MALIGNANT FIBROUS HISTIOCYTOMA OF MAXILLA FOLLOWING RADIOTHERAPY FOR BILATERAL RETINOBLASTOMA

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Malignant fibrous histiocytoma of maxilla following radiotherapy for bilateral retinoblastoma

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Abstract

A 20-year-old man developed a malignant fibrous histiocytoma in the right maxilla 19 years after irradiation for bilateral retinoblastoma.

The incidence of second tumours in patients who survived bilateral retinoblastoma treated with radiation was 8.5 per cent. Malignant fibrous histiocytomas which arise in a site of prior radiation are fatal. The present case is presumed to have the autosomal dominant retinoblastoma gene, not associated with deletion of the q 14 band of chromosome 13. The patient succumbed to the second tumour.

Introduction

Malignant fibrous histiocytoma is believed to be a rare neoplasm of the head and neck. It occurs principally on an extremity or in the abdominal cavity. Approximately 3 per cent of all the lesions reported have occurred in the head and neck. Blitzer *et al.* (1981) published the recent review of 76 cases of the tumour and 11 additional cases to the literature. Patients with radiation-associated lesions appear to do poorly (Blitzer *et al.*, 1981). Soloway (1966) stated that, in patients who developed this tumour following therapy for retinoblastoma, the prognosis was exceptionally poor. In this report, we present a rare case of neoplasm following radiotherapy for bilateral retinoblastoma.

Report of A Case

A 23-year-old Japanese male was referred to the Department of Otorhinolaryngology, University of Tokyo, for evaluation of a right infraorbital mass, with a three-month history of bloody rhinorrhea, nasal obstruction, and headache.

There was a family history of retinoblastoma. The family history is summarized in a pedigree (Fig. 1).

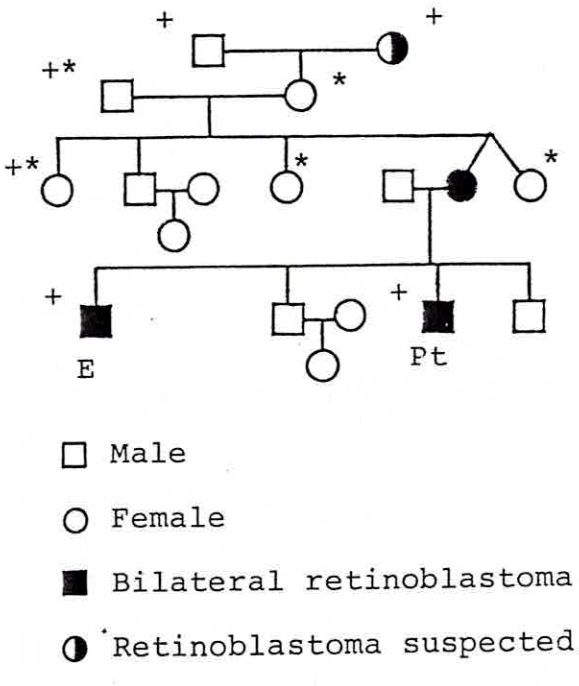

FIG. 1

Pedigree of family with retinoblastoma. Pt indicates patient; E: eldest brother died of retinoblastoma at four years of age; +: deceased; ★: unknown.

Presented at the sixth annual meeting of the Japan Society of Head and Neck Tumour, Tokyo, 19 June 1982.
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The past medical history was significant. At nine months of age, the right eye (with the retinoblastoma) was enucleated (Fig. 2). As a prophylactic therapy, the left orbital contents were irradiated with a total of 900 rads. The field size was a 3×3 cm. rectangle. The exposure dose from the left temporal area was 300 rads. and from the direct anterior area was 600 rads. The duration of therapy is not known. At six years of age the patient complained of impairment of visual acuity in the left eye. The left eye was enucleated, and pathologic examination confirmed the diagnosis of retinoblastoma.

