Opinion Article / Artigo de Opinão

Colon Cancer: Time for MRI has come?

Cancro do Cólon: Chegou a Altura da RM?

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Introduction

Even if the only currently curative treatment for colon cancer is surgery, recently there has been a growing discussion about the benefit of neoadjuvant chemotherapy (nChT) for patients with locally advanced cancers at increased risk of recurrence, upon recognition of adverse prognostic factors. The first works about nChT in colon cancer have showed promising results.[1-3] In specific, results from the FOXTROT trial, designed to evaluate the potential benefits of nChT for patients with locally advanced colon cancer, are greatly expected.[1] If that treatment will become standard, pre-operative imaging will become a valuable tool to select patients for nChT.[4]

On the other hand, as some colon tumours are now surgically removed by laparoscopy, is important to recognize those patients in whom laparoscopy might not be appropriated, either because the tumor is bulky or locally advanced.[5]

Therefore, imaging could be important to select: 1) early cancers that may undergo surgical excision directly; 2) locally advanced cancers that may need nChT or require an open approach/radical surgery because of involvement of adjacent organs; and 3) metastatic cancers for which curative surgery is not primarily indicated.[6] Traditionally, this selection has been performed by computed tomography (CT), but this method has some important limitations.[7] As such, some recent works have focused on the role of magnetic resonance imaging (MRI) in colon cancer staging.[4,6,8-10]

T Staging

For T staging, the primary endpoint should be the selection of poor prognosis neoplasms (T3 tumours with >5 mm of extramural invasion – T3cd – and T4 tumours) as this was proven to possess a greater prognostic significance than the differentiation between T2 and T3 tumours,[11] being also the entry criteria for the FOXTROT trial.[1]

Based on the available reports from the literature, detection of T3cd/T4 tumours remains somewhat problematic with MRI. The low sensitivity reported by some authors[4,6] indicates that the lesions tend to be understaged possibly due to microscopic invasion of the peri-colic fat, still impossible to depict with the currently available imaging modalities. Overstaging, mainly related to desmoplastic reaction surrounding the neoplasms, is also an important source of false results. The apparent discrepancy between these and other studies which have yielded higher sensitivity values[8-10] may be explained by several factors, including differences in patient selection, technical protocol and image interpretation.

Therefore, at the moment it seems clear that larger, multi-institutional studies as well as further technological development of methods with higher spatial resolution and fewer artifacts, are still warranted in order to assess, in a more precise way, the true role of MRI of the colon as the imaging modality to better select patients for nChT if this treatment becomes standard for colon cancer.

N Staging

Overall, results for nodal staging by MRI are relatively poor.[4,6,8-10] It is known that lymph node diameter is not accurate for assessing nodal metastasis in colon cancer.[12] False negative results are thus related to microscopic metastatic deposits in normal-sized nodes, whereas false-positives are caused by benign lymph nodes that are enlarged because of inflammatory or reactive changes. As nodal staging by imaging is problematic, additional research is neede, in order to improve the detection of nodal metastases in patients with colon cancer. If the results coming from nodal characterization studies in patients with rectal cancer could be replicated in patients with colon cancer, then the use of contrast media can increase the accuracy of MRI, whereas DWI is probably not useful for nodal characterization.[13-15]

Estramural Venous Invasion

Extramural venous invasion (EMVI) can be recognized on MRI as direct invasion of the tumor growing into or along a vascular structure, an irregular expansion of peritumoral veins and/or irregular margins of the vessel wall near the tumor site.[16,17]

Results available so far indicate sub-optimal ability of MRI for detecting EMVI;[4,6,8-10] in fact, similarly to what happens with lymph nodes, imaging has some problems in detecting microscopic metastasis and misdiagnosing inflammatory changes.

Comparison with CT

As there is not a definite role for nChT in colon cancer, imaging is not crucial for selecting patients for pre-operative treatments. However, this may be changing in the future as the benefits of nChT for patients with locally advanced colon cancer are currently under investigation.[1] If imaging becomes fundamental for the selection of patients undergoing nChT, then modalities as accurate as possible are required. Distant and local staging of colon cancer is currently performed mainly with CT, which serves to determine local resectability, apart from detecting distant metastases. Nevertheless, a recent meta-analysis demonstrated that CT has difficulties to detect tumor invasion beyond the bowel wall of 5 mm or more (T1–T3ab vs T3cd–T4) and nodal involvement; pooled sensitivities were 77% and 71%, respectively, whereas pooled specificities were 70% and 67%, respectively.[7] These numbers have raised a growing interest towards MRI for the assessment of patients with colon cancer, as an alternative to CT.

Analyzing some of the works that have compared MRI and CT, overall there seems to be a trend towards the ability to distinguish between locally advanced colon cancer defined as tumour stage T3cd-T4 from non-locally advanced cancers by either high resolution MRI or CT.[6,9,10] However, high resolution MRI may possess an edge over CT, related to its high soft tissue discrimination that allows identification of prognostic factors, such as T-stage and extramural venous invasion. Nodal staging remains considerably imperfect by both imaging modalities. Moreover, MRI does not use ionizing radiation nor injection of iodinated contrast media and furthermore imaging of the colon can be combined with the imaging of the liver. Since MRI is probably the best modality in the detection of liver metastasis with a significantly higher sensitivity than CT,[18] it may become a 'one-stop-shop' allowing evaluation of the whole abdominal cavity.

Conclusions

The available literature suggests that MRI has the potential to become a valuable tool in primary staging of colon cancer, essentially allowing identification of locally advanced disease and additional risk factors, such as serosal involvement and EMVI. Nodal staging still needs improvement as characterization of lymph nodes is unreliable.

Combined with its high sensitivity in detecting liver metastases, MRI can become a pivotal imaging modality for abdominal staging of patients with colon cancer.

Furthermore, if a paradigm shift in the diagnostic and therapeutic work-up of colon cancer occurs, with introduction of nChT for T3cd-T4 disease, MRI may play an important role in selecting patients who will benefit from that approach.

Ultimately, as the available research on this subject is still quite limited, more works are warranted in order to better determine the role of MRI in colon cancer staging.

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