

Detection and Appearances of Malignant Colorectal Masses through Transabdominal Sonography

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ABSTRACT

Objectives: To illustrate the sonographic features of malignant colorectal masses in regards to their clinical significance.

Material and methods: The study included 37 patients, including 20 men and 17 women, ranging between 30 and 85 years (mean, 46 years old). The abnormal large bowel segment was localized and demonstrated by anatomic site and orientation along with sonographic features.

Results: Out of 37 patients, lower GI tract masses included 4 (10.8%) patients of sinister ileocecal masses. 14 (37.8%) cases of colonic tumors included patients of 4 ascending colon; 2 cases of transverse colon; and 8 cases of descending colon. Sigmoid tumors were documented in 7 (18.9%) patients besides 9 (24.3%) cases of rectal masses. The masses were either lobulated or revealed a segmental wall thickening simulating appearance of kidney (Pseudokidney sign), or diffused wall thickening (Target sign). On color coding with Doppler scanning, most of the masses demonstrated low resistant flow pattern.

Conclusion: We concluded that transabdominal sonography may be the preliminary imaging modality that patients undergo after they present with nonspecific lower gastrointestinal signs and symptoms followed by barium enema and/ or flexible colonoscopy for the confirmation of diagnosis of colorectal masses.

Key words: Ultrasonography, malignant, colorectal masses.

INTRODUCTION

Ultrasonography is often the first imaging modality performed in patients with abdominal pain and undiagnosed bowel disease. Many diseases produce bowel wall abnormalities that can be evaluated with ultrasound. Familiarity with the sonographic appearances of diseases that affect the intestine may allow specific diagnosis based on the degree and distribution of bowel wall thickening and associated changes of the perienteric tissues.

Colorectal cancers usually produce a mass or segmental wall thickening of the involved segment of large intestine that can be demonstrated, not often, with transabdominal sonography. Patients complaining of symptoms such as altered bowel habits, fresh bleed per rectum (hematochezia), or bowel obstruction, transabdominal sonography may depict a mass in the bowel lumen or symmetrical or asymmetrical circumferential thickening of the colonic or rectal wall.

With more advancements and easy accessibility of sonography in the evaluation of patients with abdominal symptoms, colorectal masses may be

detected with greater accuracy. Sonography enables localization of large-bowel obstruction in 85% of patients and diagnosis of the cause of large-bowel obstruction in 81% of patients. In this article, we attempted to illustrate the sonographic features of malignant colorectal masses in regards to their clinical significance.

METHODOLOGY AND TECHNIQUE

This cross sectional study was conducted in Department of Radiology, Omer hospital, between September 2008 and January 2011. Ultrasound scanning was performed in the patients with vague lower abdominal symptoms. The patients' medical records were reviewed prior performing sonography. The study included 37 patients, including 20 men and 17 women, ranging between 30 and 85 years (mean, 46 years old). The diagnosis was confirmed either by histology through surgically resected specimen, trucut biopsy or fine needle aspiration.

We performed transabdominal sonography using Toshiba Nemio XG ultrasound equipment (SSA 660A; Tokyo, Japan). Transabdominal scans were performed with 3.5 MHz curvilinear array transducer. Gentle compression was applied to displace adjacent bowel loops. The colon was differentiated from small bowel loops by the location and course of the bowel loops. Scanning through the course of the colon

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proceeded along the length of both flanks for the ascending and descending colon, across the midline of the upper part of the abdomen for the transverse colon, along the left side of the lower part of the abdomen from the descending colon toward the pelvic cavity for the sigmoid colon, and across the midline of the pelvic cavity for the rectum.

Rectal carcinomas are seen only when the bladder is well-filled. Absence of luminal content in abnormal areas of the colon enabled us to detect a mass or mural thickening by sonographic examination. The abnormal bowel segment was localized by anatomic site and orientation. Colorectal masses presented pathologically as a fungating mass, either within or outside the lumen, or as a short segmental wall thickening. Sonographic appearances reflected the pathology, that is, either a bulky mass or segmental thickening of the colonic wall. After the hypochoic layer of the bowel wall was measured, mural thickening was considered to be present when the hypochoic layer of the colon exceeded 3 mm in thickness.

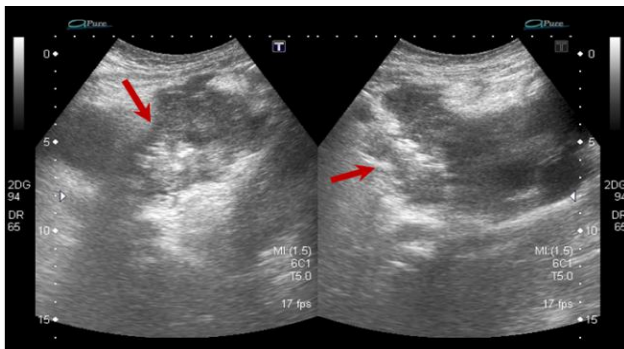


Fig. 1: Malignant mass of descending colon (red arrows) sonographically appear as a fungating mass, with short segmental wall thickening.

Associated findings-such as enlarged mesenteric lymph nodes, direct invasion of the surrounding tissues or distant metastasis, and ascites were also revealed in subsequent patients. Malignant conditions of the colon showed the following characteristics: loss of stratification, perienteric as well as small bowel segment involvement with significantly greater wall thickness than in benign lesion. We demonstrated four sonographic patterns of colorectal malignant masses; localized irregular thickening of the colonic wall with heterogeneous low echogenicity; irregular contour; lack of movement or change in configuration on real-time scanning; and absence of a layered appearance of the colonic wall. Other findings included lymphadenopathy and perienteric soft tissues involvement.

