Original Article

Usefulness of MRI in detection of rectal cancer

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ABSTRACT:
Background: Rectal cancer is a common tumor in the Western world and is one of the most common malignant tumours of the gastrointestinal (GI) tract. The present study was conducted to assess usefulness of MRI in detection of rectal cancer. **Materials & Methods:** 40 patients of histologically confirmed cases of rectal cancer were staged with MRI preoperatively. All images were reported by two radiologists. Histology slides from the resected specimens were studied by histopathologists. All the scans were performed on one of two 1.5T scanners with an 8-channel cardiac coil or a synergy body coil. **Results:** Out of 40 patients, males were 22 and females were 18. T1 stage was seen in 4, T2 in 24 and T3 in 12. The difference was significant (P< 0.05). Sensitivity of MRI in rectal cancer was 94%, specificity was 88% and PPV was 64%. **Conclusion:** MRI was useful in detecting rectal cancer. Preoperative staging with MRI is very sensitive in identifying CRM involvement.
Key words: Gastrointestinal tract, MRI, Rectal cancer

INTRODUCTION

Rectal cancer is a common tumor in the Western world and is one of the most common malignant tumours of the gastrointestinal (GI) tract. More than 14,000 new cases are diagnosed every year in the UK.[1] The higher prevalence in the West as compared to the developing world has been attributed to differences in diet.[2]

Magnetic resonance imaging (MRI) has emerged as the dominant method of pelvic imaging in rectal cancer, although MRI is not always available.[3] The main reason for this dominance is the superb soft tissue contrast between tumour and other soft tissues on T2-weighted imaging on MRI, while computed tomography (CT) has difficulties in this regard. MRI also provides the possibility of imaging in different planes, although multi-detector CT can also provide reformatted images. Multi-disciplinary meetings using MRI have led to improved possibilities of selecting the most appropriate treatment for patients with rectal cancer. Despite the apparent advantages, the value of MRI is sometimes overrated.[4]

The disease is more common after the age of 50 and shows a slight male predilection. Over the last decade, many improvements have been made in the management of rectal cancer. With better radiological staging, curative surgical resection is becoming more popular. The recurrence rates after surgery vary from 3 to 32%. Local tumour spread, involvement of lymph nodes, and distant metastases all influence the prognosis of rectal cancer.[5] The present study was conducted to assess usefulness of MRI in detection of rectal cancer.

MATERIALS & METHODS

The present study comprised of 40 patients of histologically confirmed cases of rectal cancer. All patients were enrolled with their written consent.

Data such as name, age, gender etc. was recorded. All patients were staged with MRI preoperatively. All images were reported by two radiologists. Histology slides from the resected specimens were studied by histopathologists. All the scans were performed on one of two 1.5T scanners with an 8-channel cardiac coil or a synergy body coil. The sequences used were T2W sagittal (3 mm), T2W axial (angled, 3 mm), and T2W coronal (for low rectal cancers, 3 mm). An additional axial T2W sequence through the pelvis, with a larger field of view (slice thickness: 6 mm), was performed up to the iliac crest for identifying nodal disease. All T2W sequences were non-fat-suppressed. Results thus obtained were subjected to statistical analysis. P value less than 0.05 was considered significant (P< 0.05).

RESULTS
Table I Distribution of cases

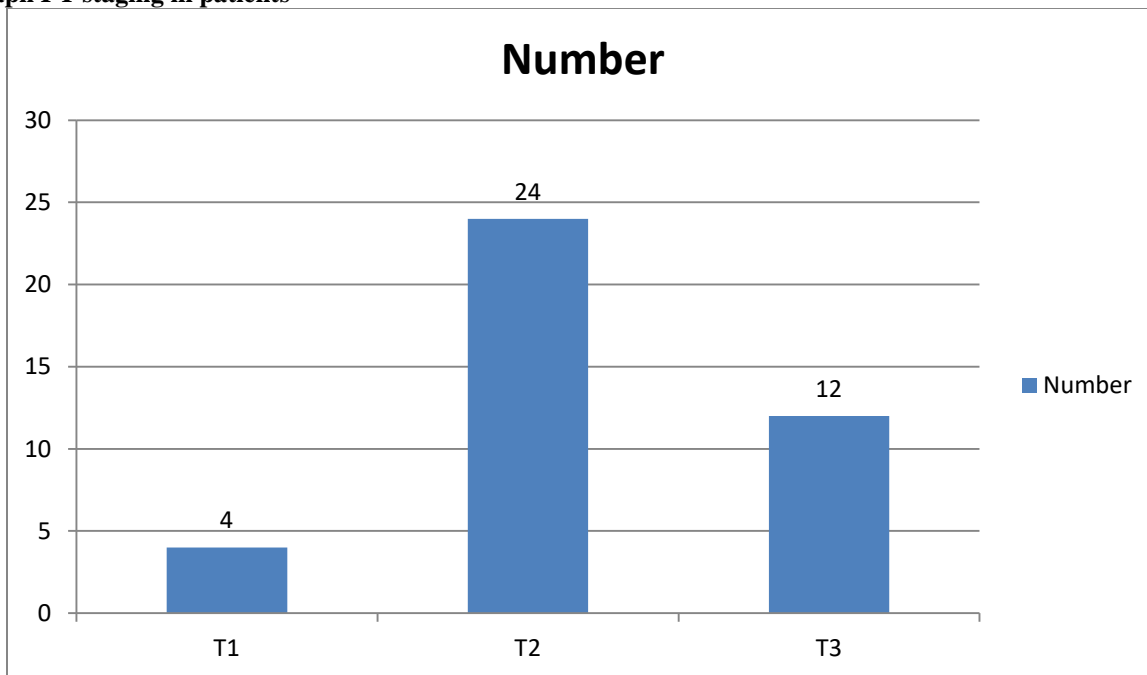| Total- 40		
Gender	**Males**	**Females**
Number	22	18

Table I shows that out of 40 patients, males were 22 and females were 18.

