Intracranial midline anterior fossae ossifying fibroma invading orbits, paranasal sinuses, and right maxillary antrum

Case report

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The clinical course, roentgenological findings, and operative management of a patient with an ossifying fibroma (benign osteoblastoma) of the anterior cranial fossae are described. The tumor invaded the orbits, the ethmoids, the upper nasal cavity, and the right maxillary antrum. The differential roentgenological diagnosis is discussed.

Key Words: ossifying fibroma · intracranial tumor · paranasal sinuses · maxillary sinus

This case is reported because of the unusual locations of the tumor, its benign histological but “malignant” invasive nature, and the problems incurred in its histologic diagnosis and surgical management.

Case Report

This 22-year-old woman was admitted to Temple University Hospital in May, 1961, complaining of severe headaches and loss of the sense of smell. A right maxillary sinus operation for epistaxis was done in February, 1960, at another hospital. At that time she developed cerebrospinal fluid (CSF) rhinorrhea which apparently subsided. In February, 1961, she developed meningitis, from which she recovered. Her past history was otherwise noncontributory.

Examination. The physical examination was normal except for a slight right exophthalmos. The neurological examination showed an alert patient with anosmia. Vision and visual fields were normal. The external ocular movements and the remainder of the examination was normal. Routine blood count, urinalysis, serology, and blood chemistry studies were normal. Skull films including planography, showed an intracranial bilateral calcified mass arising from the cribiform area and involving the ethmoids, sphenoid sinuses, and upper nasal cavity. There was a polypoid mass in the right maxillary antrum (Figs. 1 and 2). Lumbar puncture showed clear acellular fluid with a pressure of 166 mm of water and a protein content of 35 mg%. On May 28, 1961, the mass in the anterior fossa was tapped and an attempt to instill Pantopaque was unsuccessful. A right carotid arteriogram showed a large midline anterior fossa mass elevating the anterior cerebral artery, the internal cerebral vein, and septal vein. There were no feeding vessels.
A prominent ophthalmic artery was noted (Fig. 3).

First Operation. A bifrontal craniotomy revealed the large dome of a calcified midline extradural tumor which extended from the anterior portion of the cribriform plate to the clinoids. The optic nerves were not visualized. The hard dome of the mass was opened on the right side, and a small amount of yellow fluid was drained which subse-

Fig. 1. Tomogram showing the ossifying fibroma involving the mid-anterior fossa bilaterally and extending posteriorly to the clinoids. Note the invasion and destruction of the cribriform area, the mesial walls of the orbits, and the ethmoids. Left: Anteroposterior view. Right: Lateral view.

Fig. 2. Tomogram showing tumor involving the upper nasal cavity and ethmoids and a circumscribed mass in the right maxillary antrum.

Fig. 3. Preoperative angiogram. Note the branches of the anterior cerebral artery stretched over the dome of the tumor and the unusually large ophthalmic artery. Note droplets of Pantopaque from the unsuccessful attempts to visualize the interior of the cyst.
Anterior fossae ossifying fibroma

FIG. 4. Postoperative x-ray films. Most of the intracranial tumor has been removed except for the portion over the tuberculum sellae. Note silver clip placed in the tumor tissue in the right upper nasal cavity through the opening in the anterior fossae at the first operation. Left: Anteroposterior view. Right: Lateral view.

Subsequently showed a protein of 4579 mg%. In some areas, the tumor appeared hard as bone, and in other areas paper thin. It had the consistency of a fibrocytic tumor. After additional tumor removal, we could see the superior nasal cavity and the ethmoid sinuses. The cribriform plate area had been completely destroyed by the lesion. A silver clip was placed in the remaining tumor in the upper nasal cavity for subsequent x-ray identification (Fig. 4). The tumor in the anterior fossae was removed except for the posterior extension over both clinoids which was left in place to avoid damage to the optic nerves. The dura of the vertical portion of the frontal bone was reflected downward over the large opening and sutured to the remaining dura of the anterior fossae. This gave a fairly complete, but not watertight, closure of the defect. A large fascia lata graft was placed over the dural flap; this covered the dural suture line adequately, and layers of gelfoam were placed over the graft.

The maxillary sinus was not explored because of the extensive intracranial surgery and the invasive nature of the intracranial tumor, which was diagnosed as a psammomatous meningioma invading bone.

Postoperative Course. There was no postoperative CSF rhinorrhea. The patient was discharged on the 16th postoperative day. She resumed her household duties.

Second Examination. The patient was readmitted in July, 1963, because of severe headaches. There was no CSF leak. There was a moderate proptosis of the left eye. The neurological examination was normal. A skull film revealed further extension of the tumor into the ethmoid sinuses.

Second Operation. A bifrontal craniotomy was repeated, the frontal lobe retracted, the anterior fossae with its dural graft exposed, and the residual portion of tumor over the anterior clinoids identified. The optic nerves had not been compressed, and there was no evidence of additional tumor in the cranial cavity. We did not re-elevate the dural graft from the cribriform area because of the probability that the remaining tumor could not be removed from the nasal cavity and contiguous area without producing an uncontrollable CSF fluid leak. The right orbit was explored because the x-ray films had shown erosion of its mesial wall. When the orbital capsule was incised, there was an immediate herniation of fatty tissue due to increased intraorbital pressure. Tumor tissue was palpated deep in the bony orbit; no attempt was made to remove it. Because the patient had a moderate proptosis of the left eye, the roof of the left orbit was also removed and the orbital capsule opened. Palpation revealed hard tissue, presumably tumor, which was not disturbed.

