# Renal Cell Carcinoma presenting as small bowel obstruction secondary to a metastatic ileal intussusception

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ABSTRACT

We report a rare clinical presentation of renal cell carcinoma in the form of small bowel obstruction which was secondary to a metastatic ileal intussusception. Intussusception in the elderly is most commonly due to an underlying neoplasm, however metastases from a renal cell carcinoma is very uncommon. We present clinical details, radiological and pathological findings of the case followed by a discussion of the diagnosis and management of intussusception in the adult population.





## CASE REPORT

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Patient was a 52 year old male with a three day history of vomiting and constipation.

A supine abdominal radiograph revealed multiple dilated small bowel loops and also two nodular opacities in the retro-diaphragmatic part of the right lung (Figure 1). No obvious cause for the small bowel obstruction could be appreciated on the radiograph.

Patient was then referred to us for a CT (Computed Tomography) scan of the abdomen to identify the underlying cause of the small bowel obstruction. A large, irregular, avidly enhancing mass measuring 10.1x7.8x7.5 cm (anteroposterior x mediolateral x superoinferior) was noted arising from the lower pole of the left kidney which showed neovascularity on the arterial phase (Figure 2). The mass was of soft tissue density on the plain scan and had heterogeneous post contrast enhancement with non-enhancing irregular hypodense central necrotic areas. The mass extended into the perinephric fat. Anteriorly, the Gerota's fascia was intact. There was focal small tumor thrombus noted in one of the intrarenal venous channels however the main renal vein was well opacified with no thrombus within. The small bowel loops were dilated. A heterogeneously and avidly enhancing endoluminal polypoidal mass lesion measuring 2.3x2.0x1.5 cm (anteroposterior x mediolateral x superoinferior) was seen in one of the distal ileal loops in the right lower quadrant of the abdomen which had few small non-enhancing necrotic areas within showing an enhancement pattern similar to that of the renal mass (Figure 3). An intussusception was noted of the adjacent ileum with its mesentery with the endoluminal mass being the lead point, best depicted on the coronal and sagittal Multi Planar Reconstruction (MPR) images (Figure 4). Based on the presence of the large hypervascular left lower polar renal mass, the possibility of the hypervascular endoluminal lesion being a metastatic deposit of a clear cell type of renal cell carcinoma was entertained. Metastatic nodules were also noted in the posterobasal segment of the right lung and in the right gluteal muscles.

Since the clinical condition of the patient further deteriorated, the surgical team performed a laparotomy wherein resection and anastomosis of the distal ileum was performed. The surgical specimen revealed a protruding polypoidal mass at the head of the instussusceptum.

Histopathological examination revealed a sheet of tightly packed cells with vesicular nuclei and abundant clear cytoplasm in the submucosal layer consistent with the clear cell type of renal cell carcinoma (Figure 5).

## DISCUSSION

Adult small bowel intussusception is an uncommon cause of small bowel obstruction forming only 1% of the total number of cases of small bowel obstruction and 5% of cases of intussusception. [1] Compared to the ones in childhood, adult intussusceptions are more frequently associated with an underlying pathology. [2] Intussusceptions can involve both the small and the large bowel, however the etiology of these two entities tend to be different. Small bowel intussusceptions are secondary to benign lesions on most occasions whereas large bowel intussusceptions are more frequently associated with malignancies. [2, 3] Acquired immunodeficiency syndrome (AIDS) has been associated with a higher risk of intussusceptions due to its greater association with various infective and neoplastic lesions of the small bowel. [4] Other risk factors include previous abdominal surgery and long feeding tubes. Malignancy as a cause of small bowel intussusception is uncommon accounting for 15% cases of small bowel intussusception. [2] Melanoma metastases to the small bowel form the commonest cause amongst the malignancies. [1] Small bowel metastases are most commonly associated with malignant melanoma with incidence of 2-5 % in malignant melanoma of the skin. [5] Metastases from varied malignancies can cause intussusception but are uncommon. [6]

