The ‘amputated right colon’ — a diagnostic pitfall on barium enema examination

A report on 6 cases

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Summary

Six patients had strictures of the right colon not causing clinical obstruction. The strictures did not fill during barium enema tests resulting in the ‘amputated’ proximal right colon mimicking the caecum and/or terminal ileum. Positive caecal identification relies on terminal ileal and appendiceal filling. In 4 patients, a barium follow-through study, performed immediately after a barium enema allowed quick and safe identification of a proximal colonic stricture.

In spite of the advances in computed tomography, ultrasonography and colonoscopy, the primary examination for assessment of colonic disease remains the barium enema. However, false-negatives especially for polyps and carcinoma in the rectum and caecum are not uncommon in both single- and double-contrast barium enemas. In the case of the right iliac fossa (RIF), non-detection of a caecocolic mass on barium enema may be due to mistaking the incompletely filled and distorted right colon for the caecum and even the terminal ileum. We refer to this as the ‘amputated right colon’ since there is no evidence of associated colonic obstruction. Immediate barium follow-through films will quickly identify the right colon and terminal ileum in these cases.

Six cases seen at Groote Schuur Hospital over 3 years are reported.

Patients and methods

Over a 3-year period, we encountered 6 patients in whom routine double-contrast hypotonic barium enema studies revealed constricting lesions in the proximal to mid-right colon which mimicked the caecum and/or terminal ileum. Immediate single-contrast barium follow-through studies were done in 4 and delayed studies in 2 cases. The stomach was always screened and limited radiographs taken before placing the patient in the right lateral decubitus position to speed up barium transit time, 200–300 ml of barium was used and intravenous metochlopramide was given if transit time was slow. Spot films of the terminal ileum and proximal colon were taken once barium reached the colon.

Results

Three of the patients, aged 70–74 years (mean 72 years), had primary carcinoma involving the mid-ascending colon and terminal ileum (Fig. 1), caecum and mid-ascending colon respectively. All carcinomas were extensive and not resectable. Two of these patients had an RIF mass and pain, and 1 had vague generalised abdominal pain. Metastatic squamous carcinoma affected the mid-ascending colon in 1 (Fig. 2), a nonspecific inflammatory mass in another (Fig. 3), and both Crohn’s disease and carcinoid tumour of terminal ileum (Fig. 4) affected the sixth patient.

In the 4 patients with malignant disease, the inability to visualise terminal ileum and/or appendix prompted an immediate follow-through study since there was clinical suspicion of colonic malignant lesions in all and RIF pain or mass in 3. The delayed diagnosis in the other 2 could have been avoided by performing similar, immediate follow-through examinations. In both patients, clinical clues favoured RIF lesions.

Discussion

In both double- and single-contrast barium enemas, the false-negative error rate in cancer of the colon is approximately 5%. Most of the missed lesions are in the rectosigmoid and caecolic regions and even advanced carcinomas may be missed. This applies especially to the right colon when the point of hold-up of barium flow is mistaken for the caecum. The ‘amputated right colon’ on barium enema is not associated with obstructive features. The inability to delineate the stricture on barium enema is probably due to a combination of the low head of pressure of the barium column in the right colon and the valve effect of the lesion. During a barium enema, the caecum can be identified with certainty when there is reflux of barium into the terminal ileum or appendix, sometimes obtained only in the erect position and with compression. If neither of these structures fills, then caecal filling may be determined indirectly by recognising different caecal configurations or the ileocaecal valve at the level of the first hastral segment. However, these indirect means of assessing caecal filling should not be relied upon when the patient has symptoms or signs in the RIF. In these patients the radiologist should avoid diagnosing a high caecum or even referring to the visualised proximal colon as the ‘apparent caecum’ when neither the appendix nor the terminal ileum is identified with certainty. The other cause of misinterpretation results from the distorted, amputated right colon which mimics both the caecum and a short segment of terminal ileum (Figs 1, 3 and 4). In either case, it is essential to perform a follow-through study to identify the terminal ileum and caecum.
Fig. 1. Patient 1, a 74-year-old woman, had had pain in the RIF for 6 weeks, dysentery and an RIF mass. Top: barium enema showing proximal colon resembling the caecum and terminal ileum (arrow). Below: immediate barium follow-through study revealed extensive carcinomatous infiltration of the proximal ascending colon (open arrows) and terminal ileum (curved arrow); site of amputation (solid arrow).

