Editorial

Imaging for guiding a more tailored approach in rectal cancer patients

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We read with great interest the paper by Chen *et al.* (1) that demonstrated the usefulness of Three-dimensional endorectal ultrasound (3D-ERUS) in rectal cancer evaluation after preoperative chemoradiotherapy (pCRT). The authors showed how the volume reduction of the rectal mass after pCRT allows the identification of good [tumor regression grade (TRG) 0 or 1] and complete responders (TRG 0) to neoadjuvant treatment with a high accuracy.

The finding that the reduction of the volume of the rectal lesion is related to the response to pCRT is not new, but has mainly been detected in staging and restaging examinations performed with CT and MRI (2-4) and not with 3D-ERUS. These results are of interest since ERUS can be and additional tool that could be added to the standard restaging system mainly based on endoscopy and MRI, since it is a not expensive and radiation/contrast free imaging tool that could be easily introduced in the restaging work-flow of rectal cancer patients. Moreover, this finding is of outmost importance since the paradigm of rectal cancer treatment is progressively moving towards rectum sparing approaches especially among patients achieving complete response after pCRT (5,6).

In the last years, the clinical interest towards rectum sparing approaches such as transanal local excision (LE) and watch and wait approaches has increased, since they proved to spare morbidity of total mesorectal excision (TME) while providing acceptable oncological outcomes in selected patients (5,6). The key question in these approaches is how accurate can be the prediction of pathological response among clinical complete responders, since, the more accurate is the restaging the more tailored can be the treatment of each patient affected by rectal cancer.

Several efforts have been made to compare different techniques in predicting complete pathological response (7,8). Previous studies can be divided in 2 groups. First, the application of texture analysis on the classical radiological images of restaging (8-11); second, the use of innovative imaging techniques and their application to correlate complete clinical response with complete pathological response (12-15).

The texture analysis showed promising results. This technique can extract a large amount of data that cannot be identified nor measured visually by the eye of the radiologists. The quantification and precise measurements of the normally qualitative evaluated parameters of imaging data has been demonstrated to be useful in rectal cancer (8-11). In the normal clinical setting on MR images the development of fibrosis after pCRT inside the rectal lesion is identified as a low signal in T2-wieghted sequences and a low signal on high b values diffusion weighted imaging (DWI) sequences (16). Thus, the pixel-by-pixel analysis performed by texture analysis can easily differentiate the presence of small foci of tumor cells in the lesion compared to the qualitative evaluation of the radiologist.

Among the new techniques, PET/MRI (14) showed the most promising results. With this technique it is possible to combine precise anatomical and morphological data obtained by MR sequences and functional data deriving

from MR sequences (i.e., DWI sequences) and PET images. In a recent systematic review 18F-FDG PET/MRI showed a better accuracy in T and N staging compared to PET/CT or MRI, confirming a role of this technique in selecting patients that can be managed with a rectum sparing approach (14).

Both texture analysis using PET and MR images and innovative techniques can be used together to further improve the imaging accuracy (17,18). In the ongoing trials on rectum sparing approaches the clinical complete response is evaluated with endoscopy and digital rectal examination while MRI is the reference standard tool to exclude loco-regional nodal metastases (5,6). The future could include a multimodal imaging evaluation for T and N restaging, including both ERUS and MRI evaluation, with subsequent texture analysis of the images, aiming to obtain the most accurate assessment of the disease, while sparing contrast media or exposure to radiation.

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