

CASE REPORT

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Situs inversus and metastatic renal cell carcinoma: A case report

Sunil Rangarajan, Bhuvana Sunil, Arun S Shet

ABSTRACT

Introduction: Situs Inversus Totalis is a rare congenital condition with an autosomal recessive inheritance. Most of the people with SIT are asymptomatic, making its diagnosis a challenge. Although many cases of cancers co-existing with SIT have been reported in medical literature, the co-existence of RCC with SIT is extremely rare. We are presenting the 5th reported case in the published medical literature. **Case Report:** We report a case of a 65-year-old male who was presented with intractable back pain, difficulty in performing daily activities and unintentional weight loss. Evaluation of these symptoms revealed SIT, a right renal mass and widespread metastatic deposits. Immunohistochemical analysis confirmed the diagnosis of clear cell type of renal cell carcinoma. **Conclusion:** Situs Inversus is a rare congenital abnormality which may be associated with renal anomalies, Kartagener syndrome, and several types of malignancies. Further study is needed to characterize the

genetic basis of SI and establish whether there is a causal basis between SI and the development of malignancy or not.

Keywords: Situs inversus totalis, Renal cell carcinoma, Malignancy

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INTRODUCTION

Situs inversus totalis (SIT) refers to a congenital condition in which the thoracic and the abdominal viscera are transposed through the sagittal plane. It is an autosomal recessive condition with 0.01–0.02% prevalence in general population [1]. Most of the people with SIT are asymptomatic, making its diagnosis a challenge. Among all diagnosed cancers, only 2–3% belong to renal cell carcinoma (RCC), which has a greater occurrence in males, [2]. Although many cases of cancers co-existing with SIT have been reported in medical literature, the co-existence of RCC with SIT is extremely rare. We are presenting a rare case of metastatic RCC with SIT, which is the 5th reported case in the published medical literature.

CASE REPORT

A 65-year-old male was presented to the hospital with four months history of fatigue, difficulty in getting up, walking and performing daily activities. He had

Sunil Rangarajan¹, Bhuvana Sunil², Arun S Shet³

Affiliations: ¹Junior Resident, Department of Medical Oncology, St. John's Medical College and Hospital, Bangalore, Karnataka, India; ²Research Associate, St. John's Research Institute, Bangalore, Karnataka, India; ³Professor & Head, Department of Medical Oncology, St. John's Medical College and Hospital, Bangalore, Karnataka, India.

Corresponding Author: Arun S Shet, Department of Medical Oncology, St. John's Medical College and Hospital, The St. John's National Academy of Health Sciences, Sarjapur Road, Bangalore 560034, India; Ph: 91-80-22065744; Fax: 91-80-25532037; Email: arunshet1@gmail.com

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severe right flank and back pain, unintentional and significant weight loss of 12 kg. There were occasional episodes of fever and hematuria over this four-month period. A limited cut magnetic resonance imaging (MRI) of the spine and abdomen to evaluate the back pain revealed SIT, a right renal mass, and multiple osseous lesions in L1, and L2 vertebrae and in sacrum, (Figure 1). The patient admitted to a chronic history of tobacco (64 pack years of smoking) and alcohol consumption. On physical examination, the patient was cachectic (weight: 43 kg, height: 1.6 m, Body Mass Index: 16.8 kg/m²). Pertinent positive findings on systemic examination revealed findings of SIT in the chest and abdomen. Respiratory system examination revealed that the trachea was deviated to the right, and dull percussion sounds were noted in the right infra-axillary, infrascapular areas. Breath sounds and vocal resonance were diminished in the right mammary, infra-axillary, infrascapular areas and there were scattered occasional rhonchi. Apart from dextrocardia, the cardiac examination was unremarkable. Neurological examination revealed extreme tenderness on palpation over the L1, and L2 vertebrae, and mild weakness on the left half of the body.

Aside from hypoalbuminemia, and elevations in the ESR and LDH, the other hematological and biochemical parameters were normal. Of note, the serum calcium was normal. Urinalysis revealed hematuria but the sediment was otherwise normal. A contrast enhanced computerized axial tomogram (CAT) scan of the abdomen performed to evaluate the extent of the disease revealed abdominal viscera transposed through the sagittal plane, and an ill-defined right renal mass measuring 4x3.5 cm with multiple para aortic lymph nodes, and multiple vertebral deposits, (Figure 2). CAT scan of the thorax revealed dextrocardia, a 6.5x5 cm solitary irregular mass in the apicoposterior segment of the anatomical right lung engulfing the anatomical right pulmonary artery, mediastinal lymphadenopathy, and multiple rib deposits, (Figure 3). A bone scan was not performed as the patient declined further testing.