Fig. 2. Patient 2, a 57-year-old woman known to have squamous carcinoma of the cervix, with an RIF mass. Top: barium enema showing apparent well-filled proximal colon. Below: immediate barium follow-through study revealed malignant infiltration of mid-right colon (curved arrows); caecum (solid arrow). Colonoscopic biopsy was positive for squamous carcinoma, presumably metastatic from the cervix.
Fig. 3. Patient 3, a 28-year-old man, who had had a painful RIF mass for 2 months. Top: barium enema study which was interpreted as showing extrinsic impression on the caecum with reflux into terminal ileum (arrow). Below: barium follow-through study a week later showed grossly distorted proximal ascending colon (open arrow), site of amputation (solid arrow) and terminal ileum and appendix (black arrows). The excised mass had nonspecific, chronic inflammatory changes, possibly due to foreign body perforation.

Fig. 4. Patient 4, a 31-year-old woman, had suffered for a few months from diarrhoea, colic and a tender RIF. Top: barium enema study interpreted as showing a 'high caecum' and 'reflux' into 'normal terminal ileum' (arrows). Below: barium follow-through study a week later showed obstructed distal small bowel, proved at laparotomy to be due to desmoplasia which extended to the mid-ascending colon. Histology detected ileal carcinoid tumour and concomitant Crohn's disease.
Barium follow-through studies can be done rapidly on the same day immediately after the enema. Pharmacoradiographic techniques will assist transit and allow rapid identification of the terminal ileum, caecum and colon proximal to the site of amputation. A 'cocktail' comprising barium and water-soluble iodinated contrast material may be used, but we have not found this necessary. In the peroral pneumocolon, orally administered barium and rectal insufflation allows double-contrast visualisation of the ileocaecal region whenever the barium enema fails to show this adequately. There is a fear that barium will inspissate proximal to a colonic stricture and may convert an incomplete to a complete obstruction, but it has been shown that barium proximal to acute colonic obstruction remains in a liquid state. In partial obstruction barium remains diluted and it is unlikely to precipitate complete occlusion. In our experience we have not come across a case of obstruction due to the oral administration of barium in patients with proximal colonic strictures.

The fact that 4 of our 6 patients had carcinoma emphasises the need for caution when the caecum is not positively identified in older patients with RIF symptoms or signs or where the faecal occult blood test is positive with no definite cause. In 1 of our patients the terminal ileum was involved by caecal tumour extension and in another by colonic cancer desmoplasia. Metastatic peritoneal seeding may also affect this area, so that the stomach should be examined at the time of the barium follow-through study. Involvement of the area by metastatic cervical carcinoma is unusual.

Obstruction in carcinoid tumours is not unusual and may be due to intussusception, tumour bulk or, most commonly, an extensive localised desmoplasia obstructing terminal small bowel and proximal colon. The association with Crohn's disease is unusual and may have contributed to the development of later, complete obstruction in our patient.

The inflammatory mass (patient 3) represents the benign, eminently curable end of the spectrum of the 'amputated colon'. While this was a chronic, nonspecific, inflammatory mass, other possibilities include tuberculosis, Crohn's disease, appendix abscess, diverticulitis, amoebiasis, actinomycosis and endometriosis.

**Conclusion**

The barium follow-through study immediately after a barium enema for assessing caecocolic amputation can all be done within 1–2 hours. This will establish an unequivocal, quick diagnosis of caecocolic and ileocolic disease and avoid the diagnostic pitfall of the 'amputated right colon'. In our patients, orally administered barium proved to be safe in examining the colon proximal to a stricture in the right colon.

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**REFERENCES**