Radiology Case Reports 15 (2020) 970–974

Available online at www.sciencedirect.com

ScienceDirect

journal homepage: www.elsevier.com/locate/radcr

Case Report

Nasal congestion and nasal obstruction: An unusual presentation of renal cell carcinoma ☆,☆☆

Zalak T. Patel, MD[a,*], *Jeffery P. Hogg, MD*[a], *Andrew Plata, MD*[b]

[a] *Department of Radiology, West Virginia University, Morgantown, WV, USA*
[b] *Department of Pathology, Anatomy, and Laboratory Medicine, West Virginia University, Morgantown, WV, USA*

ARTICLE INFO

Article history:
Received 2 March 2020
Revised 11 April 2020
Accepted 13 April 2020

Keywords:
Sinonasal metastasis
Renal Cell Carcinoma
Nasal congestion
Nasal Obstruction

ABSTRACT

Renal cell cancer (RCC) is among the 10 most common cancers affecting both genders in the United States. Advanced RCC often remains clinically silent for much of its natural history. This can make the diagnosis challenging, especially when presenting symptoms arise from a metastasis. Sinonasal malignancies are rare, accounting for <1% of all malignant tumors and 3% of malignant tumors of the upper aerodigestive tract. RCC is the most common infraclavicular malignant primary tumor that metastasizes to the nasal cavity and paranasal sinus, followed by breast and lung. We describe a case of a 59 year-old male presenting with nasal congestion and allergy-like symptoms for 6 months duration. CT examination revealed a large hyper-vascular mass within the right maxillary and ethmoid sinuses and nasal cavity. Primary RCC was recognized only after surgical removal of sinonasal mass. We discuss the epidemiology, clinical presentation, differential diagnosis, imaging, pathology, and treatment for sinonasal RCC.

Introduction

Renal cell cancer (RCC) is among the10 most common cancers affecting both genders in the United States [1]. Advanced RCC often remains clinically silent for much of its natural history, making the diagnosis challenging. RCC is the most common malignant tumor that metastasizes to the nasal cavity and paranasal sinus. Renal cell tumors represent a group of histopathologically and molecularly heterogeneous tumors, with different sets of genetic and epigenetic abnormalities and was recently classified into 16 subclasses, of which clear cell renal cell carcinoma is most common, exhibiting varied growth rate, metastatic time and spreading patterns [2]. We report an unusual case of a metastatic RCC presenting as nasal obstruction and congestion.

Case report

A 59 year-old male with past medical history of hypertension, chronic hepatitis B, and allergic rhinitis presents to his pri-

☆ Funding: None.
☆☆ Competing Interests: Authors report no relevant disclosures for the manuscript.
* Corresponding author.
E-mail address: zalak.patel@hsc.wvu.edu (Z.T. Patel).
https://doi.org/10.1016/j.radcr.2020.04.020

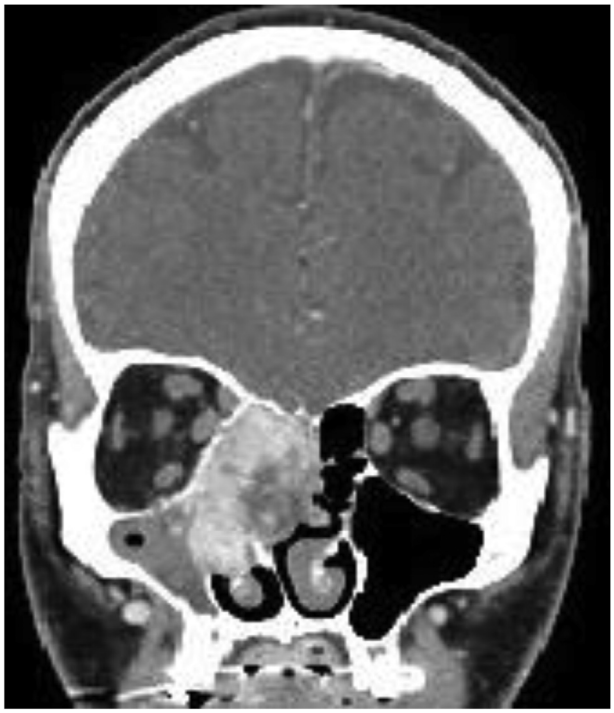

Fig. 1. – Coronal image of post contrast CT paranasal sinus shows enhancing soft tissue density mass lesion centered over the middle turbinate and meatus, extending into right maxillary and ethmoid air cells.

