Clinical Case Report

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Giant sellar metastasis from renal cell carcinoma

A case report and literature review

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Abstract

Rationale: Sellar metastasis is a rare and complex disease whose clinical features are strongly associated with the primary malignancy. Here, we present a rare case of giant sellar metastasis spread from renal cell carcinoma (RCC).

Patient concerns: A 30-year-old Chinese woman was admitted to our Hospital, reporting headache, nasal congestion, nausea, vomiting, and a sharp decline in her right eye vision.

Diagnoses: Brain magnetic resonance imaging (MRI) revealed an invasive sellar mass with cavernous sinus and nasal cavity extension. Additionally, the patient had a medical history of right radical nephrectomy for clear-cell RCC.

Interventions: The patient underwent a successful subtotal resection of the tumor. Final pathological diagnosis confirmed sellar metastasis from RCC. After surgery, the patient was referred to our medical oncology department and received further systemic therapy.

Outcomes: No light perception remained in her right eye even after prompt surgical decompression. Follow-up MRI showed subtotal resection of the giant sellar metastasis.

Lesson: Sellar metastasis, although rare, should be particularly considered for elderly patients with deteriorating visual function and medical histories of cancer.

Abbreviations: ACTH = adrenocorticotropic hormone, ccRCC = clear cell renal cell carcinoma, MRI = magnetic resonance imaging, PRL = prolactin, RCC = renal cell carcinoma, SM = sellar metastasis.

Keywords: pan-hypopituitarism, renal cell carcinoma, sellar metastasis, visional function

1. Introduction

Sellar metastasis (SM) is a rare disease caused by the migration of distant malignant tumors to the sellar region. Breast and lung cancer are the 2 most common sources of metastases to the sellar region.[1] Renal cell carcinoma (RCC) is a relatively rare source of distant metastases to this region. Clinical manifestations of SM largely depend on tumor size and location; reported symptoms include visual field defects, headache, pituitary gland dysfunction, diabetes insipidus, and ophthalmoplegia.[2] Occasionally, these symptoms are the first manifestation of occult malignancy. Clinically, SM should be considered in differential diagnoses of patients with rapid tumor growth and histories of malignancy. Although histopathological confirmation is critical to a definitive diagnosis of SM, many published cases of SM were clinically presumed rather than histologically confirmed.[1] Here, we present a case of giant SM from RCC, which was successfully resected and confirmed by histopathology. In addition, we provide a literature review with basic statistics regarding this rare neurosurgical topic.

2. Case report

In June 2017, a 30-year-old Chinese woman presented to our clinic reporting headache, nasal congestion, nausea, vomiting, and a sharp decline in her right eye vision. The intermittent headache, located mainly in bilateral frontotemporal regions, first occurred 2 months earlier and decreased after taking pain relievers. One month earlier, the headache worsened and was associated with nasal congestion, hyposmia, nausea, and vomiting. She had also suffered a sharp decline in her right eye vision over 6 days. She denied polyuria, diplopia, dysphonia, and other symptoms. When admitted to our hospital for further evaluation, she had lost most of the sight in her right eye. Eye examination revealed her pupils were equally round with direct light reflex and indirect light reflex diminished on the right eye and left eye respectively, indicating right optic nerve injury. There was no evidence of eyelid ptosis or eye movement disorder. Magnetic resonance imaging (MRI) demonstrated an invasive sellar mass with cavernous sinus and nasal cavity extension, measuring 48 × 36 mm (Fig. 1A, B). Three months previously, the patient had undergone right radical nephrectomy for clear-cell renal cell carcinoma (ccRCC). She presented with no other symptoms or medical history of brain injury, and endocrine examination showed normal pituitary function.

Editor: N/A.

The authors have no conflicts of interest to disclose.

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Medicine (2018) 97:47(e13376)