He was well until September 1977, when, at the age of 20, he noticed a mass in the right lower orbital region. It grew slowly. The patient consulted the eye clinic one year later. In November 1978, the mass was resected and a pedicled forehead skin flap was used to cover the operative defect. Scintiscanning with ^{67}Ga and bone X-ray films of the whole body showed no metastasis. The patient had a normal level of carcinoembolic antigen (1.76/ng.), and of alpha-fetoprotein (3.0 ng./ml.).

In December 1980, a swelling was noticed again in the right maxillary and infraorbital region. The patient complained of nasal obstruction and headache, and bloody rhinorrhea was noted. On 19 February 1981, the patient was referred to the Department of Otorhinolaryngology, University of Tokyo, for evaluation of the mass. On physical examination a 4×5 cm., firm, fixed, slightly tender mass was found on the right inferior orbital floor and in the maxilla. On the tumour there was necrotic granulation and two fistulae, with mucopurulent discharge. The right infraorbital rim was not felt on digital examination. Examination of the right nasal cavity demonstrated a pale, slightly projecting inferior turbinate. A swelling in the right buccoalveolar sulcus was found. No sign of tumour was seen in the nasopharynx. The remainder of the physical examination was within normal limits. Roentgenograms of the paranasal sinuses showed evidence of a destructive mass involving the right nasal cavity, antrum and ethmoid sinuses. The superior orbital rim could not be visualized (Fig. 3). A CT scan confirmed the presence of a soft mass in the antrum extending into the nasal cavity (Fig. 4). The anterior maxillary antral wall was eroded. Karyotyping of peripheral lymphocytes was performed on the patient to look for deletion of the q 14 band of chromosome 13 (13 q 14). However, deletion or aneuploidy were not present in all chromosomes.

On 13 March 1981, embolization of the right internal maxillary artery by fluoroscopy was performed, followed three days later by maxillectomy *via* a Denker approach. A greyish-white firm tumour without a capsule was resected in pieces. The lesion had destroyed the maxilla, extended to

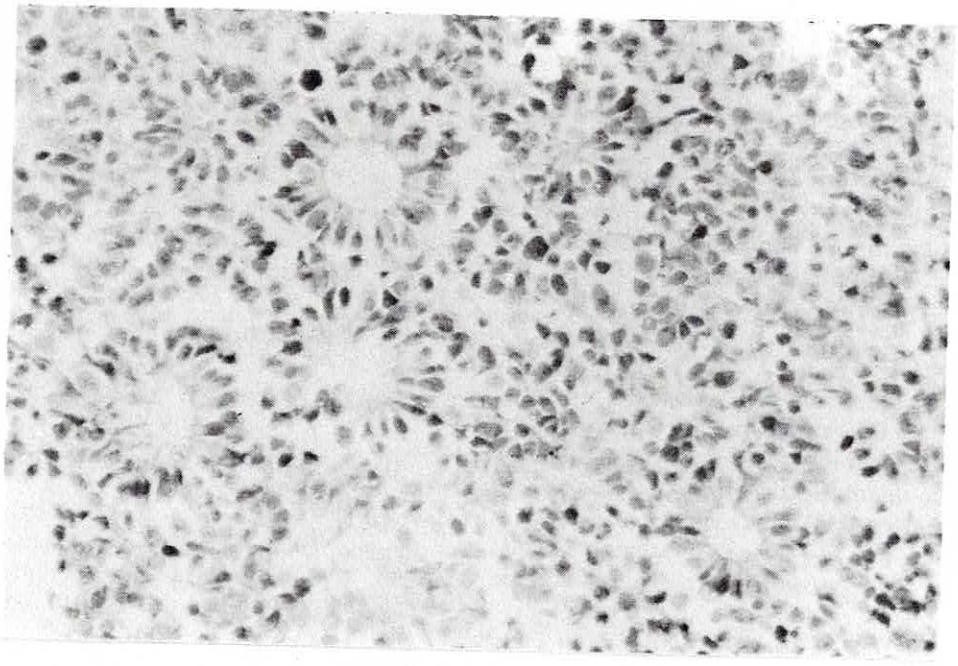

FIG. 2

Retinoblastoma of the right eye showing rosettes. H and E stain (original magnification ×330).

the soft tissues of the cheek, floor of the orbit, infratemporal fossa, and ethmoid sinuses. Through the roof of the orbit, the neoplasm had eroded into the dura mater and extended to the brain; however, there was no leakage of cerebro-spinal fluid. The surgical defect was packed with gauze.

