

## CASE REPORT

# Pathological clavicular fracture as first presentation of renal cell carcinoma: a case report and literature review

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### ABSTRACT

Renal cell carcinoma (RCC) accounts for approximately 3% of all cancer cases. RCCs usually metastasize to the lungs, bones, liver, or brain. Only <1% of patients with bone metastases manifested clavicular RCC metastases. Thus, clavicular metastasis as the initial presentation of RCC is extremely rare. We report a patient with RCC metastasis to the left clavicle, which was first presented with pain caused by a pathological fracture. Magnetic resonance image revealed a renal tumor, and technetium-99m–methylene diphosphonate bone scintigraphy showed multiple osseous metastases. The patient eventually underwent surgery to remove the lateral end of the left clavicle and right kidney. Histopathology revealed renal tumor and clear cell carcinoma in the clavicle. Finally, we review 17 cases of clavicular metastases originating from different malignancies.

### KEYWORDS

Clavicle; metastasis; renal cell carcinoma (RCC); pathological fracture

## Introduction

Bone metastasis of renal cell carcinoma (RCC) is not rare but usually located in the spine, the pelvic bones, or the ribs<sup>1</sup>. A solitary bone metastasis and presented with a pathological fracture in the clavicle is extremely rare, with only a few references in the literature. We report one case of RCC presenting with a solitary clavicular metastasis and review the related literatures, so as to add to knowledge about clavicular metastasis.

## Case report

A 64-year-old man was admitted to the Fourth Hospital of Hebei Medical University in January 2014, due to constant pain in the left shoulder after a mild trauma. X-ray and magnetic

resonance imaging (MRI) results revealed a pathological clavicular fracture (**Figure 1**) because no specific, high-energy trauma in the clavicular region was reported and the lesion was osteolytic. Contrast-enhanced computed tomography (CT) and MRI images indicated a tumor, measuring approximately 5 cm × 5 cm, in the right renal cortex. The tumor had spread to the renal capsule (**Figure 2**). Technetium-99m–methylene diphosphonate bone scintigraphy revealed multiple radioactive foci, indicating multiple osseous metastases in addition to the clavicular metastasis (**Figure 3**).

The patient underwent surgery to remove the lateral end of the left clavicle. Histopathology of the clavicle revealed clear cell renal carcinoma (**Figure 4**). The patient then underwent right nephrectomy, and histopathology showed RCC. Thus, clavicular RCC metastasis was confirmed. The patient was referred to an oncologist and was prescribed sorafenib tosylate and zoledronic acid. The patient was alive and showed no symptoms during a 6-month follow-up period.

