Metastatic Renal Cell Carcinoma to the Sinonasal Cavity: A Case Series

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Abstract

Objectives To describe the presentation, work-up, and management of patients with metastatic renal cell carcinoma (RCC) to the sinonasal cavity and skull base, and to describe our current treatment algorithm of endoscopic surgical resection followed by radiation therapy.

Design Retrospective review of two recent cases from our institution over a 1-year period, with a relevant review of the literature.

Setting A large regional tertiary care facility.

Participants Consecutive cases of RCC with metastases to the sinonasal cavity presenting to our institution.

Main Outcome Measures Preoperative and postoperative sinonasal outcome test (SNOT-22) scores, duration of hospital stay, complications, and local disease control.

Results Patients in this series underwent preoperative embolization followed by endoscopic resection without complication. Postoperatively they were treated with radiation therapy. They experienced improvement in their SNOT-22 scores and are currently free of local disease.

Conclusion Metastatic RCC to the sinonasal cavity can be safely treated with preoperative embolization followed by endoscopic surgical resection and radiation therapy, which can result in improvement in sinonasal quality of life and is a potential adjunct for local control of disease.

Keywords
► renal cell carcinoma
► quality of life
► embolization
► epistaxis
► nasal obstruction

Background

Renal cell carcinoma (RCC) is a relatively rare tumor, accounting for just over 2% of all adult malignancies as of 2008.¹ Metastatic disease occurs through hematogenous spread that most often manifests in bone, lung, and the liver; however, the head and neck have been reported sites of metastasis in up to 15% of patients.² Metastatic disease tends to present at or near the time of initial diagnosis, but there have been reported cases of metastases to the head and neck manifesting greater than 10 years following primary nephrectomy.²³

The most common site of metastatic disease in the head and neck is the thyroid gland, but the sinonasal cavity is also a frequent site, and metastases to the neck, tongue,⁴ facial skin, and other sites have also been reported.⁵⁶ Epistaxis, facial pain, or nasal obstruction may be the presenting symptom for patients with metastatic RCC.⁷⁸ Tumor in the sinonasal cavity can result in a significant decrease in quality of life due to recurrent severe epistaxis, nasal obstruction, and local pain.⁹ Any patient presenting with nasal obstruction or epistaxis and a history of RCC should have metastatic disease included in the differential diagnosis.
The typical work-up for a patient with a presumed sino-nasal mass should include nasal endoscopy, followed by prebiopsy imaging with contrast-enhanced computed tomography (CT) and magnetic resonance imaging (MRI) if the lesion extends to the skull base. Several reports have described profuse bleeding at the time of biopsy of sinonasal RCC due to the hypervascular nature of these tumors, requiring external carotid ligation; thus, any biopsy of a suspicious lesion should be performed in the operating room. Historically, external beam radiation therapy has been the treatment of choice for metastatic sinonasal RCC, with or without concurrent chemotherapy. Surgical resection has been controversial and usually reserved for small solitary lesions or for debulking after primary radiotherapy.

We present two cases of metastatic RCC to the sinonasal cavity and skull base that were successfully resected endoscopically after preoperative embolization. Both patients had significant sinonasal symptoms that resolved posttreatment. We discuss each patient’s presentation, detail our institution’s work-up and treatment algorithm, and highlight the safety and minimal impact of surgery followed by postoperative radiation.

**Case 1**

A 53-year-old white man had a 4-month history of left-sided nasal obstruction and facial pressure. He noted discolored, brown nasal drainage, but did not have frank epistaxis. At the time of initial evaluation his sinonasal outcome test (SNOT-22) score was 32 (where 7 or less is “normal” and higher values indicate more severe sinonasal symptoms). His past medical history was significant for a right nephrectomy for a T1N0 renal cell carcinoma 10 years prior to presentation. On exam, nasal endoscopy was remarkable for a mass in the left nasal cavity, medial to the middle turbinate and the sphenoid recess, extending into the sphenoid sinus and nasopharynx. Superiorly, it extended to the cribriform plate but did not appear to breach the skull base, and bony remodeling along the medial maxillary wall was noted. There was no radiologic evidence of intracranial extension (►Fig. 1).

An initial biopsy resulted in extensive bleeding, and pathology was suggestive of a benign process, such as hemangioma. Subsequently he was referred to our service for further treatment. Given the degree of bleeding at the time of initial biopsy, preoperative embolization was performed. The angiography at the time of embolization showed that the majority of the blood supply was from the internal carotid system via the anterior ethmoid arteries, which could not be embolized...
Contributions from the sphenopalatine artery were embolized (Fig. 3). The day following embolization, the mass was removed endoscopically en bloc with minimal intraoperative bleeding after selective endoscopic bipolar cautery of several feeding vessels from the anterior ethmoid artery. The patient tolerated the procedure well and was discharged the day following surgery without complication. Final pathology was consistent with RCC and demonstrated typical clear cells arranged in nests that stained positively for RCC antigen (Fig. 4).

