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CT diagnosis of Meckel diverticulum in a paracolic internal hernia

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Abstract

The autopsy incidence of internal hernia has been reported to be between 0.2% and 0.9%, and these hernias are usually diagnosed on imaging due to their complications or at surgery. Meckel diverticulum is the most common congenital anomaly of the gastrointestinal tract, occurring in 1% to 3% of the population according to autopsy studies. The condition also is usually diagnosed at surgery, by barium studies or scintigraphy, or on cross-sectional imaging due to complications. We present an unusual case of a large Meckel diverticulum in a right paracolic hernia diagnosed on multidetector computed tomography. This diagnosis was made after attacks of subacute intestinal obstruction with the aid of multiplanar reconstructions. This case emphasizes the role of multidetector computed tomography and postprocessing techniques such as multiplanar reconstruction in the diagnosis of bowel pathology.

Key words: Paracolic hernia—Meckel diverticulum—Multidetector computed tomography

The autopsy incidence of internal hernia has been reported to be between 0.2% and 0.9% [1], and these hernias are usually diagnosed on imaging due to their complications or at surgery [2]. Meckel diverticulum is the most common congenital anomaly of the gastrointestinal tract, occurring in 1% to 3% of the population according to autopsy studies [3]. The condition is also usually diagnosed at surgery, by barium studies or scintigraphy, or on cross-sectional imaging due its complications. We present an unusual case of a large Meckel diverticulum in a right paracolic hernia diagnosed on multidetector computed tomography (MDCT). This diagnosis was made after attacks of subacute intestinal obstruction, with the aid of multiplanar reconstructions (MPRs). This case emphasizes the role of MDCT and postprocessing techniques such as MPR in the diagnosis of bowel pathology.

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Case report

A 25-year-old man presented with a 2-year history of recurrent pain in the right lower quadrant associated with intermittent vomiting. There was no history of pyrexia, weight loss, or loss of appetite. On examination, the patient showed mild guarding in the right iliac fossa and a vague palpable lump. Routine laboratory tests were normal. Repeat ultrasound examination of the abdomen were inconclusive. With a working diagnosis of episodic subacute intestinal obstruction of uncertain etiology, abdominal CT was requested after the most recent episode of pain.

CT was performed on a MDCT scanner (Volume Zoom, Siemens AG, Erlangen, Germany). The patient drank 1 L of oral contrast (prepared with 20 mL of 76% [w/v] ionic contrast diluted to 1 L with a flavoring agent) over 1 h before the examination, and rectal contrast was administered just before scanning. The scan was performed by using a collimation of 2.5 mm and a table increment of 10 mm after administration of 80 mL of non-ionic intravenous contrast. Images were reconstructed at 3-mm overlapping (2.5-mm interval) sections for viewing on a reporting workstation and at 8-mm contiguous sections for filming. MPRs using a thickness of 3 to 10 mm were performed according to the standard protocol at our institution.

The scan showed herniation of the distal small bowel loops posterior to the ascending colon, with the cecum close to the midline in the pelvis. On closer inspection of the axial images, a dilated blind-ending bowel loop was seen in the right iliac fossa (Fig. 1). The coronal reconstructions confirmed the findings and demonstrated the

communication of this structure with the ileum (Fig. 2). There was no evidence of proximal dilatation. A diagnosis of a right paracolic hernia containing ileal loops and a Meckel diverticulum was made.

A barium meal study subsequently was requested by the surgeon, which showed the same findings, with the delayed barium film replicating the coronal reconstruction of the CT study (Fig. 3)

At surgery, the ascending colon was found to be mobile with a long mesentery. A defect was seen in this mesocolon, through which the ileum was herniating into the paracolic region. The Meckel diverticulum was identified, and a diverticulectomy was performed. The internal hernia was reduced, and the defect was closed. The rest of the small bowel was examined at surgery and found to be normal. The postoperative period was uneventful, and the patient showed no symptoms at the final follow-up.

