

# TUBERCULOMAS OF THE CRANIOSPINAL AXIS

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## **SUMMARY :**

*Seventeen neuraxis tuberculoma cases diagnosed and treated at Hacettepe University Medical Central between 1965 and 1988 were reviewed. Thirteen of these patients were explored surgically and all except two who died received anti-tuberculous chemotherapy in the postoperative period. In four patients who received aggressive medical treatment without surgical intervention, this treatment led to regression of lesions which was monitored by sequential computed tomography (CT).*

*An analysis of the clinical features in the 17 cases showed certain similarities and some interesting differences from previously reported series. The diagnosis of tuberculoma of the central nervous system can be made independently of pulmonary processes. Any delay in establishing diagnosis and adequate treatment may result in disabling morbidity and even mortality.*

## **KEY WORDS :**

*Anti-tuberculous chemotherapy, Computed tomography, Craniospinal axis tuberculoma, Surgical intervention, Tuberculoma*

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*Tuberculoma of the central nervous system is a rare form of extrapulmonary tuberculosis (2,3,13,16,19,23). Although some recent reports have emphasized the increasing frequency of tuberculoma in India and some countries in eastern Europe and the Middle East (1,2,13,14,17), improvement in socio-economic standards and anti-tuberculous treatment has resulted today in an impressive decline in the incidence of tuberculoma of the central nervous system (14,15,19). In the twenty-four years period from January 1965 to December 1988, 17 patients with neuraxis tuberculomas were encountered at the Department of Neurosurgery of Hacettepe University Hospital. These 17 cases comprise approximately 0.5 per cent of the intracranial and intraspinal tumours studied at the centre during this period.*

*The aim of this paper is to present 17 cases that were admitted in recent years with neuraxis tuberculomas and treated, review the experience of our clinic with this form of tuberculosis and compare our data with the relevant literature.*

## **PATIENTS AND METHODS**

A retrospective analysis of the case records of 17 cases with neuraxis tuberculoma seen in our department was undertaken. The diagnosis of tuberculoma was on clinical and radiological grounds in the first instance and confirmed by histology in those patients who had surgery, or by the response of the patients to anti-tuberculous treatment without surgical intervention. Only four patients received medical anti-tuberculous treatment without surgical treatment. Out of 13 patients operated, 11 were treated during the operation and postoperatively with anti-tuberculous chemotherapy. The remaining two patients died during the 15-day postoperative period before receiving chemotherapy and will not be analyzed further in terms of survival.

## **FINDINGS**

In Table 1, distribution through the years is shown. As it is seen, incidence of tuberculoma is gradually decreasing from eight cases in the period 1965-1970 to two in 1983-1988.

Nine male (53 %) and 8 female (47 %) patients ranged in age from 6 to 54 years were seen. Anatomical location of the tuberculomas according to age group is shown in Table 2.

### **Clinical Presentation**

The interval between onset of complication and date of admission to hospital ranged from 20 days to 3 years. Most of the patients came to hospital because of syndrome of intracranial hypertension. In ours, and

in other series (19), headache was the most common complaint. In 7 patients (41%), the first symptom was headache, the chief symptom of intracranial hypertension. Seizures were the presenting symptoms in 5 (29%) patients. The incidence of these symptoms is reversed in some series (15). Focal weakness and visual disturbance were less common (Table 3).

The findings of neurological examinations in 17 patients are entirely non-specific and relate to the area of craniospinal axis involvement as well as raised intracranial pressure or spinal cord compression. Non-specific findings (i.e., papilledema and hyperactive deep tendon reflexes) were the most common, with motor weakness, cranial nerve disturbance and cerebellar symptoms the next most often seen. Sensory changes, intellectual impairment and sphincter disturbances were less often found (Table 4).

On physical examination, a careful search for foci of tuberculosis in the lung or other organs is essential. Pulmonary tuberculosis was found in 4 patients (24%). Also, there was a strongly positive family history of tuberculosis in 1 patient.

### RADIOLOGICAL FINDINGS

As noted previously in the literature, calcification of the tuberculoma is rare, occurring in rare, occurring in 1 to 6 per cent of reported cases (2,8,15,18). Thus, direct x-ray films of the craniospinal axis are commonly normal, only in 1 (6%) was there x-ray evidence of increased intracranial pressure. None of the tuberculomas showed x-ray evidence of calcification. Also, chest radiographs demonstrated tuberculosis in 3 out of 17 patients.

