Metastatic Renal Cell Carcinoma to the Left Sphenoid Sinus: A Case Report in Light of the Literature

Fumi Shoji,* Nobuo Ohta,* Kazuhiro Murakami,† Naoya Noguchi,* Takahiro Suzuki,* Yutaro Saito,* Shiori Kitaya,* Yutaka Tateda,* Muneharu Yamazaki,* Yusuke Kusano,* Miho Nakazumi,* Yusuke Ishida,‡ Kazue Ise,† Yuriko Kagaya,§ Ryo Tamura,§ Keigo Murakami,† and Yasuhiro Nakamura†

**Division of Otolaryngology, Tohoku Medical and Pharmaceutical University, Sendai 981-0905, Japan, †Division of Pathology, Tohoku Medical and Pharmaceutical University, Sendai 981-0905, Japan, ‡Division of Anatomy and Cell Biology, Tohoku Medical and Pharmaceutical University, Sendai 981-0905, Japan, and §Division of Radiology, Tohoku Medical and Pharmaceutical University, Sendai 981-0905, Japan*

ABSTRACT

A 79-year-old Japanese woman presented with a rare case of metastatic renal cell carcinoma to the left sphenoid sinus with left nasal bleeding. She had previously had right radical nephrectomy for renal cell carcinoma at the age of 64 years and brain and spinal cord infarction at 74 years. Endoscopic examination revealed no mass in the nasal cavity. CT and MRI revealed a tumor in the left sphenoid sinus. The size of the tumor increased gradually from 12 to 15 years after the radical nephrectomy. Complete resection with endoscopic surgery was performed without preoperative embolization. The tumor cells had clear cytoplasm and were arranged in a trabecular pattern lined by a layer of endothelial cells. These findings were identical to the pathological findings of the surgical specimen of the renal cell carcinoma from 15 years previous. A pathological diagnosis of metastatic renal cell carcinoma of clear cell type (grade 1) was made. PET-CT demonstrated no metastasis. The patient's condition was successfully managed with excision of the tumor, and she remains well with no evidence of recurrence and metastasis 36 months after treatment. Metastatic renal cell carcinoma to the sphenoid sinus is rare, but it might be considered in the differential diagnosis of masses in the paranasal sinus even long after initial treatment of renal cancer.

Key words metastatic renal cell carcinoma; sphenoid sinus; endoscopic surgery; nasal bleeding

Twenty-five percent of patients with renal cell carcinoma have already distant metastatic lesions at the time of initial diagnosis.[1] Regional lymph nodes, lungs, bones and liver are common metastatic sites, but metastasis in the head and neck region is rare.[2, 3] On the other hand, renal cell carcinoma is the most frequent tumor to metastasize to the nasal cavity and paranasal sinuses among infraclavicular tumors.[4] We report a rare case of a 79-year-old Japanese woman with metastasis of renal cell carcinoma to the left sphenoid sinus, 15 years after nephrectomy for primary renal cell carcinoma. Complete resection with endoscopic surgery was performed. Diagnostic, retrospective imaging analysis of the lesion and therapeutic options are discussed in the light of the current literature.

PATIENT REPORT

A 79-year-old Japanese woman was referred to our otolaryngology department for evaluation of left nasal bleeding for several weeks. She had previously had right radical nephrectomy for renal cell carcinoma at the age of 64 years and brain and spinal cord infarction at 74 years. Endoscopic examination revealed no mass in the left nasal cavity. Axial computed tomography (CT) of the paranasal sinuses showed a slightly high-density, homogeneous lesion occupying the left sphenoid sinus (Figs. 1A and B). Axial magnetic resonance imaging (MRI) showed that the tumor had high signal intensity in the T1-weighted STIR image (Fig. 1C). CT and MRI indicated no evidence of intracranial extension or bony defect of the skull base (Figs. 1A–C). The patient was admitted to our department for definitive diagnosis and treatment. Complete resection with endoscopic surgery was performed under general anesthesia. The tumor was removed with the use of 0-degree-of-view, 4-mm-diameter rigid endoscopes. To our surprise, histological examination during the operation suggested that the tumor was a renal cell carcinoma. Since the tumor adhered to the supra-posterior wall of the left sphenoid sinus, we partially resected the anterior wall of the left sphenoid sinus to obtain a clearer view of the tumor. Complete resection with endoscopic surgery was performed without preoperative embolization (Fig. 2A). The volume of bleeding during surgery was 100

