Applying Lung-RADS to Pulmonary Nodules Within Fibrotic Tissue

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INTRODUCTION

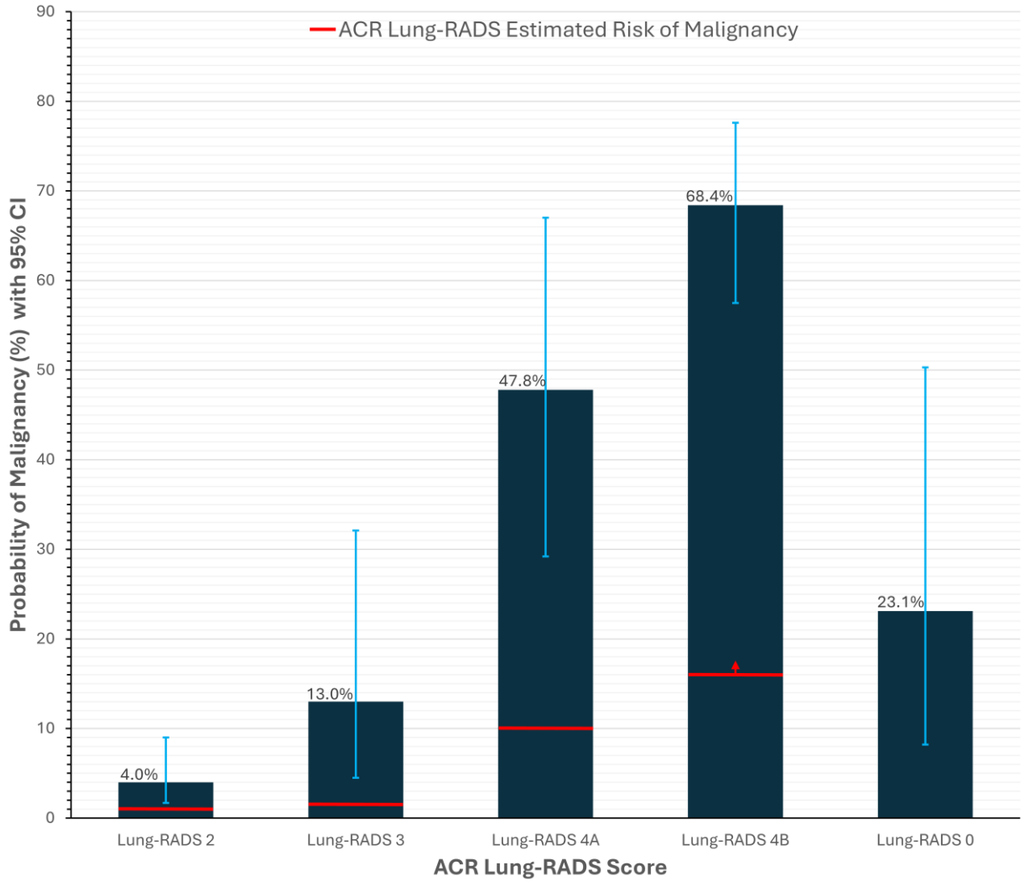
Patients with pulmonary fibrosis are at significantly higher risk of developing lung cancer. Specifically, it has been shown that nodules within fibrotic lung tissue are substantially more likely to be cancerous than their non fibrotic counterparts. Because patients with pulmonary fibrosis often receive periodic chest CT scans to track disease progress, the American College of Radiology (ACR) Lung-RADS scoring system can be used to make decisions about follow-up imaging if nodules are found. However, this scoring system was created for general lung cancer screening, and the nodule follow-up recommendations are based on risk of malignancy in this population. The purpose of this research was to retrospectively apply Lung-RADS to patients with dominant nodules in fibrotic tissue, and to compare the probability of malignancy for each Lung-RADS score with the risk of malignancy published by the official Lung-RADS guidelines.

METHODS

Pulmonary fibrosis patients with a nodule within or inseparable from fibrotic tissue and at least two CT scans less than 18 months apart were selected from a database. All CT scans from 1/1/2010 through 5/30/2023 were reviewed for selected patients and a Lung-RADS score was assigned to all qualifying scans. If cancer was diagnosed within 1 year, the CT and associated Lung-RADS score were considered “cancer present”. The percent of cancer present scans within each Lung-RADS category was used to calculate a confidence interval for the probability of malignancy, and this probability of malignancy was compared to the “risk of malignancy” percentage, published by the ACR Lung-RADS 2019 guidelines, for each Lung-RADS score. This study received approval and a waiver of informed consent from the Columbia University Institutional Review Board under protocol AAAU7162.

RESULTS

A total of 264 chest CT scans qualified for evaluation. Lung-RADS 2 scans had a 4.0% (95% CI, 1.7-9.0%) probability of malignancy, Lung-RADS 3 scans had a 13.0% (CI, 4.5-32.1%) probability of malignancy, Lung-RADS 4A scans had a 47.8% (CI, 29.2-67.0%) probability of malignancy, Lung-RADS 4B scans had a 68.4% (CI 57.5-77.6%) probability of malignancy, and Lung-RADS 0 scans had a 23.1% (CI 8.2-50.3%) probability of malignancy. All were significantly higher than the risk of malignancy percentages published in the ACR Lung-RADS 2019 guidelines (< 1% for Lung-RADS 2, 1-2% for Lung-RADS 3, 5-15% for Lung-RADS 4A, and 15+% for Lung-RADS 4B). There is no published risk for Lung-RADS 0.



DISCUSSION

These findings reveal that for each Lung-RADS score, there is a significant increase in probability of malignancy when the dominant nodule is fibrotic as compared to the same score in the general group of patients receiving lung cancer screening. This may suggest utility in adding a fibrosis modifier to the Lung-RADS guidelines, which would function to shorten the follow-up interval required if a nodule is within or inseparable from fibrotic tissue. However, it should be noted that an increased probability of malignancy does not necessarily mean more frequent follow-up imaging would lead to better patient outcomes, as the stage at diagnosis may remain the same. There is no perfect way to assess this retrospectively, though a comparison can be made between the percentage of stage I vs stage II or greater cancers diagnosed in fibrotic nodule vs non-fibrotic nodule Lung-RADS scores. If the percentage of stage II or greater cancers is disproportionately higher for fibrotic nodule Lung-RADS scores, it is reasonable to assume more frequent follow-up intervals may have detected some at stage I and thus improved patient outcomes. This comparison represents the next step for this research.

CONCLUSION

Lung-RADS scores with a dominant nodule within or inseparable from fibrotic tissue are substantially more likely to be followed by a cancer diagnosis within 1 year as compared to the same score in the general population receiving lung cancer screening. More research is needed to assess the clinical significance of this finding.

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