## Discussion

RCC represents approximately 3% of all cancer cases. Classic

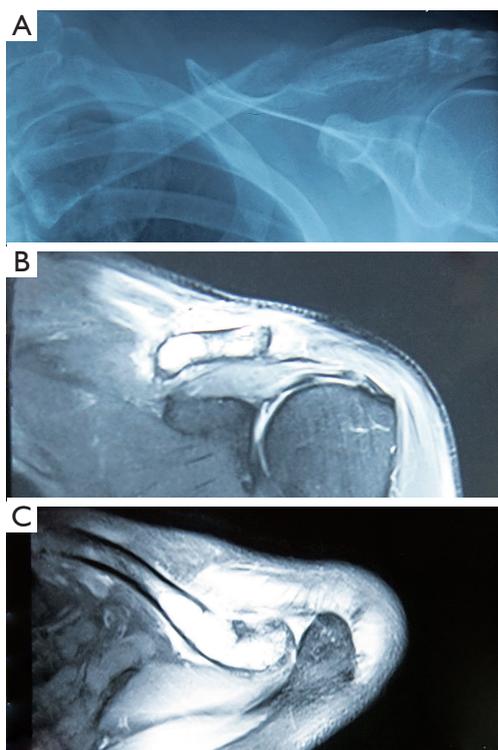
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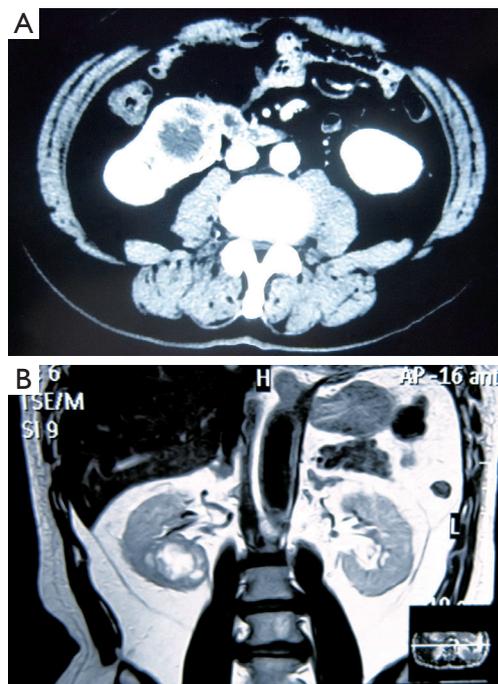
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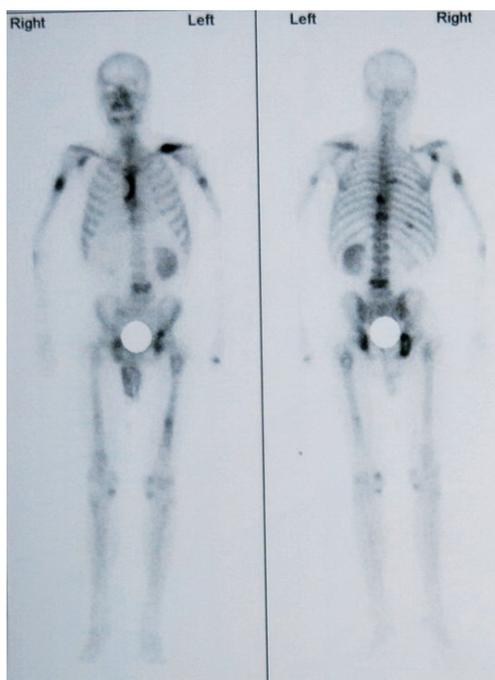
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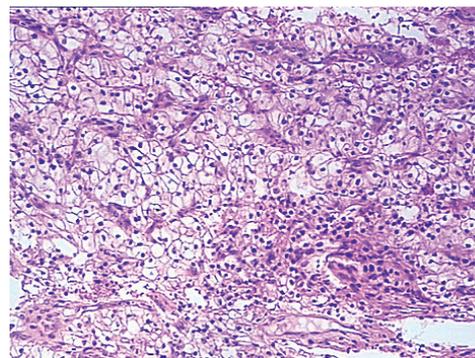
**Figure 1** X-ray and MRI results of a 64-year-old patient. (A) X-ray result displayed an osteolytic lesion in the lateral third of left clavicle. (B,C) T2-weight MRI to the left clavicle revealed high-intensity lesions.



**Figure 2** A tumor in the right renal cortex, spreading to the renal capsule. (A) CT. (B) MRI.



**Figure 3** Technetium-99m-methylene diphosphonate bone scintigraphy revealed multiple radioactive foci.



**Figure 4** Histopathology of clavicle revealed clear cell carcinoma (H&E staining, 200×).

symptom triad comprising hematuria, abdominal mass, and flank pain is found in only 10% of patients. However, RCCs commonly metastasize widely before any symptom is observed<sup>1</sup>. RCCs typically metastasize to the lungs, bones, liver, or brain, but clavicular involvement is reported in only <1% of all bone metastases<sup>1-3</sup>. Clavicular metastases are seldom reported. A total of 17 cases of clavicular metastases between 1998 and 2014 are reviewed in this study (**Table 1**)<sup>4-8,10-18</sup>. Despite four RCC cases<sup>5,15,19</sup> which account for 25% of all documented cases, other malignancies rarely metastasize to the clavicle. Kim *et al.*<sup>20</sup> studied 4,953 patients with hepatocellular carcinoma, of