Discussion

The autopsy incidence of internal hernia has been reported to be between 0.2% and 0.9% [1], with involvement of the ileocecal region in 13% of cases [2]. The clinical manifestations usually are intermittent episodes of right lower abdominal pain, tenderness, small bowel distention, nausea, and vomiting [1]. Our patient also presented with recurrent right lower abdominal pain and vomiting. Delayed films in a small bowel series have been considered useful to make the diagnosis, with demonstration of the herniated ileal loops posterolateral to the cecum. In a paracolic internal hernia, the involved small bowel loops protrude though defects in the persistent ascending mesocolon. Its radiologic differentiation from a transitory transmigration of the small intestine anteriorly over the ascending colon into the right paracolic gutter has clinical and prognostic significance [1]. In our case, axial CT scans clearly demonstrated herniation of the small bowel and its mesentery posterior to the ascending colon (Fig. 1).

Meckel diverticulum is the commonest congenital anomaly of the gastrointestinal tract and is usually detected in vivo due to its complications [4], including gastrointestinal bleed, infection, stone formation, neoplasm [5], or obstruction due to a band or intussusception of the diverticulum [6]. They also may be associated with umbilical anomalies consisting of fistulas, sinuses, cysts, or bands [4]. In our case, there was no

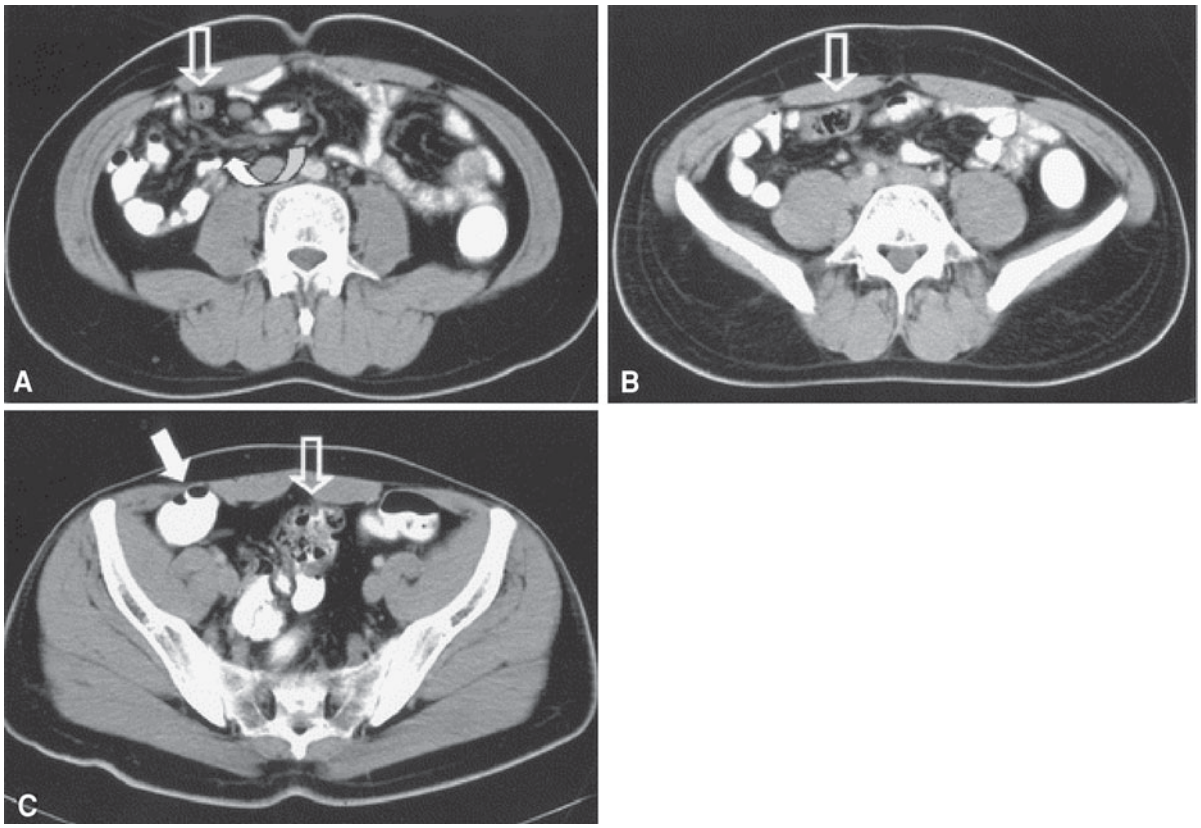

Fig. 1. A–C Axial CT sections of the abdomen show a medially placed ascending colon (*open arrows* in A and B). The cecum is seen in the midline of the pelvis (*open arrow* in C). The herniated small bowel is in the right paracolic gutter, and its mesenteric vessels are seen traversing beneath the ascending colon (*curved arrow* in A). Meckel diverticulum is seen as a blind-ending dilated loop of bowel in the right iliac fossa (*solid arrow* in C)

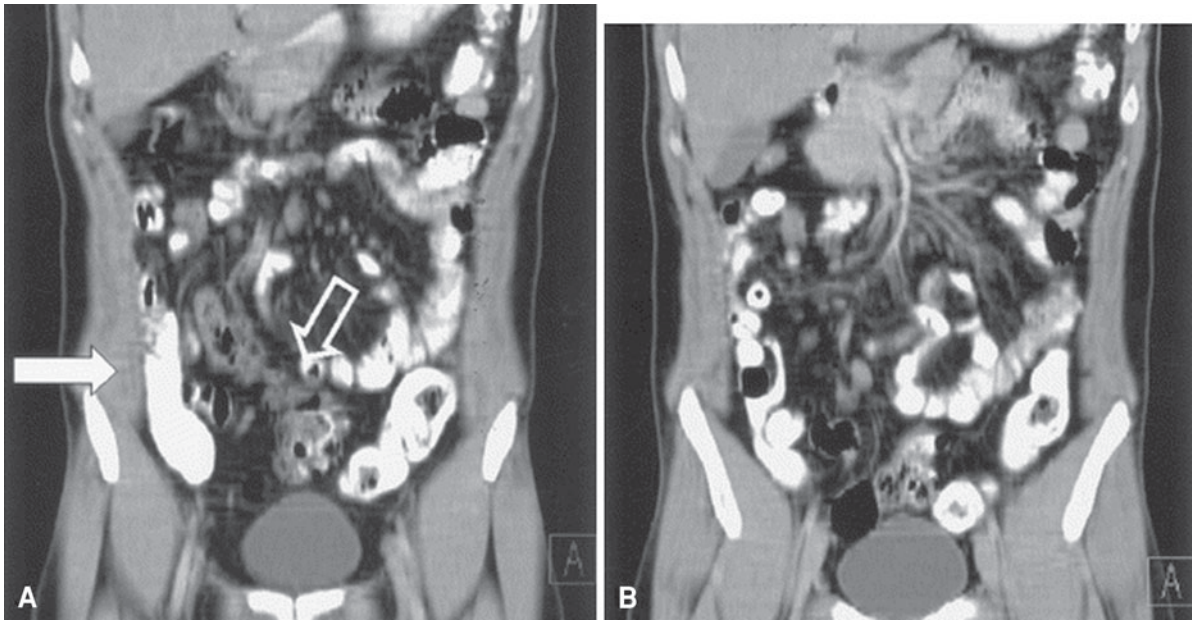

Fig. 2. **A, B** Coronal MPRs show the medial position of the ascending colon, with the cecum in the midline (*open arrow* in A). Meckel diverticulum is seen in the right iliac fossa (*solid arrow* in A)