Corresponding author: Nobuo Ohta, MD, PhD
noohta@hosp.tohoku-mpu.ac.jp
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Abbreviations: CT, computed tomography; MRI, magnetic resonance imaging

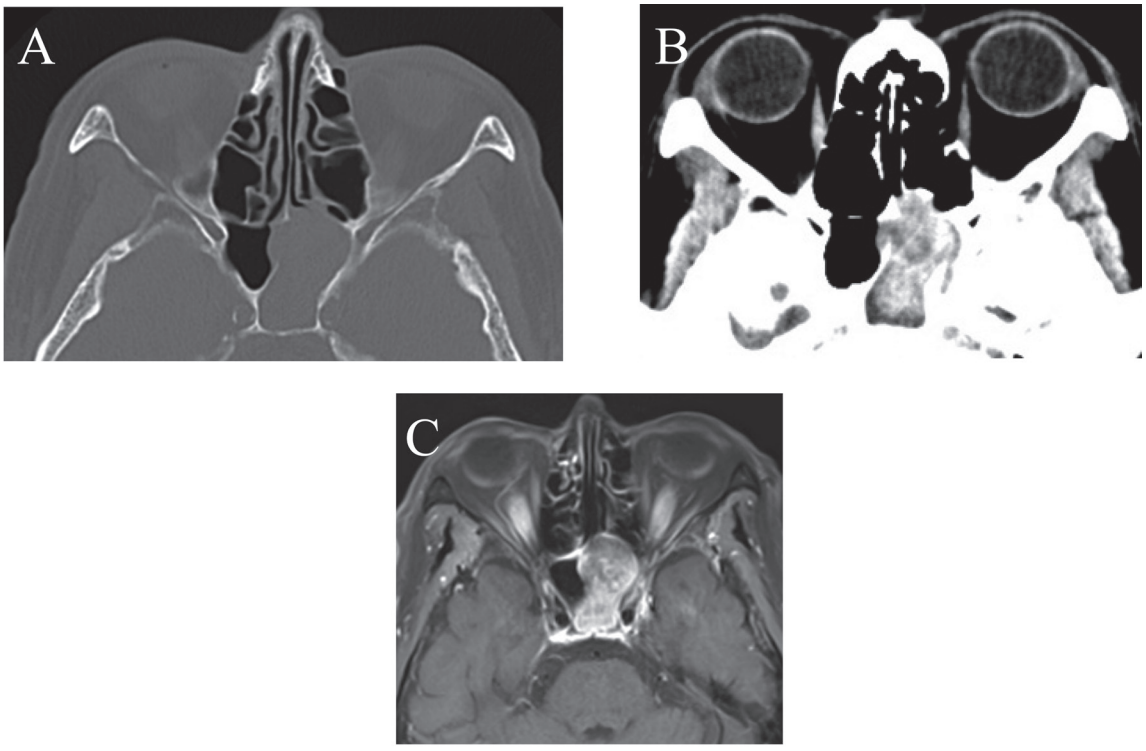

Fig. 1. (**A**, **B**) Axial CT scan of the paranasal sinuses showed a slightly high-density, homogeneous lesion occupying the left sphenoid sinus. (**C**) Axial MRI showed that the tumor had high signal intensity in (**C**) the T1-weighted STIR image indicating strong enhancement. CT, computed tomography; MRI, magnetic resonance imaging; STIR, short T1 inversion recovery.

