Diagnostic Value of Imaging Modalities for COVID-19: A Literature Review

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Table of Contents

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Abstract

Background: Coronavirus disease 2019 (COVID-19) is a serious infectious disease resulting in severe respiratory illness. This pandemic represents a serious public health risk. Therefore, early and accurate diagnosis is essential to control disease progression. Radiological examinations play a crucial role in early identification and management of infected patients.

Objective: To identify the diagnostic value of different imaging modalities used for diagnosis of COVID-19.

Methods: A comprehensive literature search was conducted using the PubMed, Scopus, Web of Science, and Google Scholar databases. The keywords diagnostic imaging, radiology, respiratory infection, pneumonia, coronavirus infection and COVID-19 were used to identify radiology articles focusing on the diagnosis of COVID-19 and to determine the diagnostic value of various imaging modalities, including x-ray, computed tomography ultrasound, and nuclear medicine for identification and management of infected patients.

Results: 50 articles were identified in the literature search. Studies that investigated the diagnostic role and imaging features of patients with COVID-19, using either chest CT, lung ultrasound, chest x-ray, or PET/CT scan, were discussed. Of these imaging modalities, chest x-ray and CT scan are commonly used for diagnosis and management of COVID-19 patients, with chest CT scan being more accurate and sensitive in identifying COVID-19 at early stages. Only a few studies have investigated the role of ultrasound and PET/CT scan in diagnosing COVID-19.

Conclusions: Chest CT scan remains the most sensitive imaging modality in initial diagnosis and management of suspected and confirmed patients with COVID-19. Other diagnostic imaging modalities could add value in evaluating disease progression and monitoring of critically ill COVID-19 patients.

