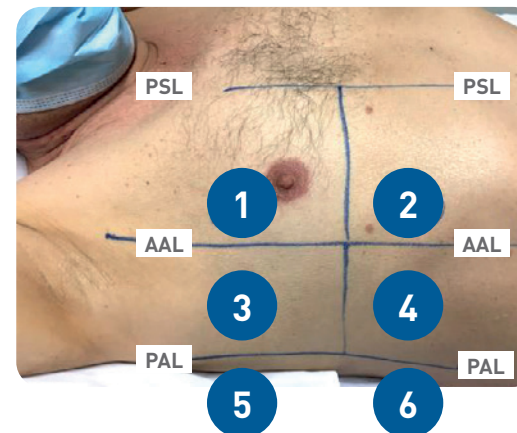


Name ☐ m ☐ f ☐ d
Age Examiner Smoker: ☐ yes ☐ no
Patients position: ☐ prone position ☐ supine position ☐ sitting position
Respiration: ☐ spontaneous ventilation ☐ assisted ventilation ☐ controlled ventilation
☐ Convex transducer ☐ Linear transducer ☐ Pocket ultrasound device Documentation: ☐ image ☐ video
Ultrasound device
Clinical signs
Date of first complaints Clinical suspicion of COVID-19 ☐ no ☐ yes
☐ positive test for COVID-19 ☐ chest X-ray ☐ CT of the thorax ☐ follow-up via ultrasound
Comorbidities ☐ no ☐ yes, which: ☐ hypertension
☐ asthma ☐ COPD ☐ other lung diseases ☐ heart disease ☐ diabetes ☐ cancer ☐ HIV ☐ hepatitis
☐ renal failure ☐ cirrhosis of the liver ☐ immunosuppression ☐



PSL: parasternal line

AAL/PAL: anterior / posterior / axillary line.

The two posterior areas 5/6 are best investigated in the lateral positions.

In the case of pathological findings, the transducer position could be marked with a felt pen for follow-up scans.

please check:
yes/no (y/n)
empty = not examined

RIGHT LUNG

pleural effusion:

- ☐ no
☐ yes:
☐ small volume
☐ moderate volume
☐ large volume

Fragmented pleura

Consolidation

Air bronchogram

"B-Lines"

INVESTIGATION AREAS

areal **1** anterior cranial

areal **2** anterior caudal

areal **3** lateral cranial

areal **4** basal caudal

areal **5** dorsal cranial

areal **6** dorsal caudal

please check:
yes/no (y/n)
empty = not examined

LEFT LUNG

pleural effusion:

- ☐ no
☐ yes:
☐ small volume
☐ moderate volume
☐ large volume

Fragmented pleura

Consolidation

Air bronchogram

"B-Lines"

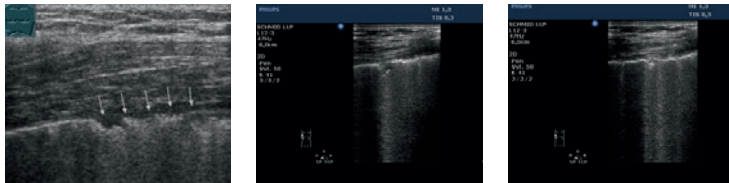
Others (for example pneumothorax, ARDS, „interstitial syndrome“)

Conclusion:

Lung Ultrasound Protocol – DEFINITIONS

Preliminary note: Self protection is top priority - especially in positive Covid-19 infection use full personal protective equipment against droplet and airborne transmission as there is close contact with the patient. Consider scanning the patient's left side from the left side of the bed thereby avoiding stretching across the patient which latter increases face to face proximity considerably. Also try to limit the scanning time in these cases. Adequate hygiene protocol for the ultrasound device! Protective plastic cover for the ultrasound device may also be discussed!

Device setting: A convex transducer is recommended for intercostal ultrasound examination of the pleura and lung to optimally display artefacts of diagnostic relevance including pleural surface irregularities and ultrasonic B-lines. Correlation with contemporaneous and previous X-ray or CT images and the clinical picture, including differential diagnoses is required.