Metastases of RCC frequently involve lung, liver, bone and brain.[7] Involvement of the bowel is rare and metastatic intussusception from a renal cell carcinoma is a rare entity with less than ten cases reported. [8] In our case, the patient presented with symptoms of small bowel obstruction and did not show any symptoms related to the renal mass. CT performed to detect the cause of the small bowel obstruction revealed the renal mass. The enhancement pattern of the mass and neovascularity on arterial phase indicated a hypervascular neoplasm indicating a clear cell type of RCC. [9] In contrast, papillary and chromophobe subtypes of RCC are hypovascular. Calcification in the mass, which was absent in our case, is also seen more frequently in papillary and chromophobe variants of RCC than in clear cell type. [10] On MRI, another feature pointing towards clear cell histology is presence of intratumoral fat. This can be detected with chemical shift imaging with loss of signal within the tumour on out of phase sequence.

The older literature, based on information obtained from surgical findings and hospital records has attributed a serious underlying pathology in most adult intussusceptions with idiopathic cases being a small minority. [11] However, with greater use of CT, many idiopathic, transient and self limiting intussusceptions have been detected in adults as well. [12] Transient intussusceptions are more likely to occur in the proximal small bowel and are unlikely to present with small bowel obstruction and are frequently asymptomatic. [13] The low detection of idiopathic cases of intussusception in the older literature can be attributed to the asymptomatic nature of most transient intussusceptions. It has been hypothesized that uncoordinated peristaltic activity in the proximal small bowel is the cause for these transient intussusceptions. [14] Few investigators have considered intussusception length as an important factor to distinguish self-limiting intussusceptions from ones requiring surgery and have considered a length of 3.5 cm as the cutoff. [15] However, some others have disputed the importance of intussusception length and have concluded that the only significant finding on CT is colonic intussusception which has a significantly greater surgical importance than entero-enteric intussusceptions. [16] Another clue to diagnosing transient intussusceptions is reviewing all the phases if a multiphasic study has been performed. A transient intussusception may not be seen on a different phase of the study.

The first line of investigation to be performed in a patient presenting to the emergency department with abdominal symptoms tends to be a supine abdominal radiograph. A radiograph may show dilated small bowel loops as a sign of obstruction. However, this finding is unlikely with transient small bowel intussusceptions. The intussusception may be visualized on the radiograph as a soft tissue opacity. Various signs such as the target sign and meniscus sign have been described on plain film radiography in intussusceptions. However, the plain film may be unreliable with a study showing equivocal findings in more than half of the cases. [17] Barium enema examination may be performed but is a less important examination in adults compared to children in whom an enema examination can be of both of diagnostic and therapeutic value. If performed, the meniscus sign and coiled spring sign have been described as classic signs in intussusception on a barium enema. [17] Ultrasonography is also a reliable modality for making the diagnosis with high sensitivity and specificity. [18] Bowel in bowel appearance called the target sign on axial sonograms and sandwich sign on longitudinal sonograms has been described. [19] Colour Doppler can show vascularity in the instussusceptum and can be used to predict bowel viability. [20] However, in adult patients presenting with acute symptoms, a CT examination may have a good risk-benefit ratio and can positively impact the prognosis. The presence of an intraluminal soft tissue density within the bowel lumen representing the herniated intususceptum, referred to as the 'target' sign associated with presence of eccentric mesenteric fat and vessels are considered pathognomonic CT findings of intussusception. [2] The next important step after diagnosing an intussusception on CT is to localize it to the small or large bowel as colonic intussusceptions are statistically of greater surgical importance. Intussusceptions of the proximal small bowel tend to be idiopathic and transient. Intussusception can be classified into two groups- those associated with a lead point and those without. Most intussusceptions do not show an obvious lead point and the etiology can be difficult to diagnose. However certain cases may show an obvious lead point. A lipoma as the lead point may be confused with mesenteric fat but can be differentiated from it by the lack of mesenteric vessels coursing through it. [2] Colonic intussusceptions may be associated with an underlying adenocarcinoma or lymphoma.

## TEACHING POINT

CT plays a key role in the diagnosis and accurate localization of adult intussusceptions with bowel within bowel appearance and associated invagination of the mesenteric fat and vessels being reliable findings on CT. Detection or exclusion of an associated lead point on CT helps confidently determine need for surgical intervention. The presence of an enhancing mass associated with a small bowel intussusception makes metastases a highly likely possibility. Presence of another mass of similar density and enhancement pattern can indicate the primary malignancy.