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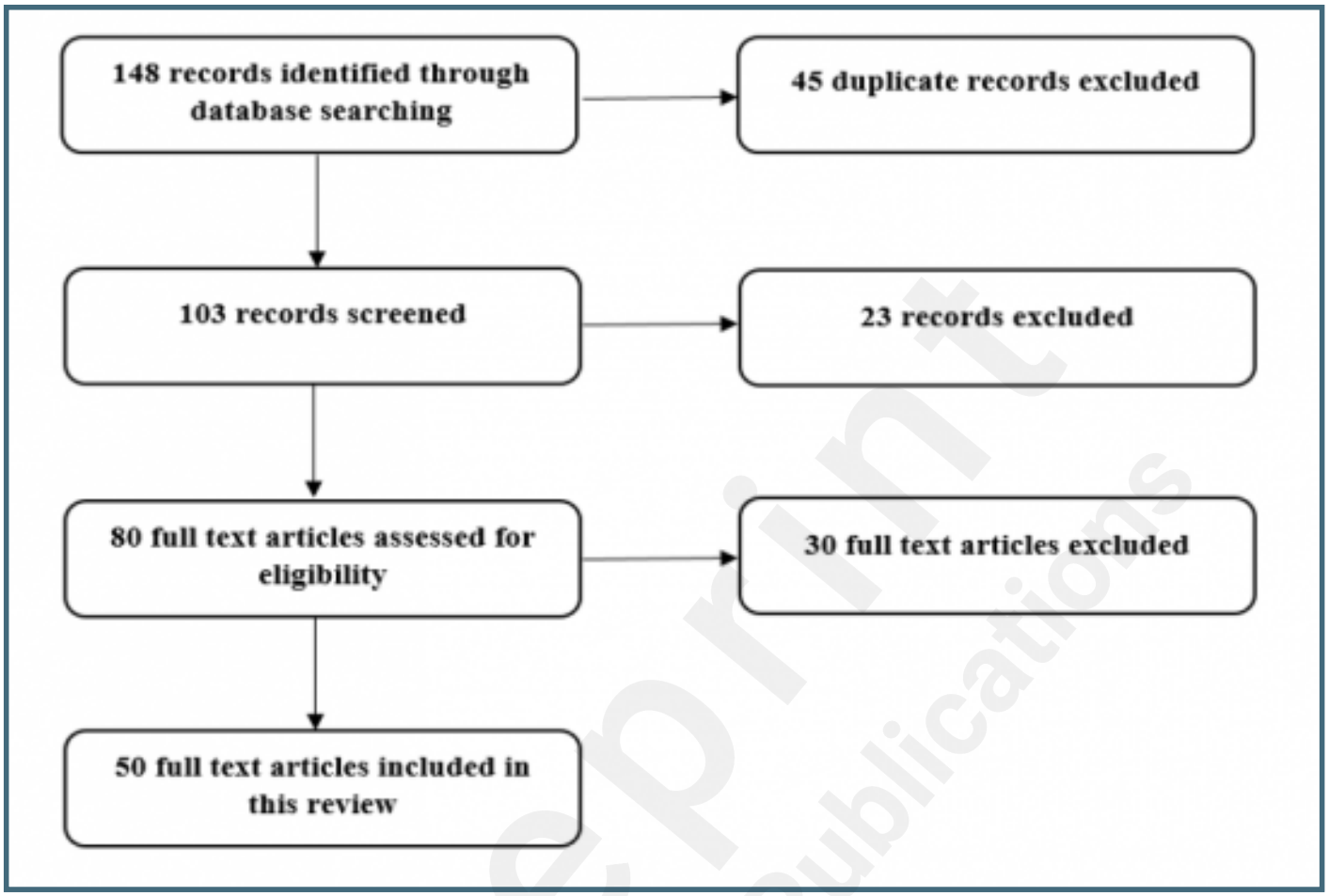
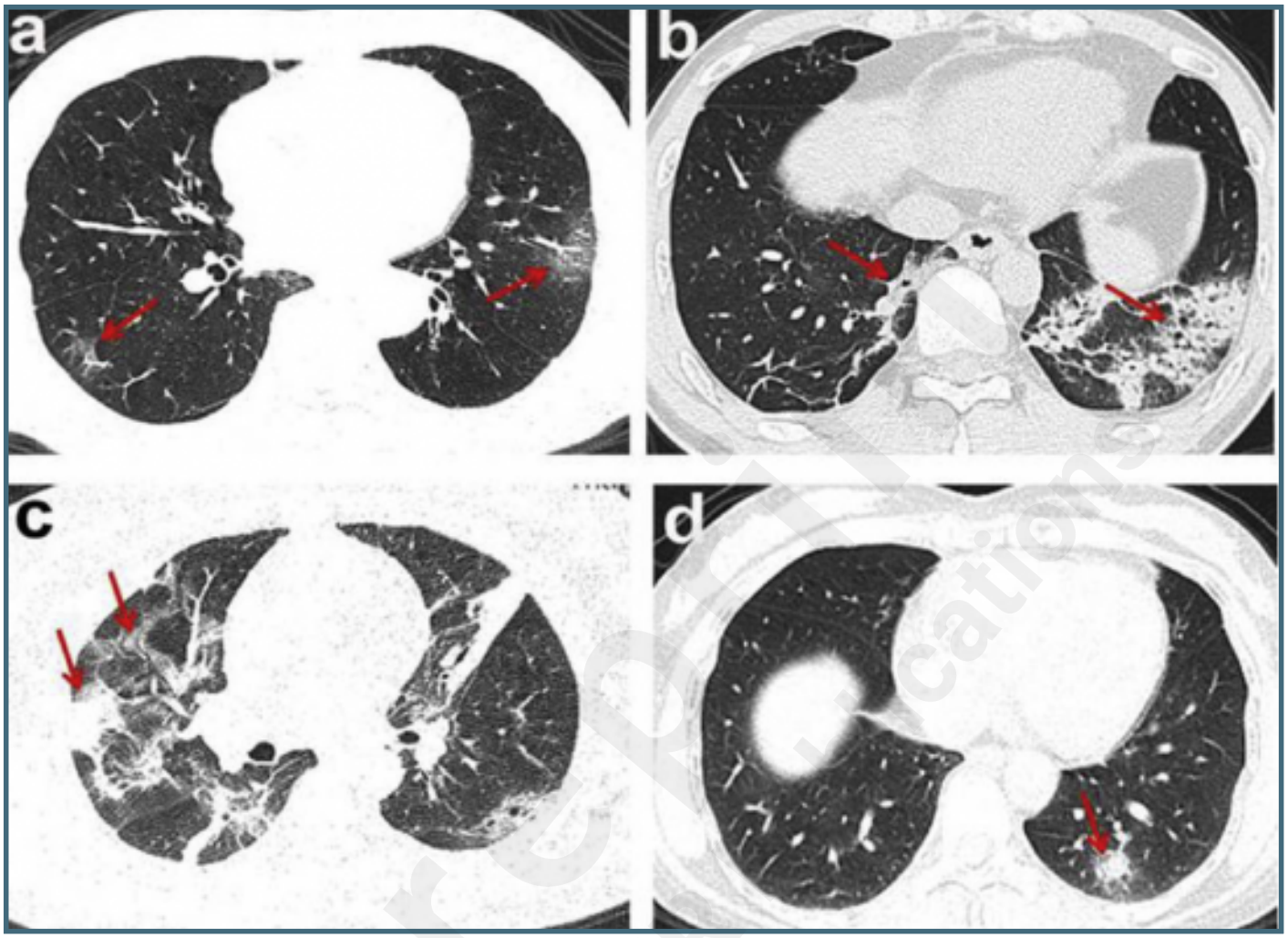
Supplementary Files

