MRI has become established as the state-of-the-art modality for imaging of the rectum including the perirectal tissues. The most important advantages of MRI compared to other cross-sectional imaging modalities is the soft tissue contrast resolution between the propria muscle layer of the rectum and the perirectal fat, the ability to visualize the different pelvic compartments including the visceral pelvic (mesorectal) fascia and the surrounding tissues in the pelvis.

Inflammatory bowel disease

In inflammatory bowel disease, MR-enterography has become the image modality of choice to evaluate the small bowel for the extent of inflammation and complications such as stricture formation, fistulas and abscesses without use of ionizing irradiation (1,2). When evaluating the distal part of the large bowel including the rectum, pelvic MRI with an external phased-array coil obtaining T2-weighted sagittal, transaxial and oblique sequences as well as volumetric T1-weighed images before and after iv Gd-administration can provide detailed information about extent of inflammatory disease in relation to the pelvic floor and anal canal. Such images are needed to assess rectal/anal fistulae and abscesses. Use of dynamic contrast-enhanced imaging has also been shown to provide information on disease activity (3).

Cancer staging

For rectal cancer staging, high resolution T2-weighted sequences sagittal, transaxial and images perpendicular to the tumour with a maximum of 3 mm slice thickness and a small field of view using and external phased array coil is used (4,5). When staging rectal cancer for extramural extension, rectal administration of contrast agents may interfere with the assessment of the relation of the tumour to the potential circumferential resection margin and should thus not routinely be used (CRM) (6).

The evaluation of rectal cancer includes evaluation of tumour morphology, distance to anal verge, extent of extramural spread, distance to the CRM and neighbouring organs in the pelvis as well as assessment of adverse features such as extramural venous invasion and presence of local lymph node metastases (7-10). In low tumours, the relation of the tumour to the levator muscle, the relation to the puborectalis muscle and possible involvement of the intersphincteric space and the external sphincter is also noted (11).

The primary tumour and lymph nodes may be visualized using diffusion-weighted imaging (DWI) with high b-values and there is a potential to use DWI to evaluate effect of chemo-irradiation, so far for use in controlled clinical trials (12). Contrast agents such as ultrasmall superparamagnetic iron oxide (USPIO) particles have been evaluated to improve characterization of mesorectal lymph node metastases, though these agents are not yet clinically available (13).

For the future, improvement and implementation of volumetric sequences for T2-weighted imaging of the rectum is desirable since it would allow the rectum to be examined with higher in-plane resolution with unlimited choices of imaging planes (14).
References


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