A comparison of endoanal ultrasound and computed tomography in staging rectal cancer and in clinical decision making – a preliminary study

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(Index words: rectal cancer, CT imaging, endoanal ultrasound)

Abstract

Introduction The treatment options and the prognosis of rectal cancer (RC) depend mainly on the stage. Computed tomography (CT) has been the main staging tool in RC but endoanal ultrasound (EAUS) is thought to be more accurate.

Methods Patients with histologically proven rectal cancer presenting for the first time were staged using CT and EAUS. TNM staging was used to stage the rectal cancer.

Results 24 patients (M:F 1:1) with a mean age of 57.3 (range = 23-80, SD = 15.3) years were included. The majority had a tumour of stage IIA/T3N0M0 (CT = 10, EAUS = 12). The staging of the tumour was the same in both investigations in 11 patients, while in 8 patients, EAUS staging was higher. The agreement for the T and N stages were kappa 0.24 and 0.5 respectively. There was a moderate and fair agreement between the overall TNM staging (weighted kappa 0.435) and the treatment strategies (weighted kappa 0.226) respectively, based on each imaging method. Of the 13 patients whose staging was different, the management changed in 6 (25%) patients (p = 0.016). CT identified distal metastases in 2 patients.

Conclusions EAUS and CT have only a fair to moderate agreement for staging and deciding treatment. However, EAUS has a significant influence when deciding treatment protocols.

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Introduction

Colorectal cancer is the third highest cause of cancer related deaths in the world. The incidence in Sri Lanka has risen from 0.7/100,000 in 1985 to 2.4/100,000 in 2005 [1]. Although computed tomography (CT) has been the main modality of rectal cancer staging since 1981, recently, endoanal ultrasound (EAUS) and magnetic resonance imaging (MRI) have made their presence felt in a major way [2-4]. In Sri Lanka, there are only 8 CT scanners available in the public health sector and only 2 centres with EAUS facilities. Therefore CT remains the most available and widely used imaging modality in rectal cancer staging.

Previous studies that compared CT imaging and EAUS in the staging of rectal cancer have failed to describe the impact of either imaging modality on patient management [5].

Therefore, the aims of our study were (i) to identify the correlation between stages and treatment strategy based on each imaging modality and (ii) to look at the impact of EAUS imaging on clinical decision making and patient management.

Methods

All patients with histologically proven rectal cancer presenting for the first time for EAUS imaging were included in the study. In addition, they underwent CT evaluation within 2 weeks of the date of EAUS assessment. The Ethics Review Committee of the hospital approved the study protocol. EAUS was performed by a single investigator using the 360 degree 10 MHz Olympus GFUM 20 endoanal probe (Olympus America Inc., Pennsylvania). CT imaging was done using a 16 slice CT scanner (Activion, Toshiba). Each interpreter was blinded to the findings of the other investigator.

Inter-rater reliability analysis using the kappa statistic was performed to determine consistency among the patient's tumour and nodal stages and the TNM stage as determined by CT and EAUS. There is a general consensus on stage oriented protocols for adjuvant and neo-adjuvant chemo-radiotherapy and depending on the staging of each imaging technique, all the patients were categorised into 3 treatment groups; (i) surgery alone (ii) surgery with adjuvant chemo-radiotherapy (ACRT) or (iii) palliative treatment [3,5]. The two treatment modalities as determined by CT staging were then compared with treatment modality determined by EAUS using weighted kappa. Fisher's exact test was used to assess the association between CT and EAUS staging and the change in the management plan.

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Statistical analyses were performed using MedCalc for Windows, version 11.3.0.0 (MedCalc Software, Mariakerke, Belgium).

Results

Twenty four patients (M:F 1:1) were included in the study. The average age was 57.3 (range 23-80, SD- 15.3) years. The majority had a tumour of stage II-A/ T3N0M0 (10 CT staging and 12 EAUS staging) (Table). The staging of the tumour was the same in both imaging modalities in 11 patients and in 8 patients, EAUS staging of the tumour was higher than the CT staging.