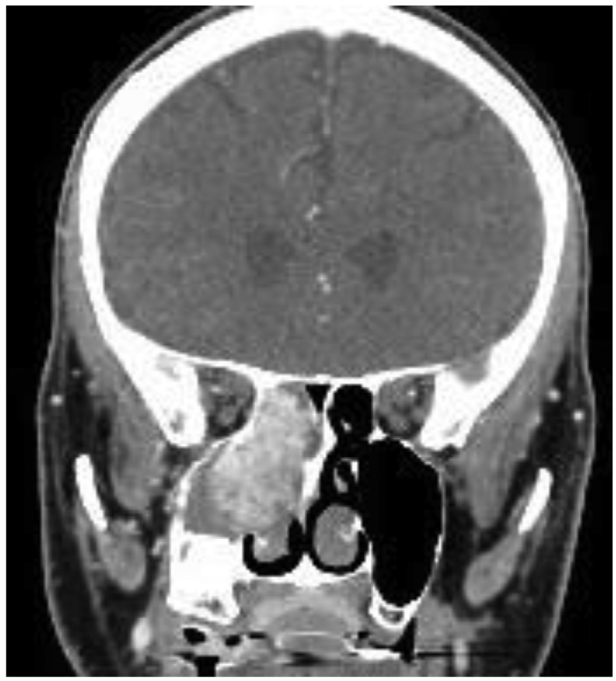

Fig. 2. – Coronal image of post contrast CT paranasal sinus (soft tissue window) shows mass obliterating the visibility of superior turbinate, middle turbinate, and ethmoid air cells on right.

mary care physician with complaints of 6 months of nasal congestion and "allergy-like" symptoms. He had been treated over the course of his 6 months of nasal symptoms with nasal saline irrigation, nasal anti-inflammatory sprays, oral anti-histamines, montelukast, and multiple empiric courses of antibiotics. In addition, he noted a pulsatile sensation coming from the right side of his nasal cavity. He denied epistaxis, asthma, aspirin allergy, facial trauma or family history of significant sinonasal allergy. However, despite these treatments by his primary care physician, his nasal congestion, post nasal drip, nasal obstruction, and cough with occasional yellow phlegm persisted. He was then referred to otolaryngology for further evaluation.

On otolaryngological examination, vitals were stable. Nasal examination revealed moderate rightward nasal septal deviation and a right nasal polyp. Rigid nasal endoscopy showed a pulsatile mass filling the entire right middle meatus. There was some drainage posterior to the mass, however no bleeding was noted. The nasopharynx was clear with no visible lesion.

For detailed sinonasal cavity evaluation, CT of the sinuses was ordered by the otolaryngologist. The patient delayed getting the CT examination for 3 months as his symptoms improved with anti-allergy medication and was lost to follow up. His otolaryngologist attempted without success a few times to contact the patient and explain about the necessity of examination. Nine months after initial onset of his symptoms, the CT was eventually performed. It showed progression of disease with the large expansile soft tissue density mass centered over the right middle turbinate and meatus (Fig. 1). The mass obliterated visibility of the superior turbinate, middle turbinate, and ethmoid air cells on the right (Fig. 2). The mass extended to the nares anteriorly, caused leftward bowing of the nasal septum, eroded the medial wall of right maxillary sinus, cribriform plate, and anterior superior nasal septum. The mass also remodeled and displaced superiorly the right lamina papyracea (Fig. 3). The right ocular globe was proptotic. No other evidence of intra-orbital extension was seen. There was complete opacification of right maxillary, frontal, ethmoid and sphenoid sinuses. Differential diagnostic considerations included inverted papilloma and sinonasal polyposis. MRI of skull base was performed to better characterize tumor extent and that study showed no extension within the anterior cranial fossa. The mass contained numerous flow signal voids raising concern for hemangioma, inverted papilloma and, glomangiopericytoma (Fig. 4).

