Pathogenesis of Unusual Intracranial Tuberculomas and Tuberculous Space-Occupying Lesions*

Gajendra Sinh, F.R.C.S., S. K. Pandya, M.S., and Darab K. Dastur, M.D.
Department of Neurosurgery, and the Neuropathology Unit, Indian Council of
Medical Research, Sir J. J. Group of Hospitals, Bombay, India

The persistently high incidence of intracranial tuberculomas in India has led to
a number of studies analyzing brain tumors that document this group in detail.
Dastur and Iyer,5 Ramamurthi and Varadarajan,12 and Dastur and Desai2 have each re-
ported that about 20% of all intracranial space-occupying lesions in their series were
tuberculomas. The percentage rises to 47% when brain tumors in children under 15
years of age are considered separately.3 This incidence, of course, contrasts markedly with
the almost negligible occurrence of this particular granuloma in many of the recent
Western series of brain tumors10 and is reminiscent of the older European observations.9

Method

We have studied 70 tuberculomas out of
a total of 386 space-occupying lesions op-
erated on and histologically verified during
the years 1960–1966. Standard neurologi-
cal and radiological examinations were fol-
lowed by operative exploration and patho-
logical examination of the specimen. The
manifestations and appearances of the usual
type of brain tuberculoma are too well
known to be elaborated upon. The great ma-
jority (58%) of our specimens were from
cases of this sort.

The purpose of this paper is not to underta-
take the usual clinical analysis of this ma-
terial, but to present a discussion of the possi-
ble pathogenetic mechanisms underlying
some of the unusual types of intracranial
tuberculomas. Twelve unusual intracranial
tuberculomas or tuberculous space-occup-
ing lesions will be considered under the fol-
lowing headings: 1) incipient types; 2) those
associated with the subdural cyst; 3) cystic
tuberculoma; 4) tuberculous abscesses with
or without a solid tuberculoma; 5) edematous
encephalopathy with or without an inconse-
quential tuberculoma; and 6) tuberculoma
with a transdural spread to the calvarium. At
least one illustration from each of these six
groups will be considered in detail.

Incipient Tuberculoma

Case 1. (Irregular cerebellar cortical and
meningeal tuberculomatisis.) A 17-year-old
girl was admitted with complaints of convul-
sions of the right arm and weakness for the
past 2 years. The convulsions came at irreg-
ular intervals and were at times followed by
coma. Over the 5 months before admission,
the patient had experienced a progressive
loss of vision, and for the fortnight before
admission had been totally blind. During this
time she was vomiting and had an unsteady
gait, and during the last week had a severe
neck pain.

Examination. The patient was in severe
agony each time she tried to turn her head
and neck. She was fully conscious, intelli-
gent, and cooperative. There was marked
stiffness of the neck. She was totally blind,
with dilated pupils and severe bilateral papil-
ledema. There was gross right-sided incoor-
dination. Plain skull x-rays were normal, but
a ventriculogram confirmed the presence of
a cerebellar tumor.

Operation. The dura was seen to be ad-
herent to the cerebellar cortex, the latter
being gliotic and tough. The right cerebellar
hemisphere, especially in its medial half, was
of varied consistency, firm in some places,
hard in others. When explored, small irreg-
ular masses of grey-brown vascular tissue
were seen replacing about 1½ in. of the right
cerebellum, each of these areas being distinct
from the other but bound together by abnor-
mal gliotic cerebellar tissue. Both cerebellar
tonsils had herniated through the foramen

Received for publication January 25, 1968.
* Presented at the Second Congress of the Asian
and Australasian Society of Neurological Surgeons,
Sydney, Australia, April, 1967.
magnum. The abnormal cerebellar tissue was excised en masse.

Postoperative recovery was uneventful. The patient was readmitted 2 weeks after discharge because of recurrence of the right-sided fits. Medication in the hospital controlled the convulsions which were felt to be secondary to a small left-sided cerebral cortical tuberculoma, too small to be seen on ventriculography. On antitubercular therapy, she has remained asymptomatic, apart from the total blindness.

**Histological examination.** There were small discrete tubercles or masses of granulomatous reaction with vasculitis, giant cell systems, and an outward extension in the form of an irregular plaque involving the meninges (Fig. 1). Thus, there was a mixture of meningeal and cortical, discrete and confluent masses of tuberculoid reaction. Caseation was noticed only in the larger granulomatous masses, both meningeal and cortical. The findings indicated an early cerebellar cortical and meningeal tuberculomatosis.

**Case 2.** (Grape-like clusters of tuberculomas along a cerebral vessel). A 20-year-old woman was admitted with the complaints of progressively severe headache, vomiting, and right-sided convulsions for 4 years. For 8 months she had noted a progressive right-sided weakness, and for 2 weeks, failing vision and difficulty in speaking.

**Examination.** The patient was fully conscious but slow of speech. Gross bilateral papilledema was noted, with a minimal weakness of the right lateral rectus muscle. The right limb power was graded at 3, left at 5, the right limbs being spastic with exaggerated deep reflexes and an extensor plantar response. Right limb and trunk sensations were impaired. A left parietal tumor was diagnosed clinically and confirmed by ventriculography.

**Operation.** The brain was tense, and at a depth of 1 in, from the cortex several discrete, firm, vascular, circular, and ovoid masses were seen distributed along cerebral vessels, being of varying sizes and discrete from one another. The "tumors" were excised, and with antitubercular therapy the patient improved. When discharged, mild residual papilledema was noted, but the right limb power was now graded at 4.

**Histological examination.** The tuberculomas were composed of a conglomerate mass of microscopic tubercles, with intervening lymphocytic borders and not much caseation.

**Subdural Cyst Overlying Intracerebral Tuberculoma**

**Case 3.** A 7-year-old boy was admitted with irregular, continuous pyrexia for the preceding 6 weeks and progressive drowsiness for the past 4 weeks. The cerebrospinal fluid examined elsewhere 4 weeks before admission had been found to contain markedly increased proteins, diminished chlorides and sugar, and 173 cells, mainly lymphocytes.

**Examination.** The patient was very drowsy, had mild neck stiffness, and gross bilateral papilledema. Generalized weakness was noted but the limb tone was normal all over. There was no obvious sensory deficit, and the reflexes were within normal limits. The child was emaciated and pale. Plain skull x-rays showed a widening of the sutures. A subdural pneumogram showed a large right subdural cyst with a shrunken cerebral hemisphere on that side (Fig. 2).

**Photomicrograph of diffuse meningocortical tuberculomatosis.** The more active cellular part of the granuloma had penetrated into a sulcus. H. & E., ×100.