Figures

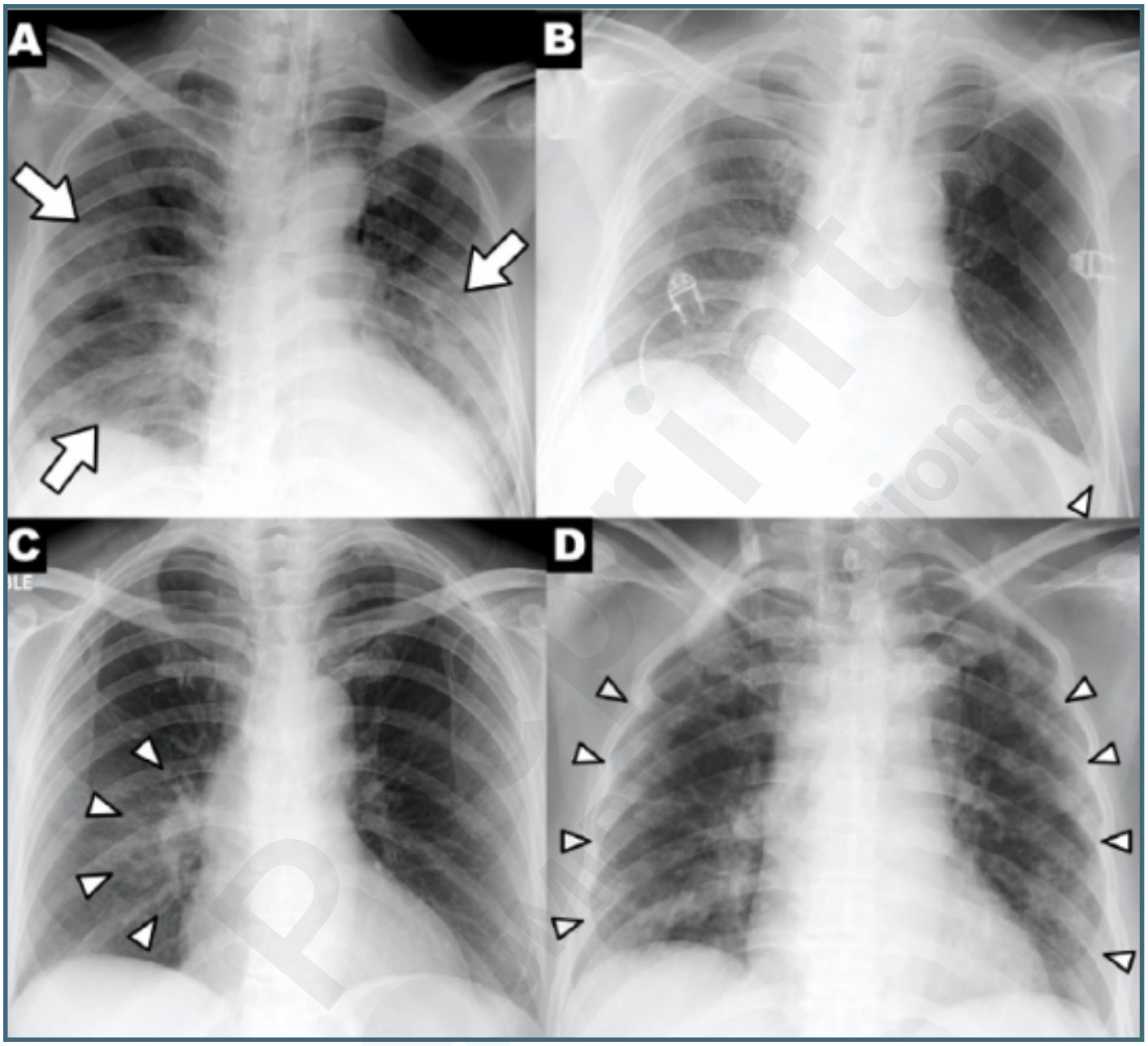
Flowchart showing the selection process and article identification.