**Table 1** Review of the previously reported cases of clavicular metastasis

Age of diagnosis (years)	FS	Sex	Side/location	Primary sites (histology)	Solitary or multiple	Ref.
48	N	Female	L/medial	RCC	Multiple	4
58	Y	Male	R/medial, lateral	RCC	Solitary	5
62	Y	Male	R/middle	RCC	Solitary	5
34	N	Male	R/medial	Uveal (melanoma)	Solitary	6
41	N	Female	L/medial	Thyroid (follicular)	Solitary	7
48	N	Male	R/-	Tonsil (SCC)	Multiple	8
67	Y	Male	R/medial	HCC (epithelial)	Solitary	9
68	N	Male	R/medial	Colon (AD)	Multiple	10
67	N	Male	L/medial	Cecum	Multiple	11
55	N	Female	-	Unknown (AD)	Multiple	12
67	N	Man	L/medial	Larynx (SCC)	Multiple	13
73	N	Female	L/medial	Adnexa (microcystic)	Multiple	14
20	N	Male	R/medial	Trigeminal (epithelioid schwannoma)	Multiple	15
67	N	Male	L/entire	Prostate	Solitary	16
52	N	Male	R/lateral	Adrenal (pheochromocytoma)	Solitary	17
40	N	Female	R/medial	Thyroid	Multiple	18
71	Y	Male	-	RCC	Multiple	19

FS, first presentation; RCC, renal cell carcinoma; SCC, squamous cell carcinoma; HCC, hepatocellular carcinoma; AD, adenocarcinoma.

whom only 37 presented bone metastases and only one patient manifested clavicular metastasis. Osseous metastases from primary gastrointestinal cancers are also uncommon, ranging from 5.6% to 7.9%, and they usually occur in the vertebrae, pelvis, sacrum, skull, femur, and humerus<sup>21</sup>. A single case of malignant epithelioid schwannoma from the trigeminal nerve with clavicular metastasis has been documented, whereas metastases of intracranial gliomas to bones other than the clavicle are more frequent<sup>13</sup>. Although primary uveal and adnexal cancers rarely metastasize to the clavicle<sup>4,13</sup>, prostate and thyroid cancers commonly metastasize to this area<sup>5,6,12</sup>.

Clavicular fractures represent 5% to 10% of all fractures<sup>1</sup>. Medial clavicular fractures are rare and are normally caused by high-energy traumas, which are frequently due to pathological causes<sup>22</sup>. Of the 17 cases, 11 had medial clavicular metastases<sup>4-7,9-11,13-15,18</sup> and two of them revealed clavicular fracture<sup>5,9</sup>. Clavicular fracture was presented as the first symptom in four cases<sup>5,9,19</sup>. Swanson *et al.*<sup>23</sup> reported that symptoms caused by bone metastases led to subsequent diagnosis of RCC in 121 of 252 (48%) patients, 37 of whom presented with pathological fractures. Our patient was admitted after a mild trauma that could not have caused clavicular fracture. This fracture should be evaluated carefully by physicians and requires routine investigation for an underlying pathological condition. Laboratory tests for measuring prostate-specific antigen,

$\alpha$ -fetoprotein, blood calcium, and alkaline phosphatase levels; imaging tests, including radiography, CT, MRI, bone scan, and positron emission tomography; and fine-needle aspiration are essential for the early detection of primary tumors.

In conclusion, clavicular symptoms may be manifested before the diagnosis of primary tumors, such as RCC. Clavicular fracture may be the first symptom of tumor metastases to bones. Distinguishing pathological fractures from clavicular fractures due to other causes may help diagnose the primary tumors and necessitate whole-body scanning at an early stage.

## Conflict of interest statement

No potential conflicts of interest are disclosed.

## References

1. Singh J, Baheti V, Yadav SS, Mathur R. Occult renal cell carcinoma manifesting as nasal mass and epistaxis. *Rev Urol* 2014;16:145-148.
2. Malik SS, Azad S, Malik S, Hing CB. Difficulty in diagnosing the pathological nature of an acute fracture of the clavicle: a case report. *J Orthop Surg Res* 2009;4:21.
3. Ren K, Wu S, Shi X, Zhao J, Liu X. Primary clavicle tumors and tumorous lesions: a review of 206 cases in East Asia. *Arch Orthop Trauma Surg* 2012;132:883-889.

