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Triphasic Computed Tomography Enterography with Polyethylene Glycol to Detect Renal Cell Carcinoma Metastases to the Small Bowel

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Key Words

Triphasic computed tomography enterography · Renal cell carcinoma · Obscure gastrointestinal bleeding

Abstract

Enteroclysis was first used to diagnose small bowel obstruction in 1996. However, nasojejunal intubation required during enteroclysis causes discomfort to the patient. Triphasic computed tomography (CT) enterography, a noninvasive procedure that does not require intubation, was found to be an efficient method to diagnose small bowel lesions. We describe our experience of using triphasic CT enterography with polyethylene glycol (PEG) for diagnosing renal cell carcinoma (RCC) metastases to the small intestine. RCC can metastasize to many organs and can cause variable clinical presentations. We report the case of a 56-year-old man with RCC who had psoas muscle involvement and lung metastasis. The patient presented with melena and intermittent abdominal pain. Two conventional CT and small bowel series examinations had shown no obstructive lesion in the small intestine. However, triphasic CT enterography with PEG detected two enhanced masses suggestive of small bowel metastasis. The patient underwent laparotomy and segmental resection of the jejunum with primary anastomosis. Histologic examination was compatible with RCC. This is the first report where RCC metastasis to the small bowel was diagnosed using triphasic CT enterography. Our study emphasizes the importance of triphasic CT enterography in

cases of obscure gastrointestinal bleeding, especially in patients suspected of having small bowel metastasis.

Introduction

The detection of tumors of the small bowel becomes difficult when only endoscopy or barium study is used because of the various clinical presentations and inaccessibility of these tumors [1]. Although small bowel tumors are infrequent, their malignancy rate is estimated to be as high as 60% [2]; therefore, detection and subsequent pathologic confirmation of small bowel lesions is critical. Schwartz and Barkin reported that the most common malignant tumors were adenocarcinomas, lymphomas, melanomas, carcinoids and sarcomas [2]. Peroral computed tomography (CT) is done by ingestion of enteric contrast, using a multidetector CT to evaluate the small bowel. Recent studies have shown that the diagnostic efficacy of peroral CT enterography is high for evaluating tumors of the small bowel and obscure gastrointestinal bleeding (OGIB) [3].

Renal cell carcinoma (RCC) can cause variable clinical presentations and can metastasize to many organs. Metastasis occurs in 33% of patients with RCC and can be noted in more than one organ, the lung and liver being the most common sites of metastases [4]. However, RCC with either metachronous or synchronous small intestine metastasis has been reported only in a limited number of cases [4]. We report the case of a patient with metastatic RCC of the small intestine who was diagnosed preoperatively by triphasic CT enterography using polyethylene glycol (PEG).

Case Report

A 56-year-old Chinese man was admitted for the evaluation of anemia and intermittent abdominal fullness with dull pain. Conventional abdominal CT performed 3 months earlier had revealed a mass in the right renal hilum with direct invasion of the psoas muscle, and the patient was diagnosed as having RCC of the right kidney. Lung metastases were also noted but no intestinal metastasis was found. A subsequent biopsy revealed clear-cell-type RCC. The patient underwent tomotherapy in combination with sunitinib malate therapy that led to partial resolution of the RCC. However, intermittent vague abdominal pain and dark-colored stools were noted shortly after the treatment. The patient also had several episodes of profound anemia (with hemoglobin levels between 4.7 and 8.0 g/dl), necessitating blood transfusion and hospitalization.

The patient underwent gastrointestinal evaluation, but gastroscopy and colonoscopy were unremarkable. A small bowel series revealed no obstructive lesion. Conventional abdominal CT did not reveal any abnormality in the intestine. Hence, we performed triphasic CT enterography. The patient abstained from food for 8 h before the examination. To promote luminal distension, the patient was orally administered 1 liter of PEG 30 min before the scanning (160 ml of diluted PEG at 5-minute intervals). Abdominal sonography was performed to evaluate the extent of small bowel distension; triphasic CT enterography was performed after the terminal ileum was distended.

