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ORIGINAL ARTICLE

Role of magnetic resonance imaging in assessment of rectal neoplasms

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KEYWORDS

Magnetic Resonance Imaging (MRI);
Rectal;
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Abstract *Background:* MRI examination of the rectum has evolved as the standard technique in the assessment of cancer rectum having multiplaner capabilities and high tissue contrast imaging.
Aim of the work: The aim of this study is to evaluate the role of MRI in assessment of rectal neoplasm.
Patients and methods: In this work, 42 patients were studied as preoperative evaluation and staging that known to have or highly suspected clinically to have rectal neoplasms. They were subjected to assessment by MRI using pelvic phased array coil with IV contrast (Gadolinium) and rectal gel administration.
Results: MRI was proved to have high accuracy in the assessment of the rectal wall infiltration and pelvic organ involvement which is about 93% and also has high accuracy in the assessment of perirectal lymph nodes involvement which is about 91% as compared to the post-operative pathological results.
Conclusion: Our study results demonstrate that high resolution MRI has pivotal role in accurate staging of rectal cancer and predicting involvement of the perirectal and pelvic lymph nodes as well as planning of the sphincter sparing surgery.

1. Introduction

Colorectal cancer (CRC) is a major health problem. More than one million patients worldwide are diagnosed annually (1). Colorectal cancer ranks third among the most frequently diagnosed tumors in the world, after lung cancer and breast cancer (2). Around 30% of all colorectal cancer are diagnosed in the rectal anatomic site (accounting for 5% of malignant

Abbreviations: CRC, colorectal cancer; CT, computed tomography; US, ultrasound; CRM, circumferential resection margin

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tumors and ranked as the fifth most common cancer in adults) (3). Rectal cancer is more prevalent in the elderly population with a greater than 10-fold increase in the incidence beyond 65 years old. A decreasing trend in the age incidence has been observed in the last decade, with a higher incidence among males (3–5) (see Figs. 1–7).

Most rectal cancers are thought to primarily develop from adenomatous polyps over a period of 10–15 years, known as the adenoma carcinoma sequence. The incidence of polyps increases with age and the risk of malignant transformation of a polyp markedly increases with its diameter. The rate of malignant transformation is about 1% for polyps less than 1 cm in diameter but 10% for larger ones (6).

Despite advances in the diagnosis and treatment of rectal cancer, five year survival rates continue to represent around the 50% mark. For cancers limited to the bowel wall, the survival rate climbs to 83–90%, and drops to less than 10% if there are distant metastases, highlighting the importance of early detection and treatment (7,8).

Routine imaging modalities that can be used to assess this region include barium studies, computed tomography (CT) with contrast enhancement and ultrasound (US) (9,10). However, these examinations are limited in their ability to depict the anatomy of the entire pelvic floor, so that they fail to delineate the full extent of lesions and their relationship with the pelvic anatomy. Endosonography is unable to aid in the assessment of supra-sphincteric tracts and perirectal disease (9). Sonography has inherent problems. It is operator-dependent, and problems arise when scanning high or stricturing lesions. The limited field of view makes assessment of structures beyond the field of view difficult to interpret. CT has shown poor results for the local staging of rectal lesions (11).

Furthermore, these conventional imaging modalities are uncomfortable for the patient. It was found that magnetic resonance imaging to be useful to both the surgeon and the gastroenterologist in assessing the extent of rectal diseases and, when necessary, in planning surgical intervention. Magnetic Resonance Imaging (MRI) is also acceptable to the patient as it is non-invasive and does not cause discomfort (9).

MRI is the imaging modality with the highest soft-tissue contrast (12). It is the newest modality developed for cross-sectional imaging of the body and nearly all organ systems can be evaluated with this technique. MR imaging of the hollow organs of the gastrointestinal tract (GIT) is being used to evaluate and stage malignancies, especially of the rectum (13).

