



## Case Report

# Isolated late intradural cauda equina metastasis of renal cell carcinoma

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## ABSTRACT

**Background:** The cauda equina (CE) is the most common site for intradural extramedullary metastasis from systemic malignancies such as lung, breast, and thyroid carcinomas. However, renal cell carcinomas (RCC), with their high metastatic potential, are rarely responsible for CE metastatic lesions. Here, we report an intradural cauda equina mass, as the first and only site of metastasis of a renal cell carcinoma.

**Case Description:** A 55-year-old female had undergone a left nephrectomy for renal cell carcinoma 8 years ago. She now presented with a unifocal renal cell metastasis to the CE. As such metastases are rare, establishing the correct pathological diagnosis proved to be a challenge.

**Conclusion:** The cauda equina was the first and only site of an 8-year-delayed metastasis attributed to a renal cell carcinoma.

**Keywords:** Cauda equina, Intradural, Isolated, Metastasis, Renal cell carcinoma

## INTRODUCTION

Renal cell carcinoma (RCC) is known for its high metastatic potential. At the time of diagnosis, 30% of patients with RCC already have metastases, and another 78% of these occur within the first 5 years.<sup>[1]</sup> The typical sites of RCC metastases include; the lungs (4.7%), bones (19.6%), liver (8.0%), lymph nodes (7.5%) contralateral kidney (2.5%), adrenal gland (2.5%), pancreas (1%), and the brain (1%).<sup>[5,7]</sup> However, the cauda equina (CE) is a rare site for such isolated as well as delayed (i.e., 8 years following the original diagnosis) for RCC metastases.<sup>[1,3,8]</sup>

## CLINICAL PRESENTATION

A 55-year-old female had undergone a left-sided nephrectomy 8 years ago for clear/renal-cell carcinoma (RCC). She now presented with a two-month history of gradually progressive low back pain with radiation into the left lower extremity. Her neurological examination only demonstrated a lack of pin appreciation in the left L3 distribution, while all routine laboratory studies were within normal limits.

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## Radiographic evaluation

The plain X-rays only showed lumbarization of S1 [Figure 1a]. However, the MR revealed a well-defined intradural extramedullary mass at the L3-L4 level with extension into the left L3/L4 foramen. The lesion was isointense on T1, and mildly homogeneously enhanced with contrast; it measured 2.5 cm craniocaudally and 1.5 cm anteroposteriorly [Figure 1b and c]. The bone scan and the CT of the chest/abdomen/pelvic demonstrated no additional metastatic RCC lesions. With these findings, the original provisional preoperative diagnosis favored a primary nerve sheath tumor.

## Surgery

Following a L3-L4 laminectomy and midline durotomy, with the opening of the arachnoid membrane, revealed a firm, vascular lesion densely adherent to multiple roots. The caudal pole was readily skeletonized from the cauda equina, but was adherent to the L3 nerve root exiting through the left L3/L4 foramen; it was sacrificed [Figure 2a]. The cranial pole was removed in a piecemeal fashion, leaving multiple particulate remnant adherent to various nerve roots [Figure 2b and c]. Postoperatively, the patient remained neurologically intact and was discharged on the 5<sup>th</sup> post-operative day.

## Histology/immunohistochemistry

The tumor's histological features were consistent with metastatic renal cell carcinoma, as were the results of immunohistochemical stains (i.e., positive for PAX8 and Cam5.2) [Figure 3a-c]. The patient was next referred to oncology for further chemotherapy.

## DISCUSSION

Cancers that metastasize to the intradural lumbar spine (i.e., breast, lung, thyroid, and gastrointestinal malignancies in decreasing frequency), are rare. The account just for 6% of all spinal metastases,<sup>[1]</sup> Solitary RCC intradural spinal metastases are even less frequently encountered. Of the 19 cases of spinal RCC metastases found in the literature, only 13 occurred in the cauda equina, and just three were solely found in that location.<sup>[1-4]</sup>[Table 1]. Further, RCC usually recurs with increasing time at atypical sites.<sup>[5,7]</sup>

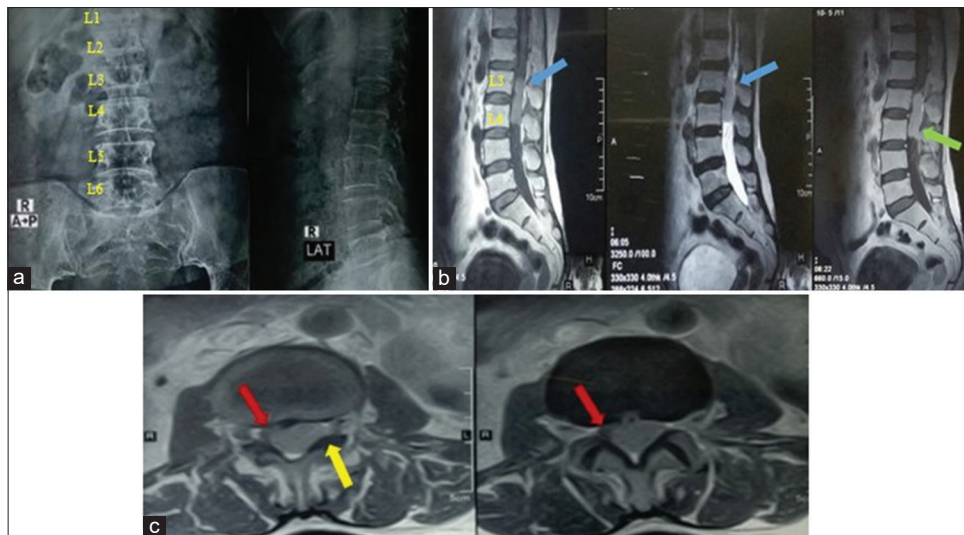
## Surgery and Histopathological Confirmation of Isolated Metastasis of RCC to CE

Although our provisional diagnosis was for a L3-L4 nerve sheath tumor, intraoperatively, the tumor's adherence to multiple roots of the CE and lack of a proper capsule was more consistent with a malignant lesion such as RCC.