CT was performed using a Siemens Sensation 16-slice CT scanner; 90 ml of non-ionic iodine as a contrast material was intravenously administered using power injection at a rate of 3.5 ml/s. Scans for the precontrast, arterial, and portal venous phases were obtained. Contiguous axial (5-mm) sections of the entire abdomen and pelvis were obtained. The arterial phase is automatically triggered when the aortic density reaches 100 HU after contrast injection. The delayed phase was acquired 70 s after contrast injection. The triphasic CT enterography revealed two hypervascular tumors in the jejunum ([fig. 1](#), [fig. 2](#)).

Subsequent exploratory laparotomy revealed two intraluminal tumors 70 cm below the ligament of Treitz (**fig. 3**). Segmental resection was performed with primary anastomosis of the jejunum and resection of both the intraluminal tumors. Postoperative histologic findings were consistent with metastatic RCC. The patient responded well after the operation.

Discussion

RCC is known to have diverse clinical manifestations. Metastasis occurs in 33% of patients with RCC, with the lung and liver being the most common sites of metastases [4]. Metastasis can be noted in more than one organ; however, RCC with either metachronous or synchronous small intestine metastasis has been reported only in a limited number of cases [4]. Similar to the manifestations in our case, most metastases of RCC to the small bowel manifest with intestinal obstruction and/or OGIB. These unusual clinical presentations are potentially life-threatening and pose serious challenges for most clinicians. Therefore, determining reliable and safe examination methods for the confirmation of the diagnosis of small bowel lesions is essential.

The diagnostic accuracy of conventional CT is only 48% for the detection of low-grade small bowel obstruction [5]. CT enteroclysis can improve the diagnostic efficacy; however, its clinical application is limited because of the considerable difficulties and complications associated with it, such as bowel perforation, enteral contrast material aspiration, respiratory depression, or failure of enteroclysis tube placement. Wireless capsule endoscopy is a powerful tool to diagnose OGIB, but it is expensive and relatively contraindicated in patients with bowel obstruction [6]. Due to these clinical complications, peroral CT enterography is considered an alternative diagnostic tool. Unlike CT enteroclysis and wireless capsule endoscopy, peroral CT enterography is a safer and cost-effective method. It can reliably detect small bowel bleeding, tumors, and vascular lesions [3] and enable the evaluation of luminal and extraluminal alterations of the small intestine [7]. Water, lactulose solution, and mannitol are used as oral contrast agents in peroral CT enterography [8, 9]; however, none of these agents have wide clinical applications because of their inconsistent quality. PEG, a commonly used laxative, obtains better bowel distension and shows marked contrast differences compared to those obtained by other contrast agents. PEG is a neutral enteric contrast agent that detects attenuation differences between enteric wall, enhanced tumors, and water-attenuating enteric luminal contrast, with limited side effects [10]. Because of these advantages, we used triphasic CT enterography to make an accurate diagnosis. After sufficient luminal distension, which was determined by conventional sonography, the arterial phase images, as well as the images of the delayed phase, acquired by CT clearly showed two hypervascular small bowel tumors. With this helpful information, we could plan an effective treatment for our patient.

In conclusion, this is the first reported case of RCC metastasis to the small bowel that was diagnosed by triphasic CT enterography. Our study emphasizes the efficacy of triphasic CT enterography in determining the cause of small bowel lesions and OGIB.

Disclosure Statement

The authors have no conflicts of interest and no research funding to declare.