Imaging findings were discussed with patient. Otolaryngologist discussed the options of biopsy versus nasal mass excision with the patient. The patient gave surgical consent for complete removal with the understanding that the extent of the surgical procedure might be influenced by intraoperative findings. On the day of surgery, rigid nasal endoscopy revealed a large pulsatile mass covering the entire right nasal cavity, bleeding easily when touched, with no extension to the left side of the nasal cavity. The hypervascular mass was supplied by branches of the sphenopalatine artery. The procedure was complicated with significant amount of hemorrhage (approximately 600 mL). Procedure was aborted after removal of the anterior 1/3rd of the mass. The pathology revealed metastatic clear cell renal carcinoma (Fig. 6).

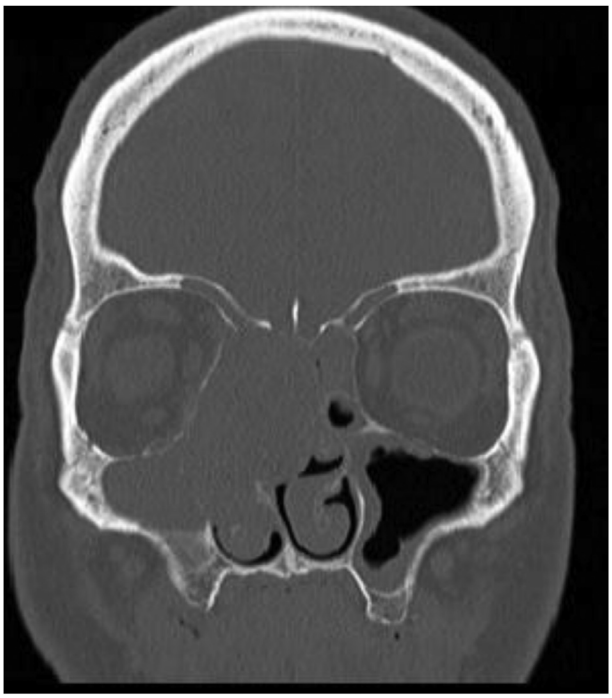

Fig. 3. – Coronal image of CT paranasal sinus (bone window) shows bony remodeling of right lamina papyracea, cribriform plate, anterior-superior nasal septum and medial wall of right maxillary sinus by mass lesion. This osseous remodeling reduces intraorbital volume, accounting for the patient's right proptosis.

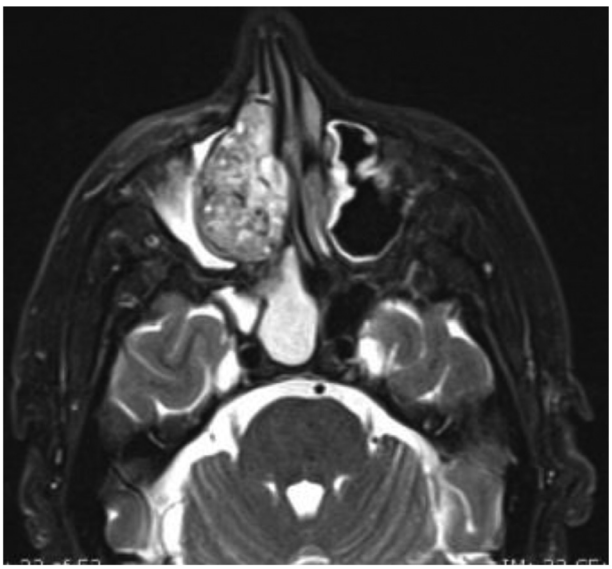

Fig. 4. – T2W Axial image of MRI paranasal sinus shows multiple flow voids within the mass suggestive of hypervascular nature of mass lesion.