Received: 22 August 2018 / Accepted: 31 October 2018

http://dx.doi.org/10.1097/MD.0000000000013376

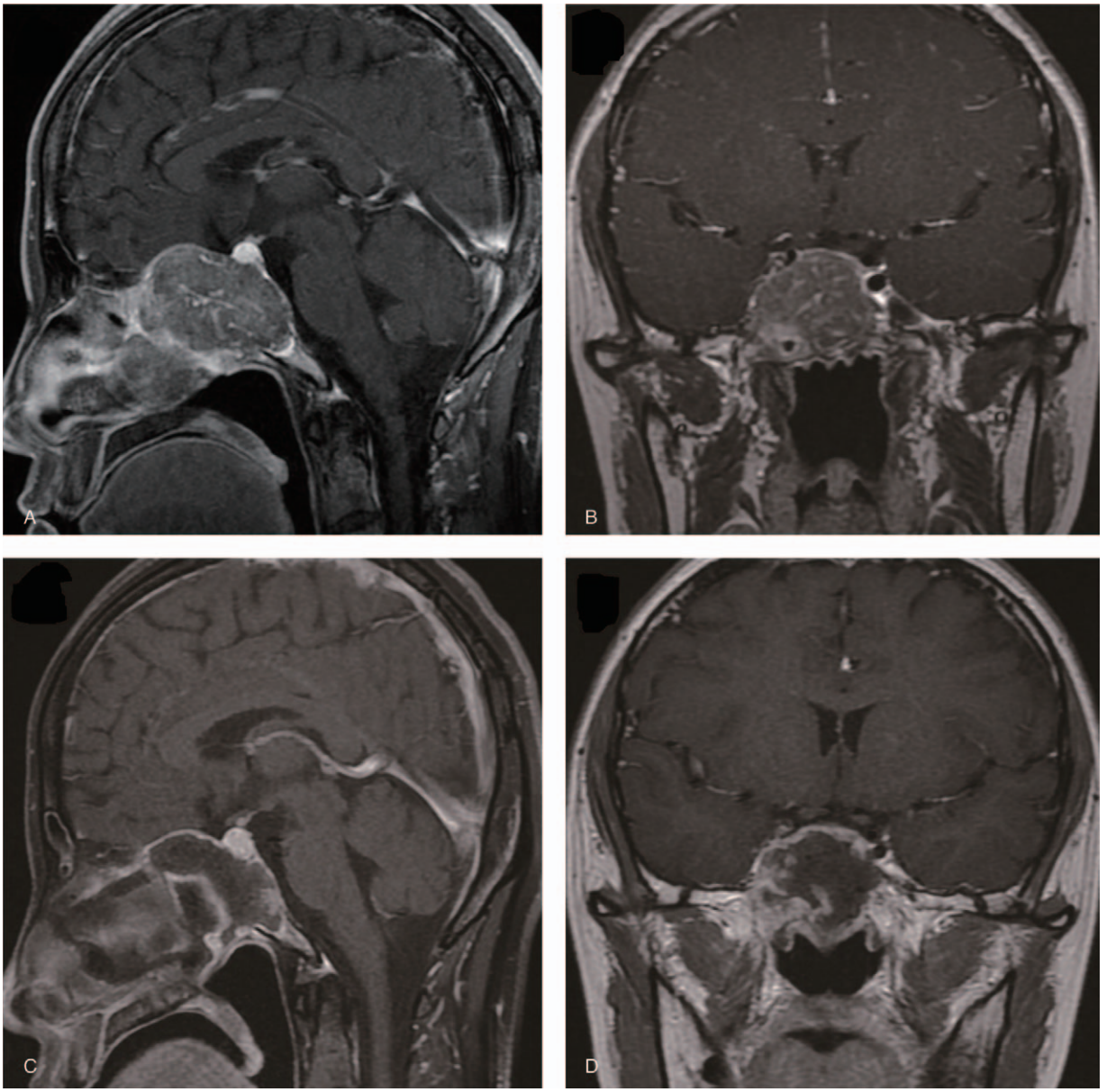

Figure 1. Preoperatively, sagittal (A) and coronal (B) contrast magnetic resonance images (MRI) of the brain showing an invasive sellar regional lesion extending to the cavernous sinus and nasal cavity; Postoperatively, sagittal (C) and coronal (D) contrast MRI shown subtotal tumor was resected via a transsphenoidal approach.

As our patient had a history of ccRCC, and a rapid onset and progressive symptoms of headache and decreased visual function, a metastasis from RCC was presumably diagnosed. Endoscopic endonasal transsphenoidal surgery was immediately performed to restore the patient's partial right vision. Follow-up MRI showed subtotal resection of the giant sellar metastasis (Fig. 1C, D). Unfortunately, no light perception remained in her right eye even after prompt surgical decompression. Immunohistochemistry revealed that tumor cells were positive for the markers PAX-8, CA9, RCC, and vimentin, and negative for CD10 and epithelial membrane antigen, consistent with the diagnosis of a ccRCC metastasis (Fig. 2). Also, the Ki-67 index was 15%, indicating highly active tumor cells. After surgery, the patient was referred to our medical oncology department and received further systemic therapy. Through follow-up via telephone in July 2018, the patient was still alive receiving chemotherapy and showed no relief of her visual disability.