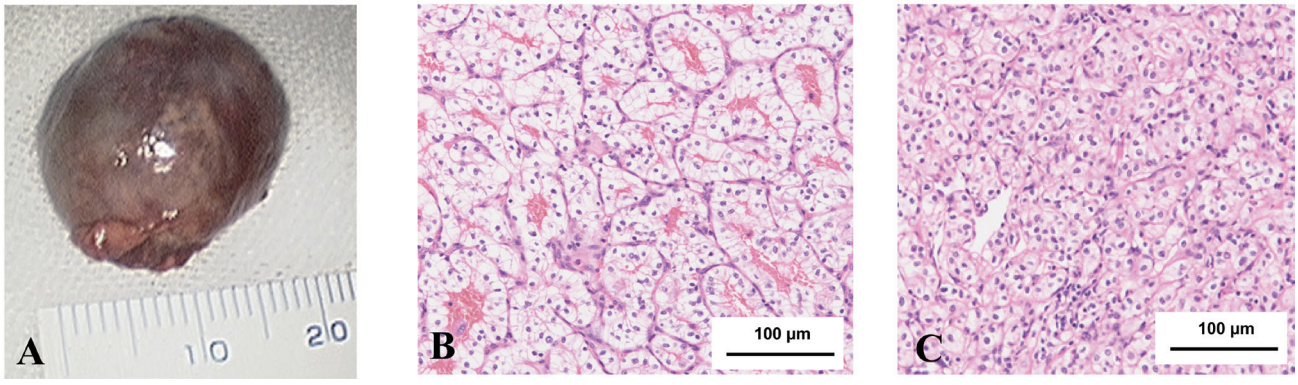

Fig. 2. (**A**) The clearly demarcated, soft and elastic specimen with a size of about 21 mm × 30 mm × 22 mm. (**B**) Histologically, the tumor cells had clear cytoplasm and were arranged in a trabecular pattern lined by a layer of endothelial cells. (**C**) These findings were identical to the pathological findings of the surgical specimen of the renal cell carcinoma from 15 years previous. A pathological diagnosis of metastatic renal cell carcinoma of clear cell type (grade 1) was made. Bar = 100 μm.

mL. Histologically, the tumor cells had clear cytoplasm and were arranged in a trabecular pattern lined by a layer of endothelial cells (Fig. 2B). These morphological findings were identical to the pathological findings of the surgical specimen from 15 years previous (Fig. 2C). In addition, tumor cells were immunohistochemically positive for PAX-8 and CD10. A pathological diagnosis of metastatic renal cell carcinoma of clear cell type (grade 1) was made (Fig. 2B). After definitive diagnosis, PET-CT was performed and indicated no metastasis. The patient's condition was successfully managed with excision of the tumor, and she remains well with no evidence of recurrence and metastasis 36 months after treatment (Fig. 3). The size of the tumor was analyzed

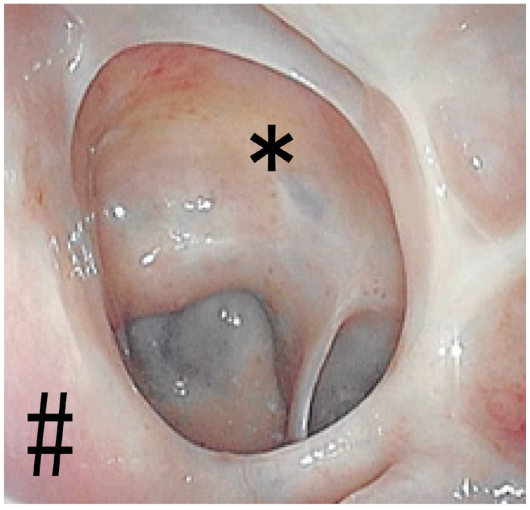

Fig. 3. Postoperative endoscopic photograph of the left nasal cavity 36 months after surgery. (* sphenoid sinus, # nasal septum)

retrospectively and increased gradually from 12 to 15 years after radical nephrectomy (Figs. 4A–D).

DISCUSSION

When a neoplastic condition is detected in the paranasal sinuses, a primary paranasal tumor is firstly suspected, but metastatic tumors from other primary sites should also be considered.[5] Renal cell carcinomas are known to metastasize early, and symptoms due to the metastatic lesion may be the initial and only manifestation.[6] Because of initial slow growth in about 60% of cases of renal cell carcinoma, the primary lesion receives little attention until symptoms occur because of metastasis.[1, 3–6] There are two routes for renal cancer to metastasize to the nasal and paranasal sinuses. The first route is the caval route, in which tumor cells travel through the inferior vena cava, the right heart, the lungs, the left heart and the maxillary artery to the nasal and paranasal sinuses.[4–6] The other route is the vertebral plexus route, in which tumor cells do not flow into the inferior vena cava, but travel through the venous plexus, the intracranial venous plexus and the cavernous venous plexus to reach the nasal and paranasal sinuses.[4–6] The vertebral venous plexus route might have been involved in this case, because lung and liver metastases were not detected.

