis medication includes isoniazid, rifampicin, pyrazinamide, and ethambutol (Streptomycin or a fluoroquinolone antibiotic can be used as an alternative) for 2–3 months¹². Isoniazid and rifampicin are then prescribed as consolidation treatment for 12 months¹³. The regimen can be extended to 18 months if necessary¹³. Surgical resection is considered in cases of a mass effect, intracranial hypertension, posterior fossa tuberculomas with hydrocephalus, visual disturbance, and progression of the tuberculoma while on anti-tuberculosis medication. All patients in our study underwent surgical resection of lesion to confirm the diagnosis and relieve mass effect.

Initial reports of mortality ranged from 10% to 27% for intracranial tuberculomas, but the results have improved dramatically in recent years. Numerous reports have been published of patients with deep-seated, inaccessible lesions and lesions in the brain stem who have had excellent recoveries.

5. Conclusion

Cerebral tuberculoma is a rare but serious form of extrapulmonary tuberculosis. Its protean clinical presentation often leads to delayed diagnosis. Surgical exploration and histopathological examination of the lesion is the gold standard. Its outcome has improved due to better surgical approaches and antitubercular drug regime.

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