3. Discussion

Metastases to the sellar area are rare, accounting for only 0.87% of all reported intracranial metastases.[3] Reportedly, the most common sources are breast cancer in women (29%), and lung cancer in men (30%).[1] Renal cell carcinoma is the ninth most common cancer worldwide,[4] and is a relatively rarer source of distant metastases to sellar region. Table 1 summarizes 21 full-text, English-language case reports of SMs from RCC (including this case report) that could be searched from 1992 to 2018 in PubMed,[5–19] whereas Table 2 shows basic statistical analyses of some characteristic parameters in these studies. We found the median patient age is 56.6 years old which is similar to the finding

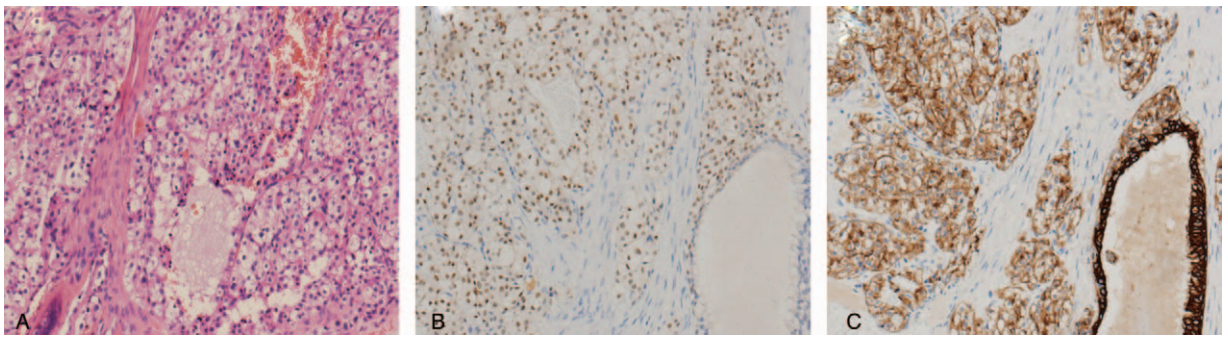

Figure 2. A, Tumor epithelial cells with clear cytoplasm and small granular nuclear chromatin were demonstrated by light microscopy (H&E, ×100). B, Tumor cells demonstrate diffuse reactivity for the tumor marker, PAX-8 (×100). C, Renal cell carcinoma (RCC; ×100). Additional immunohistochemical staining revealed a predominance of vimentin, and CA9 with no evidence of CD10 and epithelial membrane antigen, consistent with a diagnosis of clear-cell RCC.

Table 1

Literature review of 21 reported cases of sellar metastasis from renal cell carcinoma.

