Anterior Chamber Metastasis from Neuroblastoma

Jorge L. Alio, M.D., Ph.D.
A. Faci, Ph.D.
G. García-Julian, Ph.D.
A. Martinez-Tello, Ph.D.
Madrid, Spain

Introduction

Neuroblastomas are highly malignant solid tumors of unknown etiology, arising from the sympathetic neuroblasts of the adrenal medulla, the abdominal, thoracic or cervical sympathetic ganglion chain or of the ectopic adrenal tissue. This tumor is usually seen in children, accounting for about 15% of all cancer cases in childhood. It is the third commonest neoplasm among children, exceeded only by leukemia and cerebral tumors.

Systemic metastasis may occur by direct extension from the right adrenal gland into the liver or via the bloodstream and lymphatic system into the bones, particularly those of the skull and orbit. Skeletal involvement, particularly of the skull, may occur in as high as 74% of patients. Ophthalmological involvement occurs in approximately 54.7% of the cases of neuroblastoma, orbital metastasis being by far the most frequent finding. Orbital symptoms are the initial complaint in 10.6% of the cases of neuroblastoma. Intraocular metastases from this tumor are said to be extremely rare.

In this paper we report a case that, as far as we know, is the first in medical literature, in which anterior chamber metastases are the initial manifestation of an adrenal neuroblastoma.

Case Report

A 10-day-old white girl was referred to our Pediatric Ophthalmology clinic because of a white mass in the right eye since birth. The child was born by normal vaginal delivery following an uncomplicated full-term pregnancy, and there was no family history of ocular disorders. The patient's general health was normal. The Apgar Test was 8 at the end of the first minute and 10 at the end of the first ten minutes of extrauterine life. The weight at birth was 3330 gms.

On external ocular examination we observed an hyphema occupying about one fifth of the right anterior chamber, and a dull-white irregular shaped anterior chamber mass. This had an extension from 4 to 9 o'clock and apparently arose from the iris. The pupils were round, diameter of 6 mm, and equal in size, with slow reaction to light stimulus in the right eye.

Biomicroscopic examination 48 hours after the initial study revealed a rough gray-white mass located in the lower part of the right iris, extending from the iris root to the pupillary border (Figure 1). The mass's surface was irregular being more prominent between 5 and 7 o'clock. Laterally, it reached the limits of both inferior quadrants. The tumor showed a profuse vascularization which was very noticeable especially in the inferonasal quadrant. There was no residue of the previous hyphema in the anterior chamber, and the eye was white without any sign of inflammation or vascular congestion. The pressure, according to applanation tonometry, was 16 mm Hg in the right eye, and scleral indentation revealed no abnormalities in the posterior pole or peripheral fundus of either eye.

Physical examination revealed moderate abdominal distension with 5 cm of hepatomegaly, 3.5 cm of splenomegaly, and a rounded abdominal mass located

FIGURE 1 (Alio, Faci and Associates): Appearance of the right eye on initial examination, 12 days after birth. Rough and prominent grey-white vascularized anterior chamber mass.
deep in the left flank. Some degree of collateral circulation could also be noticed on the abdominal wall. Multiple subcutaneous nodules could be palpated in the areas of the right scapula, left shoulder, left leg, left mamilla, and above the umbilicus. The size of these nodules was approximately 1 x 1 cm, and there were no associated inflammatory signs.

Laboratory findings revealed a total bilirubin level of 4.25 mgs/100% with the direct fraction of 0.33 mgs/100%, and complete normality regarding other data. Sternal puncture revealed atypical cellularity with rosette formation.

Roentgen studies revealed a left calcified retroperitoneal mass with bilateral displacement of the renal shadows on the intravenous pyelogram. Roentgenograms of the skull and extremities were normal. Hepatic gammagraphy showed a marked decrease in the functional tissue with irregular captation of the isotope.

Diagnosis was congenital neuroblastoma with abdominal tumor in the left adrenal gland and hepatic, subcutaneous and bone marrow metastases. Laparotomy confirmed the presence of a left adrenal gland neuroblastoma. The abdominal tumor was formed by small rounded undifferentiated cells (neuroblasts) arranged in groups. Between these groups of cells there was a slight connective tissue stroma forming a light fibrous framework (Figure 2). Occasionally, pseudorosette formation of the cells surrounding depositions of eosinophilic material could be observed (Figure 3). Necrotic as well as hemorrhagic areas were scattered all over the specimen. Histologic appearance was similar in the hepatic and subcutaneous nodules resected in the operation.