Only 9 patients underwent computed tomography (CT) before treatment, and all of these scans were positive. Also, followup CT, the investigation of choice today, was used for checking the course of the disease (5,14,15,17,24). In 13 cases the lesions were simple. This incidence is important because of the possibilities of surgical treatment of the condition.

Carotid angiography was carried out in only 7 patients before or after the availability of the CT scanner. In 5 cases, angiography showed displacement and absence of vessels in the region of the tuberculoma. All but two electroencephalograms (EEGs) obtained from 16 patients were abnormal (88%). Electroencephalographic records of tuberculomas did not differ from those found with tumours, that is, slow sharp waves, indicating hydrocephalus, cerebral edema or cortical irritation. Pantopaque or air ventriculography was carried out in 2 patients before the CT scanner became available and abnormal findings. Myelography was performed in 1 case and revealed a complete block (Table 5).

TABLE 1

#### Distribution of the cases according to years

Years	No. Cases	%
1965-1970	8	47
1971-1976	4	23
1977-1982	3	18
1983-1988	2	12

TABLE 2

#### Distribution According to Localization

AGE	LOCALIZATION				
	Cerebral	Cerebellum	Midbrain	Intraspinal	Multiple
0-10	1	1	-	-	-
11-20	2	2	-	-	-
21-30	2	2	-	-	-
31-40	-	1	1	1	-
41-50	2	-	-	-	1
51-60	-	-	-	-	1
Total	7 (41%)	6 (35%)	1 (6%)	1 (6%)	2 (12%)

TABLE 3

#### Presenting Symptoms

First Symptom	No.	%
Headache	7	41
Seizures	5	29
Weakness	3	18
Visual Disturbance	2	12

TABLE 4

#### Neurological Abnormalities

Signs	No.	%
Papilledema	6	35
Abnormal Reflexes	5	29
Motor Deficit	5	29
Cerebellar Signs	4	24
Cranial Nerve Disturbance	3	18
Sensory Disturbance	1	6
Mental Disturbance	1	6
Sphincter Disturbance	1	6

#### Results of Treatment

One patient underwent tuberculoma biopsy only, and in one case total removal was thought to be achieved by the operating surgeon. Furthermore, one case was treated with a ventriculoarial shunt placement only. Eleven patients received anti-tuberculous treatment in addition to surgical procedure. One patient had biopsy only before medical treatment. Three

cases were listed as subtotal tuberculoma removal, with 7 total tuberculoma excisions listed in the group treated with postoperative anti-tuberculous treatment. Only 4 patients received medical anti-tuberculous treatment without surgical treatment. Anti-tuberculous treatment with 3 or 4 antibiotics-rifampin, isoniazid, streptomycin and pyrazinamide or ethambutol hydrochloride-was administrated.

Two cases died after the surgical procedure as a result of the operation itself, the mortality rate was 12 %. Fifteen patients for whom adequate follow-up data were available had follow-up examinations for a postoperative period of 1 to 6 years. It was found that 9 (60 %) were completely normal; 5 (33 %) had minimal neurological deficits; and 1 (7 %) patient had severe neurological deficits. No recurrences were seen in our series (Table 6).

**TABLE 5**  
**Diagnostic Studies**

Study	No.	No.	%
	Positive	Negative	Accuracy
Direct x-ray Films	1	16	6
CT	9	—	100
Angiography	6	1	86
EEG	14	2	88
Ventriculography	2	—	100
Myelography	1	—	100

**TABLE 6**  
**Result of Treatment at Follow-up Examination**

Treatment	Results		
	Normal	Minimal Deficit	Severe Deficit
Medical+Surgical			
Bopsy	1	—	—
Subtotal Excision	1	2	—
Total Excision	4	2	1
Medical Alone	3	1	—
Total	9 (60 %)	5 (33 %)	1 (7 %)

## DISCUSSION

The first operation for intracranial tuberculoma was performed by Sir William MacEwen in 1883 (17). During the next century, the incidence of tuberculoma dropped from 40 percent to 0.5 percent of all intracranial space-occupying lesions in most developed countries (2,14,17,20). In Turkey, people with no previous contact with factories and large towns moved into the industrialized cities in the 1950's, they are easily tuberculized and became very susceptible to tuberculosis and as a result of this immigration. Dur-

ing the last 20 years, however, there has been great improvement in their health because of improved socio-economic standards and modern chemotherapy. And, consequently, the incidence of tuberculomas of the central nervous system has been declining by same factors from year to year at our clinic, consistent with other series (11,14,15,19). Today, except a few countries, tuberculoma is encountered with decreasing frequency.

