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CASE REPORT

Colonic transformation of ileal pouch–anal anastomosis and of the distal ileum: MRI findings

[1]O F DONATI, MD, [1]D WEISHAUPT, MD, [2]A WEBER, MD and [3]D HAHNLOSER, MD

[1]*Institute of Diagnostic Radiology, University Hospital Zurich, Zurich, Switzerland,* [2]*Department of Pathology, University Hospital Zurich, Zurich, Switzerland and* [3]*Department of Visceral and Transplantation Surgery, University Hospital Zurich, Zurich, Switzerland*

ABSTRACT. Colonic metaplasia of the ileal reservoir in patients after ileal pouch–anal anastomosis (IPAA) is described in pathological and histochemical studies. So far, there are no reports on the imaging presentation of colonic transformation. We describe the distinctive post-operative MRI features found in a 28-year-old patient with IPAA after failed conservative treatment of chronic ulcerative colitis. These distinct MRI features of colonic transformation of ileum mimicking normal colon are important to know for radiologists reading MR examinations of patients with IPAA.

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Total proctocolectomy with ileal pouch–anal anastomosis (IPAA) is a well-accepted surgical therapy for patients with chronic ulcerative colitis (CUC) after failure of medical treatment and for patients with familial adenomatous polyposis (FAP) [1]. Technically the procedure includes proctocolectomy, creation of an ileal reservoir (ileal pouch), ileal pouch–anal anastomosis and, occasionally, temporary ileal loop ileostomy, which is closed 8–12 weeks later.

Post-operatively, the ileal pouch is adapting to its function as neorectum. During this adaptation process, the ileal pouch may undergo a series of morphological changes with inflammatory infiltration and alterations in mucosal architecture.

Because histopathological studies in patients with IPAA have demonstrated the transformation of ileal pouch mucosa into colonic mucosa [2–5] and chemical studies have shown a change of pouch mucin from small bowel-type sialomucin to colorectal sulfomucin [6, 7], a theory of colonic transformation of the ileal pouch mucosa has been developed. As a result of the post-operative adaptation of the ileum to its function as neorectum, deep clefts in the ileal pouch mucosa resembling rectal valves may occasionally be observed during fluoroscopic contrast examination (pouchography). These valves are known as ''pseudovalves of Houston'' in the literature [8]. In this report, we describe for the first time MRI findings of morphological colonic transformation after IPAA.

Address correspondence to: Olivio F Donati, Institute of Diagnostic Radiology, University Hospital Zurich, Rämistrasse 100, CH-8091 Zurich, Switzerland. E-mail: odonati@gmx.net

Case report

A 28-year-old man underwent proctocolectomy with IPAA as therapy for refractory chronic ulcerative colitis 2 years previously. Post-operatively, the patient had several episodes of pouchitis, the latest of which took place 6 months before admission to our hospital. He presented with difficulties in evacuation and a chronic pelvic abscess. Rectoscopy was performed and revealed a high-grade stenosis at the level of the anal anastomosis with dilatation of the ileum pouch and the ileal segment proximal to the IPAA with several ulcerations. All biopsies were negative for Crohn's disease. MRI was performed following oral ingestion of 1 l of a solution containing 0.2% locust bean gum and 2.5% mannitol for small bowel distension [9]. In addition, a rectal enema with 200 ml of water was administered and 40 mg of scopolamine butylbromide (Buscopan, Boehringer Ingelheim, Germany) was injected intramuscularly. The MRI protocol included unenhanced T_1 and T_2 weighted sequences as well as dynamic contrast-enhanced T_1 weighted imaging using a three-dimensional (3D) gradient-recalled echo (GRE) MRI sequence following intravenous administration of an extracellular gadolinium-based contrast agent (Dotarem (Gd-DOTA), Guerbet, France).

MRI confirmed the stenosis at the level of the anal anastomosis found at rectoscopy (Figure 1) and demonstrated marked wall thickening and dilatation of the entire ileal pouch (maximal diameter, 9.9 cm) (Figure 2a) as well as dilatation of the ileal segment proximal to the ileal pouch–anal anastomosis (maximal diameter, 8.6 cm). The dilated ileal segment was approximately 1 m long and contained faecal material. The intestinal wall of the ileal pouch was markedly thickened and the wall of the distal ileum slightly thickened. Both intestinal walls showed slight enhancement during dynamic

Figure 1. Coronal T_1 weighted contrast-enhanced three-dimensional spoiled gradient echo pulse sequence showing marked stenosis of the anal anastomosis (arrow). P, pouch.

contrast-enhanced 3D GRE imaging. No ileal folds were visible either in the dilated pouch or in the ileal segment proximal to the ileal pouch–anal anastomosis. However, deep clefts were noted in the ileal pouch and in the dilated ileal segment similar to what has been described as pseudovalves of Houston [8] (Figure 2b).

The small bowel loops proximal to the dilated ileal segment were of normal calibre, with the typical appearance of ileal folds. No free fluid or findings consistent with an intra-abdominal abscess or small bowel stenosis were noted.