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FIGURES

**Figure 1.** 52 year old male patient with left renal cell carcinoma and a metastatic ileo-ileal intussusception. Supine abdominal radiograph reveals dilated jejunal (thick arrow) and ileal (thin arrow) small bowel loops. Also note two nodular opacities in the retro-diaphragmatic part of the right lung (interrupted circle).

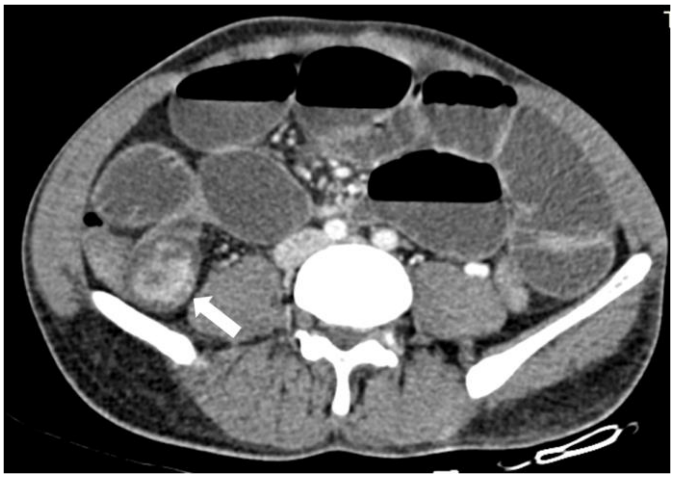

**Figure 3.** 52 year old male patient with left renal cell carcinoma and a metastatic ileo-ileal intussusception. Axial contrast enhanced CT in the venous phase reveals dilated small bowel loops with an intraluminal polypoidal enhancing mass measuring 2.3x 2.0 x 1.5 cm (anteroposterior x mediolateral x superoinferior) in one of the distal ileal loops (solid white arrow). TECHNIQUE: Axial CT, 105 mAs, 120 kV, 1 mm slice thickness, 80 ml iohexol.

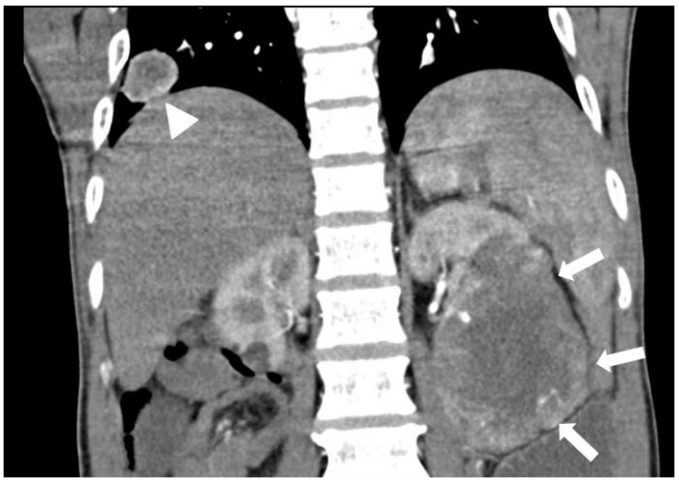

**Figure 2 (left).** 52 year old male patient with left renal cell carcinoma and a metastatic ileo-ileal intussusception. Coronal multiplanar reconstruction of a contrast enhanced CT in the arterial phase shows a large irregular heterogeneous mass lesion arising from the lower pole of the left kidney (solid white arrows) measuring 10.1 x 7.8 x 7.5 cm (anteroposterior x mediolateral x superoinferior). Also note the enhancing metastatic nodule in the lower lobe of the right lung (arrowhead). TECHNIQUE: Coronal CT reconstruction. 105 mAs,120 kV, 1 mm slice thickness, 80 ml iohexol.