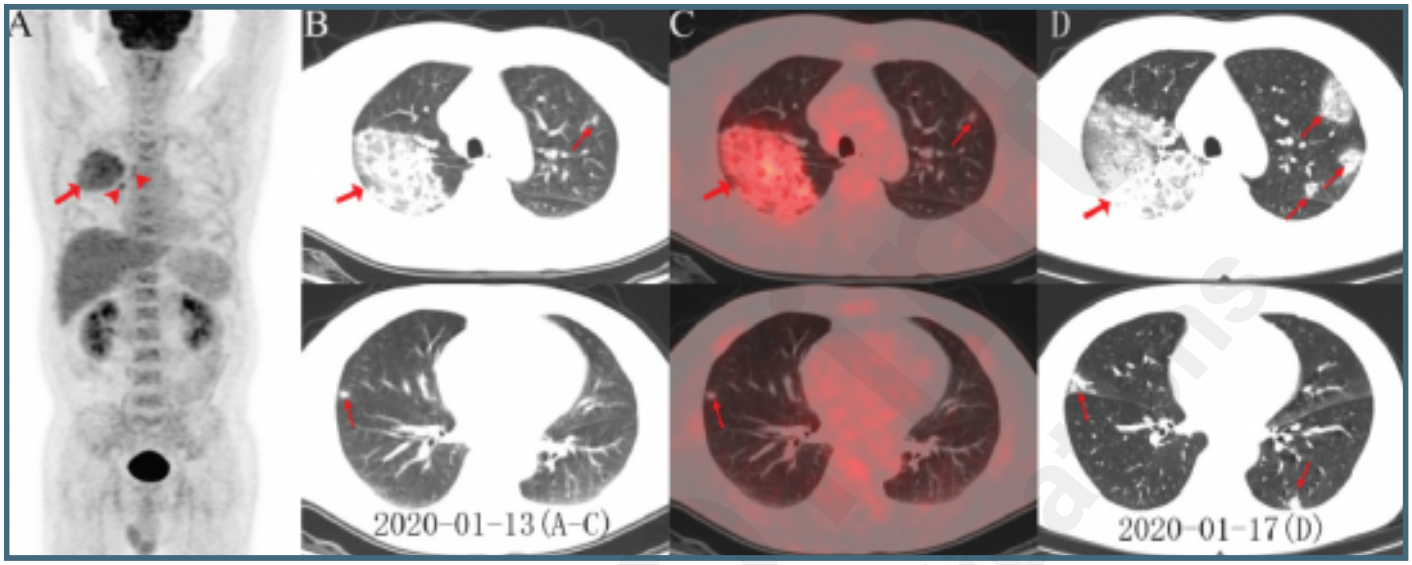
Chest CT findings in patients with COVID-19. (a) Ground-glass opacities, (b) Consolidations, (c) Consolidations with ground-glass opacities, (d) Solid nodule [63].