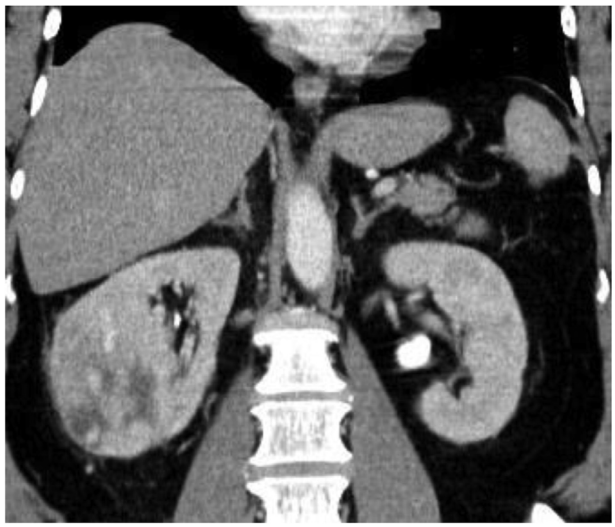

Fig. 5. – Coronal image of post contrast CT abdomen showed large right renal inferior pole mass lesion with heterogeneous enhancement.

Five days subsequently, the patient underwent functional endoscopic sinus surgery with intraoperative navigation and a right Caldwell-Luc approach. During this second operative procedure, he had right pterygopalatine fossa dissection with ligation of internal maxillary artery, ligation of right anterior and posterior ethmoid arteries, ligation of nasal septal branch of left sphenopalatine artery, right medial maxillectomy, right total ethmoidectomy, right sphenoidotomy, right frontal sinusotomy, posterior septectomy, resection of right lamina papyracea, partial resection of right inferior turbinate and resection of nasal tumor. Patient tolerated the operation well without any major complication.

For further evaluation of renal cell cancer, patient underwent renal ultrasound (US), PET/CT whole body and referral to Urology. Renal US and PET/CT revealed solid, hyper-vascular mass (Fig. 5) with central necrosis in the right inferior renal pole, measuring 8.2 cm. Maximum SUV uptake of the lobular right inferior pole renal mass was 3.7. FDG uptake in this mass was not significantly different from the surrounding renal parenchyma. No additional metastatic foci or abnormal FDG uptake was found elsewhere in the body. PET/CT examination had findings consistent with post-operative changes with no residual tumor in the right sinonasal cavity.

At one month postop follow up visit with otolaryngology, patient denied epistaxis, was doing well and rinsing the nasal cavity 3 times a day. At urology visit, he denied abdominal pain, hematuria, and weight loss. Patient underwent robotic assisted laparoscopic right radical nephrectomy and limited (paracaval) retroperitoneal lymph node dissection 3.5 months after his functional endoscopic sinus surgery. Pathology from nephrectomy specimen showed clear cell renal carcinoma, the same histology as his sinonasal mass. (Fig. 7).

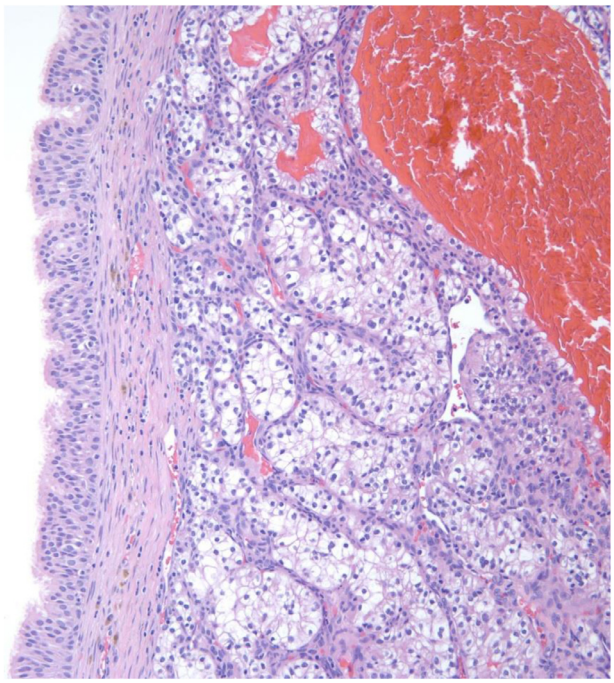

Fig. 6. – Sinonasal Specimen: (Hematoxylin-eosin stain at 20× magnification)
The image shows a metastatic focus of tumor just below nasal mucosa lined by ciliated pseudostratified columnar (respiratory) epithelium. The cellular morphology and architecture of the metastasis is consistent with that of the primary tumor (Clear cell renal cancer).