CAT scan guided tru-cut biopsy of the most accessible metastatic deposit in the sacrum revealed

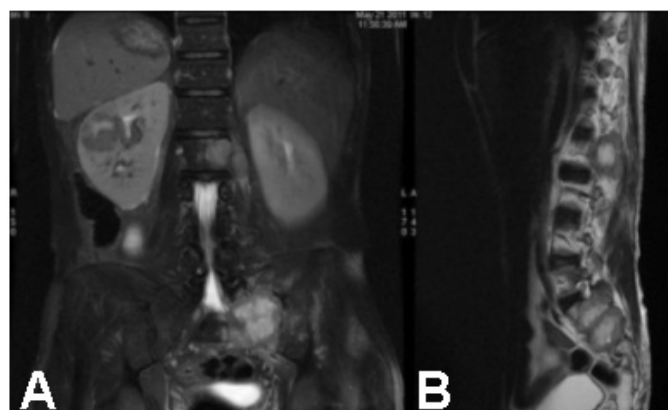


Figure 1: MRI of the Spine, (A) Renal mass in the anatomical right kidney; (B) Multiple metastatic deposits in the vertebrae, largest being the one in the sacrum.

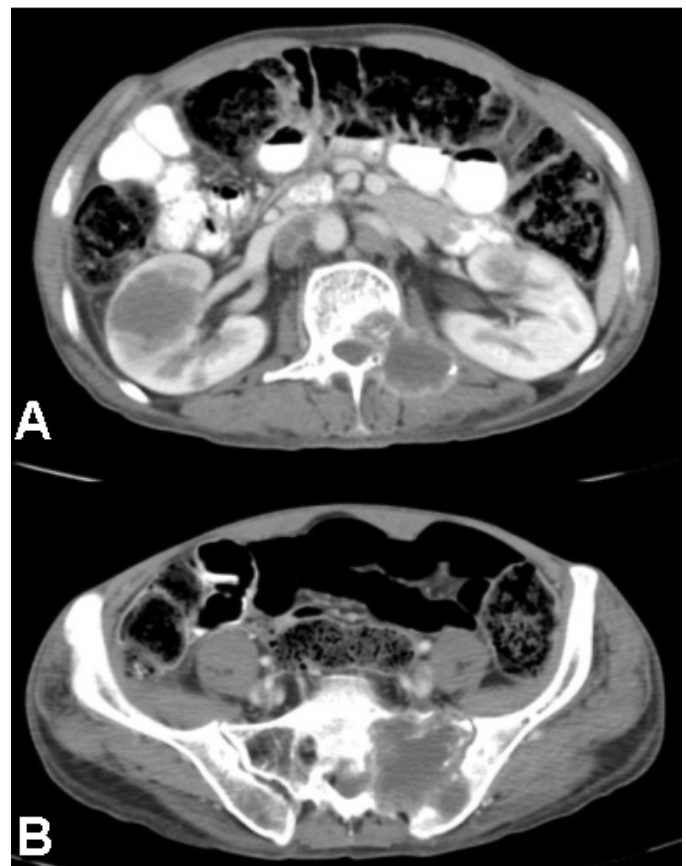


Figure 2: Contrast CT of Abdomen: (A) Mass in the anatomical right kidney with a metastatic lesion in the L1 vertebra; no extension of the mass into the renal vein. (B) Metastatic deposit in the sacrum.

neoplastic cells arranged in a glandular pattern. Immunohistochemical analysis revealed the malignant cells to be positive for pancytokeratin (3+, 95%), cytokeratin (CK) 5 and CK 7 (3+, 95%), CD 10 and vimentin (3+, 100%), and negative for thyroid transcription factor-1 (TTF-1) and prostate-specific antigen (PSA) (Figure 4). Based on the clinical, radiological, and histopathological findings, a diagnosis of metastatic clear cell type of RCC was made and the patient was counseled regarding his disease [3]. The patient was offered palliative radiation therapy but elected to receive opioid analgesia as the sole pain control modality. Over the next few days his overall condition deteriorated and he elected to get discharged from the hospital for home hospice care.