Retrospective imaging analysis of the lesion was conducted, as the patient has received regular MRI for assessment of brain infarction annually. Interestingly, the tumor was not detected during the first 12 years after the radical nephrectomy, but was first detected at 13 years, and its size increased gradually over 2 years. These findings may allow us to speculate that it takes a long time for renal cell cancer cells to settle down in the paranasal sinus, but once growth has begun, the size increases rapidly. ENT physicians should keep in mind the possibility of metastatic renal cell carcinoma even long after initial treatment of renal cancer.

Many metastatic tumors originating from renal cancer develop in multiples, but most metastatic tumors in the nasal or paranasal sinuses are single and are treated surgically.[1–7] In this case, CT and MRI indicated no evidence of intracranial extension or bony defect of the skull base, and complete resection by endoscopy was performed. However, endoscopic surgery for tumor(s) in sphenoid sinus is still challenging because of the narrow working space, the angled, anatomically variable sphenoid sinus and the proximity to the optic canal, internal carotid artery and skull base. Advances in imaging, surgical instrumentation, intraoperative navigation systems and multi-angle visualization might enable to perform radical resection by endoscopic surgery.[8] Preoperative embolization before resection of metastatic renal cell carcinoma is recommended to reduce the volume of bleeding during surgery.[4–6] Here, however, it was not performed on account of the patient's history of

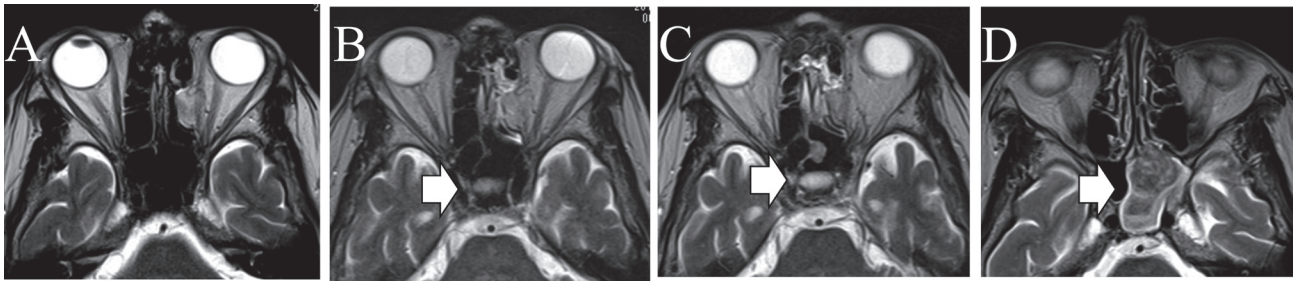

Fig. 4. (**A**–**D**) Axial MRI showed the change of the size of the tumor in left sphenoid sinus at (**A**) 12, (**B**) 13, (**C**) 14, and (**D**) 15 years after radical nephrectomy. The tumor was not detected at 12 years after the radical nephrectomy (**A**), but was first detected at 13 years (arrow) (**B**), and its size increased gradually over 2 years (arrow) (**C**, **D**). (**D**) Axial MRI showed that the tumor had low signal intensity in (arrow) (**D**) the T2-weighted image.

brain and spinal cord infarction. Non-surgical treatment modalities such as chemotherapy, immunotherapy and radiotherapy have significantly failed to improve overall survival, and surgery is the mainstay of treatment and offers the best hope for survival.[1–4] Recently, kinase inhibitors, including sorafenib, sunitinib and temsirolimus, were used in patients with metastatic renal cell carcinoma.[1, 3, 6, 7]

In conclusion, although metastatic renal cell carcinoma to the sphenoid sinus is rare, it might be considered in the differential diagnosis of masses in the paranasal sinus even long after initial treatment of renal cancer. Endoscopic management might be considered in suitable cases.

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The authors declare no conflict of interest.

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