ORIGINAL RESEARCH PAPER
Volume - 12 | Issue - 05 | May - 2023 | PRINT ISSN No. 2277 - 8179 | DOI : 10.36106/ijsr
INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

GIANT INTRACRANIAL TUBERCULOMA: EXPERIENCE OF A NEUROSURGEON

Neurosurgery

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ABSTRACT

Background: Central nervous system involvement of tuberculosis is rare but is the most severe form of tuberculosis. It rarely presents as a huge mass known as a giant tuberculoma which can mimic as, the neoplasm of the brain on imaging. As an intracranial space-occupying lesion it may present with focal neurological deficits associated with raised intracranial pressure, hydrocephalus, or seizures. **Material and Method:** 10 cases were operated on for giant intracranial tuberculoma by gross total excision at a tertiary care hospital. **Results:** All the cases showed complete resolution of symptoms and absence of any new symptoms till their latest follow-up. Both, medical as well surgical management are accord together in the management of giant intracranial tuberculoma. Timely diagnosis and management are essential for better clinical outcomes.

KEYWORDS

Tuberculoma, giant, tuberculosis, Neurosurgery, excision, intracranial, mass effect, ATT

INTRODUCTION

Tuberculosis remains a substantial global burden especially in developing countries1,2. Mycobacterium tuberculosis, most commonly affects the lungs, other extrapulmonary sites commonly include the gastrointestinal system, the musculoskeletal system, the lymphoreticular system, the skin, liver, and the reproductive system; and rarely the CNS(central nervous system)2,3. Central nervous system involvement of tuberculosis is a rare entity but it is the most severe form of tuberculosis3. Mycobacterium tuberculosis causes various forms of cerebral tuberculosis; But, it can also be caused by other non-tuberculous mycobacteria such as M. avium-intracellulare in persons infected with human immunodeficiency virus(HIV)4. Central nervous system tuberculosis (CNS-TB) can present as meningitis (TBM), spinal arachnoiditis, and intracranial tuberculoma5.However, it rarely presents as a huge mass known as a giant tuberculoma which can mimic as, the neoplasm of brain on imaging6. Tuberculoma may cause hydrocephalus and, other signs and symptoms indicative of a CNS mass effect6. It can result in nonspecific focal neurological deficits associated with raised intracranial pressure, hydrocephalus, or seizures7. It usually spreads via hematogenous route from a distant source8. For diagnosis, assessment of complications, and monitoring; CT brain and MRI are useful imaging modalities5. When non-invasive methods are inconclusive Stereotactic biopsy with histopathological analysis can provide a definitive diagnosis; however, efforts should be made to find an extra-neural focus of TB for safer diagnostic sampling3,9. Other diagnostic methods if it is associated with TB Meningitis are CSF culture and analysis; tissue culture, Ziehl-Neelsen(Z-N) stain, immunohistochemical examination for mycobacterial antigen, enzyme-linked immunosorbent assay (ELISA) for tuberculous, polymerase chain reaction (PCR) for detection of mycobacterial DNA (Cartridge-based nucleic acid amplification test (CBNAAT)) improves diagnosis and they are also useful for testing drug resistance resulting in effective diagnosis and treatment6,9,10. CSF cultures, which takes up to 6 weeks provides sensitivity testing that further allows medications to be altered accordingly for medical management11.

In cases of giant tuberculomas with mass effects and failure of medical management, surgical interventions such as debulking surgery and gross total resection should be considered for better outcomes12–14. Although, medical management is preferred and ATT should be administered immediately if tuberculoma is suspected13.

MATERIAL AND METHOD

Series of cases operated for tuberculoma by Dr. Dipanker Singh Mankotia, were included in this study design. For the purpose of this study, giant intracranial tuberculoma was defined as a lesion with a size >5cm with a significant mass effect. There were a total of 10 cases of diverse age groups, (average age: 21.7 years) they were admitted with clinical features such as headache, vomiting, and seizures; signs and symptoms were related to mass effect, raised intracranial pressure, and few other constitutional symptoms. Patients who had infratentorial lesions had a history of vomiting and headache; whereas, supratentorial lesion cases also had a history of seizures. The diagnosis of Tuberculoma was made based on imaging studies, clinical features, and laboratory tests accordingly. They were managed by craniotomy and excision of tumor. All the patients did receive ATT for months along with other medical management such as steroids. All 10 cases had clinical and radiological follow-up at regular intervals with neurosurgery for any recurrence.