The inter-rater reliability for the T stage was found to be kappa = 0.24 (95% CI-0.0675 to 0.559) and for the N stage was kappa = 0.5 (95% CI 0.162-0.838). There was a moderate agreement between the overall TNM staging between CT and EAUS (weighted kappa 0.435, 95% CI 0.135 to 0.735) and a fair agreement between the treatment strategies based on each imaging method (weighted kappa 0.226, 95% CI -0.137 to 0.588).

Of the 13 patients whose stagings were different, the management was changed in 6 (25% of the total study sample, p=0.016). When there was a change in the T stage, the management changed in 5 patients and this was also statistically significant (p=0.015). However, when the N stage changed, the management changed only in 1 patient (p=1.0).

Table. Summary of patients, their staging and change in management

Patient number	*CT staging*	*EAUS staging*	*Outcome*	*Change in management*
1	T4 N0 M0	T3 N0 Mx	EAUS stage lower	No
2	T3 N0 M0	T3 M0 Nx	Stages equal	No
3	T3 N0 M0	T3 N0 Mx	Stages equal	No
4	T3 N0 M0	T3 N0 Mx	Stages equal	No
5	T2 N0 M0	T3 N1 Mx	EAUS stage higher	Yes
6	T4 N0 M0	T4 N1 Mx	EAUS stage higher	No
7	T3 N0 M0	T4 N1 Mx	EAUS stage higher	No
8	T3 N0 Mx	T3 N0 Mx	Stages equal	No
9	T2 N0 Mx	T3 N0 Mx	EAUS Stage higher	Yes
10	T3 N0 Mx	T3 N1 Mx	EAUS stage higher	No
11	T3 N0 Mx	T3 N0 Mx	Stages equal	No
12	T3 N1 Mx	T3 N1 Mx	Stages equal	No
13	T4 N0 M0	T3 N0 Mx	EAUS stage lower	No
14	T3 N1 Mx	T3 N1 Mx	Stages equal	No
15	T4 N1 M1	T3 N1 Mx	EAUS stage lower	Yes
16	T3 N0 Mx	T3 N0 Mx	Stages equal	No
17	T2 N0 Mx	T2 N0 Mx	Stages equal	No
18	T0 N0 M0	T3 N0 Mx	EAUS stage higher	Yes
19	T4 N0 Mx	T3 N0 Mx	EAUS stage lower	No
20	T4 N0 Mx	T4 N0 Mx	Stages equal	No
21	T3 N0 Mx	T3 N0 Mx	Stages equal	No
22	T3 N0 Mx	T3 N1 Mx	EAUS stage higher	No
23	T3 N1 M1	T3 N1 Mx	EAUS stage lower	Yes
24	T2 N0 Mx	T4 N0 Mx	EAUS stage higher	Yes

Discussion

The stage of the rectal cancer is the single pre-operative predictor of survival after therapy [2]. A recent meta-analysis reported sensitvity and specificity of MRI to be equal to EAUS in detecting adjacent organ and lymph node involvement and that EAUS is superior to CT (and even MRI) in assessing local invasion [4].

There is consensus that the T staging is the most important factor determining treatment and, the lack of agreement raises concerns about the optimal staging, especially for resource poor centres/countries which only have facilities for CT [6]. The management protocol changed significantly (p=0.015) when the T stage was different and there were equal numbers of patient (n=3) in each group who had either a more invasive or a less invasive therapeutic option.

Of the 9 patients in whom the EAUS detected positive lymph nodes, CT had only identified 4 patients. Other authors report better nodal staging with EAUS [7]. Of the 13 patients whom had different staging in each method, in 4, the management changed to a more costly/risky/invasive strategy. This is slightly lower than the value described (63.3 %) [8]. The use of preoperative chemo-radiotherapy is a well identified factor affecting staging accuracy [9]. We did not include patients who presented with recurrences following surgery and/or radiotherapy because it was neither financially nor logistically possible to repeat either of the imaging following neoadjuvant therapy.

Conclusion

There was a fair agreement between EAUS and CT for T staging but a moderate agreement was shown for the N stage, a moderate agreement between the overall TNM staging and a fair agreement between the treatment strategies based on each imaging modality. There was a significant change in the management protocol which was due to EAUS staging. However, distal metastases are still best detected by CT scans. Therefore, prior to planning the management of a patient with carcinoma of the rectum both EAUS and CT may be considered complementary to make an accurate assessment of local and distal spread respectively.

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