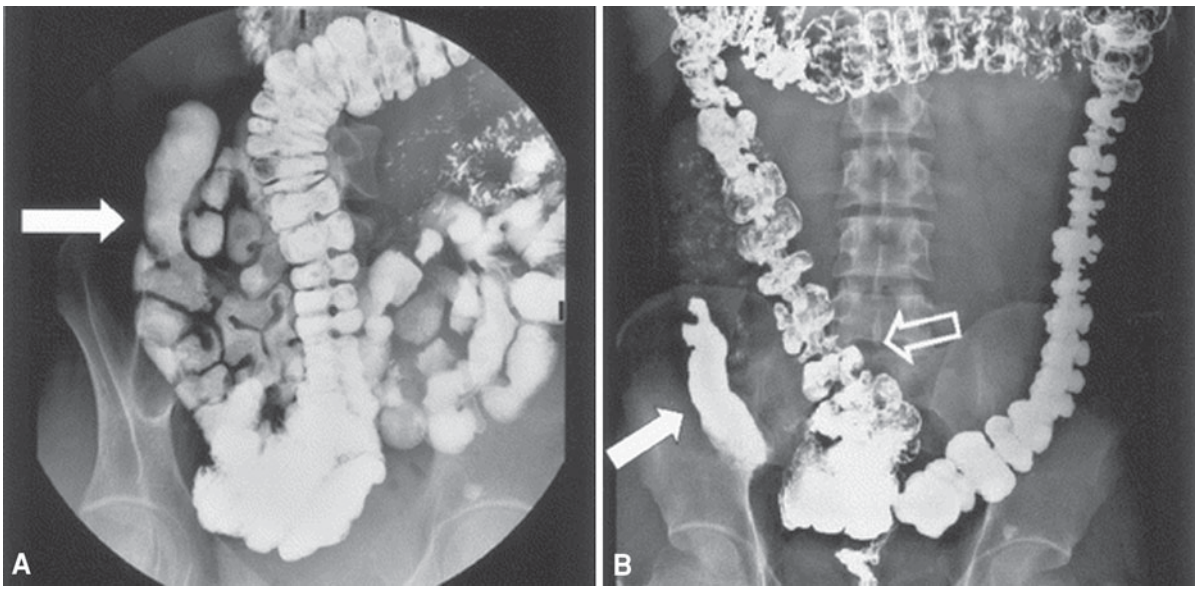

Fig. 3. **A, B** Radiographs of the small bowel series show the distal ileal loops, with the Meckel diverticulum in the right iliac fossa (*solid arrows*). The cecum is seen in the midline of the pelvis (*open arrow* in B) on this delayed film. Note similarity of the findings on Figures 2A and 3B

evidence of diverticulitis, obstruction, intussusception, or hemorrhage.

Traditionally, Meckel diverticulum has been diagnosed at surgery or by barium studies and scintigraphy. The sensitivity for the latter technique decreases in older individuals due to fewer diverticula containing ectopic gastric mucosa [7].

Until recently, the diagnosis of an uncomplicated Meckel diverticulum by CT has been difficult [6–8]. The presence of enteroliths within the diverticulum occasionally helps its CT diagnosis [9], with other useful features being associated inflammation, tumor, or demonstration of attachment to the umbilicus.

With the advent of MDCT, CT has been considered the first-line modality for the evaluation of a wide variety of small bowel diseases [10]. Due to the high *z*-axis resolution, it is possible to perform isotropic imaging using MDCT [11]. This capability, in addition to advanced

three-dimensional postprocessing software available on all modern scanners, allows the visualization of small bowel anatomy similar to that seen on barium studies [12]. The orientation of the bowel loops and mesenteric vessels have been useful in detecting malrotation, hernias, and volvulus of the bowel [13]. These conditions often are better evaluated on coronal reconstructions than on axial images. Our case demonstrated a greater level of confidence in our diagnosis on MPR, which almost mimicked the finding on barium study.

Conclusion

The symptoms of our patient were related predominantly to the paracolic internal hernia containing ileal loops, leading to repeated attacks of subacute intestinal obstruction. Meckel diverticulum was an incidental finding. Both findings were diagnosed preoperatively on MDCT after an attack of subacute obstruction.

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