In addition, histopathology showed the characteristic clear cells arranged in an alveolar pattern classic for RCC while specific immunohistochemical stains (i.e., PAX 8 and CAM 5.) differentiated clear cell/RCC from other organ tumors (i.e, adrenal vs. liver).<sup>[6,9]</sup>

## Prognosis and treatment

RCC has a 5-year survival of between 0 and 10%; therefore, aggressive surgical resection is warranted for solitary metastases. Resection of a distant solitary RCC metastasis

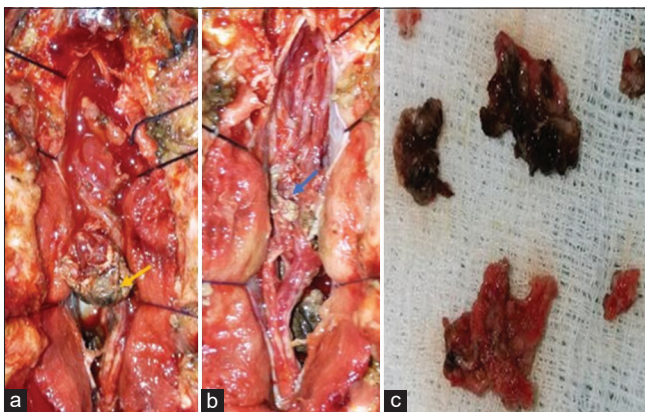


**Figure 1:** (a) Plain X-ray Lumbosacral spine showing 6 lumbar vertebrae, to aid in marking level per operatively. (b) Sagittal MRI lumbosacral spine showing rectangular mass at L3-4 level, isointense on T1 and T2, and mild homogenous contrast uptake. (Level counted taking X-ray into consideration). (c) Axial MRI at L4 level, showing well-defined homogeneously enhancing mass, extending toward left neural foramina (marked with yellow arrow), displacing the cauda equina to the right side (marked in red).

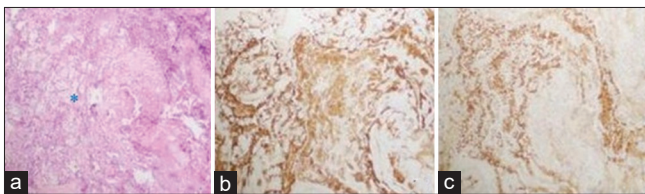
**Table 1:** Published cases of RCC metastasis as IDEM, with cauda equina being the first and the only site.

Author	Year	Age/ Sex	Location	Type of RCC	Latency to ID mets	MRI findings	Size of mets (cm)/ Status of dura	Preoperative impression	Treatment
Alfieri <i>et al.</i> <sup>[1]</sup>	2004	67/F	L3-5	Papillary	2 years	-	6.2*1.6 Dura involved	Maxopapillary ependymoma	L&E
Strong <i>et al.</i> <sup>[2]</sup>	2013	49/F	L4	-	8 years	Homo/ mild E	2*2.7*1.6 More vessels on dura than usual	Nerve sheath tumor	L&E
Sibhi <i>et al.</i> <sup>[4]</sup>	2018	54/M	L3-4	Clear cell	1 years	Homo/ mild E	3.2*1.9*1.4 Thickened dura	Hemangiopericytoma on frozen section	L&E, CT/RT
Present Case	2020	55/F	L3-4	Clear cell	8 years	Homo/ mild E	5.2*2*1 No change in dura	Nerve sheath tumor	L&E

Homo: Homogenous, E: Enhancement, L&E: Laminectomy and excision, CT: Chemotherapy, RT: Radiotherapy, -: Not mentioned



**Figure 2:** (a) Peroperative image showing caudal pole dissected (marked with yellow arrow) (b) tumor adherent to nerve roots (marked with blue arrow). (c) Specimen after piecemeal excision.



**Figure 3:** (a) Photomicrograph of Hematoxylin and Eosin stain showing polygonal cells with hyperchromatic nuclei, scanty cytoplasm arranged in alveolar pattern (marked with \*) typical of clear cell carcinoma, (b) PAX 8 immunostaining showing distinct nuclear reactivity characteristic of renal origin and (c) CAM 5.2 antibody immunostaining for CK8 showing diffuse positivity thus verifying epithelial origin. All images are  $\times 100$  original magnification.

provides effective local control (i.e., as in this case) and contributes to a 35–50% 5-year survival with adjuvant therapy. Notably, RCC only poorly responds to the typical non-surgical adjuvant therapies (i.e., chemotherapy,

hormonal therapy, immunotherapy (8% response rate) and radiotherapy).<sup>[10]</sup>

## CONCLUSION

The cauda equina (i.e., intradural/extramedullary) is an uncommon site for metastasis of renal cell carcinoma. Therefore, even patients with remote (i.e., 8 years ago in this case) histories of RCC malignancies many years later can present with CE metastases.

## Declaration of patient consent

Institutional Review Board (IRB) permission obtained for the study.

## Financial support and sponsorship

Nil.

## Conflicts of interest

There are no conflicts of interest.

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