Case Report and Technical Notes

Adult Teratoma of the Gasserian Region

G. Schisano, M.D., and G. Westberg, M.D.

Departments of Neurosurgery and Radiology, Serafimerlasarettet, Stockholm, Sweden

Observations on tumors located in the medial part of the middle cranial fossa have become rather frequent in recent years. Different kinds of tumors may be found in such a position, the majority of them giving rise to typical clinicoradiological syndromes. Neurinomas of the gasserian ganglion and meningiomas attached to the floor of the middle fossa seem to be the most common among the extracerebral tumors of this region. By contrast, the benign teratoma removed successfully 10 years ago, and reported on in this paper, constitutes an extremely rare variety of tumor localized to the medial part of the middle fossa. We have not been able to find in the literature another case of teratoma with such a location. It may be remembered that Weber in a paper dealing with 71 cases of teratoma (including 7 personal observations) described a patient with an orbital tumor extending into both the anterior and the middle fossa. The patient had no symptoms from the oculomotor or trigeminal nerves. Epidermoid tumors of the gasserian region seem to be somewhat more frequent than teratomas (1 case, Fasiani et al., 3 cases, Baumann and Bucy). Apart from the rarity of our case, the clinical syndrome typical of the location and the highly characteristic radiological changes seem to be of interest.

Case Report

M.A., a 7-year-old boy, was admitted to the Neurosurgical Clinic of Serafimerlasarettet on May 8, 1952. In the 2 years before admission his father had observed a progressive left-sided exophthalmos. Six months after the onset of the symptoms the boy started to complain of severe pain on the left side of his face. The pain was localized to the left eye, but often extended to the cheek and lips as well. It occurred in attacks lasting about 15 min., sometimes several hours. It was usually fairly severe, and at times was followed by lacrimation, reddening of the conjunctiva, and even vomiting. During the past few months, the attacks of pain had become increasingly frequent.

Examination. Vision OD 5/5, OS 5/15; exophthalmos on left side (difference of 6 mm. between the 2 eyes). Diminution of sensibility in whole territory supplied by left trigeminal nerve. Left corneal reflex weak, and corneal ulceration present. Slight peripheral facial palsy on left side, and some impairment of caloric vestibular reactions on the same side.

Radiograms of the skull (Figs. 1 and 2) revealed: asymmetry of base of skull caused by enlargement of left middle cranial fossa; partial decalcification of its floor; lesser wing of the sphenoid on the left side elevated in the middle and medial portions; flat, sharply delimited defect in its posterior margin (sphenoidal ridge); sharply delimited bony defect in apex of pyramid; marked dilatation of left foramen ovale and no areas of calcification.

Encephalography (Figs. 3 and 4) disclosed: no lateral displacement of the ventricular system; aqueduct and 4th ventricle elevated and pushed backwards; anterior and middle portions of left temporal horn markedly elevated and pushed slightly backwards; concavity of arch formed by the supracornual eft and lateral cleft directed basally and medially; extracerebral air visible around a rounded, sharply delimited tumor the size of a hen's egg in the floor of the left middle cranial fossa.

Carotid angiography (Fig. 5) showed: no lateral displacement of pericallosal artery or internal cerebral vein; marked elevation of intradural portion of carotid siphon, sylvian vessels, anterior choroidal artery and basal vein; extradural portion of carotid siphon irregularly deformed but not displaced laterally; arterial branch from this part of the siphon directed upwards and backwards.

Operation (May 27, 1952). By a frontotemporal approach the dura mater was opened over the temporal lobe, the brain substance was elevated, and a mass soon came into view in the lateral part of the region. The dura mater on the floor of the middle fossa had been elevated by the tumor. After incision of the dura mater a rather hard, nodular tumor came into view. Part of it was removed. The growth had invaded Meckel's cavity and extended around the carotid artery. These parts of the mass were also removed, but there was some uncertainty as to whether a few small bits of capsule might have been left behind, adherent to the artery. Small pieces extending down into the posterior fossa and also toward the orbit were removed.

Histological Report. Several well-differentiated structures were seen. Glial tissue without cells was present. In addition, the specimen contained cartilage, cysts with epithelium partially of respiratory type, and epithelium with "goblet" cells. Structures resembling mucous and serous glands were also seen, as well as connective tissue, muscle fibres and fat. Diagnosis: Teratoma of adult type, without signs of malignancy.

Postoperative course was uneventful and the patient left the Clinic 2 weeks after the operation. Visual acuity in his left eye was reduced, and he had impairment of the 5th, 6th, 7th, and 8th cranial nerves. He was living a normal life 10 years after the treatment. His visual and auditory functions were slightly impaired on the left side.

Discussion

From the histological point of view this is a
fairly typical example of a benign adult teratoma composed of differentiated mature tissue. The microscopical appearances call to mind 1 of the 2 cases of teratoma of the posterior fossa described by one of us (Case 116). In that paper, the origin, development and pathology of teratomas were also discussed. Our present tumor occurred in a male child, and this is in agreement with the general belief112 that teratomas tend to occur in the young and only very occasionally in girls. They are considered to be partly cystic in the majority of cases.7 The tumor reported here was macroscopically completely solid, but small cysts were found on histological examination. It was quite hard in consistency, and not vascular; indeed, its gross appearance did not differ much from a neurinoma.