4. Vartanian SM, Colaco S, Orloff LE, Theodore PR. Oklahoma prosthesis: resection of tumor of clavicle and chest wall reconstructed with a custom composite graft. *Ann Thorac Surg* 2006;82:332-334.
  5. Tabuenca Dumortier J, Ortiz Cruz E, Olivas Olivas J. Total cleidectomy for a solitary metastasis of the clavicle. *Acta Orthop Belg* 2001;67:178-181.
  6. Tozum H, Ozkan K, Reddy K, Turkmen I, Ciloglu U, Senol S, et al. Solitary secondary malignant melanoma of clavicle two years after enucleation for ocular melanoma. *Case Rep Orthop* 2013;2013:591679.
  7. Aliyev A, Ylmaz S, Ozhan M, Asa S, Halac M. FDG PET/CT in the detection of metastases in a patient with Tg and 131I WBS negative follicular thyroid cancer. *Clin Nucl Med* 2013;38:226-227.
  8. Müller S, Khuri FR, Kono SA, Beitler JJ, Shin DM, Saba NF. HPV positive squamous cell carcinoma of the oropharynx. Are we observing an unusual pattern of metastases? *Head Neck Pathol* 2012;6:336-344.
  9. Mantonakis EI, Margariti TS, Petrou AS, Stofas AC, Lazaris AC, Papalampros AE, et al. A pathological fracture and a solitary mass in the right clavicle: an unusual first presentation of HCC and the role of immunohistochemistry. *World J Surg Oncol* 2012;10:50.
  10. Patel NN, Shah PR, Wilson E, Haray PN. An unexpected supraclavicular swelling. *World J Surg Oncol* 2007;5:90.
  11. Sheen AJ, Drake D, Langton S, Sherlock DJ. Unusual bony colorectal metastases in post-hepatometastasectomy patients. *J Hepatobiliary Pancreat Surg* 2002;9:379-382.
  12. Hoshi M, Taguchi S, Hayakawa K, Ieguchi M, Nakamura H. Evaluation of clinical problems associated with bone metastases from carcinoma from unknown primary sites. *Arch Orthop Trauma Surg* 2011;131:59-64.
  13. Caronia FP, Fiorelli A, Zanchini F, Santini M, Lo Monte AI, Castorina S. Reconstruction with a pectoralis major myocutaneous flap after left first rib and clavicular chest wall resection for a metastasis from laryngeal cancer. *Gen Thorac Cardiovasc Surg* 2014. [Epub ahead of print].
  14. Ohta M, Hiramoto M, Ohtsuka H. Metastatic microcystic adnexal carcinoma: an autopsy case. *Dermatol Surg* 2004;30:957-960.
  15. Ganapathy K, Ghosh M. Clavicular metastasis from malignant trigeminal schwannoma. *J Clin Neurosci* 2003;10:485-492.
  16. Cenedi O, Haznedar R. Solitary clavicle metastasis in prostate carcinoma. *Hell J Nucl Med* 2008;11:55-57.
  17. Ramos I, González I, Martínez R, Trillo L, Sánchez J. Perioperative management of late metastasis of pheochromocytoma in clavicle. *Eur J Anaesthesiol* 2008;25:79-80.
  18. Bose SM, Ravindra N, Girdhar G, Bhattacharya A. Clavicular metastasis of insular carcinoma of the thyroid showing increased uptake in the presence of a functioning thyroid gland. *Clin Nucl Med* 1998;23:774-775.
  19. Salapura V, Zupan I, Seruga B, Gasljevic G, Kavcic P. Osteoblastic bone metastases from renal cell carcinoma. *Radiol Oncol* 2014;48:243-246.
  20. Kim SU, Kim do Y, Park JY, Ahn SH, Nah HJ, Chon CY, et al. Hepatocellular carcinoma presenting with bone metastasis: clinical characteristics and prognostic factors. *J Cancer Res Clin Oncol* 2008;134:1377-1384.
  21. Kanthan R, Loewy J, Kanthan SC. Skeletal metastases in colorectal carcinomas: a Saskatchewan profile. *Dis Colon Rectum* 1999;42:1592-1597.
  22. Akasbi N, Elidrissi M, Tahiri L, Elmrini A, Harzy T. An unusual cause of shoulder pain in an elderly woman: a case report. *J Med Case Rep* 2013;7:271.
  23. Swanson DA, Orovan WL, Johnson DE, Giacco G. Osseous metastases secondary to renal cell carcinoma. *Urology* 1981;18:556-561.
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