

Carcinoid tumors of the small bowel: characteristic imaging features in MR-enteroclysis

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Introduction: The detection and localization of primary carcinoid tumors (pCT) of the small bowel with imaging has always been challenging due to their small size at first clinical presentation and their multiplicity. CT and MRI without bowel preparation provide disappointing results in determining the primary tumor site [1, 2]. Small bowel distension is known to improve the visualization of small bowel pathology [3], yet the performance of MRE in identifying pCT has not been elucidated, to date. The purpose of the present study was to determine the value of MRE in the localization and characterization of pCT of the small bowel and to describe typical imaging features.

Material and Methods: Twenty patients with suspicion of primary small bowel carcinoid tumors (pCT) were recruited to undergo MRE following nasojejunal intubation and small bowel filling with 2.5l of 0.5% methylcellulose solution under MR-fluoroscopic guidance. MRE was performed on a 1.5T MR-scanner including T2 weighted (w) SSFSE, SSFP and contrast-enhanced T1w GRE sequences with fat saturation. Fifteen patients, who subsequently had surgery for resection of their pCT, were retrospectively included in the study. Two patients had primary pulmonary carcinoid and 3 patients were considered inoperable due to extended mesenteric and peritoneal involvement.

All MRE were analyzed as for the presence, location, number, size, multiplicity and morphologic appearance of the pCT by two board certified radiologists in consensus. The easiness of tumor detection was rated for each sequence type, separately, according to a 4-point rating scale. Signal intensity measurements were performed in tumor and muscle. The presence of desmoplastic reaction, vascular involvement and lymph node metastases was also recorded.

Results: pCT were correctly identified and localized in 14/15 patients. Tumor detection was best in contrast-enhanced T1w fat saturated GRE sequences due to hyperenhancement (Fig. 1a-d). SSFSE was clearly inferior disclosing the tumor either hyperintense or isointense to muscle. pCT appeared as nodular intraluminal masses in 40% of the cases, as focal wall thickening in 33.3% and in 20% with both. Mean size was 25mm (7mm-46mm) with a tendency to smaller size for ileal tumors. MRE failed to depict superficial micronodular peritoneal spread in one patient. Desmoplastic reaction was observed in 73.3% with mesenteric masses showing lower signal than the pCT due to fibrotic changes.

Conclusion:

MRE is a valuable tool in the detection and localization of primary carcinoid tumors, appropriate bowel distension provided. A number of characteristic morphologic imaging features can be established at MRE to characterize pCT and their loco-regional metastases.

Figures:

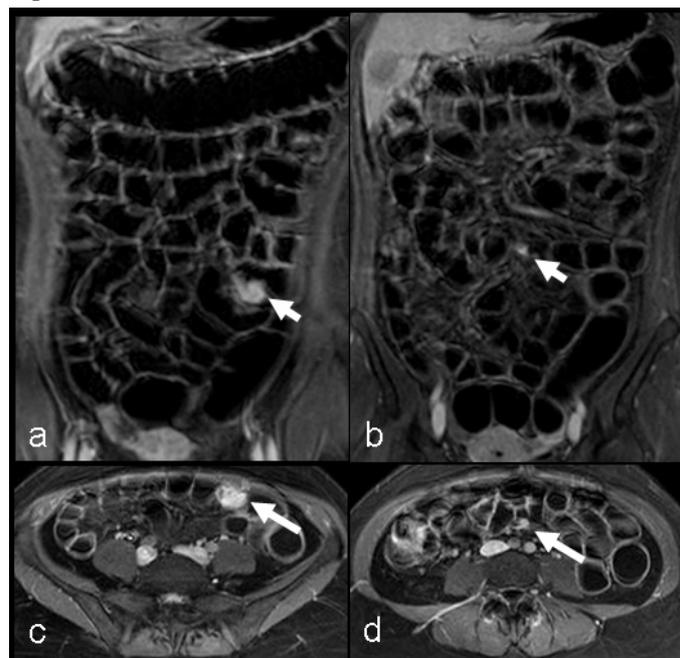


Figure Caption:

Fig. 1: MR-Enteroclysis in a 45 yo male with multiple primary carcinoid tumors in the proximal ileum. The intraluminal nodules were 7mm (b,d) and 23mm (a,c) in size and hyperenhancing on contrast-enhanced T1 weighted fat saturated GRE images. Desmoplastic reaction was absent.

References:

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