Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

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Methods and materials:

Single-centre retrospective consecutive cohort (n=139) with PCR-confirmed COVID-19 infection with CTPA between 1 December 2020 and 7 January 2021.

Two radiologists undertook blinded analysis of a first CTPA and scored out of 25 to produce a CT severity score (CTSS). Clinical, biochemical and outcome data was collected with a median follow up of 61 days.

Results:

Strong inter-rater agreement for CTSS with a correlation coefficient of 0.93 (CI 0.90–0.95).

CTSS was associated with clinical disease severity at time of CTPA as demonstrated by WHO ordinal progression score (CTSS 15 versus 12.5 for inpatient (IP) severe versus IP moderate, p=0.004) and O2 saturations (r=−0.37, p<0.0001). Weak association with C-reactive protein (CRP) and lymphocytes (CRP r=0.24, p=0.009; lymphocytes r=−0.24, p=0.007).

CTSS associated with clinical outcomes; patients with subsequent admission to critical care had a mean CTSS of 16.0, versus 12.6 for those not admitted (p<0.0001). Death associated with mean score of 15.7 versus 13.2 for recovery (p<0.005). Moderate correlation with hospital length of stay (rho=−0.42, p<0.0001).

Using a receiver operating characteristic (ROC) analysis, a threshold score of ≥14 on CTSS was used to define severe disease, and this was significantly associated with both death and admission to critical care controlling for age, sex and comorbidities (death HR=3.2, p=0.008; critical care HR=3.8, p<0.0001). It was also associated with a significantly longer hospital length of stay (17.4 for score ≥14 versus 7.9 days for score <14).

Conclusion:

CTSS on CTPA correlates with disease severity and may risk stratification in patients with COVID-19.

Quantitation of disease severity using computer-derived airway measurements in idiopathic pulmonary fibrosis

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Category: Thoracic

Purpose:

Idiopathic pulmonary fibrosis (IPF) is a chronic lung disease characterised by progressive lung function decline and lower lobe traction bronchiectasis. We evaluated differences in airway tapering measurements on computed tomography (CT) imaging between IPF patients and healthy individuals to establish whether a lack of airway tapering can delineate fibrosis-related lung damage.

Methods and materials:

Manual airway and automated lobar segmentations of volumetric CT imaging in 12 IPF and six normal individuals were obtained. Using AirQuant, a novel computational tool, we evaluated airway damage by quantifying differences in airway tapering between adjacent airway segments in central and peripheral regions of the lung. AirQuant also quantified the volumes of abnormal airways in IPF patients and normal subjects.

Results:

A reduction in airway tapering was observed in the IPF cohort, compared with normal individuals, with findings most marked in the left (p=0.0462) and right (p=5.91 × 10−7) lower lobes, and across the fifth to eighth airway generations (p=0.0233). Airways in the lower lobes occupied a higher relative percentage volume of lung parenchyma in IPF patients compared with healthy subjects.

Conclusion:

Computational measurements of airway diameter highlighted the lobar distribution and severity of airway abnormality in patients with IPF compared with healthy subjects. Our computer-derived metrics have the potential to be used as a complementary biomarker alongside existing lung function tests to determine the severity of IPF-related lung damage.

Comparison of COVID-19 disease severity and PE rates between Kent B1.1.7 lineage versus other lineages on CTPA

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Category: Thoracic

Purpose:

To compare radiologically determined COVID-19 disease severity and pulmonary embolism (PE) rates on initial computed tomography pulmonary angiogram (CTPA), clinical severity and outcomes of patients infected with B1.1.7 lineage compared with those infected with remaining strains.

Methods and materials:

Single-centre retrospective analysis on a cohort of 139 consecutive patients with polymerase chain reaction (PCR)-confirmed COVID-19 infection who underwent CTPA and viral genome sequencing between 1 December 2020 and 7 January 2021.

Two radiologists undertook blinded analysis of the first CTPA since admission and scored out of 25 for lung involvement to produce a CT severity score (CTSS). Pulmonary embolism rates were determined on radiological report. Clinical, biochemical and outcome data was collected with a median follow up of 61 days.

Results:

88/139 patients infected with B1.1.7 lineage.

A significant difference in venous thromboembolism (VTE) rate was observed between B1.1.7 (11%, 1/88) and non-B1.1.7 (13.7%, 7/51) controlling for age, gender, anticoagulation on admission and comorbidities (adjusted p=0.0104).

No difference in CTSS or clinical severity (determined by ventilatory requirements or oxygen saturations), hospital length of stay, admission to critical care or death between B1.1.7 and non-B1.1.7.

However, significantly higher C-reactive protein (CRP) was found in non-B1.1.7 versus B1.1.7 (mean CRP 179 versus 134, adjusted p=0.0001).

Conclusion:

Although B1.1.7 variant has been shown to associate with increased mortality and disease severity, we did not demonstrate a difference in CT severity score nor in clinical severity or outcomes. Further, patients with non-B1.1.7 had a significant higher rate of pulmonary embolism and higher maximal CRP.