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Interpreting MRI Accuracy After Radiotherapy: Is Timing the Missing Variable?

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Interpreting MRI Accuracy After Radiotherapy: Is Timing the Missing Variable?

Dear Editor,

We read with great interest the article by Cebeci et al. titled "Diagnostic accuracy of magnetic resonance imaging for post-radiotherapy recurrent laryngeal cancer: a comparison study with primary laryngeal cancer," which evaluated the diagnostic accuracy of magnetic

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resonance imaging (MRI) in recurrent laryngeal cancer (RLC) using histopathology as the reference standard.[1] The authors should be congratulated for addressing an important clinical challenge. We believe, however, that several methodological considerations may further refine the interpretation of their findings.

Perhaps the most important issue is the timing of post-radiotherapy imaging. In the recurrent cohort, the interval between completion of radiotherapy and recurrence detection was 4.0 ± 1.0 months (range, 3–6 months), indicating that MRI was performed during a biologically heterogeneous phase of tissue healing.[1] Earlier work by Ljumanovic et al. suggested that MRI reliability evolves during the first months after radiotherapy and improves as post-treatment tissue remodelling stabilizes.[2] More recently, Hiyama et al. emphasized that interpretation during the early post-treatment period remains particularly challenging because oedema, inflammation, fibrosis, and radionecrosis frequently mimic recurrent disease.[3] Consequently, analysing all recurrent patients as a single cohort may obscure the influence of imaging timing on diagnostic performance. The remarkably low specificity reported for cartilage invasion (26.7%), supraglottic extension (33.3%), and particularly paraglottic involvement (0%) may therefore reflect not only the limitations of MRI itself but also the biological stage of post-radiotherapy tissue remodelling. In this regard, the present study may primarily evaluate MRI during a transitional phase of tissue healing rather than its overall diagnostic performance in recurrent laryngeal cancer.

Another important limitation is the absence of endoscopic clinical staging, which the authors appropriately acknowledged.[1] In routine practice, salvage surgery is based on multidisciplinary integration of endoscopic findings, clinical examination, biopsy results, and cross-sectional imaging rather than MRI alone.[4] Therefore, radiologic-pathologic agreement may not fully reflect real-world clinical decision-making. This issue is particularly relevant in the paraglottic space, where MRI demonstrated 100% sensitivity but 0% specificity in both

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cohorts, raising the possibility of a diagnostic threshold favouring sensitivity over specificity rather than an inherent limitation of MRI.

Finally, although diffusion-weighted imaging (DWI) and apparent diffusion coefficient (ADC) maps were obtained for all patients, quantitative diffusion metrics were not incorporated into the analysis.[1] Given the growing evidence supporting quantitative ADC metrics for differentiating recurrent tumour from radiation-induced fibrosis, inclusion of quantitative diffusion parameters could have provided valuable insight into the substantial false-positive findings observed in this study. Smits et al. demonstrated that incorporating diffusion-weighted imaging improves tumour delineation against histopathology while reducing overestimation of tumour extent, supporting the potential value of quantitative diffusion biomarkers in post-treatment assessment.[5]

In conclusion, we commend the authors for undertaking this demanding and clinically highly relevant study. Their valuable work highlights not only the strengths and limitations of MRI but also the importance of when MRI is performed and how its findings are interpreted within a multidisciplinary framework. The principal question raised by this study is therefore not whether MRI lacks specificity after radiotherapy, but under which biological and clinical conditions it can reliably represent the true extent of recurrent laryngeal cancer.

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Key Messages

What is already known on the subject

- Differentiating recurrent laryngeal cancer from radiation-induced tissue alterations remains one of the most significant challenges in post-radiotherapy cross-sectional imaging.
- Magnetic resonance imaging (MRI) maintains high sensitivity but often exhibits limited specificity in several anatomical subsites during the post-treatment follow-up period.

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What this paper adds to our understanding

- This paper highlights that remarkably low MRI specificities in the early post-radiotherapy period (3–6 months) likely reflect a transitional biological phase of tissue healing rather than an intrinsic limitation of the imaging modality itself.
- It identifies a potential diagnostic threshold bias (systematic overcalling) in isolated radiological interpretations of paraglottic space involvement.
- It emphasizes the critical need to integrate quantitative imaging biomarkers—specifically quantitative ADC metrics—and endoscopic clinical staging within a multidisciplinary framework to minimize false-positive findings and prevent unnecessary radical salvage surgery.

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