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MRI Differentiation of Recurrent Colorectal Carcinoma from Postoperative Fibrosis

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Abstract. The potential applications of magnetic resonance imaging in the differential diagnosis of recurrent colorectal carcinoma from postoperative fibrosis are described. Correlation with computed tomographic findings is presented in 2 cases.

Key words: Colon, neoplasms – Recurrent colon carcinoma, diagnosis – Colon neoplasms, MRI.

Postoperative radiologic evaluation of the patient with colorectal carcinoma has relied most recently on interval examination by computed tomography (CT) and percutaneous needle biopsy to diagnose recurrence [1]. Recent reports have described magnetic resonance imaging (MRI) detection of recurrent pulmonary neoplasm in the mediastinum [2] and its differentiation from radiation fibrosis [3]. This report presents MRI differentiation of local tumor recurrence from postsurgical fibrosis in patients with colorectal carcinoma.

The CT examinations were performed with a Siemens Somatom DR3 and MRI was performed with a nonsuperconducting 0.3 T Fonar unit.

Case Reports

Case 1

An 85-year-old man with well-differentiated adenocarcinoma of the rectum was initially treated 5 years ago by local fulguration followed by radioactive implantation with iridium 192. He underwent abdominoperineal resection 2 years prior to the current evaluation. Computed tomography was performed in search for local recurrence and revealed a moderate-sized soft tissue mass in the rectal bed (Fig. 1A). A sagittal spin-echo TE28/TR1000 (Fig. 1B) displays the recurrent tumor as a medium-intensity mass. A transaxial, more T2-weighted, spin-echo sequence (TE28/TR2000) (Fig. 1C) shows a signal intensity increase in the mass, and on inversion recovery (TI310/TR1500) (Fig. 1D) the tumor mass has an extremely low signal intensity. Percutaneous needle biopsy of the presacral mass identified moderately differentiated adenocarcinoma.

Case 2

In this 71-year-old man a well-differentiated adenocarcinoma of the sigmoid colon was discovered at the time of left hemicolectomy for diverticulitis. Postoperative cobalt 60 therapy was given. Three months later CT examination revealed a spiculated soft tissue density mass at the surgical site (Fig. 2A). An MRI study using T1-weighted spin-echo technique generated low-intensity signal from the operative site (Fig. 2B). T2-weighted spin-echo images also displayed a low signal intensity mass (Fig. 2C). Percutaneous biopsy was offered to the patient, who refused. Six months later, a follow-up CT study demonstrated a reduction in size of the soft tissue mass, consistent with post-therapy fibrosis (Fig. 2D).

Discussion

The superior ability of MRI to differentiate soft tissues by manipulation of pulse sequence parameters has been thoroughly studied in various organ systems and animal models [4]. A recent report focused on the clinical use of MRI in tumor recurrence detection following radiation therapy to the mediastinum [3]. By characterizing T1 and T2 values, areas of recurrent tumor could be separated from areas of radiation fibrosis. Tumor masses have prolonged T1 and T2 values, which give a low signal on T1-weighted images but medium-

