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Metastatic Carcinoma to the Sphenoid Sinus Case Report and Review of the Literature

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Summary. Metastatic carcinoma to the sphenoid sinus is a rare event. A case of metastatic adenocarcinoma from the prostate gland to the sphenoid sinus and diagnosed with the aid of immunoperoxidase staining is presented. A concurrent review of the literature uncovered only 17 previously reported cases of carcinoma metastatic to the sphenoid sinus. Among these cases, adenocarcinoma from the large bowel and prostate gland predominated.

Key words: Carcinoma – Metastatic – Sphenoid sinus

Primary carcinomas of the nose and paranasal sinuses are uncommon tumors, and comprise only 3% of the cancers involving the upper respiratory and upper alimentary tracts [1]. Primary carcinoma of the sinuses most often involves the maxilla, ethmoid, sphenoid, and frontal sinuses in descending order [2]. Metastatic carcinoma to the sinuses follows the same order of occurrence as primary tumors, yet the overall incidence is extremely rare. Consequently, metastatic carcinoma to only the sphenoid sinus is very unusual, as indicated by a review of the literature [3–8] and examination of the records of the University of Michigan Department of Pathology for the last 20 years (1963–1983). The results of this study are depicted in Table 1. In reviewing the records of the Department of Pathology, six cases were found to be metastatic to the paranasal sinuses. However, only one of these cases was documented to be metastatic to the sphenoid sinus.

Case Report

The patient was a 55-year-old white male with a past medical history of adenocarcinoma of the prostate gland that was treated by radium implantation.

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Upon admission to the University of Michigan Hospitals, the patient complained of constant frontal headaches, blurring of the right eye, and slight unsteadiness of gait. Most recently, he had experienced nasal stuffiness and decreased sense of smell and taste. Examination revealed a large tumor mass in the midline of the nasopharynx. The neurologic examination was unremarkable except for the presenting symptoms. Tomographic examination of the skull revealed a large mass within the sphenoid sinus, extending to the clivus and sella turcica. In addition, a suprasellar component with extension into the posterior fossa was noted (Fig. 1). Shortly after admission, serum acid phosphatase levels were determined and found to be 5.2 IU/l (normal < 0.8 IU).

The sphenoid sinus was explored via a transphenoidal approach and revealed "abundant tumor". This tumor mass was biopsied but no extensive procedure was undertaken. Histopathologic diagnosis demonstrated an infiltrative well-differentiated adenocarcinoma, consistent with metastatic adenocarcinoma, composed of small clear to foamy cell arranged in solid sheets and in many areas small acini (Fig. 2).

A more specific immunohistochemical diagnosis was ascertained using an avidin-biotin complex immunoperoxidase method [9]. Formalin-fixed paraffin embedded sections (4 μm thick) were dewaxed and then treated with peroxide-methanol (1%) for 15 min. After washing in phosphate-buffered saline (PBS) at pH 7.2 and treatment with suppressor serum for 10 min, tissues were

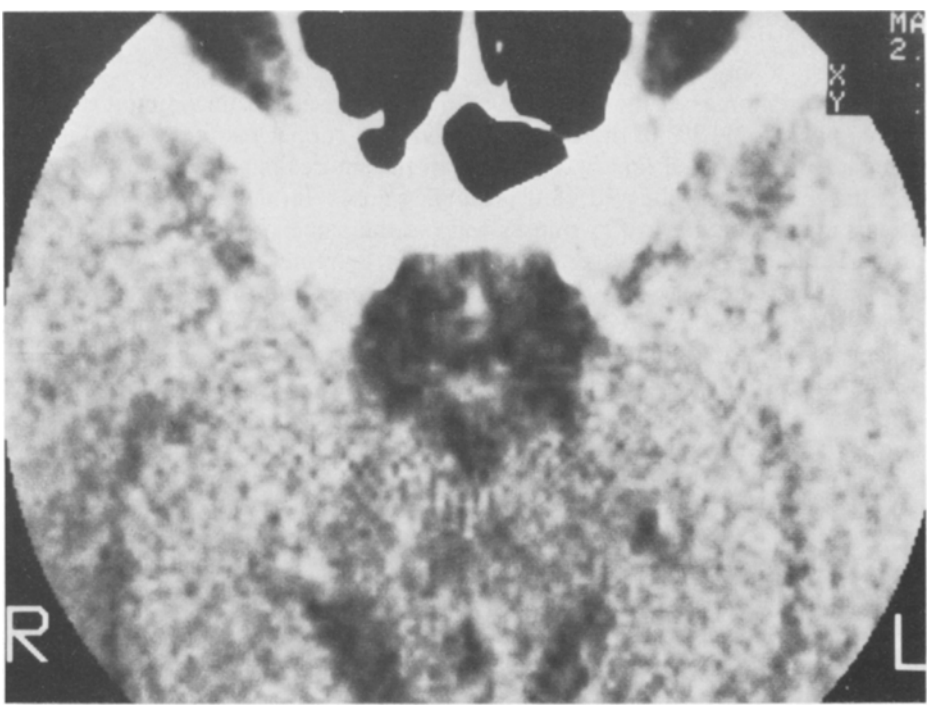

Fig. 1. Tomogram demonstrating the sphenoid sinus mass extending to the clivus and sella turcica