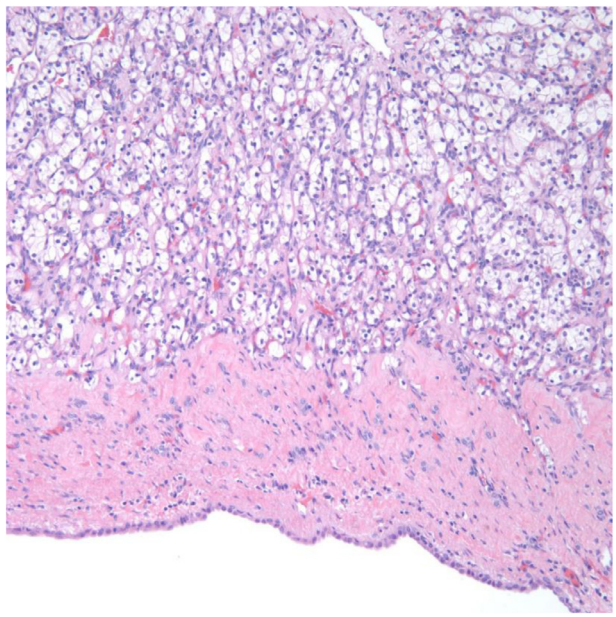

Fig. 7. – Nephrectomy Specimen: (Hematoxylin-eosin stain at 20× magnification)
The image of the primary tumor shows a classic histologic findings of clear cell renal cell carcinoma, nest of clear cells with round nuclei surrounded by intricate branching vascular septae. The section photographed shows the tumor near the urothelial mucosa of the renal pelvis.

Discussion

Nasal obstruction is one the most common sinonasal complaints seen by primary care, otolaryngology and allergy physicians. Nasal obstruction is defined as sensation of insufficient airflow through the nose [3]. During the normal airflow through the nose, anatomical structures of turbinates, septum and ostiomeatal complex contributes to natural turbulence of the air column. Any alteration of these internal structures can disturb the physiologic turbulence and the perception of normal airflow causing symptoms of nasal obstruction and congestion. Acquired structural causes of nasal obstruction include enlarged adenoids, foreign bodies, disorders of nasal septum, nasal valve abnormalities, inflammatory conditions, nasal polyps and neoplastic disorders. Sinonasal malignancies are rare, accounting for <1% of all malignant tumors and 3% of malignant tumors of the upper aerodigestive tract. When a nasal endoscopic exam reveals a hypervascular mass, a primary sinonasal tumor is first suspected, such as angiofibroma, hemangiopericytoma, hemangioma, or sinonasal glomus tumors [4]. For a minority of patients, it represents a metastatic secondary sinonasal mass such as adenocarcinomas, melanomas, and other metastatic tumors arising from infraclavicular primary sites. Renal cell cancer is the most frequent infraclavicular tumor metastasizing to the nasal cavity and paranasal sinuses followed in frequency by breast and lung [5,6]. Our patient experienced nasal obstruction, congestion and allergy symptoms for 6 months before having detailed otolaryngology evaluation revealing a pulsatile right nasal mass. During the initial surgery, this hypervascular mass had significant bleeding. Eventual pathology and subsequent testing confirmed metastatic RCC as the underlying etiology. Therefore, in the setting of a hypervascular sinonasal mass, it is important to maintain a high index of suspicion and use a cautious approach if RCC is a plausible diagnostic consideration.

Review of the case cohort by Basteir P.L. et al [7], suggested the most common symptom leading to the diagnosis of metastasis in the sinonasal cavity was nasal bleeding (54.7%), followed by nasal obstruction (37.7%). Additional but uncommon symptoms reported were facial/dental pain, nasal/facial mass, headache, proptosis, diplopia, nasal discharge and in advanced cases, symptoms of cranial nerve impairment. These alarming symptoms should elevate suspicion for underlying malignancy and indicate need for appropriate imaging evaluation.

Renal cell cancer encompasses a histologically diverse group of solid renal tumors. The most common histologic subtype is clear cell RCC (85%) [8]. Unusual sites of metastasis are characteristic of RCC and virtually any organ site can be involved, including thyroid, pancreas, skeletal muscle, skin and underlying soft tissue. The clinical course of the primary tumor is often unpredictable. Metastasis may be found at the time of diagnosis in 25%-30% of patients or at some interval after nephrectomy. Nose and paranasal sinuses are unusual

sites for metastatic RCC however, RCC remains the most common primary tumor to metastasize to paranasal sinus. The maxillary sinus is the most commonly involved paranasal sinus [9].