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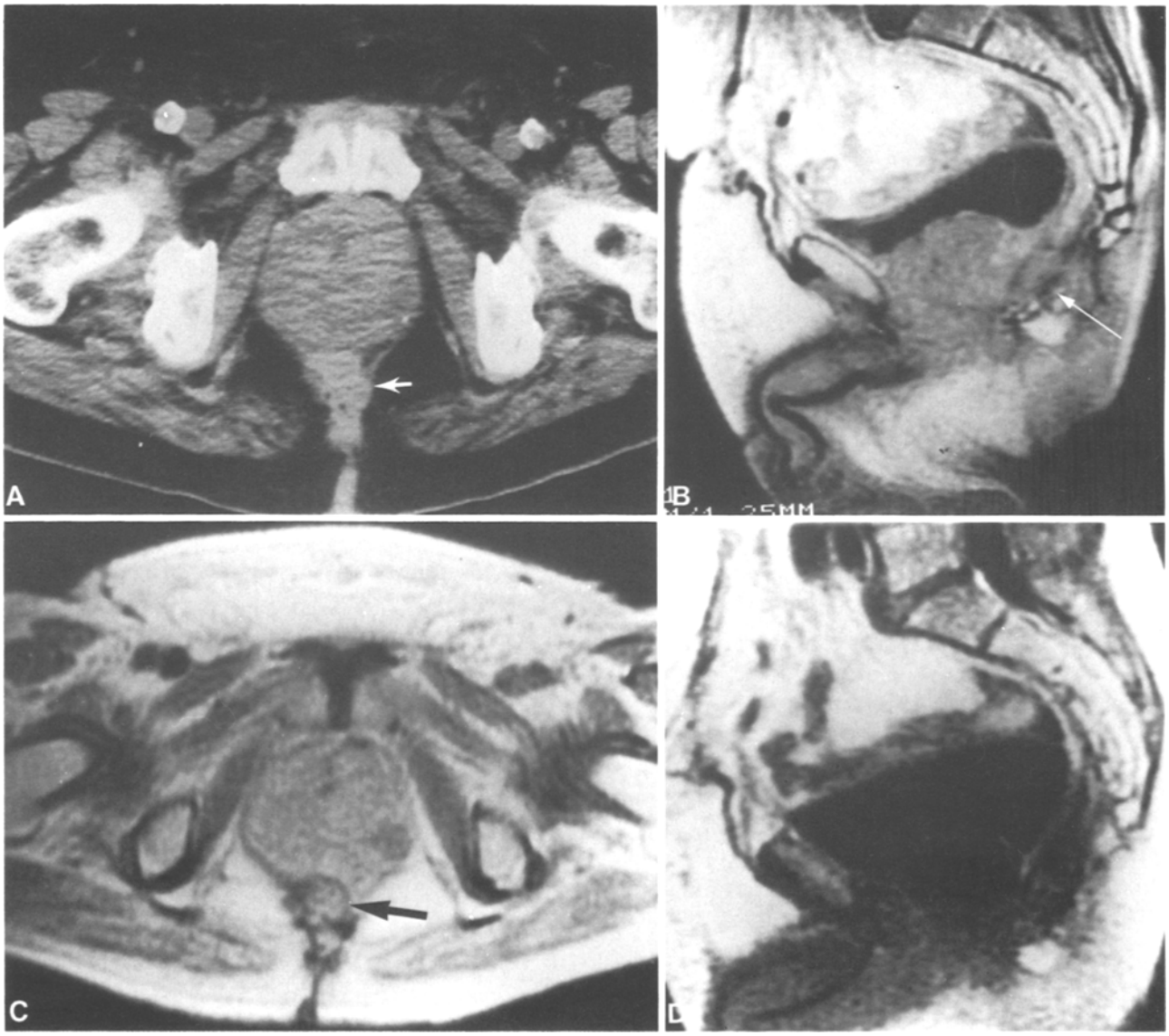

Fig. 1. **A** The CT scan shows soft tissue mass in rectal bed (*arrow*). **B** Sagittal T1-weighted spin-echo (TE = 28 msec and TR = 1000 msec): medium–low-intensity mass (*arrow*). **C** Transaxial, more T2-weighted, spin-echo (TE = 28 msec and TR = 2000 msec): higher intensity within the mass. **D** Sagittal inversion recovery (TI = 310 msec and TR = 1500 msec): very low intensity in the mass.

to high-intensity signals on T2-weighted images. On the other hand, fibrous tissue consistently displays low-intensity imaging characteristics because of long T1 and short T2 and/or a paucity of mobile protons [5].

We have demonstrated our experience with the detection of tumor recurrence following surgery and radiation therapy in 2 cases of adenocarcinoma of the colon. We correctly predicted that tumor recurrence existed in case 1, and fibrosis only without neoplasm in case 2, based on high signal on the T2-weighted sequences in the first patient and low signal on the T2-weighted sequence in the second patient. Although further experience is necessary, we believe that MRI evaluation of patients with colorectal carcinoma after surgery and after radiation may prove effective in differentiating tumor recurrence from fibrosis, thereby avoiding needle biopsy in some instances. Biopsy confirmation of suspected malignancy will be necessary prior to treatment, because other pathologic entities can have high intensity on T2-weighted sequences (e.g., hemorrhage, infection, acute radiation changes).