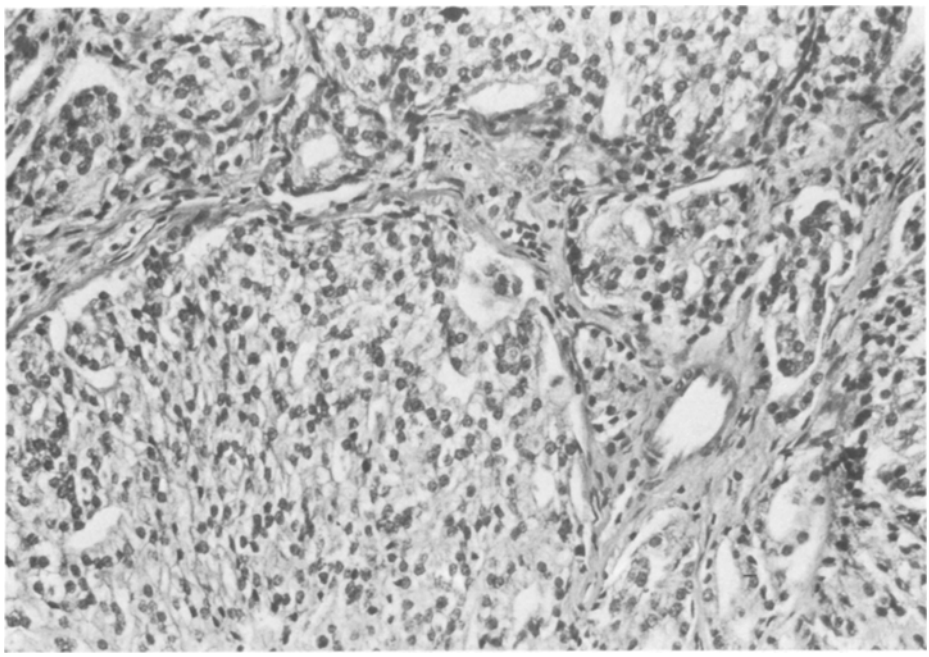

Fig. 2. Well-differentiated adenocarcinoma containing sheets of neoplastic cells admixed with acini. H&E; × 250

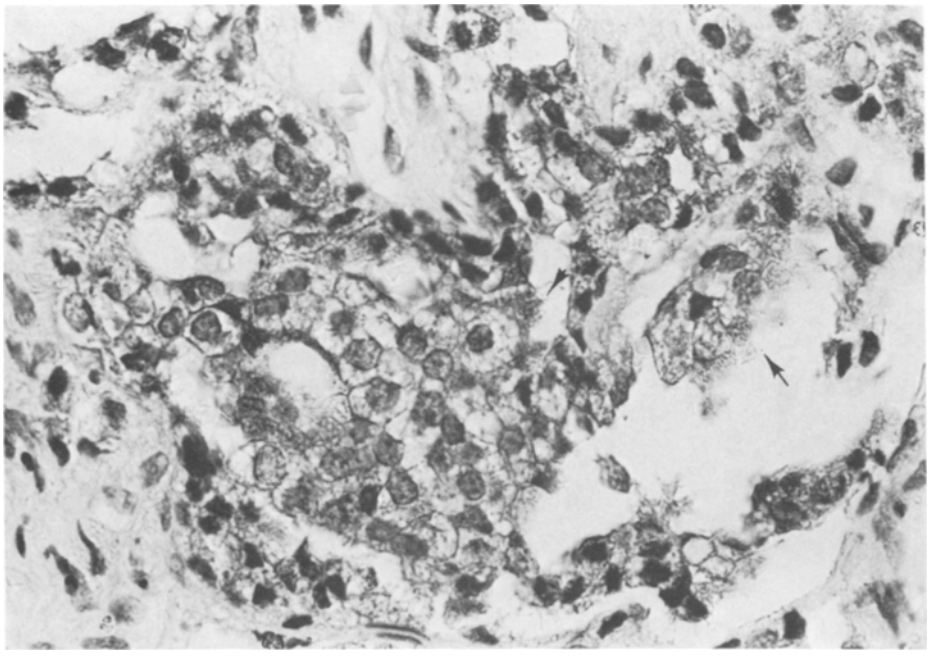

Fig. 3. Immunoperoxidase staining of tissue specimen with positive reaction for prostatic acid phosphatase (*arrows*); × 400

incubated with a 1/500 dilution of antisera to prostate specific antigen (Dako Laboratories, Santa Barbara, CA) and prostatic acid phosphatase (Eureka Laboratories, Sacramento, CA) for 60 min. This was followed by washes in PBS and incubation with biotin IgG (Vector Laboratory, Burlingame, CA) for 30 min. After PBS washes and incubation in avidin-biotin peroxidase complex (Vector Laboratories, Burlingame, CA) for 30 min, tissues were treated with diaminobenzidine-HCL (20 mg%) with 0.05% peroxide, washed with distilled