Authors and year	Age and sex	Manifestations and pituitary function	MRI and size	Pathology	Medical history and other metastases	Management	Interval from RCC to SM	Survival status
Present study	30, F	Headache, visual decline, normal	4.8×3.6 cm, sellar mass with bone destruction	ccRCC	ccRCC, lung	Transsphenoid resection + radiotherapy + chemotherapy	3 m	Still alive in July 2018
Yi Zhao et al, 2018	40, M	None, primary hyperthyroidism	unknown	ccRCC	ccRCC, unknown	Transsphenoid resection +radiotherapy	Unknown	Death
Di Nunno V et al, 2018	59, M	None, normal	Pituitary node	Absence	ccRCC, chest lymph, pancreas, cerebellum	Gamma knife surgery +sunitinib	14 y	Still alive before case report
Wendel C et al, 2017	61, M	Visual defects, headache, diabetes insipidus, pan-hypopituitarism	1.8×3.4×2.7 cm	ccRCC	ccRCC, lung, vertebral, brain, nasal septum	Surgical resection +radiotherapy+sunitinib	2 y	Death 30 m after surgery
Payandeh M et al, 2016	50, M	Diabetes insipidus, pan-hypopituitarism	Pituitary node	Absence	ccRCC, lung, vertebrate	Antiangiogenesis+sunitinib	SM was first found	Still alive before case report
Ravnik J et al, 2016	54, F	Eyelid ptosis, worsening vision, headache, pan-hypopituitarism	2.5 cm, bone destruction.	ccRCC	ccRCC, pancreas, lungs	Surgical resection + radiotherapy + chemotherapy	6 y	Death 8 m after surgery
Hwang JM et al, 2013	40, F	Headache, vision worsened, hyperprolactinemia, hypocortisolism	2.5 cm sellar mass, suprasellar extension	ccRCC	RCC, chest lymph, lung, adrenal gland, psoas muscle	Chemotherapy + surgical decompression	3 y	Still alive before case report
Yang L et al, 2013	51, M	Blurry vision, hemianopia, ptosis of eyelid, diplopia, hyperprolactinemia, ACTH deficiency	Diffuse enlargement of pituitary gland	ccRCC	ccRCC, adrenal gland, bone, retroperitoneal lymph node, lung	Sorafenib + surgery + radiotherapy	<7 m	Death 9 m after surgery
Grossman R et al, 2013	45, M	Visual deterioration, decreased libido, pan-hypopituitarism with elevated prolactin level	3.6×2.4 cm sellar mass, eroding the sellar floor	ccRCC	No significant medical history	Surgical resection + stereotactic radiosurgery	SM was first found	Not described
Kramer CK et al, 2010	74, M	Visual deterioration, abducens nerve palsy, pan-hypopituitarism with prolactin value increased	1.2×0.9 cm sellar mass	RCC	RCC, lung,	Chemotherapy + radiotherapy + tumor resection	5 y	Not described
Gopan T et al, 2007	67, M	Diaphoresis, dizziness, blurry vision, headache, impotence, diabetes insipidus, pan-hypopituitarism with mild hyperprolactinemia	2.0 cm sellar mass with erosion of sellar floor	ccRCC	RCC, paranasal sinus, lung	Surgical resection + radiation therapy	27 y	Still alive before case report
Gopan T et al, 2007	51, M	Headache, visual defects, ACTH and gonadotropin deficiency	2.3 cm sellar mass with optic chiasm elevated	ccRCC	RCC, lung, scalp	Surgical resection + whole brain radiation treatment	About 10 y	Still alive before case report
Gopan T et al, 2007	53, M	Headache, lethargy, decreased libido, increased thirst, diplopia, hemianopsia, third nerve palsy, diabetes insipidus, pan-hypopituitarism	Invasive sellar and parasellar mass	ccRCC	No significant medical history	Surgical resection + radiotherapy	SM was first found	Death 12 m after surgery
Gopan T et al, 2007	67, F	Fatigue, ACTH and gonadotropin deficiency	2.5 cm sellar mass with optic chiasmal compression	None	RCC, pancreas	Stereotactic radiotherapy + chemotherapy + sorafenib	7 y	Still alive before case report
Gopan T et al, 2007	61, F	Altered mental status, pan-hypopituitarism with elevated prolactin level	1.9 cm sellar mass with optic chiasm compression	None	ccRCC, lung	Declined surgical intervention, stereotactic radiotherapy + tyrosine kinase inhibitor	3 m	Still alive before case report
Pallud J et al, 2005	70, M	Headache, bitemporal hemianopsia, unknown	Sellar mass eroding the sellar base	RCC	RCC	Surgical resection + radiotherapy	6 y	Still alive before case report
Basaria S et al, 2004	77, F	Blurred vision, reduced appetite, fatigue, diplopia, ptosis, hemianopsia, pan-hypopituitarism with elevated PRL	2.0×2.0 cm pituitary mass compressing the optic chiasm	RCC	RCC, lung, spleen	Surgical resection + stereotatic radiosurgery	2 m	Death 12 m after surgery
Yokoyama T et al, 2004	63, M	Visual field deficit, headache, hemianopsia, diabetes insipidus, pan-hypopituitarism	Sellar mass with erosion of the bony floor and dorsum sella turcica	None	RCC, lung, bone	Stereotatic radiosurgery	8 y	Still alive before case report
Weber J et al, 2003	62, M	Headache, visual loss, bitemporal hemianopsia, normal pituitary hormones	Large sellar mass	ccRCC	RCC, adrenocortical adenoma	Surgical resection	4 y	Death from pneumonia
Beckett DJ et al, 1998	56, M	Lethargy, vomiting, loss of libido, pan-hypopituitarism	Large pituitary tumor extending the optic chiasm	RCC	No significant medical history	Surgical resection + radiotherapy	SM was first found	Still alive before case report
Koshiyama H et al, 1992	57, M	Bitemporal hemianopsia, diabetes insipidus, pan-hypopituitarism with elevated PRL	Large sellar mass	Metastatic ccRCC	RCC, pancreas,	Surgical resection + radiation therapy	Unknown	Still alive before case report

ACTH = adrenocorticotropic hormone, ccRCC = clear cell renal cell carcinoma, F = female, M = male, m = month, PRL = prolactin, RCC = renal cell carcinoma, SM = sellar metastasis, y = year.

Table 2

Basic statistical analysis of 21 cases of sellar metastasis from renal cell carcinoma.