A complete resection of the abdominal tumor was achieved, and postoperatively the child received additional treatment with a total of 900 rads in the midabdominal area, and a course of intravenous cyclophosphamide. At the time of discharge she was maintained on oral Cytoxan.

During treatment, the right anterior chamber tumor increased in size after the resection of the tumor and after radiotherapy and chemotherapy. About one month after starting the treatment the tumor became stable. At the end of the second month of treatment it showed signs of involution (Figure 4). One month later we could observe an almost complete disappearance of the tumor vascularization and a marked regression of the mass. Six months after the operation the right anterior chamber tumor had almost completely regressed. Only some small calcified residues remained in the iris, between 5 and 7 o’clock (Figure 5). The right eye did not show any inflammatory signs at any time during this evolution.

Six years after the diagnosis of neuroblastoma had been made the child is still living and well. Her uncorrected visual acuity (Snellen) is 20/30 in both eyes.

Discussion

Metastases to the anterior segment of the eye occur much less often than do metastases to the choroid. In 1938, Sanders observed that among all patients

300

NOVEMBER DECEMBER 1962, VOLUME 19, NUMBER 6
FIGURE 5 (Alto, Fact and Associates): After six months of general treatment, the anterior chamber tumor showed almost complete regression. Only some small calcified foci remain attached to the iris.

reported in the world literature with histologically proved carcinoma metastatic to the eye, the choroid was involved in 156 and the iris and ciliary body in only 17. Greer reported 42 patients with carcinoma metastatic to the eye, in only two of his cases the anterior segment was the principal site of involvement. Bloch and Gartner found that in autopsy studies of 28 patients with carcinoma metastatic to the eye, the iris was involved in only two cases. In an extensive review, Ferry and Font reported 227 cases of cancer metastatic to the eye or orbit, 28 of which showed involvement of the anterior segment of the eye as the predominant feature. Involvement of the left eye by metastatic tumor seems to be more common than involvement of the right. To explain the predominance of the left eye, a more direct approach of the metastatic emboli via the left carotid system has been advocated.

The case reported here is noteworthy because of the early onset of ocular symptoms in the form of an unusual right anterior chamber metastatic mass present since birth and preceding the detection of the primary tumor, namely, a neuroblastoma.

In our review of the literature we have not found any other report of anterior chamber metastasis of neuroblastoma. The finding of ocular symptoms preceding the discovery of the original neoplasm occurs in about 50% of cases of anterior segment cancer metastasis of Ferry's series. According to this author, patients with anterior segment metastases tend to be middle-aged or older, with a mean age of 60 years, relative to patients with metastases confined to the posterior segment (mean age, 52 years) or orbit (mean age, 35.5 years). Anterior segment metastases are exceptional in children. We have not found in the literature any other report in which iris metastases were present from birth, as in the patient reported here.

Neuroblastoma very rarely metastasizes in the eye in spite of its frequent metastases in the orbit. Several authors in extensive reviews have not found any case of intraocular metastases of neuroblastoma. Metastatic tumor cells were histologically demonstrated in the choroidal vessels by Bothman and Blankstein as an isolated finding in a patient who died because of severe metastatic disease from neuroblastoma.

The case reported here seems to us to be the first case in the literature of a congenital anterior chamber metastasis, and the first case of an anterior segment metastasis from a neuroblastoma.

Summary

An apparently normal 10-day-old girl had, since birth, a gray-white vascularized tumor in the inferior quadrants of the right anterior chamber. General physical examination revealed abdominal distension, hepatomegaly, splenomegaly, and a deeply located abdominal mass. Multiple subcutaneous nodules scattered all around the body's surface could be palpated. Surgical exploration confirmed the presence of a left adrenal neuroblastoma. Six months after a complete resection of the abdominal tumor and general radiotherapy and chemotherapy, the right anterior chamber mass regressed almost completely, leaving only a calcified residue. The child is living and well six years after the diagnosis of neuroblastoma. This is the first case known to us in the literature of a congenital anterior chamber metastasis, as well as the first case reported of an anterior segment metastasis from a neuroblastoma.

References