RESULTS

Out of 37 patients, lower GI tract masses included 4 (10.8%) patients of sinister ileocecal masses. 14 (37.8%) cases of colonic tumors included patients of 4 ascending colon; 2 cases of transverse colon; and 8 cases of descending colon. Sigmoid tumors were documented in 7(18.9%) patients besides 9 (24.3%) cases of rectal masses. The masses were either lobulated or revealed a segmental wall thickening simulating appearance of kidney (Pseudokidney sign), or diffused wall thickening (Target sign). On color coding with Doppler scanning, most of the masses demonstrated low resistant flow pattern.

DISCUSSION

Adenocarcinoma is the most common malignant tumor of the colon. Morphologically, the tumor produces an annular or polypoid colonic mass. On ultrasound, an annular tumor appears as a hypochoic mass with central linear echoes, representing the tumor and air in the residual lumen, respectively. Polypoid tumors appear as focal, irregular colonic wall thickening. An abrupt loss of the normal layered appearance of the bowel wall is typical of a neoplastic lesion.

The normal colonic wall is visualized as a single, circular, hypochoic layer surrounding the hyperechoic bowel content comprising gas, feces, or a mixture of the two. The hypochoic layer is considered the muscle layer; the submucosal layer, normally seen in the gastric wall as a middle hyperechoic layer, is too thin to be visualized in the wall of the colon. The hypochoic wall becomes indistinct during peristalsis at the stage of distension. The normal thickness during the contraction stage is 2-3 mm, and wall thickness beyond 3 mm is considered abnormal.

A colon mass on sonography may be small or relatively large, up to 10 cm or more, and is usually irregular or lobulated in contour. The cluster of high-amplitude echoes denoting adjacent intraluminal gas and fecal content may be visible, eccentrically located around the mass. The other common sonographic appearance of colorectal cancer is segmental eccentric wall thickening, or circumferential thickening of the colonic wall. The pathologic segment usually does not contain feces or gas, making sonographic visualization relatively easy.

The mural thickening may be irregular but not as severe as in a fungating type of carcinoma. The central echo clusters are small because the pathologic lumen is usually narrow. This type of carcinoma may frequently result in colonic obstruction, and thus the tumor mass can be detected on sonography as a cause of colonic obstruction. Inflammatory diseases may present with

a typical target appearance, but mural thickening in inflammatory disease is usually thinner and more uniform in thickness and involves a longer segment.

Sonographic diagnosis of colonic carcinoma has been described by several authors. Colonic carcinomas have two typical sonographic appearances. The first type is seen as a localized hypoechoic mass up to 10 cm or more with an irregular shape and a lobulated contour. The intraluminal gas, seen as a cluster of high amplitude, is usually eccentrically located around the mass. The second type shows segmental eccentric or circumferential thickening of the colonic wall. The mural thickening may be irregular but not as severe as in the first type. The central echo clusters are small because the diseased lumen is usually narrow. This type leads frequently to colonic obstruction.

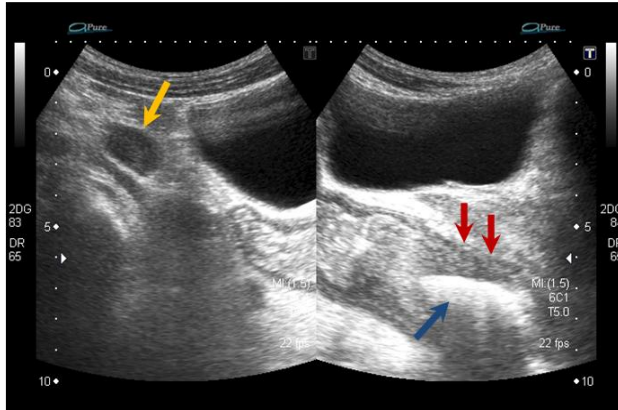


Fig. 2: Malignant rectal mass with irregular mural thickening and absence of a layered appearance of the colonic wall (red arrow). Luminal narrowing is also demonstrated (blue arrow). Perirectal lymphadenopathy was demonstrated along the iliac vessels (yellow arrow).

With recent technical developments, increasing use of sonography in the initial evaluation of patients with abdominal disease may allow detection of unexpected tumors within the abdominal cavity. An appropriate diagnosis should be made by performing a barium enema or colonoscopy. A negative sonographic examination is of little diagnostic value: sonography is not helpful in detecting a small mass or an early stage of cancer. Negative findings on sonographic examinations do not rule out the diagnosis of colonic carcinoma because small masses and overlying bowel gas can lead to false-negative results. Because of these limitations, mainly in sensitivity, abdominal sonography is not an effective screening technique in the diagnosis of colonic cancer.

CONCLUSION

Sonographic detection of colorectal masses, usually incidental, warrants the inclusion of the bowel loops in the routine transabdominal sonographic examination when a patient complains of symptoms suggesting colorectal cancer. Although barium enema and colonoscopy have been the procedures of choice for the detection and diagnosis of colorectal cancer, transabdominal sonography may be the preliminary imaging modality that patients undergo after they present with nonspecific lower gastrointestinal signs and symptoms. Careful sonographic examination of large intestine may reveal a focal mass or mural thickening. The incidental finding of a focal mass or mural thickening in the distal part of colon or rectum is far more common than elective imaging preliminary done for colorectal cancers.

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