It is shown that high-resolution pelvic MRI has an undeniable role in the therapeutic management of rectal cancer, particularly for the determination of the circumferential resection margin and evaluation of sphincter invasion (14,15).

The evolution of surgical techniques and the shift to neoadjuvant chemotherapy–radiation therapy, necessitate accurate preoperative staging (16).

Over-staging as a result of desmoplastic tumor reaction still occurs, and identification of the individual rectal wall layers, particularly the submucosal layer, can still be difficult. The assessment of nodal involvement remains a confounding factor. So the issue of our subject is to evaluate accurate MR role in assessment of rectal neoplasm.

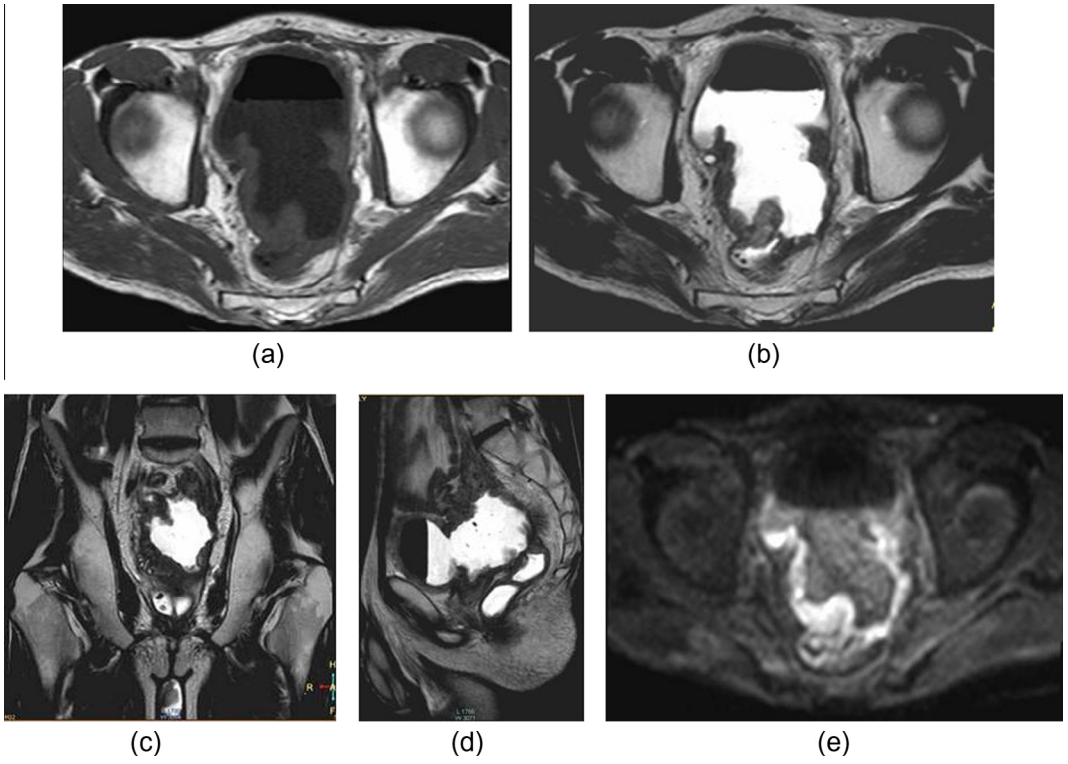

Fig. 1 (a–e); A male patient aged 26 years, with mucinous adenocarcinoma grade II, stage (T4bN1a), presented with bleeding per rectum and tenesmus, MRI rectum (a) axial T1WI, (b) Axial T2WI, (c) Coronal T2WI, (d) Sagittal T2WI, (e) Axial T1 postcontrast WI revealed heterogeneously enhancing circumferential mural polypoidal thickening at rectosigmoid region site involving all rectal layers, extending to anterior mesorectal fat (CRM) and posterior urinary bladder wall and communicating with it through opening 9 cm. The mass measures 3×2 cm and about 3.5 cm from levator insertion site (external anal sphincter).