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Reporting colon cancer staging using a template

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ABSTRACT

Purpose: The purpose of this study was to evaluate the effect of completeness of the radiological reports in primary local staging colon cancer when using a template.
Methods: The study used primary staging reports retrieved from the departments RIS/PACS. Five key tumour descriptors were evaluated within each report: tumour morphology (polypoid or annular), information on tumour breach of the colon wall (≥ T3), tumour out-growth in mm, nodal status and TNM in conclusion. The failure to provide a description of the presence or absence of a feature in a report counted as 'not reported'. To allow comparisons between reporting styles, the template or free-text style of reporting was also recorded.
Results: During a two year period, a total of 666 patients CT reports were evaluated at the colorectal center multidisciplinary team (MDT) conference. In 200 of these reports a template was used. Information on tumour morphology (polypoid or annular) was present in 81% of the template reports vs 9% in free-text style. The figures in percentage for information on tumour breach of the colon wall (≥ T3) were 93% vs 48 %, tumour out-growth in mm: 51% vs 17%, nodal status: 99% vs 86% and TNM in conclusion: 98% vs 51%. $P < 0.0001$.
Conclusion: The present study provides additional support for the routine use of template reports to improve imaging reporting standards in colonic cancer.

1. Introduction

Surgery used to be the only treatment for colon cancer, but about 40% of all operated patients later progress with incurable relapse, most often distant metastases and less often local recurrence [1]. With adjuvant (post-operative) chemotherapy, a moderate improvement in the survival rate in patients with stage II and III colon cancer can be achieved with timely initiation of therapy [2]. In rectal cancer, neoadjuvant treatment has shown to be effective [3]. Neoadjuvant chemotherapy (NCT) has the potential to improve the outcome of advanced colon cancer, with effective control and size reduction of tumor [4] and particularly patients with clinical T4b colon cancer treated with neoadjuvant chemotherapy may have an improved survival rate [5]. Computer tomography (CT) scanning is currently the national standard study method for determining the tumour stage of disease prior to treatment planning and has sufficient accuracy to distinguish between small and advanced colon tumors [6] which are defined by more than 5 mm of outgrowth (Fig. 1) [7]. CT reports describe the tumour features to clinical multidisciplinary teams (MDT) influencing clinical decisions, and the preoperative tumor stage information can alter the surgical strategy in T4 tumours. This emphasizes the importance of accurate and informative primary staging CT reports. There is increasing interest in structured reporting in radiology and pathology to improve communication of imaging findings and generating consistent reports, for clarity and content [9,10]. This also applies to rectal MRI reporting with recent consensus statements published by the European Society of Gastrointestinal Abdominal Radiology (ESGAR) and Society of Abdominal Radiology (SAR) both recommending report templates for primary staging and restaging [11,20]. Radiological imaging templates have been produced and evaluated elsewhere, but often these templates have not been widely implemented, since radiologists often prefer free-text reports [12,13]. Standardising presentation styles and development of structured report templates is gradually being recognized throughout radiology as a method of improving the communication of imaging findings. A recent study found that template-style reports significantly increases the included amount of key tumour descriptors for rectal cancer [14]. This retrospective study evaluates the use of template-style (current standard of primary staging colon cancer) CT reports from in-house and external reports presented at the MDT conference from three local hospitals.

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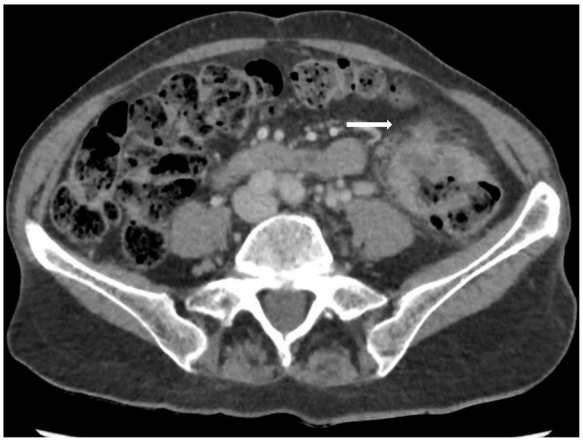

Fig. 1. Axial CT image showing a T3c tumour in the descending colon, with an outgrowth of more than 5 mm (arrow) into the pericolonic fat.

2. Material and methods

This was a retrospective evaluation study. The hospitals local committee approved the study. This study used only new primary staging reports generated as a routine part of patient care. All reports of colon cancer follow-up, Response Evaluation Criteria in Solid Tumors (RECIST) evaluation, rectal cancer and other cancer patients were excluded. The reports were retrieved from the departments Radiology Information System (RIS) and the Picture Achieving Communication System (PACS) during the departments MDT conference during a 2 year period (01.02.2017 to 01.02.2019). The patients had their CT scans performed in one of the following hospitals; Vejle -, Kolding -, Esbjerg -, Aabenraa - or Sønderborg hospital. All reports were anonymised. We did not include information about radiologist, only in-house reports or reports from other hospitals.

Reports were compared by a single investigator to a reference standard based on key tumour descriptors from UICC-TNM 5 staging and other recognized factors known to influence case management that have subsequently been included in Danish Colon Cancer Group (DCCG) recommendations, template by dr. Mona Rosenkilde, Department of Radiology, Aarhus University Hospital, based on current literature.