Case 2
A 67-year-old white man presented with several weeks of worsening intermittent epistaxis and nasal obstruction. His SNOT-22 score at the time of initial evaluation was 23. He had a history of T3bN2 RCC and underwent radical nephrectomy with retroperitoneal lymph node dissection 3 years prior to presentation. He developed several subcentimeter pulmonary nodules but had not received adjuvant systemic therapy given their slow growth rate. Nasal endoscopy revealed a large submucosal mass filling the medial meatus on the right and significant submucosal bulging of the posterior septum.

Table 1
Comparison of pre and postoperative Sinonasal Outcome Test scores

<table>
<thead>
<tr>
<th>Case</th>
<th>Preoperative SNOT-22 Score</th>
<th>Postoperative SNOT-22 Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Case 1</td>
<td>32</td>
<td>7</td>
</tr>
<tr>
<td>Case 2</td>
<td>23</td>
<td>5</td>
</tr>
</tbody>
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on both sides. An outside biopsy confirmed the diagnosis of metastatic RCC.

MRI revealed a bulky $4 \times 3 \times 4$ cm mass within the right anterior ethmoid cavity, bilateral posterior ethmoid air cells, and nasal cavity with destruction of the posterior septum, the anterior intersphenoid septum, and clivus, as well as extension of the mass into the sphenoid sinus on both sides. (Fig. 5) There was no radiologic evidence of intracranial extension. Preoperative embolization of the mass was performed and the majority of the blood supply was from the distal branches of the internal maxillary artery bilaterally (Fig. 6). Endoscopic resection was performed the following day. Gross tumor resection was accomplished, but the tumor extended into the clivus and was likely to have microscopic disease present in the marrow space beyond the area of clival resection. The patient tolerated the procedure well without complication and was discharged the following day. He has just completed adjuvant radiation therapy. At 3-month follow-up, his SNOT-22 score had decreased to 5.

**Discussion**

RCC remains a relatively rare tumor, accounting for just over 2% of all malignant disease. In the United States, an estimated 58,000 men and women are newly diagnosed each year, at a ratio of 1.5 to 1, respectively. Metastatic disease in RCC most frequently presents in the lungs (74%), bone (42%), or liver (41%). Fifteen percent of patients with RCC experience metastatic disease to the head and neck at or after the time of initial diagnosis. The most common location above the clavicle is the thyroid bed, with the nose and paranasal sinuses the second most frequent site. Because the classic triad of flank pain, hematuria, and a palpable abdominal mass occurs in only 10% of RCC patients, clinicians seeing patients...
with symptoms of metastatic disease must maintain a high index of suspicion, even in the absence of a history of primary 
RCC. Overall 5-year survival rates in the United States have 
increased from 63.7% in 1988 to 73.9% in 2002; however, this 
may be due to a lead time bias due to earlier detection of small 
localized tumors incidentally noted on abdominal imaging 
studies. When reviewing patients with metastatic disease, 
their 5-year survival remained relatively dismal at 11.9%.

Metastatic disease in RCC is thought to occur via hematog-
enous spread, with two possible mechanisms to the head and 
neck region. One is via inferior vena cava spread to the lungs, 
where small deposits may reside but may not yet be visible on 
chest radiograph. These cells may then travel to the head and 
eck via the carotid arterial system. This theory suggests that 
patients with metastatic disease in the head and neck already 
have widely disseminated RCC. A second possibility outlined 
by Nahum and Baily in 1963 is retrograde movement of tumor 
cells up theBatson sacral venous plexus to the head and neck, 
bypassing the lungs and resulting in seeding of the paranasal 
sinuses and thyroid as isolated metastatic sites. Unfortunately, the clinical behavior of RCC is frequently noted to be 
unpredictable in its location and timing of metastasis.

In our series, one patient with a T1 tumor developed an isolated 
paranasal sinus metastasis followed by micrometastasis in 
the thyroid bed more than 10 years after initial diagnosis. Our 
second patient developed pulmonary metastases followed by 
a sinonasal metastasis 3 years after initial diagnosis.