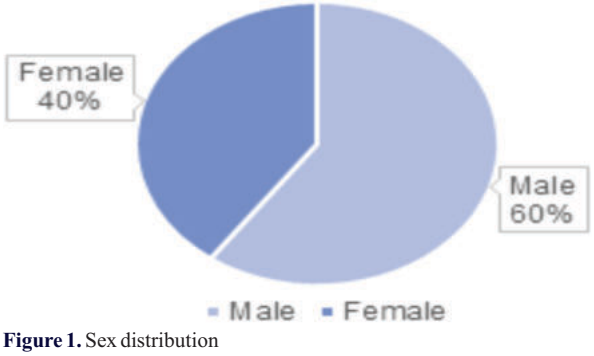


Figure 1. Sex distribution

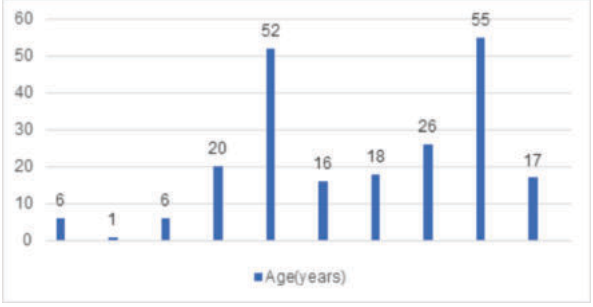
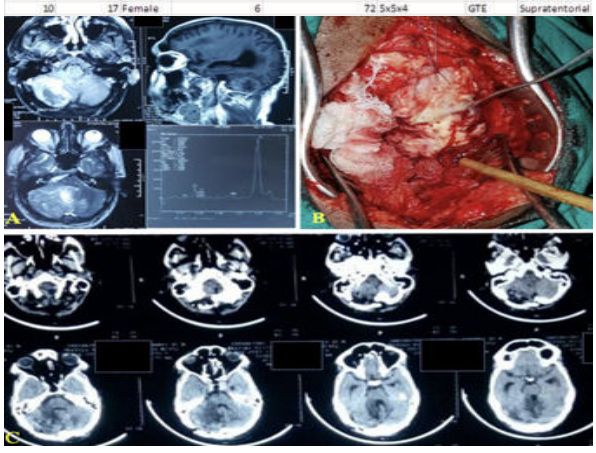


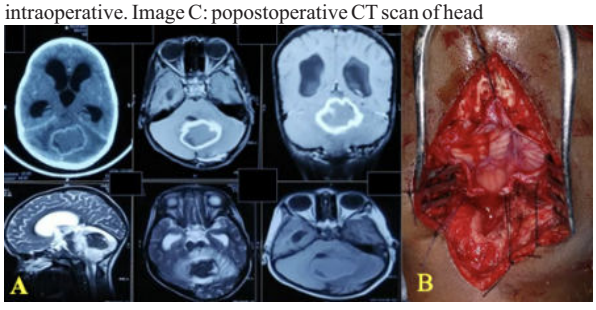
Figure 2. Age distribution

Table1. Shows Details Of All The Cases. Illustrative Images Below Shows Four Of Our Operated Cases

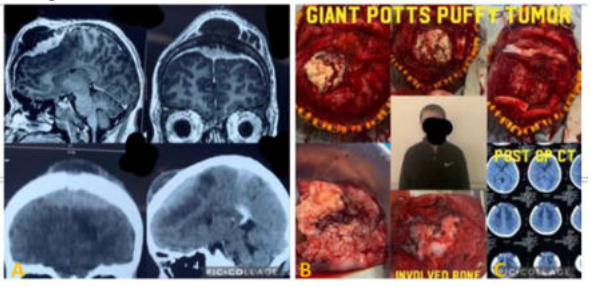
CASE	AGE (YEARS)	GENDER	DURATION OF SYMPTOMS IN MONTHS	FOLLOW UP(MONTHS)	TUMOR SIZE(CM)	SURGERY	LOCATION
1	6	Male	6	25	5x4x2	GTE	Infratentorial
2	1	Male	2	30	8x8x7	GTE	Supratentorial
3	6	Female	9	20	5x5x4	GTE	Infratentorial
4	20	Male	5	40	5x5x5	GTE	Supratentorial
5	52	Female	8	24	5x4x3	GTE	Infratentorial
6	16	Male	9	30	8x6x4	Subtotal excision	Supratentorial
7	18	Male	4	36	6x6x5	GTE	Supratentorial
8	26	Female	10	20	6x6x5	GTE	Supratentorial
9	55	Male	10	24	5x5x4	GTE	Supratentorial
10	17	Female	6	72	5x5x4	GTE	Supratentorial