The clinical syndrome was fairly typical of the region involved. The association of exophthalmos, signs of involvement of the homolateral optic nerve, and trigeminal signs and symptoms are suggestive of a location in the anteromedial part of the middle fossa. Our patient had no ocular palsy, however, in spite of the very close relation of the tumor with the cavernous sinus. In our experience, ocular palsy is a common finding in connection with both neurinomas14 and chordomas13 growing in the region of the gasserian ganglion. Two of the 3 cases of paratrigeminal epidermoid tumor reported by Baumann and Bucy,4 as well
as the case described by Fasiani et al., also had such signs. Our patient had an atypical form of trigeminal neuralgia, with pain of fairly long duration and quite different from a typical tic douloureux. He also had frequent lacrimation, reddening of the homolateral conjunctiva, and vomiting together with the pain.

Several authors emphasized the fact that involvement of the sensory root by a tumor results in changes in sensibility rather than pain, while involvement of the gasserian ganglion is commonly the source of pain. Our experience with trigeminal neurinomas—and with the present case of teratoma—tends to agree with the opinion of these authors. Our patient had a discrete diminution of sensibility in the branches of innervation of the left trigeminal nerve, and the left corneal reflex was weak. Trophic disturbances were also present in the cornea. Palsy of the muscles of mastication was lacking, however.

Other signs which are relatively frequent with tumors growing in the region of the gasserian ganglion were also present, namely, slight peripheral facial palsy and impairment of caloric reactions. A very limited extension of the tumor into the posterior fossa was responsible for these signs.

It is quite clear that a preoperative clinical diagnosis of the tumor is impossible. The lesion that most closely resembles a teratoma of the gasserian region is the neurinoma of the gasserian ganglion or possibly the rarer epidermoid (cholesteatoma). Radiography showed an extradural tumor the size of a hen’s egg in the floor of the middle fossa (Fig. 4). That such a large, sharply delimited, firm tumor had not caused any widespread skeletal destruction is probably explained by the patient’s low age—only 7 years. At this age, the bones of the skull are softer and yield more readily to pressure than at older ages, and for this reason the left fossa had been enlarged by the tumor. The widening of the left foramen ovale in all probability was caused only by the pressure of the tumor from above, as growth around the mandibular division of the trigeminal nerve and down through the foramen ovale was lacking.

The tumors occurring most frequently in the region of the gasserian ganglion are the neurinomas, menigiomas, and chordomas. Sharp-edged, clearly delimited destruction of the apex of the pyramid is a consistent finding in trigeminal neurinomas extending also into the posterior fossa. Hence, neurinoma of the trigeminal nerve could not be ruled out by an ordinary examination of the skull. Similar destruction of the apex of the pyramid may also occur with meningiomas in the region of the gasserian ganglion, although such a lesion is very rare. That the skeletal changes could have been caused by a chordoma was unlikely, since chordomas to a large degree grow in the bone itself, and such a process would have destroyed the whole of the floor in the middle fossa if it had been as large as the tumor in the present case. Encephalography with examination of the cisterns had shown that the tumor was extracerebral. This examination was necessary in order to demonstrate the exact intracranial extent of the tumor. Lindgren demonstrated that, in infratemporal tumors, the arch which is formed by the supracomrnal cleft and lateral cleft of the elevated temporal horn has its concavity directed basally and medially in the case of neurinomas from the gasserian ganglion and basally, or basally and laterally, in the case of meningiomas. As the concavity in our case faced basally and medially (Fig. 3) the tumor consequently bore a closer resemblance, at encephalography, to a neurinoma growing from the gasserian ganglion than an infratemporal meningioma. The findings at carotid

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**Fig. 4** Lateral view. Surface of tumor. Temporal horn is elevated (arrows).

**Fig. 5** Extradural portion of carotid siphon is irregularly deformed by the tumor. Small arterial branch originated from the siphon.
angiography, however, showed that the growth could not be a trigeminal neurinoma either, since with this tumor the extradural part of the carotid siphon is bowed and usually pushed forwards, downwards and inwards.\textsuperscript{3,18} In our case, the extradural part of the siphon was not displaced appreciably; instead, it was irregularly deformed (Fig. 5) as a result of the expanding process surrounding it. Normally, small arteries run from this part of the siphon to supply, among other areas, the dura mater and the gasserian ganglion. They are usually too small to be demonstrable by ordinary carotid angiography, but when a highly vascularized pathological process is present they sometimes become hypertrophied and then may be identified without difficulty. They have been described in some detail by Bernasconi and Cassinari\textsuperscript{2} and by Stattin,\textsuperscript{15} who observed them in association with meningiomas and arteriovenous malformations. They also may be seen in connection with trigeminal neurinoma.\textsuperscript{19} An extradural arterial branch of this type was observed also in the present case (Fig. 5), although it was fairly small. Small branches from the middle meningeal artery, displaced but showing no other appreciable deformity, were visible in the vicinity of the tumor. The intradural portion of the carotid siphon, the sylvian vessels, the anterior choroidal artery, and the basal vein were all displaced as is usual in basal tumors in the middle fossa. To sum up, it may be said that the radiography revealed changes differing in several respects from those usually seen in connection with the tumors occurring most commonly in the floor of the middle cranial fossa.

Almost total removal of the mass was achieved in our patient. In this case, as in most other instances of paragasserian tumors, the adherence of the growth to the carotid artery was responsible for some small pieces of capsule being left behind, attached to the wall of the artery. The result of the treatment was wholly successful, and the patient is living and in good health more than 10 years after the operation.

**Summary**

An instance of an extremely rare tumor of the middle cranial fossa growing in the gasserian region is presented. The growth was a benign adult teratoma occurring in a 7-year-old boy. The clinical syndrome was highly typical of the location, in spite of the fact that ophthalmoplegia was lacking. The changes observed in radiographs of the skull, encephalograms, and carotid angiograms are described in detail, and the differential diagnosis from some other types of tumor in the same location is discussed. The tumor was removed almost in its entirety, and the patient is living and in good health more than 10 years after the operation.

**References**