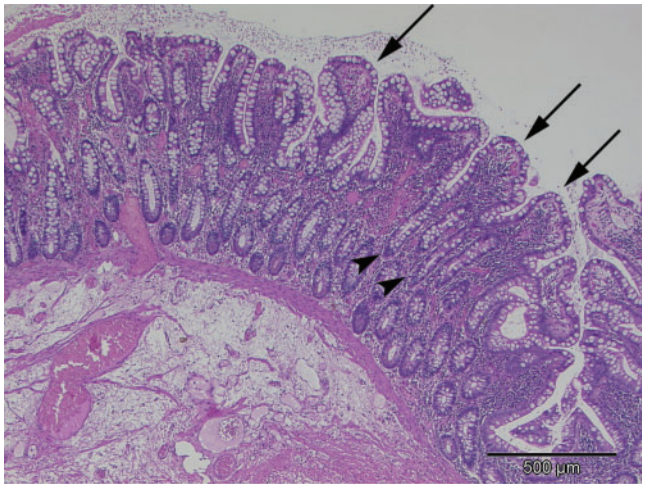
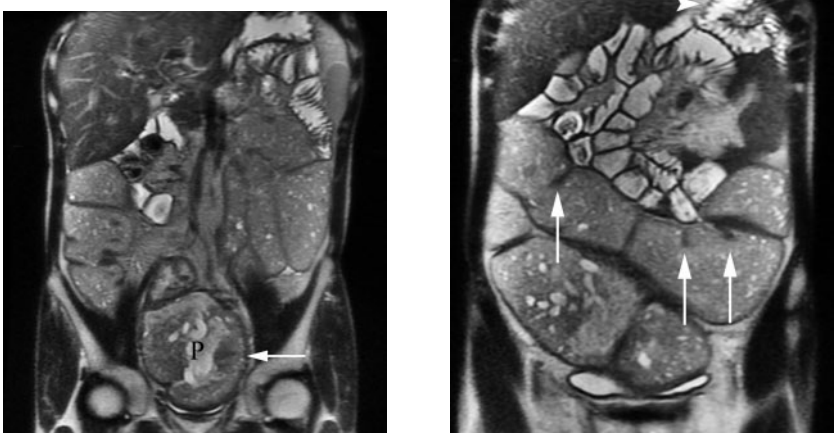


Figure 3. Photomicrograph (original magnification, ×25; haematoxylin–eosin stain) of the biopsy taken of the ileal segment proximal to the ileal pouch–anal anastomosis shows villous atrophy (arrows) along with hyperplasia of the crypts (arrowheads), producing an appearance with features of ileal and colonic mucosa.

Subsequently, the patient underwent laparoscopically assisted loop ileostomy. Histological specimens of the intraoperative biopsies taken from the ileal segment revealed no signs of inflammation but showed villous atrophy accompanied by pronounced crypt hyperplasia; therefore, producing an appearance with features of ileal and colonic mucosa (Figure 3). Follow-up MRI 4 months after the initial examination showed identical imaging features.

Discussion

Although IPAA is a relatively frequently performed surgical intervention for CUC and FAP, the literature regarding imaging of IPAA is sparse. Most of the publications in this field describe the imaging features of IPAA-associated complications including anastomotic leaks, pelvic sepsis and abscess, fistulas, strictures,



(a) (b)

Figure 2. Coronal single-shot fast spin echo images of the abdomen at two different anatomical levels. (a) Magnetic resonance (MR) image obtained at the level of the ileal pouch (P) demonstrates marked dilatation and wall thickening of the entire pouch (arrow). (b) Massive dilatation of the ileal segment proximal to the ileal pouch–anal anastomosis is noted on an MR image obtained more ventrally than (a). The ileal folds in the dilated ileal segment have vanished and have been replaced by pseudovalves of Houston (arrows). Small bowel loops proximal to the dilated ileal segment are of normal calibre with the typical appearance of ileal folds (arrowhead).

pouchitis and pre-pouch ileitis, small bowel obstruction or haematomas using fluoroscopic contrast examination, ultrasound, CT or MRI [8, 10–16].

Reports describing the normal imaging appearance of IPAA and, in particular, the adaptation process of the neorectum are rare. Whereas the ileal pouch may vary in size, the ileal segment proximal to the pouch–anal anastomosis is usually of normal calibre. In addition, the typical pattern of ileal folds within the pouch as well as in the ileal segment proximal to the pouch–anal anastomosis can be depicted using fluoroscopic contrast examination through a retrograde approach, CT or MRI. In a subset of patients, imaging findings may include a ''blind loop'' at the upper part of the reservoir, a contrast lucency at the anastomosis between the anal canal and the pouch or, where post-operative transformation of the small intestine has taken place, deep indentations in the ileum that appear similar to rectal valves (pseudovalves of Houston) [8, 17].

In our patient, MRI demonstrated marked dilatation of the entire ileal pouch, as well as of the ileal segment proximal to the stenosed ileal pouch–anal anastomosis. The intestinal walls of the pouch as well as the distal ileal segment were slightly thickened, the ileal folds had vanished and, instead, pseudovalves of Houston were seen. Without knowing the history of the patient, one could misinterpret the morphological appearance of the IPAA and the distal ileum as colon.

Following IPAA, the ileal pouch, as well as the ileal segment proximal to the ileal pouch–anal anastomosis, is often subject to an adaptation process to its function as neorectum. This process is characterised by histological and histochemical changes, such as severe villous atrophy accompanied by pronounced crypt hyperplasia and elongation [2–7]. Histochemical studies using mucin staining have shown a change from small intestinal sialomucin to colorectal-type sulfomucin [6, 7]. A study [5] has shown that this process of colonic transformation is probably triggered by recurrent inflammation of the pouch, which explains why these histological and histochemical changes are present in only some patients with IPAA. Because the histological findings of our patient were consistent with the features of colonic transformation described above, we assume that the imaging findings presented characterise the morphological correlate of such a transformation of both the ileal pouch and the proximal ileum. It might be hypothesised that the stenosis at the level of the pouch–anal anastomosis with consecutively prolonged faecal stasis had influenced the severity and extent of colonic transformation, as suggested by different authors [18–20].

In conclusion, this case illustrates that colonic transformation of ileum may mimic normal colon in MRI of patients with IPAA. Radiologists reading MR examinations of patients with IPAA should be aware of this finding.

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