Table II T staging in patients

Staging	Number	P value
T1	4	0.01
T2	24	
T3	12	

Table II, graph I shows that T1 stage was seen in 4, T2 in 24 and T3 in 12. The difference was significant (P< 0.05).

Graph I T staging in patients

Table III Sensitivity and specificity of MRI

Sensitivity (%)	Specificity (%)	PPV (%)
94%	88%	64%

Table III shows that sensitivity of MRI in rectal cancer was 94%, specificity was 88% and PPV was 64%.

DISCUSSION

Multi-disciplinary meetings using MRI have led to improved possibilities of selecting the most appropriate treatment for patients with rectal cancer. The rectum has curvatures both in the right-left direction and in the antero-posterior direction.[6] In addition, the rectum ampulla, as the name implies, especially when filled with a tumour/faeces has a spherical rather than a cylindrical shape and is thus more difficult to image perpendicular to its wall than if cylindrical. Finally, the pelvic floor is formed like a funnel necessitating different image planes than the three traditional orthogonal planes for adequate assessment.[7] It can be difficult for non-specialised MRI technicians to find a rectal tumour and to anticipate and plan the right imaging planes. Good study quality, in addition to the inclusion of two interpreters, results in higher preoperative diagnostic precision. In the Magnetic Resonance Imaging and Rectal Cancer European Equivalence Study (MERCURY), imaging workshops were held for participating radiologists to ensure standardisation of image acquisition techniques and

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interpretation of the images.[8] In this, the largest published study regarding the accuracy of staging of rectal cancer with the primary objective of assessing the depth of tumour extension in rectal cancer, T4-staging was done accurately in only five out of 14 cases. One of the reasons for staging inaccuracies in everyday practice is probably the lack of imaging in the optimal plane. One of the aforementioned studies showed that among patients with a higher inaccuracy of staging, the number of sequences was higher and imaging was more commonly performed with gadolinium contrast enhancement.[9]

T2-weighted MR imaging sequences are the most suitable for depicting the rectal wall anatomy. The rectal wall consists of three different layers that can be recognized at MR imaging. Inner hyper-intense layer, which represents the mucosa and submucosa (no differentiation is possible between these two components); an intermediate hypointense layer, which represents the muscularis propria; and an outer hyperintense layer, which represents the perirectal fat tissue.[10] The mesorectal fascia appears as a thin, hypointense line surrounding the hyperintense perirectal fat. At the level of levator ani/prostate mesorectum is thin anteriorly and mesorectal fascia is close to muscularis propria, so accuracy is low. At the level of anal canal, even if the spatial resolution is low compared with endoanal coil imaging, all of the major anatomic structures can easily be evaluated. CRM is considered as closest distance from tumor to MRF (mesorectal fascia and around the levator, tumor invading the intersphincteric plane or extends to within 1 mm of the levator muscle is considered to potentially involve the CRM.[11] The present study was conducted to assess usefulness of MRI in detection of rectal cancer.

In present study, out of 40 patients, males were 22 and females were 18. Mulla et al[12] determined the accuracy of local T staging of rectal cancer with MRI, using histopathological staging as the gold. Forty consecutive patients admitted with rectal cancer over a period of 18 months were included in this retrospective study. MRI scans were performed prior to surgery in all patients, on 1.5T scanners. Two radiologists, with a special interest in gastrointestinal imaging reported all images. Two dedicated histopathologists reported the histology slides. The accuracy of preoperative local MRI T staging was assessed by comparison with postoperative histopathological staging. There was agreement between MRI and histopathology (TNM) staging in 12 patients (30%). The sensitivity and specificity of MRI for T staging was 89% and 67% respectively. The circumferential resection margin (CRM) status was accurately staged in 94.1% of the patients.

We found that sensitivity of MRI in rectal cancer was 94%, specificity was 88% and PPV was 64%.

Endorectal USG is a modality that is becoming increasing popular and is considered an equally suitable imaging technique for the initial staging of rectal cancer.[13] It has the ability to demonstrate the different layers of the rectal wall (mucosa–muscularis mucosae, submucosa, and muscularis propria) and is, therefore, generally quite accurate, both in evaluating the early stages (T1 and T2) and in demonstrating the perirectal spread of cancer (T3). However, endorectal USG has limitations in the evaluation of the mesorectum and its fascia; also, it cannot be used in highly stenosing tumors due to difficult access.[14]

CONCLUSION

Authors found that MRI was useful in detecting rectal cancer. Preoperative staging with MRI is very sensitive in identifying CRM involvement.

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