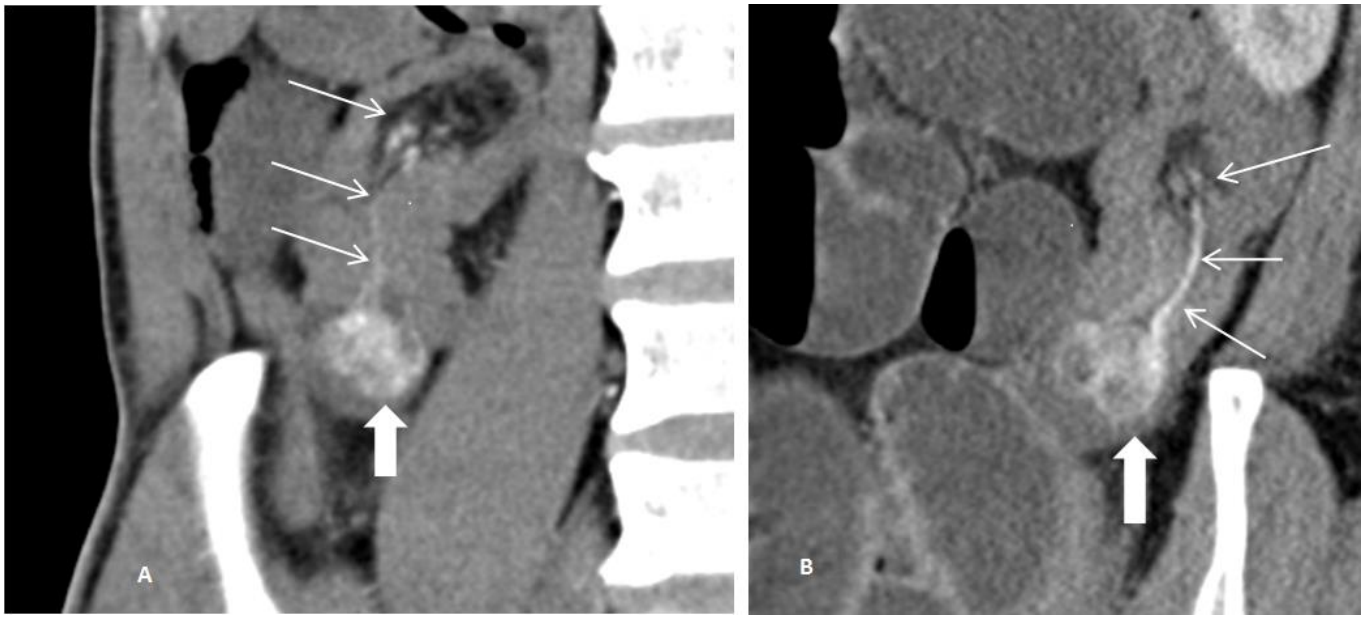


**Figure 4.** 52 year old male patient with left renal cell carcinoma and a metastatic ileo-ileal intussusception. Coronal (A) and Sagittal (B) thick multiplanar reconstructions of the arterial phase (zoomed-in images) reveal the polypoidal mass at the lead point (thick white arrow) dragging with it the mesentery and a leash of mesenteric vessels (thin white arrows). TECHNIQUE: Coronal and Sagittal CT reconstructions, 105 mAs, 120 kV, 3 mm slice thickness, 80 ml iohexol.





