Abstract title

Integrating MRI and PET/CT Radiomics for Enhanced Survival Prediction in Esophageal Cancer

Authors

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Purpose or Learning Objective

Prognosis evaluation in esophageal cancer remains challenging. Accurate survival prediction is crucial for treatment planning and follow-up strategies. Although MRI and 18F-FDG PET/CT provide valuable information, they have limitations in accurately predicting patient outcomes. This study aimed to develop radiomics models based on MRI and PET/CT to predict overall survival in esophageal cancer patients using baseline and follow-up imaging.

Methods or Background

Sixty patients (M/F: 50/10, mean age 66±9 years) with newly diagnosed esophageal cancer were prospectively included (2017-2022). Patients underwent staging with 18F-FDG PET/CT and MRI, with follow-up MRI after neoadjuvant treatment. Tumors were manually segmented using Mint™ Software, and radiomics features were extracted via QuantImage v2 platform. The dataset, including 645 features from MRI and PET/CT, was split into training (80%) and test (20%) sets. Various survival prediction algorithms were compared. Model performance was assessed with the concordance index (C-index) using bootstrapping for confidence interval (CI) estimation.

Results or Findings

Radiomics features were analyzed at baseline from both PET/CT and MRI for 52 patients, and at follow-up MRI for 49 patients. Mean survival was of 37 months (range: 1.8 to 78.1). The MRI model (14 features) achieved a C-index of 0.733 (95% CI: 0.718–0.756), and the PET/CT model (5 features) achieved 0.724 (95% CI: 0.707–0.746) for predicting OS. A combined model with 19 features improved the C-index to 0.868 (95% CI: 0.853–0.881), while a follow-up MRI model (16 features) reached 0.807 (95% CI: 0.790–0.827).

Conclusion

The radiomics model based on MRI and PET/CT demonstrated robust performance in predicting survival for esophageal cancer patients. Integrating multi-modal baseline and follow-up imaging radiomics features into survival models could enhance prognostic accuracy, improving personalized management strategies in esophageal cancer.

Limitations

The limitations of the study are the number of patients.

Funding for this study

No funding was received.

Has your study been approved by an ethics committee?

Yes

Ethics committee - additional information

The study was approved by "Commission Cantonale d'Ethique de la Recherche sur l'être humain" à Lausanne (CER-VD 2017-00388)