On histological examination, the tumour was composed of spindle-shaped fibroblast-like cells and plump histiocyte-like cells arranged in a fascicular and storiform pattern (Fig. 5a). The nuclei of the tumour cells were pleomorphic and hyperchromatic, with frequent mitoses (Fig. 5b). Rare multinucleated giant cells were noted and focal aggregates of lymphoid cell infiltrates were present. The histopathological diagnosis was of a malignant fibrous histiocytoma.

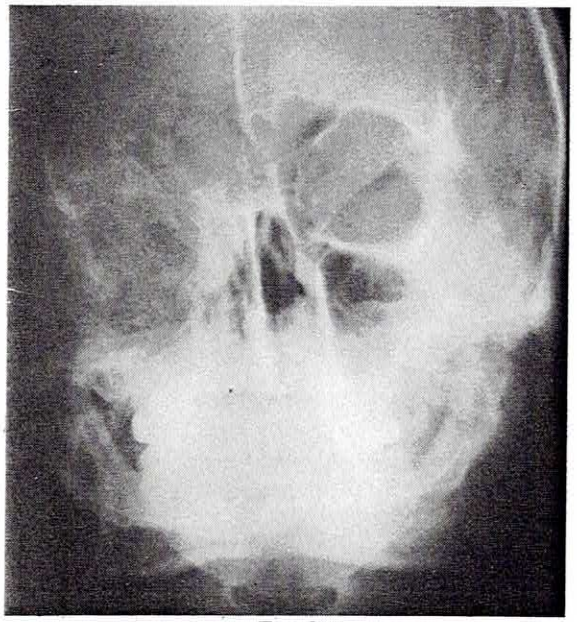

FIG. 3

Mass in right antrum involving nasal cavity, destroying maxilla and superior orbital rim.

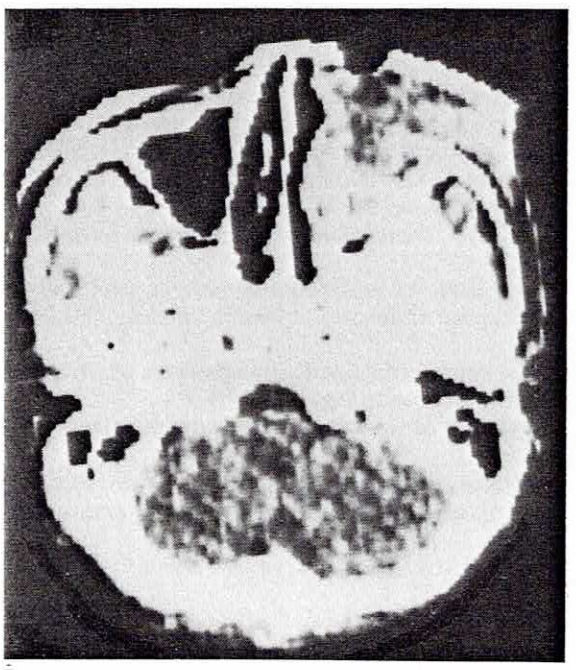

FIG. 4

CT scan revealing a soft mass in right antrum.

The post-operative recovery was uneventful. Thirteen months later, the patient developed an intracranial lesion that was fatal, but an autopsy was denied.

Discussion

The association of retinoblastoma with a second non-ocular neoplasm has been previously observed. Reese *et al.* (1949), Forrest (1961), Soloway (1966), Sagerman *et al.* (1969) and Rowe *et al.* (1980) have recorded 21 instances of neoplasia following irradiation for retinoblastoma, one of which was a malignant fibrous histiocytoma. Abramson *et al.* (1979) suggested that, in cases of bilateral retinoblastoma, the second malignant neoplasm developed independently of irradiation. Two of three cases developed second tumours outside the head and neck region (Abramson *et al.*, 1979).