Clear cell RCC is associated with loss of function of the von Hippel-Lindau gene, which upregulates hypoxia-induced factor, finally increasing the function of vascular endothelial growth factor (VEGF). This sequence of events eventually increases the angiogenesis and vascularity of clear cell RCCs and related metastases. Therefore, sinonasal metastases of RCC are characteristically prone to be hypervascular and may cause severe nasal bleeding.

The potential of RCC metastasis to bleed can be assessed by imaging. RCC metastases usually appear as a solid mass with peripheral bone destruction and wall displacement, and they enhance intensely on CT after contrast injection [10,11]. MRI shows hypo- and iso-intensity on both T1W and T2W images. The lesions enhance intensely after injection of gadolinium contrast. Flow voids may be seen in such tumors, and indicate a high risk for bleeding. In some cases, bleeding may be life-threatening [7]. Our case also demonstrated multiple flow voids on MRI suggesting the hypervascular nature of the mass.

If an RCC metastasis is suspected, a biopsy should be performed carefully with general anesthesia. Biopsy from metastatic RCC can be inconclusive due to diffuse necrosis of the lesion. Some authors advocate selective embolization prior to tumor biopsy particularly if there is a known history of nephrectomy [6]. Treatment modalities include radiotherapy and immunochemotherapy for metastatic diseases, however; surgery remains the mainstay for treatment because most metastatic tumors in the nasal or paranasal sinuses are single [9].

Conclusion

Our case demonstrates that the common ailments of nasal obstruction, congestion and allergies can rarely masquerade as the complicated etiology of secondary metastasis from renal cell cancer to the sinonasal region. The complexity of presentation underscores the need for vigilant approach from the clinicians and radiologists to identify and manage this uncommon problem.

REFERENCES

[1] Siegel RL, Miller KD, Jemal A. Cancer statistics, 2019. CA Cancer J Clin 2019;69(1):7–34.
[2] Moch H, Cubilla AL, Humphrey PA, Reuter VE, Ulbright TM. The 2016 WHO Classification of Tumours of the Urinary System and Male Genital Organs-Part A: Renal, Penile, and Testicular Tumours. Eur Urol 2016;70(1):93–105.
[3] Jessen M, Malm L. Definition, prevalence and development of nasal obstruction. Allergy 1997;52(40 Suppl):3–6.
[4] Razek AA, Huang BY. Soft tissue tumors of the head and neck: imaging-based review of the WHO classification. Radiographics 2011;31(7):1923–54.
[5] Lee SM, Kim YM, Kim BM. Epistaxis as the First Manifestation of Silent Renal Cell Carcinoma: A Case Report with Relevant Literature Review. Iran J Radiol 2016;13(1):e31208.
[6] Torres Muros B, Solano Romero JR, Baro Rodriguez JG, Bonilla Parrilla R. [Maxillary sinus metastasis of renal cell carcinoma]. Actas Urol Esp 2006;30(9):954–7.
[7] Bastier PL, Dunion D, de Bonnecaze G, Serrano E, de Gabory L. Renal cell carcinoma metastatic to the sinonasal cavity: A review and report of 8 cases. Ear Nose Throat J 2018;97(9):E6–E12.
[8] Karumanchi SA, Merchan J, Sukhatme VP. Renal cancer: molecular mechanisms and newer therapeutic options. Curr Opin Nephrol Hypertens 2002;11(1):37–42.
[9] Mahajan R, Mayappa N, Prashanth V. Metastatic Renal Cell Carcinoma Presenting as Nasal Mass: Case Report and Review of Literature. Indian J Otolaryngol Head Neck Surg 2016;68(3):374–6.
[10] Simo R, Sykes AJ, Hargreaves SP, et al. Metastatic renal cell carcinoma to the nose and paranasal sinuses. Head Neck 2000;22(7):722–7.
[11] Haberal I, Su S, Recant W, Michael E. Radiology quiz case 1. Metastatic renal cell carcinoma, clear cell type. Arch Otolaryngol Head Neck Surg 2004;130(7):892 894.