INTERRACRANIAL MENINGEAL CHONDROMA

B. RAMAMURTHI, M.D., C. G. S. IYER, M.D., AND S. P. VEDACHALAM, M.D.

Department of Neurosurgery, Madras Medical College, Madras, India

(Received for publication March 2, 1961)

The sparsity of recorded primarily meningeal cartilaginous neoplasms is evident from a perusal of the literature. According to Chorobski et al.,2 Hirschfeld3 was probably the first to record an intracranial tumor that could be classified as a chondroma. Chorobski et al., Siris and Angrist,6 and Forsythe et al.3 are some of those who have reviewed the literature on this subject when reporting their own cases. From these reviews it appears that intracranial new growths either wholly or partially cartilaginous may arise from one of several sites within the cranium. These sites include the base of the skull and the bony sinuses, the dura mater, the leptomeninges and rarely the choroid plexus.

A total of 42 intracranial chondromas were found in the literature to the present time. Of these, some were of meningeal origin. A meningeal neoplasm formed exclusively of cartilage is an unusual occurrence that raises questions regarding its mode of origin.

CASE REPORT

No. N.S. 647/59. A.R., a young man aged 18 years, was admitted to the Neurosurgical Unit, Government Hospital, Madras, for headache and blurring of vision.

Four months previously the patient had experienced numbness of the left leg which spread gradually upwards. Soon thereafter, the left leg was noted to drag when walking. This was followed by onset of headache, which was generalized, and was particularly severe early in the mornings. The headache was accompanied by bouts of vomiting and, for the last 2 months, by blurring of vision. These symptoms continued and for the last 2 weeks he had had focal convulsions involving the left half of the body.

Examination. He was an ill-nourished young male. There was an infected wound on the right side of his head caused presumably by a burr-hole made elsewhere before this admission in an attempt to relieve the intracranial hypertension. Papilledema was noted in both fundi. There was bilateral paralysis of the 6th cranial nerve, and slight weakness of the lower half of the left side of the face was found. There was spasticity and weakness of the left upper and lower limbs, the lower limb being more affected than the upper. All deep tendon reflexes were exaggerated on the left side, and an extensor type of plantar response was elicited on stroking the sole of the left foot. No abnormalities of the sensory system were revealed.

A tentative diagnosis of a right cerebral hemispherical—probably parasagittal—space-occupying lesion was entertained. Right carotid angiography revealed a depression of the corresponding anterior cerebral artery (Fig. 1).

Course. Craniotomy was postponed pending control of the infection of the scalp. During the course of antibiotic therapy for the latter, the symptoms of intracranial hypertension became aggravated, and an operation had to be performed earlier than planned originally.

Operation. A right lateral parasagittal craniotomy disclosed a tense dura mater, and with a needle through this membrane, a hard mass was encountered at a depth of about ℎ cm. from the surface. Incision of the dura mater revealed a large glistening, greyish-white nodular mass of tumor between the medial surface of the right cerebral hemisphere and the falx cerebri. The tumor appeared to be firmly adherent medially to the right surface of the falx cerebri and the sagittal sinus. Over its lateral extent it was free from the surface of the brain. Because of its enormous size, piecemeal removal was resorted to, and a space measuring about 41/2 X 31/2 X 21/2 was found to have been occupied by the mass. Bleeding from the surface of the falx and the sagittal sinus was attended to, and the wound was closed as usual.

Postoperative Course. The patient failed to regain consciousness and despite adequate attention, expired
hours later. Postmortem examination was not permitted.

Pathological Examination. Several portions of a greyish-white, glistening tumor, weighing in all about 40 gm., were available. The largest of these measured about 7X5X3 cm. and presented a convex, lobulated glistening outer surface and a ragged inner surface (Fig. 2) apparently indicating the area of attachment to the falx. On section the mass was greyish-white and homogeneous, not unlike the cut surface of cartilage.

