

## Case Report

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# Isolated 6<sup>th</sup> cranial nerve palsy: a rare manifestation of tuberculosis

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## ABSTRACT

Tuberculosis (TB) is a contagious infection that is usually caused by *Mycobacterium tuberculosis* bacteria. It usually affects the lungs and also spreads to the brain and spine. In the central nervous system, the neurological manifestations are numerous and varied and usually occur in two major forms, tuberculous meningitis and tuberculoma. Tuberculoma are well defined, granulomatous, space occupying lesions, which can occur anywhere in the central nervous system. Usually, brainstem tuberculoma can cause sixth and seventh cranial nerve affections along with motor and sensory symptoms, which are usually unilateral. Isolated abducens nerve palsy could be attributed to lesions of the nerve along their extra axial course and cause diplopia. Here we are presenting a case report of an 18-year-old boy with isolated sixth nerve palsy due to tuberculosis. The diagnosis of tuberculosis was achieved using interventional radiology for the purpose of biopsy. Using an image guided technique, we could avoid an open surgical procedure.

**Keywords:** 6th cranial nerve palsy, Diplopia, Tuberculosis, Tuberculoma, CT guided biopsy

## INTRODUCTION

The sixth cranial nerve, the abducens has the longest subarachnoid course of all cranial nerves and it innervates the ipsilateral lateral rectus (LR) which abducts the eye. Dysfunction of the sixth cranial (abducens) nerve can be due to lesions anywhere along its course starting from the sixth nerve nucleus in the dorsal pons up to the lateral rectus muscle within the orbit.<sup>1</sup>

Course of the sixth nerve is under the petroclinoid ligament. Contact of the nerve with the tip of the petrous pyramid makes this portion of the sixth nerve within Dorello's canal susceptible to pathologic processes. This is especially seen in cases that are secondary to localized inflammations or extra-dural abscesses occurring due to complicated otitis media.

Clinical presentation of patient with abducens palsy, is usually suspicious of an underlying neurological disorder

like raised Intracranial pressure, Meningitis, Brain tumour or Granulomatous conditions.<sup>2</sup>

Tuberculosis (TB) is one of the major global causes of morbidity and mortality and majority of these deaths are in developing countries. More than 2000 million people worldwide are infected with tubercle bacilli (1/3 of world's population). The incidence of tuberculosis is 110-165 cases per 100,000 population in the developing countries of Asia and Africa. India accounts for about 25% of the global TB burden. In 2019 the estimated incidence of TB in India was 2,640,000. Tuberculosis involving the central nervous system (CNS) is an important and serious type of extra-pulmonary involvement. Approximately 10% of all patients with tuberculosis have CNS involvement. CNS tuberculosis develops in two stages. Initially small tuberculous lesions (Rich's foci) develop in the CNS. This happens either during the stage of bacteraemia of the primary tuberculous infection or shortly afterwards. These initial

tuberculous lesions may be present in the meninges, the sub-pial or sub-ependymal surface of the brain or the spinal cord. These initial lesions may remain dormant for years after initial infection. Later, these lesions may rupture or grow and can produce development of various types of CNS tuberculosis. The pathogenesis for development of CNS tuberculosis can be hematogenous from a primary focus in the lung. Cranial nerve palsies occur in 20-30% of patients with tuberculosis and may be the presenting symptom of tuberculous meningitis. The sixth cranial nerve or abducens is most commonly affected cranial nerve. We report a case of abducens nerve palsy secondary to Tuberculoma formation around the cavernous sinus, internal carotid artery and extending up to the Mastoidantrum.

## CASE REPORT

An 18 -year-old male presented with a sudden onset of double vision associated with the inability to move Left eye outward. Patient gave history of unilateral Left sided headache and low-grade fever of about 15-20 days duration. A detailed history was taken and it was negative for any weakness, aphasia, confusion, ataxia, vertigo, or dysphagia. Past medical history was not significant and the boy was vaccinated as per schedule in childhood. There was no family history of tuberculosis or any other neurological illness.



**Figure 1: Left ward gaze : left eye remained in midline and was not able to move laterally while right eye was moving medially in normal manner.**



**Figure 2: Normal Right lateral gaze.**

On examination, on extreme left ward gaze the left eye remained in midline and was not able to move laterally while right eye was moving medially in normal manner (Figure 1 and 2). This made the squinting most prominent. The rest of the Neurological examination was normal.