DISCUSSION

Situs inversus (SI) is a rare disorder where most patients are asymptomatic leading to difficulty in assessing its true prevalence. It can be broadly classified based on the extent of the inversion of the viscera into SIT, situs solitus (isolated dextrocardia) and situs inversus viscerum, which is almost always associated

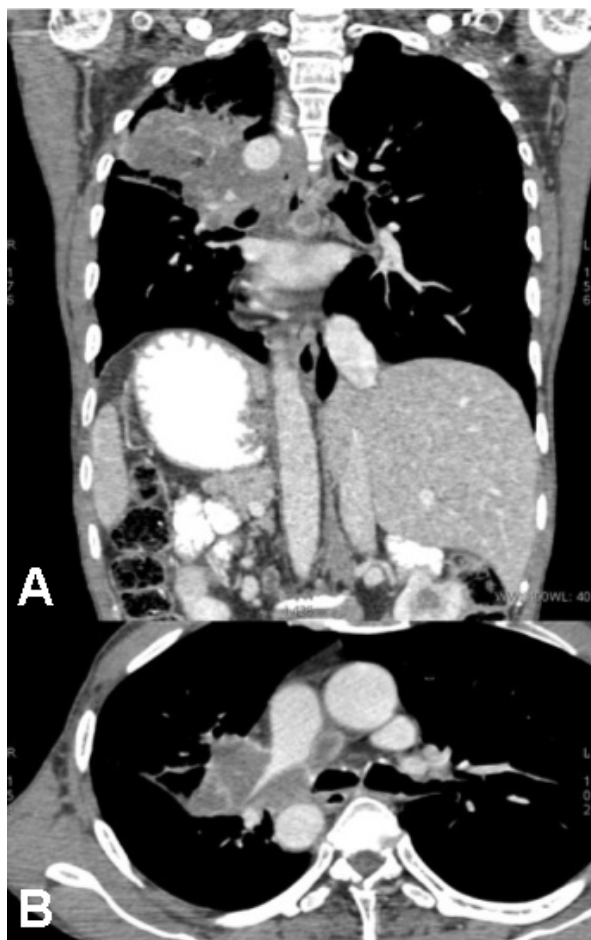


Figure 3: (A): Contrast CT of the thorax and abdomen: Image reveals the mass in the anatomical right lung with mediastinal lymph node involvement. It also reveals situs inversus of the abdomen, (B): Contrast CT of Thorax: Mass in the anatomical right lung engulfing the right division of the Pulmonary Artery. The inversion of the location of the great vessels showing Situs Inversus in the thoracic viscera.

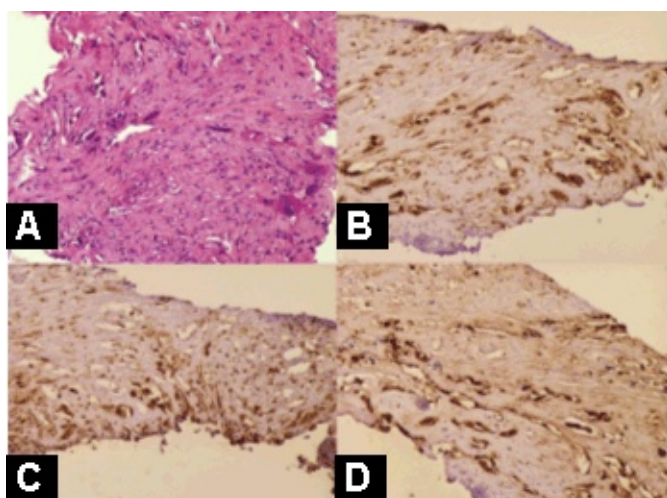


Figure 4: (A) Hematoxylin and Eosin staining of the biopsy tissue revealing the presence of thick fibrocollagenous tissue with an infiltrating neoplasm composed of neoplastic cells arranged in glandular pattern, (B) CD 10 staining positive, (C) Vimentin staining positive, and (D) CK 7 staining positive.

with congenital heart disease, [4, 5]. Other rare form of SI, situs ambiguus typically manifests as either asplenia syndrome (right isomerism) or polysplenia syndrome (left isomerism). Many cardiovascular and renal anomalies have been reported in patients with SIT. Though the exact mechanism of the abnormal heart tube orientation and development is not fully understood there are documented linkages to chromosomal abnormalities (balanced reciprocal translocation $t(5;11)(q32;q24.2)$, [6] and microdeletion of chromosome 2q37.3, [7]). Nearly 20–25% of the patients with SIT have syndrome of primary ciliary dyskinesia called Kartagener syndrome manifesting as repeated infections, bronchiectasis, and male infertility along with SIT, [4, 8].

There are several reported cases of cancers in patients with SI. A significantly high number of all the cancers that have been reported in patients with SIT have been from the gastrointestinal tract. Some of those have had much rarer forms of SIT like situs ambiguus, and polysplenia syndrome. There are also a handful of reports of double cancer involving different parts of the gut in patients with SIT. Amongst the patients with Kartagener syndrome there was a higher prevalence of lung cancer.