Because patients may present at a significant delay from 
their primary treatment, diagnosis can be a challenge. Nasal 
obstruction and facial pain are common in many sinonasal 
tumors, but recurrent profuse epistaxis appears to be specific 
to hemangiomatous and certain malignancies, including RCC 
and melanoma. In a series of six patients with metastatic RCC to 
the nose and paranasal sinuses, two patients who underwent 
biopsy had profuse bleeding that necessitated external carotid 
artery ligation. Spontaneous epistaxis from these lesions can 
result in anemia and require recurrent transfusions, and 
authors in one report argue that even in the setting of multiple 
sinonasal metastases, endoscopic resection should be performed with the primary purpose of limiting recurrent, 
massive epistaxis and improving quality of life.

In general, work-up for a sinonasal mass should include 
endoscopic examination, followed by a CT scan with contrast, 
prior to considering biopsy. This is the imaging test of choice 
for its ability to delineate vascularity and skull base involve-
ment. Typically, metastatic RCC lacks tumor calcification and 
is brightly enhancing on CT with contrast, similar to the CT 
appearance of primary renal disease.

With superior visualization and ability to control intra-
operative epistaxis, endoscopic biopsy has now become the 
standard of care for diagnosis of a sinonasal mass. Patho-
logic specimens typically demonstrate clear cytoplasm and 
show cells arranged in nests and cords with prominent 
vascular lakes. The histologic diagnosis may be supported by 
RCC antigen immunostain.

In the largest case series in the literature of patients with 
RCC metastatic to the nose and paranasal sinuses, Simo et al 
discuss six patients, all treated with radiotherapy following 
biopsy. They argue that although RCC has been thought of as a 
radioreistant tumor, this is primarily because of the inability 
to obtain high doses of radiation in the retroperitoneum, and 
that the anatomy of the nose and paranasal sinuses would 
allow for an effective dose of radiation to treat the disease. 
Thirty percent of their patients did have a complete response, 
whereas 50% had a partial response and one had no response 
(stable disease). Patients did require periodic nasal debride-
ment, including routine endoscopic debride ment and 
endoscopic resection of localized disease in the paranasal sinuses, noting 
survival rates greater than 5 years after surgery. In the past, 
radiation therapy alone has been the treatment of choice for 
metastatic disease. Our case series has demonstrated that for 
isolated lesions that impact on patient quality of life, endo-
scopic resection can be effective and safe, carrying minimal 
morbidity and greatly improving sinonasal complaints. 

Although epidemiologic data suggest that 5-year survival for 
patients with metastatic disease is low, there is a real 

opportunity to improve patient symptoms through manage-
ment of sinonasal metastases. Local control of head and neck 
metastases may allow patients improved quality of life while 
receiving systemic adjuvant therapy for more widely dissemi-
nated disease. Adjuvant treatment now includes anti-vascular 
endothelial growth factor (VEGF) and mTOR pathway 
 inhibitors, which have been shown to improve progression-
free survival in advanced RCC. These agents are now being 
added to our treatment plans where appropriate.

At our institution, preoperative embolization and endo-
scopic resection followed by proton beam radiation is the 
treatment algorithm for resectable disease. Embolization 
provides a superior operative field and visualization while 
limiting blood loss, and has been shown to be extremely safe 
in the head and neck. Even when feeding vessels arise from 
the internal carotid system, the preoperative angiogram and 
external system embolization can greatly help with surgical 
planning. Our limited series of patients had minimal blood 
loss and no significant morbidity, and they were discharged 
the day following surgery. Their sinonasal symptoms mirror 
that of a healthy population on the SNOT-22, and in our 
short period of follow-up, there has been no evidence of local 
disease recurrence.

Conclusion

RCC is a relatively rare tumor with unpredictable metastatic 
potential. Sinonasal metastases may be the initial presenta-
tion of this disease. Definitive diagnosis depends on histopa-
thology, and endoscopic biopsy can be used for this purpose.
If metastatic RCC is suspected, preoperative preparation for 
blood loss is essential given the significant vascularity of this 
tumor. Metastatic sinonasal RCC has been traditionally 
treated with radiation therapy. Our case series demonstrates 
that patients with metastatic RCC to the sinonasal cavity can
be safely and successfully treated with preoperative embolization followed by endoscopic resection. Our patients had no significant blood loss and were discharged the day following surgery. They also had a significant improvement in sinonasal symptoms and quality of life. The treatment algorithm at our institution currently involves endoscopic surgical resection for lesions that can be removed with minimal morbidity, followed by radiation therapy.

Acknowledgments
We have no disclosures.

Presentations
This paper was presented at the North American Skull Base Society Meeting in Las Vegas, Nevada in February 2012.

References
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