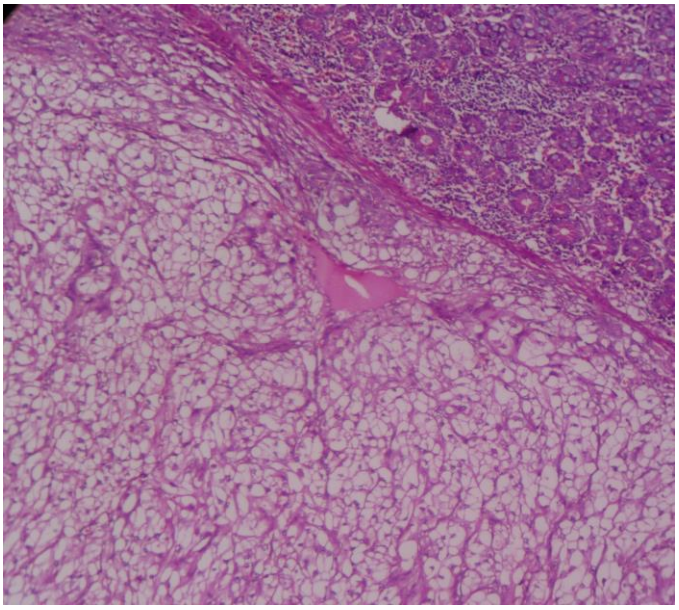

**Figure 5.** 52 year old male patient with left renal cell carcinoma and a metastatic ileo-ileal intussusception. Histopathology specimen of the intraluminal mass in the distal ileum at 100x magnification reveals tightly packed tumour cells in the submucosal layer with abundant clear cytoplasm consistent with the clear cell type of renal cell carcinoma.

| | |
|---|---|
| **Etiology** | Idiopathic (hypothesized due to uncoordinated peristaltic activity in the proximal small bowel.) Pathological causes can be benign or malignant (primary or metastatic) |
| **Incidence** | 5% of all cases of intussusceptions |
| **Gender Ratio/ Age** | None defined |
| **Risk factors** | • Previous abdominal surgery<br>• AIDS<br>• Feeding intestinal tube<br>• Malignant melanoma<br>• Primary or metastatic bowel malignancy |
| **Treatment** | Transient and idiopathic intussusceptions do not need surgical intervention. Clinical and/or imaging follow up may be needed. Those with underlying identifiable pathology are best treated with resection and anastomosis of the involved segment of the bowel. No role for hydrostatic reduction as in intussusceptions in children. |
| **Prognosis** | Excellent in transient and idiopathic cases. Variable prognosis when an underlying pathology identified. CT can help direct early surgical intervention and positively affect prognosis |
| **Findings on imaging** | **X-ray:**<br>• No findings in many cases.<br>• *Evidence of the instussusceptum:* Soft tissue opacity, target sign, meniscus sign.<br>• Dilated small and/or large bowel loops.<br>**USG:**<br>• Bowel within bowel: The target sign on axial sonogram<br>• Sandwich sign on longitudinal sonogram<br>• Colour Doppler can depict vascularity within the intussusceptum and predict bowel viability.<br>**CT:**<br>• Accurately localize site of the intussusception (enteric versus colonic)<br>• Intraluminal soft tissue density within the bowel lumen.<br>• Eccentric mesenteric fat and vessels.<br>• Evidence of a lead point- and intraluminal polypoidal mass. |

**Table 1:** Summary table of adult intussusception

| | **X-ray** | **Ultrasound** | **Computed Tomography** |
|---|---|---|---|
| **Self-limiting or idiopathic intussusceptions in adults** | Unlikely to reveal any significant finding related to the intussusception. | Unlikely to be detected. The intussusception may resolve during the study. Bowel wall vascularity would not be compromised. No lead point detected | Localized to proximal small bowel. Usually of shorter length and may resolve on a different phase of a multiphasic CT study. |
| **Pathological intussusceptions in adults** | • No findings in many cases.<br>• *Evidence of the instussusceptum:* Soft tissue opacity, target sign, meniscus sign.<br>• Dilated small and/or large bowel loops. | • Target sign on axial sonogram<br>• Sandwich sign on longitudinal sonogram<br>• Colour Doppler can depict vascularity within the intussusceptum and predict bowel viability.<br>• Ascites may be reactive or if with dense echoes could signify bowel perforation. | • Colonic intussusceptions highly associated with malignancies<br>• Intraluminal soft tissue density within the bowel lumen<br>• Eccentric mesenteric fat and vessels.<br>• Evidence of a lead point- and intraluminal polypoidal mass. |

**Table 2:** Differentiating idiopathic from pathological intussusceptions in adults.

## ABBREVIATIONS

AIDS = Acquired Immunodeficiency Syndrome
CT = Computed Tomography
MPR = Multi Planar Reconstruction
USG = Ultrasonography

## KEYWORDS

Renal cell carcinoma; Intussusception; Ileal; Metastatic; CT; Computed tomography