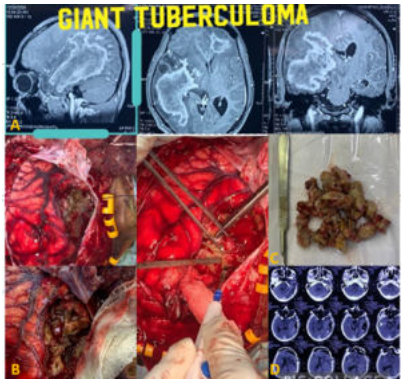
Illustrative case1. Image A: Pre operative MRI. Image B: intraoperative. Image C: popostoperative CT scan of head



Illustrative case 3. Image A: Pre operative MRI. Image B: intraoperative



Illustrative case 7. Image A: Pre operative MRI. Image B: intraoperative. Image C: Postoperative CT scan



Illustrative case 6: Image A: preoperative MRI. Image B: intraoperative. Image C: showing giant tuberculoma. Image D: postoperative CT scan

DISCUSSION

*T*uberculous is a major health issue in developing countries including India. Further, with an increase of the HIV epidemic, there is a rising horizon of tuberculosis incidence across the world including the developed nations12. CNS tuberculosis cases reported, are approximately 1% of all tuberculosis cases15. The most severe form of extrapulmonary tuberculosis (EPTB) is Central nervous system (CNS) infection, by *Mycobacterium tuberculosis* (MTB) resulting in increased mortality and morbidity16. It includes tuberculoma and tuberculous meningitis, in which majority of cases occur in children and immunocompromised patients3. Diagnosing CNS tuberculosis is a formidable diagnostic challenge due to its rarity and the variable nature of symptoms15. Tuberculomas are small tumor-like lumps that can be seen, usually in multiple numbers, in central nervous system involvement of tuberculosis7. It rarely coalesces to form a giant mass, producing severe mass effect and focal neurological deficits12. Clinical outcomes are largely dependent on timely diagnosis and treatment3. The second most common form of tubercular involvement of CNS is tuberculoma after TB meningitis14. It is mainly diagnosed by cranial imaging via CT scan or MRI, and histopathological examination17. Histopathological examination is the gold standard for a final diagnosis when other non-invasive methods are inconclusive7. The response to anti-tuberculous treatment can also be accepted as one of the methods of diagnosis, however, failure to respond does not rule out the diagnosis7 . In imaging studies, giant tuberculomas often mimic neoplasm3,14. Often, patients present with a history of active pulmonary TB, current positive tuberculin skin test, or recent exposure to tuberculosis and other risk factors such as immunocompromised or HIV positive15.Tuberculoma of the brain is mostly treated with 12–18 months of antituberculosis treatment (ATT) with or without surgery; Thereafter, some of the cases may require ATT for a longer duration18. To avoid further difficulties and the requirement for neurosurgical operations, adjuvant corticosteroid medication must frequently be administered at high dosages for extended periods of time19.Surgical management is a preferable option in cases of failure of medical management, progressive worsening of focal neurological deficit due to mass effect, or raised intracranial pressure11,12. Our cases document giant intracranial tuberculoma with supratentorial and infratentorial involvement. All our cases in this study design were immunocompetent. They were managed surgically by gross total excision followed by ATT.

RESULTS

In our study, ten patients were included (Males: Females =3:2; SD: 18.372). The average duration of symptoms was 6-10 months approximately. ATT was advised for 18 months duration. The author described giant intracranial tuberculoma measuring as >5cm. Three lesions were infratentorial and seven were supratentorial. All ten cases had history of headache and vomiting. Patients who had supratentorial lesion also had history of seizures. Mainstay of treatment was Craniotomy and gross total excision of tuberculoma followed by ATT. However, two of cases had decompressive craniotomy in view of severe mass effect even after excision of tumor and at sixth month they underwent cranioplasty. And VP shunt surgery was performed in three cases who had posterior fossa infratentorial mass which required CSF diversion. Subsequently, all the cases showed complete resolution of symptoms and absence of any new symptoms till their latest follow-up. Craniotomy and excision were mainstay except in few cases some additional procedures were done such as VP (ventriculoperitoneal) shunt surgery and decompressive craniotomy. Therefore, early diagnosis and treatment results in excellent surgical and medical outcomes. Adherence to vaccination and treatment with addressing underlying issues such as malnutrition and overcrowding can subdue CNS tuberculoma.

CONCLUSION

Consequently, early diagnosis and targeted treatments are important in this disease in terms of reducing mortality and morbidity. Giant tuberculomas can be effectively managed with characteristic radiology, an intensive ATT, and excision of tumor.

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