Microscopic sections from numerous areas stained with hematoxylin and eosin and periodic acid Schiff technique revealed the following features. On one side was a connective-tissue membrane that dipped into the tissue in places, carrying with it a core of thin-walled blood vessels. In the interstices between these vessels were a number of pale vacuolated or granular cells with central or eccentrically located nuclei (Fig. 3). Sections stained with periodic acid Schiff revealed that these cells contained periodic acid Schiff-positive granules.

Fig. 2. (Left) Photograph of largest portion of the chondroma showing the lateral surface that excavated into the cerebral hemisphere. (Right) Ragged medial surface of same specimen indicating attachment to the falx.

Fig. 3 (above). Medium-power photomicrograph of an area in the tumor showing groups of vacuolated cells between blood vessels in the connective-tissue core.

Fig. 4 (below). Histological appearance of main portion of tumor showing adult cartilage cells in a hyaline stroma.
The large bulk of the tissue consisted of numerous groups of cartilage cells in a hyaline matrix (Fig. 4). Occasional small areas of calcification were seen. Throughout the extent of all the sections studied no other elements than those described above were seen.

**COMMENT**

The clinical features presented by this patient were those of a right-sided, parasagittal, space-occupying lesion. The duration of symptomatology was brief in relation to the size and nature of the lesion. At operation there was disclosed an intradural mass adherent to the falx, which in its gross behavior had resembled a parasagittal meningioma. The microscopic features were, however, unusual as the only tissue recognizable in several portions submitted for histological examination was cartilage with occasional areas of calcification. This cartilage was formed of groups and sheets of adult cartilage cells.

The histogenesis of the chondromas or osteochondromas that arise from the bones of the skull, both of the base and of the vault, has been discussed by Chorobski et al. No elaborate explanation is necessary for those tumors having their origin from the base of the skull. Chondromas that occasionally arise from the vault are supposed to be derived from embryonal cartilaginous rests that either become included into parts of the otherwise membranous bones or persist in these bones from early stages of development. That such cartilaginous foci are found in the membranous skull was shown by Bonnet in 1891, as cited by Chorobski et al.

In the present case, however, as in some others recorded previously by others, the chondroma was clearly subdural and attached firmly to the falx cerebri. According to Chorobski et al. and other authors, it is likely that these dural chondromas are derived from rests of embryonal cartilage displaced from the bones of the skull into the dura mater. It is also likely that such aberrant cartilaginous rests might develop from cartilage cells carried along the vascularized menenchyme and blood vessels as they creep from the base over the brain during development. An alternative explanation for the development of intracranial chondromas appears to be a chondromatous metaplasia with subsequent new-growth formation of pluripotential menenchyme within the dura mater or other parts of the brain. Whatever may be the mode of origin of these tumors, in their clinical behavior and in their mode of growth within the cranium, they mimic the more commonly occurring dural neoplasms in their slow rate of growth and absence of active infiltration.

The more than coincidental association of trauma as a possible factor in the development of these peculiar tumors has been mentioned by several authors. It would appear that trauma could either help in the displacement of cartilaginous inclusions within the dura mater or possibly initiate the growth of these tumors from rests within the membrane. In either case trauma could be considered as the provocative agent in these abnormal growths. A history of trauma was recorded in the cases reported by Verbruggen and Learmonth, Alpers, Chorobski et al., Siris and Angrist, Freiman and Ficarra, and the 2 cases reported by Forsythe et al. In our case there was no history of trauma to the skull. Also, as might be expected from their slow growth and noninfiltrative character, these tumors are amenable to complete surgical removal, and in some of the cases recorded in the literature this was apparently achieved with satisfactory results. The growth in the present case was removed completely at operation, but postoperative complications and surgical shock led to the fatal outcome.

**SUMMARY**

1. A case is recorded of a solitary subdural chondroma arising from the falx cerebri in a young man, 18 years of age.
2. The patient presented clinical manifestations of a slowly growing space-occupying lesion.
3. The tumor both in its gross and microscopic characteristics presented features of a benign chondroma.
4. The literature is reviewed in brief with particular reference to the histogenesis of these unusual new growths.

We wish to express our thanks to the Dean, Madras Medical College, Madras, for permission to publish this article.

**REFERENCES**

5. **HIRSCHFELD, L.** Cited by Chorobski et al.