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DIAGNOSTIC ACCURACY OF MRI-BASED RADIOMICS FOR PREOPERATIVE PREDICTION OF MSI STATUS IN RECTAL CANCER: A SYSTEMATIC REVIEW AND META-ANALYSIS

Society: AGA**Track:** Clinical Practice**Author(s) and Affiliation(s):**

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Introduction

High mortality rates and significant morbidity rates associated with rectal cancer highlights the need to evaluate rectal cancers optimally thus optimising treatment protocols to enhance patient outcomes. Convention imaging modality such as Endoscopy and MRI have been the gold standards in staging and re-staging rectal carcinoma. Conventional imaging has been associated with limitations due to its inability to assess certain tumor characteristics which can only be assessed histopathologically. Radiomic imaging has been known to extract quantitative features which reflect tumor heterogeneity and can be potential imaging biomarkers. Patients with Microsatellite Instability (MSI) have unique biological behaviors and distinct responses to treatment and thus non-invasive imaging modality such as Radiomic imaging gains attention. Our study aims to analyse the diagnostic accuracy of MRI based Radiomic Imaging in prediction of MSI.

Methodology

The review conducted follows the PRISMA guidelines and major medical databases which include PUBMED, Google Scholar and Science-Direct were extensively searched using a comprehensive search term to identify and retrieve available articles. The studies which assessed the application of Radiomic imaging in assessing the MSI in rectal cancer were included and analysed.

The R Studio package was used to evaluate the diagnostic test accuracy. The Meta, Metadata and Mada packages were utilized to evaluate the measures of diagnostic accuracy tests i.e; Sensitivity, Specificity and Diagnostic Odds Ratio. Further, all analysis was conducted by grouping studies based on the imaging modality used and the machine learning algorithm applied. The Random intercept logistic regression model for sensitivity and specificity and the Mantel-Haenszel method (common effect model) or Inverse variance method (random effects model) was used to determine DOR. The heterogeneity of the studies was assessed using the I² test.

Results

The meta-analysis conducted involved a total of 25 Radiomic models that assessed the accuracy of Radiomic imaging in assessing Microsatellite instability in Rectal cancer. The pooled sensitivity and the specificity are 78% (72 - 83; 95% CI ; p<0.05) and 72% (62-80 ; 95% CI ; p<0.05) . Combining imaging modalities improved both sensitivity and specificity. The Diagnostic odds ratio was estimated to be 3.43 (2.82 - 4.38; 95% CI ; p = 0.03).

Conclusion

Our analysis and results indicate that MRI based radiomic imaging has a moderate to high values of sensitivity and specificity, although the subgroup analysis indicated using multiple Imaging modalities and newer improved machine learning models improved the sensitivity and specificity significantly. Radiomic imaging with its ability to assess and predict MSI instability non-invasively can be a key imaging biomarker to optimise treatment of Rectal cancer.

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