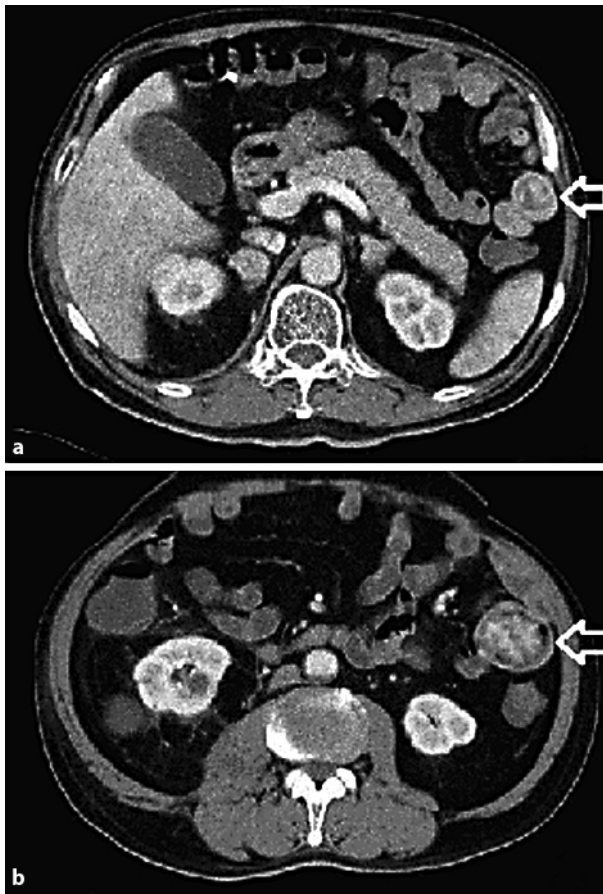


Fig. 1. a, b Transverse image of triphasic CT enterography of the small bowel. Note that two enhanced tumors (arrows) suggestive of small bowel metastatic tumors were found in the jejunum.

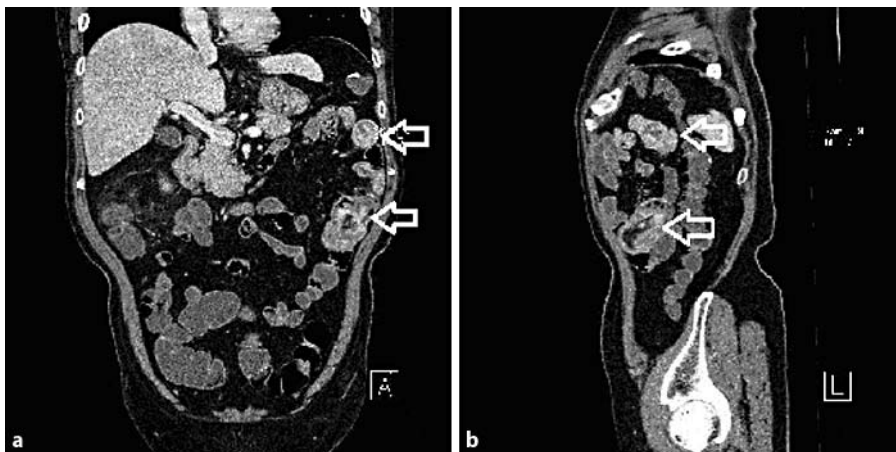


Fig. 2. a Coronal image. **b** Sagittal image. Note that two jejunal tumors (arrows) suggestive of small bowel metastatic tumors are visible using triphasic CT enterography. The small intestine is well distended.

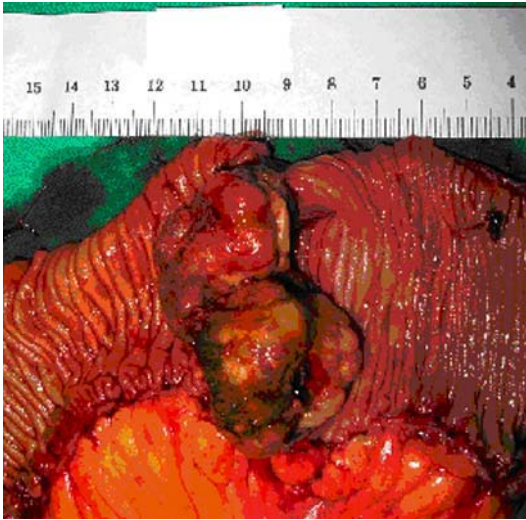


Fig. 3. Operative finding. Laparotomy revealed a 6 × 3 × 3 cm hemorrhagic polypoid mass in the lumen located close to the dilated margin of the jejunum.

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