In total, five key tumour descriptors were evaluated within each report: tumour morphology (polypoid or annular), information on tumour breach of the colon wall (≥ T3), tumour out-growth in mm, nodal status, TNM in conclusion. The inclusion of each tumour descriptor, or a comment confirming a negative finding within each report, counted as 'reported'. The failure to provide a description of the presence or absence of a feature in a report counted as 'not reported'. To allow comparisons between reporting styles, the template or free-text style of reporting was also recorded. A notification was implemented if the report was from a comprehensive cancer center or not.

3. Statistical analysis

All data was tabulated in Microsoft Excel (Office 2010, Microsoft Corp., USA) and data were analyzed with the Number Cruncher Statistical Systems (NCSS statistical software, Kaysville, UT, USA). Descriptive statistics were used to test for statistical significance in differences in reporting standards between free-text and template reports; a p-value < 0.05 was considered statistically significant.

4. Results

In total, the primary staging CT reports of 666 patients were evaluated at the colorectal centers multidisciplinary team (MDT) conference. Mean age: 71.5 years, range: 27–94 years, 350 males and 316 females. Tumour localization: sigmoid: 215, descending colon: 26, left flexure: 22, transverse colon: 57, right flexure: 46, ascending colon: 133, cecum: 132 and unknown localization: 35. Not all the, 35 patients in the group of unknown colonic localization had a colonoscopy, in this sub-group, all of the 35 patients had distant metastases at CT and biopsy of the metastases showed adenocarcinoma from the colorectal origin by immunohistochemistry staining.

Table 1
Main colon tumour descriptors in 466 prose and 200 template reports.

Information	Free-text reports	Template reports	p - value
Tumour morphology	45 (9.7 %)	162 (81.0%)	$p < 0.000001$
≥ T3	224 (48.1%)	185 (92.5%)	$p < 0.000001$
Out-growth in mm	77 (16.5%)	102 (51.0%)	$p < 0.000001$
Nodal status	243 (73.6%)	197 (98.5%)	$p < 0.000001$
Distant metastases	401 (86.1%)	197 (98.5%)	$P < 0.0001$
TNM in conclusion	241 (51.2%)	195 (97.5%)	$p < 0.000001$

In 200 of the 666 reports a template was used and in 466 no template was used. The colon tumour was reported visible in 614 (92%) of the 666 patients. Morphology of the tumor was described in 207 cases. Outgrowth into the pericolonic fat was visible in 409 patients. Outgrowth in mm measured and reported in 179 patients. Distant metastases status was available in 586 (88%) patient reports. TNM stage was reported within the conclusion in 436 (65%) patient reports. Standard templates were used in 200 of the 666 patient reports. Main results of colon tumour descriptors according to the reporting style are shown in Table 1.

In total, 277 examinations were CT scanned at the comprehensive cancer center and 389 examinations were from the other hospitals. Most of the reports using a standard template (199/200) originated from the comprehensive cancer center.

5. Discussion

The present study has revealed that existing standard of primary staging colon cancer CT reports used in clinical radiology consistently may omit key information when describing tumours. The practice of using standard template reporting has been reported to increase the included amount of key tumour descriptors when compared to free-text reporting in primary staging rectal cancer [14]. This is similar to that observed in pathology reports for colorectal cancer [15].

The vast majority of primary CT staging scans and reports often come from regional hospitals rather than specialized hospitals, but the same standards of reporting should be expected regardless. We have revealed a difference in the completeness of the reports, and our findings suggest that template reporting should be used more widely. There has been an increased focus on MRI staging in rectal cancer and as a result the survival of rectal cancer has improved and even surpassed that of colon cancer [16]. Recent studies indicate the use MRI in colon cancer patients may improve the preoperative staging [8,17,21] and perhaps even in time replace CT scanning, as suggested in the streamline study of Taylor et al. [18]. This calls for new international guidelines for reporting.

Despite the well-established prognostic link between the tumour outgrowth and worse clinical outcomes due to the more frequent occurrence of metastases with the tumour outgrowth, only 48% of free-text reports, compared to 93% of the template reports included the information on ≥ T3 tumours within the CT reports. We also found a difference in the exact measurement of the outgrowth, although it was not always measured in the template reports.

Limitations and strengths:

No identification of the radiologist were entered into the database, and an analysis of different completeness of the reports between experienced radiologist and less experienced was not possible. Nor did we

examine if the template reporting was more time consuming than the free-text style or visa Versa. Another limitation of this retrospective study is that it did not make use of the TNM version 8. If the reports had been subgroup analyzed for N positive, between N1, a, b, c and N2a, b the difference would probably have been greater. Unfortunately we did not have a uniform clear definition of involved lymph nodes in our study. However; the accuracy of lymph node staging is not high regardless of the imaging method or criteria used, but morphological criteria for lymph node metastases on CT in colon cancer results in higher specificity and moderate sensitivity in predicting stage III disease [19]. The study also did not include an evaluation of the CT reports regarding information of tumour deposits and extramural vascular invasion. However; free-text reports can vary considerably in length and clarity, which has implications for clinicians trying to quickly determine treatment decisions using only a few key tumour descriptors.

6. Conclusion

The CT reports presented at the MDT conference, that used a standardized template, included a significant higher amount of key colon tumour descriptors when compared to free-text reporting. This is true for tumour outgrowth information as well as for preoperative TNM stage. Yet, standard template reports were only used for less than a third of the patients. Along with other studies, this present study provides additional support for the routine use of standard template to improve imaging reporting standards in colonic cancer.

Declaration of Competing Interest

All authors declare no conflict of interest.

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