Table 1. A literature survey of patients with metastatic carcinoma to the sphenoid sinus

Author	Age	Sex	Presenting symptom	Primary site	Dx
1) Tolan (1939)	67	M	Supraorbital pain	Rectum	Adenocarcinoma
2) Perls (1942)	43	M	Cachexia	Bronchus (lung)	Bronchogenic carcinoma
3) Hamberger (1943)	63	F	Epistaxis	Kidney	Renal cell carcinoma
4) Hommerick (1954)	38	M	"Chronic meningitis"	Rectum	Adenocarcinoma
5) Bernstein et al. (1966)	66	M	Superior orbital fissure syndrome	Rectosigmoid -colon	Adenocarcinoma
6) Jortray (1971)	–	–	Autopsy finding	Breast	Adenocarcinoma
7) Jortray (1971)	–	–	Autopsy finding	Stomach	Adenocarcinoma
8) Barrs et al. (1979)	57	M	Diplopia, decreased visual activity, ptosis, numbness of left face	Prostate	Adenocarcinoma
9) Barrs et al. (1979)	72	M	Diplopia	Bone marrow (sacrum)	Myeloma
10) Barrs et al. (1979)	65	M	Diplopia	Submandibular area	Myeloma
11) Barrs et al. (1979)	61	M	Diplopia	Lung	Bronchogenic carcinoma
12) Barrs et al. (1979)	58	F	Drifting of right eye	Breast	Adenocarcinoma
13) Barrs et al. (1979)	61	M	Diplopia	Prostate	Adenocarcinoma
14) Barrs et al. (1979)	54	F	Decreased visual acuity in left eye	Thyroid	Follicular carcinoma
15) Barrs et al. (1979)	76	M	Diplopia, ptosis, facial pain	Kidney	Renal cell carcinoma
16) Chang et al. (1983)	50	F	Epistaxis and nasopharyngeal pain	Thyroid	Papillary and follicular carcinoma
17) McClatchey et al. (1984)	54	M	Frontal headache; blurring of right eye	Prostate	Adenocarcinoma

water, and counterstained with hematoxylin. Negative controls were treated the same way except that normal goat serum was substituted for the primary antisera. The results of this immunohistochemical staining demonstrated positive staining for both prostatic phosphatase and prostate-specific antigens consistent with metastatic prostatic adenocarcinoma (Fig. 3).

The patient is still alive at the present time and is being followed 1 year later after receiving palliative radiation at a hospital close to his home.

Discussion

We could find only a single case of adenocarcinoma of the prostate gland metastatic to the sphenoid sinus registered during the last 20 years at the University of Michigan. We then reviewed the available literature, and found 16 additional reported cases (Table 1). In reviewing these cases, the origins of the neoplasms metastatic to the sinus were found to be relatively evenly distributed. However, as indicated in Table 2, both the prostate gland (3 cases) and the large bowel (3 cases) were the major sources for these tumors. This somewhat contrasts with previously reported cases in which hypernephromas were shown to have a predilection for the paranasal sinuses [1, 10].

The principle presenting symptoms in most cases of malignancy metastatic to the sphenoid sinus involve eye signs, particularly diplopia. Barrs et al. [10] described patients managed at the Mayo Clinic from 1950–1976, and noted that eye pathology resulted from involvement of structures adjacent to the sphenoid sinus. Cranial nerve involvement varied from patient to patient, but included cranial nerves II–VIII.

Although most reported cases of metastatic sphenoid carcinoma result from *known* primary lesions, a few tumors result from unknown primary lesions [10, 11]. An important route for tumor metastasis involves the vertebral venous plexus (Batson's plexus), especially for lesions originating from below the diaphragm [12]. Since most metastatic lesions to the sphenoid sinus are also adenocarcinoma (Table 1), the differentiation of metastatic from primary adenocarcinomas at best be difficult. The use of immunohistochemical staining, as done in defining our patient's tumor, can facilitate making a histopathologic diagnosis of some of these tumors. Although the prognosis of metastatic lesions to the paranasal sinuses is uniformly poor [1], it is still obviously important to

Table 2. Primary sites

Large bowel	3
Prostate	3
Kidney	2
Lung	2
Breast	2
Thyroid	2
Stomach	1
Bone marrow	1
Submandibular area (soft tissue)	1

accurately diagnose any lesion in order to properly plan and expedite any therapy given.

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