Ophthalmological examination revealed absolutely normal acuity of vision, field of vision and colour vision. The Retina, Optic cup and disc were normal. Pupils were bilaterally equal, round and reactive to light with no afferent pupillary defect was noted.



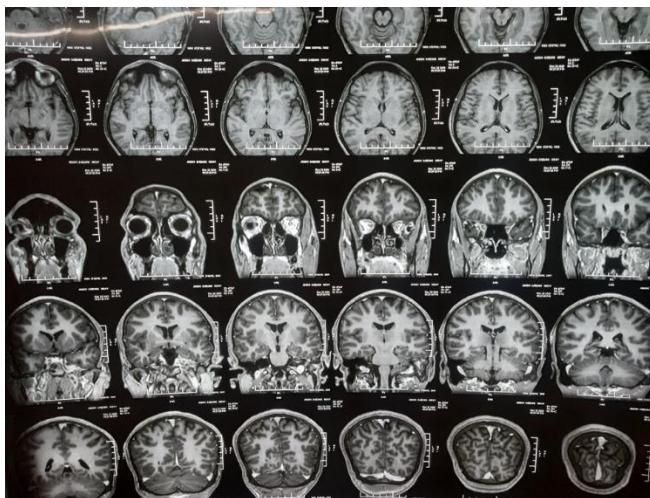
**Figure 3: CT guided tru-cut biopsy from left mastoid antrum under local anaesthesia.**

Otological examination showed bilateral normal tympanic membrane and hearing tests were also normal.

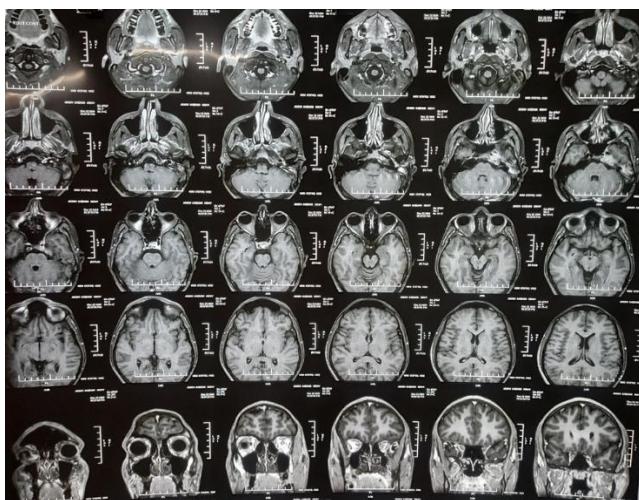
Laboratory examination showed normal hematological profile with only raised erythrocyte sedimentation rate of 45 mm/1st hour. Renal function tests and liver function tests were within normal limits. Viral markers for HIV, HBs Ag and HCV were negative. Thyroid profile was normal. X-ray chest was normal. In view of the current COVID-19 Pandemic an RT-PCR for COVID-19 was done which was negative. HRCT of lung was done which was CORADS 1. On the advice of the physician a Lumbar puncture was also done and CSF sent for analysis which was within normal limits. CSF examination was carried out for protein, sugar, total and differential leukocyte count normal limits. Gram stain, acid fast bacilli (AFB) stain, polymerase chain reaction (PCR) for mycobacterium was negative and analysis for malignant or atypical cells was also negative.

A non-contrast magnetic resonance imaging (MRI) scan of brain showed focal poorly defined, abnormal signal intensity lesion in inferolateral part of left cavernous sinus, left Meckel's cave causing their enlargement

(Figure 4). Lesion was abutting the cavernous segment of left ICA for approximately 180-degree circumference and extending into and below the foramen ovale. Contrast MRI revealed lesion was reaching up to Left inferior orbital fissure, extending across left foramen ovale with extension inferior to skull base reaching up to left Vidian canal and foramen rotundum, enhancement was also present in left mastoid air cells and the middle ear, indicating possibility of inflammatory or Granulomatous etiologies (Figure 5).