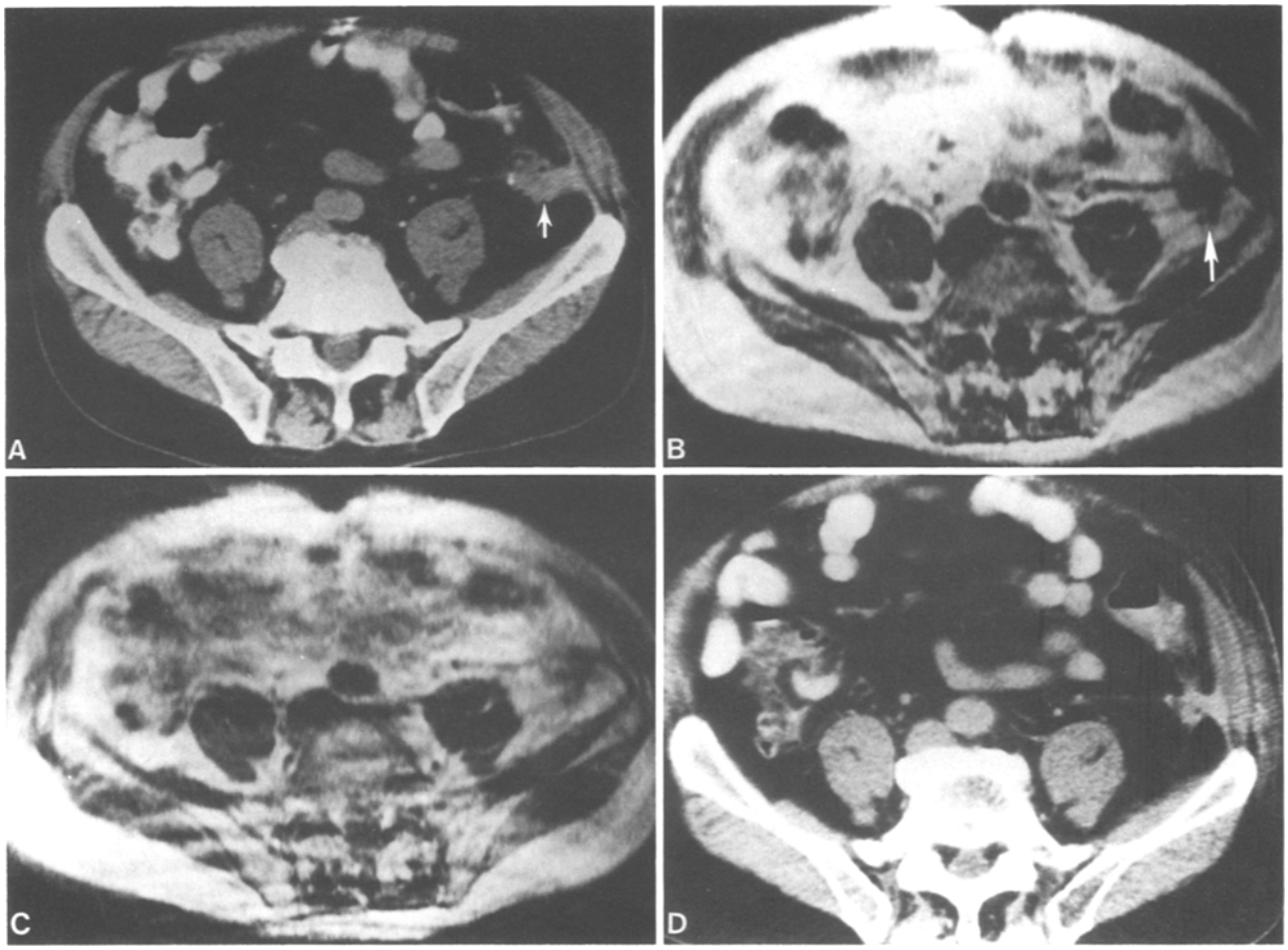

Fig. 2. A The CT scan shows soft tissue mass in the colonic bed (*arrow*). **B** T1-weighted spin-echo (TE = 28 msec and TR = 500 msec) MRI: low-intensity mass (*arrow*). **C** T2-weighted spin-echo (TE = 56 msec and TR = 1000 msec): persistent low intensity. **D** The CT scan 9 months posttreatment: diminished soft tissue mass.

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