Progress in prostate MRI quality

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Drs Purysko and colleagues are to be congratulated on their work [1], as it raises important points that need to be addressed for further advances in the field of prostate magnetic resonance imaging (MRI) quality. During the past decade, great advances have been made in prostate MRI and this technique is now a cornerstone in the so-called 'MRI pathway' for prostate cancer, which is based on MRI and MRI-targeted biopsy. [2] The process begins with the acquisition of good-quality prostate MR images, which must then be properly interpreted by the Radiologist. Clinical decisions will be compromised if the diagnostic quality of the images is not adequate, and this will eventually result in clinicians losing confidence in the technique, unless this is improved.

The Prostate Imaging Reporting and Data System (PI-RADS) guidelines (v 2.1) [3] outline the minimum technical requirements and standards for prostate MRI, but strictly following the PI-RADS technical standards does not always result in good-quality images as other factors (e.g., patient motion, artefacts from rectal air and dietary habits) need to be taken into account.

In their study, Purysko and colleagues [1] adhered to the PI-RADS v. 2.1 technical recommendations for image acquisition [3], but they also explored the impact of patient-related factors on image quality.

They showed that the use of enema and dietary restrictions before prostate MRI was associated with lower levels of rectal distension with stool/gas and distortion on diffusion-weighted imaging, better overall image quality, and improved reader confidence in the interpretation of images.

Additionally, the association of rectal enema and dietary restrictions led to the most consistent performance among different radiologists, although this outperformed each preparatory measure individually only in the amount of stool/gas in the rectum.

The use of dietary restrictions (alone or combined with enema) was associated with lower levels of rectal peristalsis, although no improvements in T2 motion artefacts were observed when compared with those from patients who did not undergo any of the preparatory measures. Improvements in rectal distension, distortion on diffusion-weighted imaging, and overall image quality for patients who used an enema were significant for all the radiologists involved in the study, with fair inter-reader agreement.

The number of patients in the four cohorts is unbalanced, with the Enema + Diet group having more than three quarters of patients than the control group (98 vs 12, respectively). In this study no antiperistalsis agents were administered to the patients and we acknowledge that the PI-RADS v. 2.1 recommendations [3] are also not stringent in this regard, as they recommend that the incremental cost and potential for adverse reactions should be always taken into consideration before using these medications. Given the lack of robust evidence, our point of view is that patients should evacuate the rectum (if possible) just prior to the MRI examination, no enema should be administered, and antiperistalsis medications (in the absence of contraindications) should be always given. In order to reduce the artefacts from rectal air, which is a common finding after a prolonged supine position, the diffusion-weighted imaging (whose image quality can be heavily hampered by the presence of artefacts from rectal air) should be acquired at the beginning of the study.

The promising results of the study by Purysko et al. [1], which deserve our confidence, are flawed by the lack of a standardised scoring system to assess the quality of the images.
The image quality metrics used in this study were subjective and we know that objective scoring systems for the evaluation of image quality, although promising, are still relatively new and need to be tested and refined with larger patient cohorts. [4-6]

The purpose of this editorial is to encourage the development of a consensus in our radiological community that will facilitate the creation of standardised scoring systems to assess the quality of prostate MR images.

This will definitely require the collaboration of clinicians from other disciplines, especially Urologists, in order to assess the efficacy of dedicated scoring systems for image quality in the detection of clinically significant prostate cancer on histology or the assessment of extracapsular extension after surgery. [7,8]
In addition to this, the development of new imaging equipment and techniques could play a role in the future, especially since a growing number of centres are using biparametric MRI, which implies that T2-weighted imaging and diffusion-weighted imaging of optimal diagnostic quality are mandatory in this scenario.

Lastly, automated methods such as those based on artificial intelligence, have the potential to provide a more reproducible and standardised assessment of image quality, meaning that the quality of a prostate MR scan could be quickly evaluated in real time during acquisition without the need of visual assessment by the Radiologist. If the image quality is suboptimal, the acquisition could be repeated.

Although the costs need to be determined via complex health economic modelling, it is clear that a missed diagnosis of prostate cancer due to suboptimal quality MRI that results in metastatic presentation later can lead to an enormous additional cost to care for that patient. Given that prostate cancer is one of the most common cancers worldwide, the cost savings will add up significantly.

Consistency and standardisation in prostate MR image quality should be a high priority for all those involved in prostate cancer, especially for Radiologists.

It is now time for the academic radiological community to collaborate on this topic by producing consensus criteria on image quality in prostate MRI and stimulate further discussion and debate. We sincerely hope that the results by Purysko and colleagues [1] and the focus provided by our editorial will spur organised efforts toward this goal.

"Coming together is a beginning.
Keeping together is progress.
Working together is success."

(Henry Ford)

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