Tuberculomas of the craniospinal axis are the result of hematogenous spreading from a primary focus elsewhere in the body, most often the lung. The incidence of associated pulmonary tuberculosis varies from 25 to 75 % (4,9). In our series, pulmonary tuberculosis was found in 4 patients (24 %). For this reason, the finding of an undamaged lung on x-ray examination does not conclusively rule out the clinical or surgical diagnosis of tuberculoma of the central nervous system. The age distribution of our patients with tuberculomas of the craniospinal axis parallels that of tuberculosis. As noted previously in the literature, although the reason for predisposition is not understood, supratentorial tuberculomas occur most frequently in adults and infratentorial ones in children (2,5,11,12,14,17). The sex distribution is approximately equal as in our series. They are usually cortical-subcortical and their size is variable (3,5,11,12,24).

A review of the literature reveals a wide range of clinical signs and symptoms. In the majority of intracranial tuberculomas the symptomatology is similar to that of gradually-expanding intracranial lesions. Seizures, focal neurological deficits and increased intracranial pressure each occur in most cases (5,14,15,17,19). General symptoms, such as asthenia, night sweating and laboratory findings are rare (2,14).

In the diagnostic studies; pathological findings were seen in 6 % of the patient at direct x-ray, 86 % on angiography and 88 % on EEG. The correct diagnosis was made in all patients who underwent CT. The value of 100 % which was obtained myelographically and ventriculographically is misleading because few cases had undergone these procedures. Today, although CT scanning is the best procedure for diagnosis and management of intracranial tuberculomas and intraspinal tuberculomas, they have no pathognomonic appearance on CT scan or other diagnostic studies. The CT image demonstrates an area or areas of low attenuation with an associated mass effect. After administration of a contrast medium, the areas of enhancement appear (Fig 1).

It is important to emphasize that in two cases the symptoms of tuberculoma appeared during anti-tuberculous treatment for tuberculous meningitis. One had intraspinal tuberculoma, and the other intracranial. There was also one case with intracranial tuberculoma which appeared 9 months after both



FIG 1 : Contrast-enhanced computerized tomography scan showing a tuberculoma within the cerebellum, the commonest site. The lesion located in the cerebellar vermis.

tuberculous meningitis and pulmonary tuberculosis. All were interesting and responded to anti-tuberculous treatment. Teoh and al. described 10 patients with intracranial tuberculoma which developed during treatment for tuberculosis (22). For this reason, some see tuberculoma as a complication of meningitis. Though symptomatic tuberculoma developing and enlarging following chemotherapy has been reported by many authors (10,22), the exact mechanism is unclear (22). The tuberculoma could have been present when therapy was started, but must have been small and asymptomatic, as it was not seen on CT scans.

The surgical treatment of tuberculomas has been practised for a long time, and postoperative fatal complications, e.g. meningitis, have been published (2,8, 14,19). With the appearance of modern antituberculous chemotherapy the result of surgery in tuberculoma have greatly improved (3,14, 19). Surgery is indicated for both diagnosis and therapy of tuberculomas (17). But, on the other hand, more recent studies indicate that conservative treatment with anti-tuberculous antibiotics was initiated and surgery considered only for non-response to anti-tuberculous therapy (3,5,15,16,24). But, if CT is not diagnostic and there is confusion with gliomas, meningiomas, or metastatic neoplasia, many of these lesions require biopsy to reveal their pathology (5,12,24,25). In our series, analysis of the successfully-treated cases shows that the development of tuberculous meningitis in the postoperative period was prevented in all cases by aggressive medical treatment after excision of the tuberculoma. Also, in 4 patients who received medical therapy alone, treatment led to regression

of the lesions. Medical treatment with 3 or 4 antibiotics was given for 1 to 1.5 years after or without excision of the tuberculoma.

Consequently, our experience with these patients suggests that intracranial tuberculomas should be treated conservatively and surgery should be considered only for those patients who have intraspinal tuberculoma and present with severely raised intracranial pressure, and who show CT evidence of a mass effect (15,24). But, it must be emphasized that non-surgical management of tuberculomas requires frequent serial CT scans (17).

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