The Role of MR Imaging In The Preoperative Staging And Planning For Sphincter Sparing Surgery In Rectal carcinoma

THESIS

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Abstract

Back ground . Rectal cancer constitutes about one third of all gastrointestinal tumor. High-resolution MRI is the best method of assessing the relation of the rectal tumor with the potential circumferential resection margin (CRM). Therefore it is currently considered the method of choice for local staging of rectal cancer. The primary surgery of rectal cancer is total mesorectal excision (TME), which plane of dissection is formed by the mesorectal fascia surrounding mesorectal fat and rectum.
This fascia will determine the circumferential margin of resection.

OBJECTIVE. The purpose of this study was to assess the accuracy of MRI in the preoperative staging, prediction of negative circumferential resection margin and planning of surgical management of rectal carcinoma.

Subjects and METHODS. Seventy five patients (30 men, 45 women) with pathologically proven rectal carcinoma underwent MRI study with trans-rectal gel administration .

CONCLUSION. MRI of rectal cancer is accurate for preoperative staging, prediction of negative circumferntial resection margin ,lymph nodes involvement and planning the feasibility of sphincter-sparing surgery.

Key Words:
Rectal cancer; High - resolution magnetic resonance imaging; Circumferential resection margin;

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List of Abbreviations

- **-ve = Negative**
- **+ ve = Positive**
- **ADC = Apparent Diffusion Coefficient**
- **AJCC =American Joint Committee On Cancer**
- **APC = Adenomatous Polyposis Coli**
- **ACS =American Cancer Society**
- **APR =Abdomino-Prineal Resection**
- **CM = Centimeter**
- **COX =Cyclooxygenase**
- **CT =Computed Tomography**
- **DCBE =double contrast barium enema**
- **DRE = Digital Rectal Examination**
- **FIT =fecal immunochemical test**
- **FOBT =fecal occult blood testing,**
- **FSE =Fast Spine Echo**
- **G =Grad**
- **GIST =Gastrointestinal Stromal Tumors .**
- **IFOBT =Immunochemical Fecal Occult Blood Test**
- **IMA = Inferior Mesenteric Artery**
- **LN = Lymph Node**
- **MHz = Mega Hertz**
- **MRI =Magnetic Resonance Imaging**
- **NSAIDs =Non steroidal anti-inflammatory drugs**
- **NCI =National Cancer Institute**
- **NPV =Negative Predictive Value**
- **PPV =Positive Predictivevalue**
- **sDNA =Stool DNA test**
- **TRUS = Transrectal Ultrasonography**
- **TSE =turbo-spine-echo**
- **USA = United State Of America**
- **US =Ultrasound**

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Introduction

Introduction

Colorectal cancer ranks third amongst the most frequently diagnosed tumors in the world, after lung cancer and breast cancer. (AJCC Cancer Staging Manual.7th ed. 2010).

High-resolution T2-weighted imaging is the key sequence in the magnetic resonance (MR) imaging evaluation of primary rectal cancer. This sequence generally consists of thin-section (3-mm) axial images obtained orthogonal to the tumor plane, with an in-plane resolution of 0.5–0.8 mm. In experienced hands, this technique allows differentiation between rectal tumors confined within the rectal wall (stage T2 tumors) and those that extend beyond the muscularis propria (stage T3 tumors) .(Harmeet et al; 2012)

Most important, the depth of invasion outside the muscularis propria can be assessed with a high degree of accuracy .In addition, high-resolution T2-weighted images allow the morphologic assessment of pelvic nodes, thereby improving accuracy in the characterization of nodes as benign or malignant, since size criteria have proved to be of limited value. (Harmeet et al; 2012)

The evolution of surgical techniques and the shift to neoadjuvant chemotherapy–radiation therapy, along with the prognostic heterogeneity of stage T3 tumors, necessitate accurate preoperative staging—primarily in terms of tumor (T) and nodal (N) staging, depth of tumor invasion outside the muscularis propria (early versus advanced stage T3 tumors), and the relationship of the tumor to the potential CRM. The accurate assessment of these factors allows the triage of patients to up-front surgical resection or short- or long-course preoperative radiation therapy or chemotherapy–radiation therapy with appropriate modification of the CRM. (Mulla et al, 2010)

Currently, surgical resection with stage-appropriate neoadjuvant combined-modality therapy is the mainstay in the treatment of rectal cancer. In the past decade, the increasingly widespread adoption of total mesorectal excision (TME) has resulted in a dramatic decline in the prevalence of local recurrence from 38% to less than 10% .TME is a surgical technique that entails en bloc resection of the primary tumor and the mesorectum by means of dissection along the mesorectal fascial plane or the circumferential resection margin (CRM) .(Harmeet et al ;2012)

Recent studies have shown that high-resolution MR imaging is a reliable and reproducible technique with high specificity (92%) for predicting a negative CRM, the relationship of the tumor to the CRM, and the depth of tumor invasion outside the muscularis propria .(Harmeet et al ;2012)

The presence of tumor at 1 mm or less from the fascia is directly related with local recurrence and a poor survival rate. While TME cures early stages of the disease, preoperative radiotherapy or chemoradiotherapy provide tumor size and staging reduction in most extensive disease, increasing the possibility of attaining free margins in surgery. (Chau et al; 2010)

High-spatial-resolution MR imaging has important role in the accurate assessment of the distance between the lower margin of the rectal cancer to the point at which the levator ani muscle attached to the rectum as a criterion for predicting the feasibility of sphincter sparing surgery and it also can assess the infiltration of the internal and external anal sphincter and the feasibility of internal sphincter resection with prolapsing technique to save at least the external sphincter and the anus although the distance was only about 1.5 cm. (Xiao et al; 2008)

Although susceptibility artifacts from bowel gas increase at higher field strength, most of recent MRI studies have been performed with high field strength of 1.5 T or more because this artifact can be reduced with the use of the spine echo sequences and distention of the rectum with warm gel (Brown et al; 2010).

Aim of the work:

This study aims at assessment the role of MRI in the preoperative staging, and planning of sphincter sparing surgery of rectal carcinoma.

Anatomy