J. Neurosurg. / Volume 34 / June, 1971 829
Second Postoperative Course. The radiation department decided against x-ray therapy. The patient had an uneventful recovery and was discharged on Dilantin and oral penicillin.

Third Examination. The patient was readmitted in September, 1967, 6 years after the first admission, complaining of right frontal headache and severe pain in the right maxillary area. The physical examination was normal; there was no proptosis. The patient was alert. The neurological examination was essentially normal. Skull films revealed no change in the small residual bony mass in the anterior fossa. Roentgenograms of the right maxillary and paranasal sinuses showed absence of the bony detail in the region of the right ethmoid air cells and a mass in the upper nasal cavity projecting into the right maxillary antrum (Fig. 2).

Third Operation. The major portion of the tumor was removed from the right maxillary sinus by Dr. Bernard Ronis. The tissue diagnosis was again psammomatus meningioma invading bone.

Third Postoperative Course. Following operation the patient developed CSF rhinorrhea, which stopped spontaneously after 6 days. The patient was afebrile and had no rhinorrhea at discharge. She was continued on Ampicillin and Dilantin.

She was readmitted to the hospital 15 months later in December, 1968, because of intermittent epistaxis from the right nostril. Roentgenograms revealed residual tumor in the right ethmoid and maxillary sinuses. There was diplopia on looking to the right. The vision was 20/20 in each eye, The visual fields were normal and there was no papilledema. There was no discernible CSF leak. The remainder of the neurological examination was normal. Additional surgery was not done because of the extensive invasion of the tumor into the sinuses and again the fear that any attempt at radical removal would open the anterior fossae to an uncontrollable CSF leak. The patient was discharged on Ampicillin and Dilantin and was able to do her housework when last seen by her family physician in May, 1970, 9 years after her first operation.

Discussion

A recent report by Lehrer1 of an ossifying fibroma of the orbital roof which had a roentgenographic appearance similar to that in our case prompted our pathologist to revise our histological diagnosis of psammomatous meningioma to ossifying fibroma because the fibrocalcific bodies were actually bone spicules and not psammoma bodies.

Thomas and Kasper6 have also reported an ossifying fibroma of the frontal bone but there was no evidence of intracranial extension in their patient. Malcomson2 has reported a case of ossifying fibroma involving the sphenoid bone, extending into the intracranial anterior fossae, and presenting the classical roentgenological appearance described below by Schwartz.9

Differentia Diagnosis

The roentgenological diagnosis between meningioma, ossifying fibroma, and fibrous dysplasia can be difficult. Sherman and Sternbergh4 describe the roentgenological appearance of benign ossifying fibroma. They note the rare occurrence of this lesion intracranially and its frequent occurrences in the facial bones, predominantly in the mandible and maxilla.

Schwartz states that the ossifying fibroma appears on roentgenograms as a round or oval-shaped tumor circumscribed by smooth margins but producing moderate expansion of the involved portion of the bone. It is frequently seen in the frontal bone at the orbital roof. The bone appears spongy at the tumor site with a homogenous "fibrous" bony pattern and thin "eggshell"-type of boundary. It extends smoothly into the confines of the cranial fossae forming a prominence resulting from the expanded and thinned-out orbital roof. As a rule there is no breakage of cortical bone, and bone reaction and distortion of surrounding bone are minimal. He states that in other instances the tumor appears sclerotic, producing thickened dense bone that surrounds the tumor and extends into neighboring structures. This variant is commonly diagnosed as fibrous dysplasia because of the destructive sclerotic appearance. In adults this variant could represent the tumor sometimes diagnosed as "osteoma."

Taveras and Wood3 state that a meningioma that arises "in relation to the air sinus of the skull, particularly about the sphenoid sinuses, often produces a characteristic roentgenographic pattern which has been
Anterior fossae ossifying fibroma
called "blistering." They state that this was first noticed by Dyke who referred to it as "hypertrophy of the bone forming the posterior ethmoid cells so that these project into the intracranial cavity." Thus, a "blistering" meningioma may resemble radiographically an ossifying fibroma of the orbital roof or the sphenoid sinus.

An epidermoid tumor involving the orbit, or a mucocele of the frontal sinus, must also be considered in the differential roentgenological diagnosis of bone lesions of the floor of the anterior fossae. Meningiomas "en plaque" with intraosseous involvement and with clinically insignificant extraosseous extension are poorly demarked and therefore resemble fibrous dysplasia clinically and radiographically rather than ossifying fibromas or "blistering" meningioma. According to Lehrer¹ there is a partial similarity histologically between the blistering meningioma and the ossifying fibroma. He states that the ossifying fibroma frequently contains small spheroids of bone or cementum which, if not carefully noted, can be confused with psammoma bodies (this certainly occurred in our case). The term "cementifying" fibroma has occasionally been used to describe ossifying fibromas in which the cementum is prominent and often in the form of irregular particles, "cementicles."

References

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