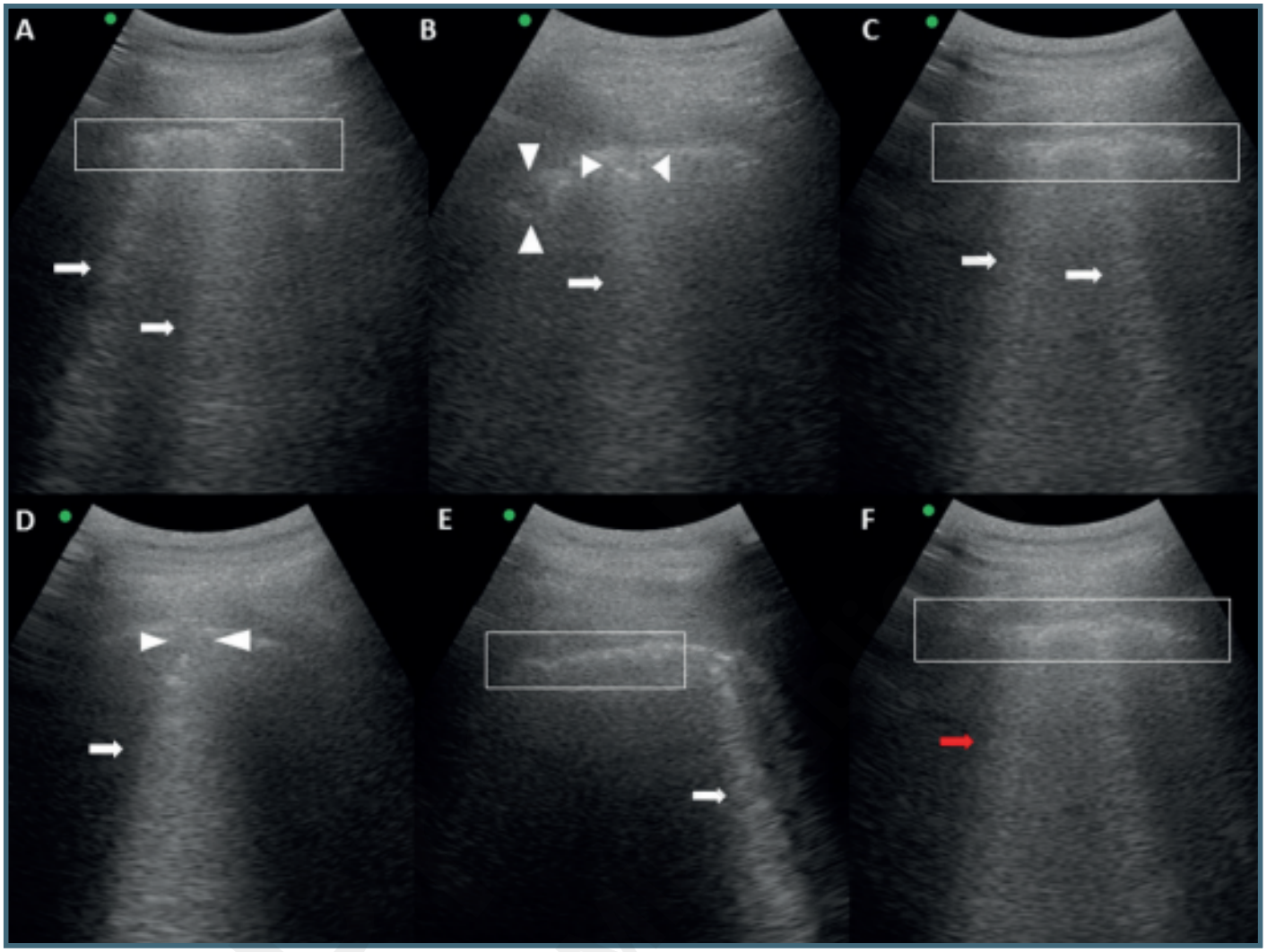
Chest x-ray findings in a patient with COVID-19 disease. (A) Patchy consolidations, (B) Pleural effusion, (C) Perihilar distribution, (D) Peripheral distribution [18].



FDG PET/CT imaging findings in a patient with COVID-19. (A) The PET maximum intensity projection (MIP) image shows an FDG-avid mass in the right lung with an SUV max of 4.9, increased accumulation of FDG in the right hilar lymph nodes, in the right paratracheal (arrowhead), and in the bone marrow. The axial images of the low-dose CT scan (B) and the PET/CT fusion (C) showed GGOs in the right upper lobe with areas of focal consolidation (arrows) and a focal opacity in the right middle and left upper lobes (arrows). The follow-up CT axial images 4 days later (D) showed lesion progression in the middle and bilateral upper lobes, with newly developed focal opacities in the left lower and upper lobes (arrows) [49].



Lung ultrasound findings in a patient with COVID-19. Irregular plural lines (Figures A, C, E, and F, within the white box); thick irregular vertical artifacts (Figures A, B, C, D, and E, white arrows); subpleural consolidations (Figures B and D, white arrowheads); and areas of white lung (Figure F, red arrow) [59].



Multimedia Appendixes

Summary of the selected articles in the literature based on the different imaging modalities and diagnostic values for COVID-19.
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