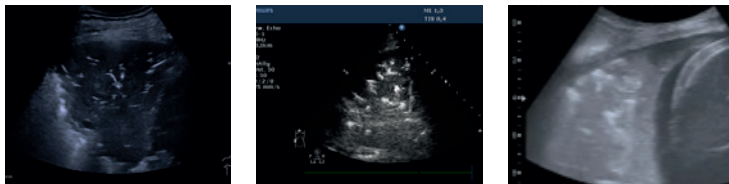
Fragmented pleura

Irregular, interrupted (mm) and thickened pleural line, partly subpleural, hypoechoic areas.



Consolidation

Echopoor subpleural area (> 5 mm) with liver- or tissue-like echo structure.



Air bronchogram

Air-filled bronchi (branching/curvilinear echogenicities) within a consolidated area.



“B-Lines“

Here the classical B-lines (a) arising from the intact pleura („sound of lung water“, described as three or more bright lines within an intercostal space) and „comet tail artefacts“ (b) (artifacts arising from pleural pathologies with an irregular pleural surface, also seen at the edge of consolidations) were put together in the group „B-Lines“ as they are sometimes hard to distinguish.

Literature:

→ Buonsenso D et al., Point-of-Care Lung Ultrasound findings in novel coronavirus disease-19 pneumoniae: a case report and potential applications during COVID-19 outbreak. Eur Rev Med Pharmacol Sci. 2020 Mar;24(5):2776-2780. doi: 10.26355/eurev_202003_20549

→ Soldati G et al., Proposal for international standardization of the use of lung ultrasound for COVID-19 patients; a simple, quantitative, reproducible method. J Ultrasound Med. 2020 Mar 30. doi: 10.1002/jum.15285.

→ Peng QY, Findings of lung ultrasonography of novel corona virus pneumonia during the 2019-2020 epidemic. Intensive Care Med. 2020 Mar 12. doi: 10.1007/s00134-020-05996-6.

→ Y Huang et al., A preliminary study on the ultrasonic manifestations of peripulmonary lesions of non-critical novel coronavirus pneumonia (COVID-19), <https://ssrn.com/abstract=3544750>

Authors: PD Dr. Konrad Friedrich Stock, Department of Nephrology, Ultrasound Section at Klinikum rechts der Isar, Technical University of Munich in cooperation with Dr. Rudolf Horn and Prof. Dr. Gebhard Mathis with assistance of instructors from DEGUM/ÖGUM/SGUM.

Thank you for your cooperation: Dr. Alexander Heinzmann, Prof. Dr. Gebhard Mathis, Dr. Rudolf Horn, Prof. Dr. Helmut Prosch, Prof. Dr. Dirk-André Clevert, Dr. Wolfgang Heinz, Dr. Joscha von Rappard, Dr. Michael Höpfner, Dr. Hans-Peter Weskott, Dr. Armin Seibel, Dr. Mathias Schmid, Dr. Jörg Kämmer, Prof. Dr. Andreas Schuler, PD Dr. Norbert Börner, Prof. Dr. Christian Görg, Prof. Dr. Deike Strobel, Dr. Susanne Morf, Prof. Dr. Josef Menzel, Dr. Thomas Müller, Dr. Martin Mauch, Dr. Wolfgang Blank, Dr. Georg Kunze, Dr. Daniel Weiss, Prof. Dr. Christoph F. Dietrich, Prof. Dr. Wolfgang Kratzer, Prof. Dr. Christian Lersch, Dr. Friedhelm Peltz, Dr. Gregor Zimmermann, Prof. Dr. Wolfgang Huber, PD Dr. Claudius Küchle, Prof. Dr. Gerhard Schneider, Dr. Markus Heim, Dr. Frank Wolfram.

Figures: Dr. Rudolf Horn, Prof. Dr. Christian Görg, PD Dr. Eckhart Fröhlich, Dr. Mathias Schmid, Dr. Thomas Müller, PD Dr. Konrad Friedrich Stock.

Translation: Dr. Wolfgang Blank, Dr. Dominique Sauter.

Thanks to Dr. Tom Fitzgerald for the critical review.

Layout: Sarah Bartl