The interval between radiotherapy and the appearance of a secondary tumour ranged from four to 30 years, with a mean of 11 years (Sagerman *et al.*, 1969). The interval in the present case was 19 years. In the case of fibrous histiocytoma, Blitzer *et al.* (1981) stated that three cases in which the tumour arose in a site of prior radiation were all fatal. Soloway (1966) stated that most patients with post-radiation sarcomas died within one year. The present case with post-radiation malignant fibrous histiocytoma died within thirteen months of the second surgery. According to Abramson *et al.* (1982) the second non-ocular tumour developed in 18 patients (22 per cent) after irradiation to one eye.

The standard treatment of bilateral retinoblastoma has been enucleation of the more-involved eye and external beam radiation, cobalt plaque, xenon arc photocoagulation, or cryopexy to the second eye. In advanced cases, bilateral simultaneous enucleation has been performed (Abramson *et al.*, 1981).

According to the hypothesis of Hethcote and Knudson (1978), retinoblastoma results from two mutational events. In the hereditary type, the first mutation is acquired as an autosomal dominant trait *via* the germ cells; the second mutation occurs post-zygotically in the somatic cells (retinoblastoma). In sporadic or non-hereditary retinoblastoma, both mutations occur after the initial

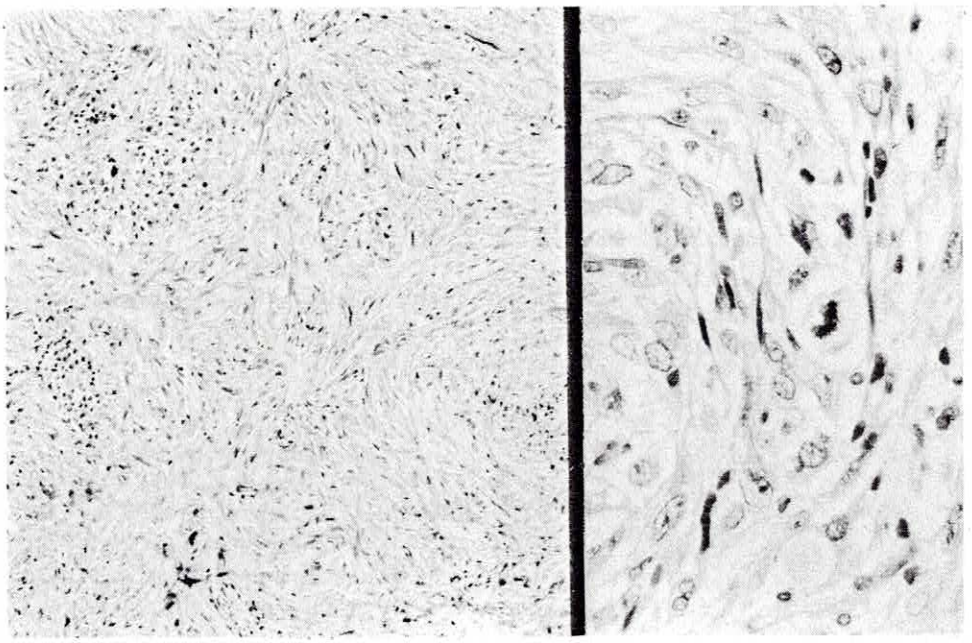

FIG. 5

Malignant fibrous histiocytoma of the right maxilla. (a) tumour showing fascicular and storiform patterns. H and E stain (original magnification ×82.5). (b) tumour cells showing pleomorphic nuclei with frequent mitoses. H and E stain (original magnification ×330).

stem cell differentiation. It may be assumed that the mother of the present patient with bilateral retinoblastoma possessed the relevant gene that was passed on as an autosomal dominant trait. However, karyotyping of the patient's lymphocytes revealed no abnormalities.

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