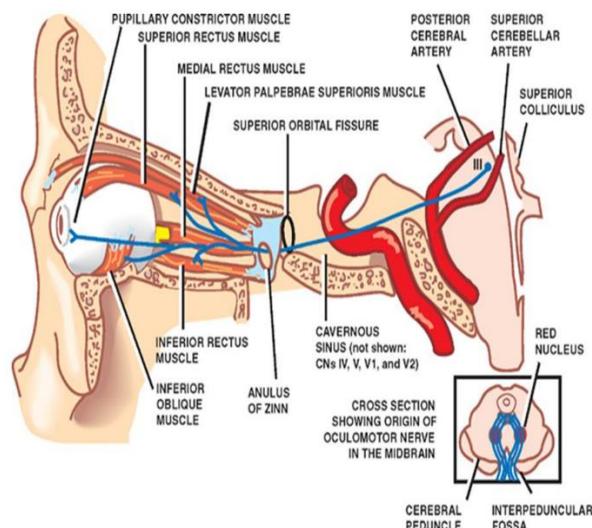
**Figure 4: A non-contrast magnetic resonance imaging (MRI) scan of brain with focal poorly defined, abnormal signal intensity lesion in inferolateral part of left cavernous sinus, left Meckel's cave.**



**Figure 5: Contrast MRI : lesion reaching up to Left inferior orbital fissure, extending across left foramen ovale.**

CT guided tru-cut biopsy from left mastoid antrum was done by our interventional radiologist under local anaesthesia (Figure 3). This procedure helped us in establishing a diagnosis and preventing an open biopsy from Mastoid antrum under general anaesthesia. Biopsy

sample was sent for Histopathological examination, AFB staining and also gene X-pert test. Gene-X-pert, a CBNAAT (cartridge based nucleic acid amplification test) is a diagnostic test for Tuberculosis. This test is not only a rapid diagnostic test for Tuberculosis detection but helps in detecting Rifampicin resistance. All the tests were positive for tuberculosis and gene X-pert also showed no Rifampicin resistance.



**Figure 6: Pathway of abducens nerve.**

Patient was started on 4 drug, rifampicin, isoniazid, pyrazinamide and ethambutol anti tubercular treatment. We are happy to report that at the end of the first month of treatment the diplopia has resolved. Patient will however continue his anti-tubercular treatment for the prescribed duration of 9 months.

## DISCUSSION

Abducens nerve palsy is the most common isolated cranial palsy as the nerve has a long peripheral course. The abducens nucleus is situated in the caudal pons, at the level of the facial colliculus. Isolated nuclear lesion of the abducens nerve is extremely rare as facial nerve loop and pontine gaze center are located in the vicinity of the abducens nerve nucleus, so any lesion at this level would cause multiple cranial nerve palsies. Abducens nerve exits from the brainstem at the margin of the pons and medullary pyramids (Figure 6). The differential diagnosis of abducens nerve palsy demands extensive investigation to find the proper cause as the nerve can be affected at any point in its long intracranial course. An isolated abducens nerve injury can be due to vascular, neoplastic, degenerative, infectious, inflammatory or traumatic etiology. A high index of suspicion must be kept for diagnosis of tuberculous meningitis or intracranial tuberculoma in any patient from a developing country having multiple or isolated cranial nerve palsies. A past

history suggestive of exposure to tuberculosis may also help in reaching a diagnosis.

Brainstem tuberculoma may present with low grade fever, weight loss, vomiting along with sixth and seventh cranial nerve involvement which is usually unilateral. Isolated abducens nerve palsy could also be due to lesions of the nerve along their extra axial course. Diagnosis can be made on basis of Imaging modalities like CT scan or MRI. A biopsy whenever possible from the lesion is usually diagnostic.<sup>3-11</sup>

## CONCLUSION

Tuberculosis is an infectious disease caused by *Mycobacterium tuberculosis*. It is a curable and preventable disease. India has a disproportionately large burden of the world's tuberculosis cases and it continues to be the biggest health problem in India. The world health organisation (WHO) TB statistics for India for 2019 gives an estimated incidence of 2.64 million cases. This means a rate of 193 case of tuberculosis per 100,000 population. A thorough clinical examination, appropriate laboratory and radiological tests and a high index of clinical suspicion can help in diagnosing Tuberculosis presenting as an isolated cranial nerve palsy and thereby treating and curing it.

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