OSTEOGENIC SARCOMA OF THE SKULL FOLLOWING ROENTGEN-RAY THERAPY FOR BENIGN PITUITARY TUMOR

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Osteogenic sarcoma of the skull is rare whether of spontaneous origin or following irradiation. In fact, it is almost unknown after irradiation of the skull or intracranial contents in any period of life. As a primary development, not associated with irradiation, it is also extremely rare, particularly in the later decades of life and in individuals who do not have an associated Paget's disease of the skull. The patient in the present report did not have Paget's disease of the skull, was 57 years of age at the time of death, and, 6 years after the beginning of roentgen-ray therapy for a verified chromophobe pituitary adenoma, had an osteogenic sarcoma of the skull, which was verified at necropsy. The case report is accompanied by photomicrographs of the pituitary tumor and also several of the osteogenic sarcoma of the skull. It is believed worthy of report because of its rarity and interest, and also to stress the importance of irradiating intracranial structures or neoplasms therein only when such therapy seems definitely or strongly indicated, as there always would appear to be a slight chance, and potential danger at least, of osteogenic sarcoma developing in the overlying skull when such roentgen therapy is carried out.

CASE REPORT

Mrs. A.D., a white woman aged 51, was first admitted to the hospital on Oct. 22, 1951. She had begun to notice visual disturbance in August 1951. A diagnosis then was made of pituitary adenoma on the basis of an enlarged sella. She had had headaches, and visual fields had revealed a bitemporal hemianopsia at that time.

She was given roentgen-ray treatment to the pituitary gland over a period of 8 days, and the headaches disappeared. Basal metabolic rate was –20 per cent and blood pressure was 110/90. She was discharged on Oct. 31, 1951.

2nd Admission, May 15, 1952. On May 16, a right frontal craniotomy was carried out (J.M.M.) with removal of a pituitary tumor between the optic nerves. Diagnosis: chromophobe adenoma of pituitary gland.

It was thought before operation that she had shown marked signs of panhypopituitarism (anterior lobe) which had been present for an indefinite period. The optic discs were very pale and well outlined, showing primary atrophy. She was discharged on May 31, 1952.

Course. In July 1952, she was treated in the Department of Internal Medicine for hypopituitarism, and was thought to have anterior pituitary insufficiency, with secondary hypothyroidism and adrenal cortical deficiency. Her basal metabolic rate on July 1, 1952 was –51 per cent.

3rd Admission, June 18, 1955. This time she was on the medical service of Dr. Elam Toone for treatment of arthritis. The diagnosis of postoperative pituitary insufficiency was made again and myxedema was well controlled with thyroid therapy. Roentgenograms of her cervical-upper dorsal spine, lumbar spine and pelvis, including the right hip, showed sacroiliac changes suggesting old rheumatoid arthritis and generalized demineralization of the cervical and lumbar spine. The basal metabolic rate was –15 per cent. She was discharged on June 22, 1955.

4th Admission, April 28, 1956, again was to the medical service. The diagnosis at that time
was adrenal cortical insufficiency with pituitary insufficiency incidental to surgical removal of the pituitary adenoma in May 1952, and hypothyroidism. Roentgenograms of the skull showed the sella turcica to measure 18 by 21 mm. with ballooning of the intrasellar space. Basal metabolic rate was −16 per cent. She was discharged on May 8, 1956.

6th Admission, Sept. 21, 1957. About 6 weeks previously, she had noticed the presence of a painless mass in the left temporal region. This had become as large as a small lemon by the time of admission, was doughy in consistency, rather fixed to the surrounding skull, and entirely painless on firm palpation and compression. There were no severe headaches or other distress associated with the condition. She was then receiving cortisone and thyroid therapy, this having been administered continuously since the operation for pituitary tumor in 1952. Roentgenograms of the skull showed evidence only of the old right-sided craniotomy: "There are no other remarkable roentgen findings in the skull." The lungs were clear as shown in a film of the chest although there was mild enlargement of the heart with an arteriosclerotic aorta. Hemoglobin was 14 gm., count of white blood cells was 8,900, and urine was normal.

On Sept. 24, 1957, under endotracheal anesthesia, an extradural mass was explored in the left temporal region. The mass definitely perforated both tables of the skull. A generous biopsy of the lesion was made, and the wound was closed entirely dry without drainage.

A quotation from the operative note reads as follows: "The temporal muscle was gently dissected, disclosing a rather massive collection of yellowish, granular, necrotic tissue apparently coming from the deeper layers of muscle, having its base and source of origin in the left temporal bone. This portion of the skull presented a defect of irregular shape and contour, partly disintegrated, and of stellate appearance. It is rather remarkable it was not seen in films of the skull. The dura mater was apparently intact and was not opened. As much as possible of the tumor was excised, and a frozen section biopsy was reported as showing an osteogenic type of sarcoma. All bleeding was readily controlled with the electrosurgical apparatus, and closure of the scalp was made, there being no excessive loss of blood at any time. The patient withstood the procedure well and left the operating room in good condition."

She died, however, on Sept. 25, 1957, 15 hours after operation, without ever having regained consciousness, primarily of a massive extradural hemorrhage from an eroded left-sided middle meningeal artery which occurred after operation at some unknown time during the 15 hours she was in the recovery room.

Pathologic Reports (from the Department of Surgical Pathology). 1. Surgical specimen of pituitary tumor removed in 1952 (S-52-3314).

Microscopic. A few capillaries surrounded by swollen cells are seen. The latter are thought to represent chromophobe tumor cells.

2. Surgical specimen of left temporal bone, Sept. 24, 1957 (S-57-7338). Specimen consisted of many pieces of yellowish-gray, soft tissue with minute hemorrhages. They varied from 3 to 11 mm. in maximal diameter.

Microscopic. Sections are of a malignant tumor which is markedly cellular and composed of extremely pleomorphic cells. The cytoplasm is indistinct, but most of the cells are spindly with ovoid and elongated nuclei, and many of them are monster forms (Fig. 1). Nucleoli are generally prominent. In addition, multinucleated tumor cells are present (Fig. 1). Mitoses are numerous and atypical. In some areas the tumor shows very little intercellular stroma. In other areas, there is an abundance of dense eosinophilic stroma, sometimes with distinct osteoid formation (Fig. 2).

Diagnosis. Osteogenic sarcoma of temporal bone, left, arising in previously (6 years) ir-radiated bone.

3. Autopsy (A-8911). Examination of the head only was allowed. When the scalp was reflected, an area of swollen tissue 4 cm. in diameter was found over the left temporal region. In the center of this area was a defect, admitting one finger, which extended through the cranium. The edges of this defect were fragile and of egg-shell consistency. The right side of the cranium revealed an old (1952) frontal craniotomy bone flap. The sites of old burr holes in both parietal bones were also identified. After sawing through the cranium, a diffuse erosion of bone, approximately 6 cm. in circumference, was noted beneath the soft-tissue abnormality