Although RCC is more commonly associated with other congenital syndromes such as Von Hippel-Lindau syndrome [9], hereditary papillary RCC [10], Birt-Hogg-Dube syndrome [11], there have been only four reported cases with SIT. Three of the previously reported RCC patients with SIT were cured with radical nephrectomy [12, 13]. Meticulous preoperative anatomical and vascular mapping and special precautions for airway management can overcome the surgical challenge posed by the presence of multiple anatomical anomalies and altered position of the blood vessels. Only one patient previously has received adjuvant chemotherapy with intramuscular interferon alfa and external beam radiation [14]. The presence of extensive metastatic disease, poor performance status and patient choices precluded more aggressive treatment choices in our case. There are no reports that confirm or refute the hypothesis that there is a causal association between situs inversus and the development of cancer.

CONCLUSION

Situs inversus is a rare congenital abnormality with an autosomal recessive inheritance pattern. In addition to renal anomalies and Kartagener syndrome, several types of malignancies co-exist in patients with situs inversus. RCC occurring in patients with situs inversus is a rare phenomenon and the association between these two conditions is unclear. Further study is needed to characterize the genetic basis of SI and establish whether there is a causal basis between SI and the development of malignancy.

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Author Contributions

Sunil Rangarajan – Conception, design, and acquisition of data, Drafting of the article, Final approval of the version to be published

Bhuvana Sunil – Conception, design, and acquisition of data, Drafting of the article, Final approval of the version to be published

Arun S Shet – Conception and design, Critical revision of the article, Final approval of the version to be published

Guarantor

The corresponding author is the guarantor of submission.

Conflict of Interest

Authors declare no conflict of interest.

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REFERENCES

1. Abossolo T, Alessandri JL, Saltet A, Dancoisne P, Pilorget H, Sommer JC. [In utero diagnosis of situs abnormalities. A case of prenatal diagnosis of visceral situs inversus with corrected transposition of great vessels]. *J Gynecol Obstet Biol Reprod (Paris)* 1996;25(3):267–3.
2. European Network of Cancer Registries. Eurocim version 4.0. European incidence database V2.3, 730 entity dictionary 2001.
3. Lina Liu, Junqi Qian, Harpreet Singh, Isabelle Meiers, Xiaoge Zhou, David G Bostwick. Immunohistochemical analysis of chromophobe renal cell carcinoma, renal oncocytoma, and clear cell carcinoma: an optimal and practical panel for differential diagnosis. *Arch Pathol Lab Med* 2007 Aug;131(8):1290–7.
4. Casanova MS, Tuji FM, Yoo HJ, Haiter-Neto F. Kartagener syndrome. Dentomaxillofac. *Radiol* 2006;35(5):386–9.
5. Chmura K, Chan ED, Noone PG, et al. A middle-aged woman with recurrent respiratory infections. *Respiration* 2005;72(4):427–30.
6. Karaman A, Binici DN, Günes N, Doru I, Kabalar ME, Kurt A. A case with balanced reciprocal translocation t(5;11)(q32;q24.2) and situs inversus viscerum. *Genet Couns* 2010;21(2):237–42.
7. Reddy KS, Flannery D, Farrer RJ. Microdeletion of chromosome sub-band 2q37.3 in two patients with abnormal situs Viscerum. *Am J Med Genet* 1999 Jun 11;84(5):460–8.
8. Carlen B, Stenram U. Primary ciliary dyskinesia: a review. *Ultrastructural Pathology* 2005;29(3-4):217–20.
9. Lonser RR, Glenn GM, Walther M, et al. von Hippel-Lindau disease. *Lancet* 2003;361(9374):2059–67.
10. Zbar B, Tory K, Merino M, et al. Hereditary papillary renal cell carcinoma. *J Urol* 1994;151(3):561–6.
11. Birt AR, Hogg GR, Dube WJ. Hereditary multiple fibrofolliculomas with trichodiscomas and acrochordons. *Arch Dermatol* 1977;113(12):1674–7.
12. Adler HL, Lerner SP. Renal cell carcinoma and situs inversus viscerum. *J Urol* 1998 Dec;160(6 Pt 1):2141–2.
13. Treiger BF, Khazan R, Goldman SM, Marshall FF. Renal cell carcinoma with situs inversus totalis. *Urology* 1993 May;41(5):455–7.
14. Bertini JE Jr, Boileau MA. Renal cell carcinoma in a patient with situs inversus totalis. *J Surg Oncol* 1987 Jan;34(1):29–31.