Characteristic	Value
Age and sex	
Median age	56.6 yrs
<55 yrs	42.9% (9/21)
≥55 yrs	57.1% (12/21)
Female	28.6% (6/21)
Male	71.4% (15/21)
Manifestation	
Headache	47.6% (10/21)
Visional decline	66.7% (14/21)
Diabetes insipidus	28.6% (6/21)
Ophthalmoplegia	23.8% (5/21)
Pan-hypopituitarism	60.0% (12/20)
Tumor size	
>4 cm	9.1% (1/11)
1–4 cm	90.9% (10/11)
≤1cm	0
Other common metastases	
lung	60% (12/20)
Pancreas	20% (4/20)
bone	20% (4/20)
adrenal gland	15% (3/20)
Interval from RCC to SM	
Median time	6.2 y
>5 y	46.7% (7/15)
≤5 y	53.3% (8/15)

RCC = renal cell carcinoma, SM = sellar metastasis, y = years, yrs = years old.

of AI-Aridi et al that median age of SM patients is 56 years.[1] However, whereas the previous study found SM to be equally distributed by sex,[1] we were surprised to find significantly higher incidence of SM from RCC in men (71.4%) than in women (28.6%; Table 2). We attribute this difference mainly to the higher incidence (62.2%) of RCC in men.[4] Regarding pathological subtype, we found ccRCC makes up almost all the reported literatures of SM from RCC (Table 1), which may be because ccRCC is the most common histological subtype.[20] In addition, we found about 60% of patients with SM from RCC develop metastasis simultaneously in the lung, followed by pancreas (20%), bone (20%), and adrenal gland (15%; Table 2).

SM is usually asymptomatic; only 20% of patients show symptoms.[21] Although the median interval from RCC to SM is 6.2 years (Table 2), in some cases SM was detected earlier than the primary RCC (Table 1).[8,12,14] Headache, pituitary dysfunction, visual deterioration, diabetes insipidus, and ophthalmoplegia are common presentations of metastases in the sellar region. Whereas hypopituitarism, visual defects, and headache are not helpful in differentiating SM from pituitary adenoma, diabetes insipidus, and cranial neuropathies are reported to be strong indicators of SM.[22] Nevertheless, we found visual disturbance (66.7%) and pan-hypopituitarism (60%) were the 2 most common symptoms in patients with RCC metastasis to the sellar region (Table 2); indeed, our present case presented a giant sellar mass extending along the cavernous sinus and optic nerve, but without diabetes insipidus or cranial neuropathy. The patient's MRI image showed an intact pituitary gland, located above the tumor. To our knowledge, this is the first report to describe a huge sellar metastasis (diameter > 4 cm) that did not invade the pituitary gland or cranial nerves related to eye movements.

Differential diagnoses of SM include pituitary adenoma and chordoma. Pituitary adenomas are generally the first suspected diagnosis for a sellar mass, even in patients with known cancers. However, the rapid onset of clinical signs is extremely rare in pituitary adenoma, and fewer than 2% of patients with pituitary adenoma present with diabetes insipidus and oculomotor palsies.[23,24] Chordoma is a locally aggressive tumor that usually invades surrounding bones, such as the sphenoid sinus, cavernous sinus, and clivus. Bony invasion can make chordoma difficult to ruling out radiographically; however, chordoma may be distinguished from RCC using immunohistochemistry.[25]

Current management of SM mainly involves surgical resection, radiotherapy, and chemotherapy. In patients with compressive symptoms, such as visual deterioration and headache, surgical resection is recommended first, to provide symptomatic relief and a definitive diagnosis.[22,26] In our opinion, the main purpose of surgery is to decrease the compression rather than total resection of tumor. Radiation treatment is a common adjunct after surgery; however, radiation is the recommended initial treatment for patients for whom surgery is unsuitable.[2] The value of chemotherapy has not been adequately studied; it is commonly used for palliation of metastatic disease in the sellar region. The prognosis of patients with SM is generally poor because of the aggressive characteristics of the primary tumor. Mean survival reportedly ranges between 6 and 22 months.[27] Surgery and radiotherapy for the secondary SM provide limited improvements on overall prognosis.

In conclusion, we reported a patient with a giant sellar metastasis from RCC, diagnosed and treated at our medical center, and systematically reviewed 21 cases who met inclusion criteria. We found additional characteristics for sellar metastasis from renal cell carcinoma, such as greater distribution among male patients and some clinical symptoms.

Acknowledgment

The authors express many thanks to the patient for generously authorizing us to share his rare case.

Author contributions

ZS and CY wrote the first draft of the manuscript. XB revised the manuscript substantially and approved its final version. RW participated in patient care.
Resources: Xinjie Bao.
Supervision: Renzhi Wang.
Writing – original draft: Zhiwei Shen.
Writing – review & editing: Chengxian Yang.

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