Klinikum rechts der Isar
Technische Universität München

Lung Ultrasound (LUS) Protocol

DEGUM SGUM SSUM ÖGUM

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

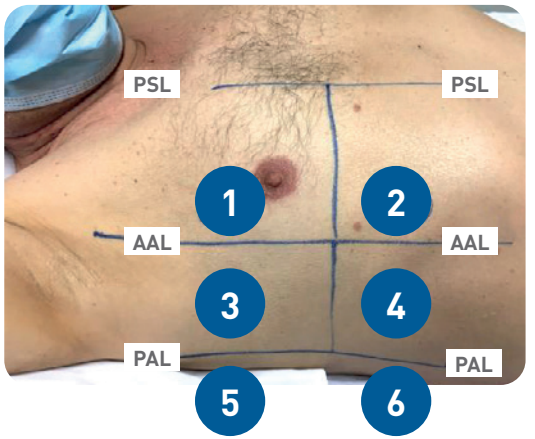
Date of first complaints Clinical suspicion of COVID-19 ☐ no ☐ yes

☐ 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

Fragmented pleura	Consolidation	Air bronchogram	"B-Lines"	INVESTIGATION AREAS	Fragmented pleura	Consolidation	Air bronchogram	"B-Lines"
☐	☐	☐	☐	areal 1 anterior cranial	☐	☐	☐	☐
☐	☐	☐	☐	areal 2 anterior caudal	☐	☐	☐	☐
☐	☐	☐	☐	areal 3 lateral cranial	☐	☐	☐	☐
☐	☐	☐	☐	areal 4 basal caudal	☐	☐	☐	☐
☐	☐	☐	☐	areal 5 dorsal cranial	☐	☐	☐	☐
☐	☐	☐	☐	areal 6 dorsal caudal	☐	☐	☐	☐

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

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

LEFT LUNG

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

Others (for example pneumothorax, ARDS, „interstitial syndrome") _____

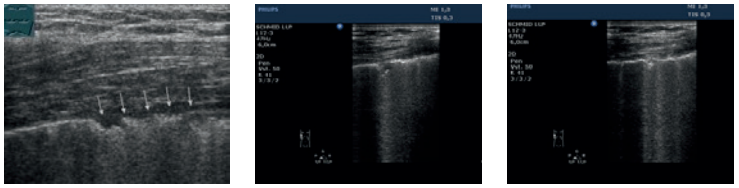
Conclusion: _____

Version 3 english – 2020.04.10

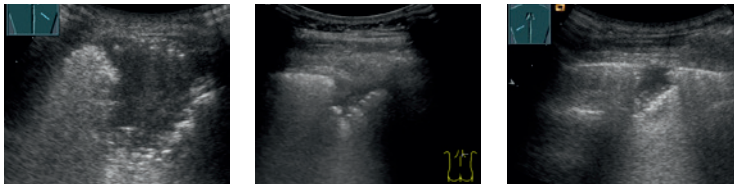
Lung Ultrasound Protocol – DEFINITIONS

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!

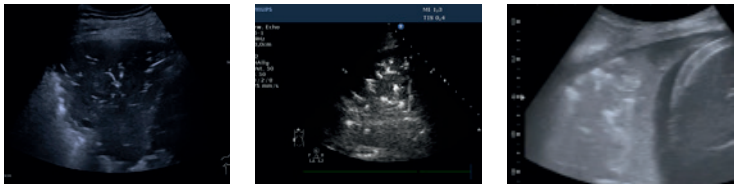
Device setting: A convex transducer is recommended for intercostal ultrasound examination of the pleura and lung to optimally display artefacts of diagnostic relevance including pleural surface irregularities and ultrasonic B-lines. Correlation with contemporaneous and previous X-ray or CT images and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



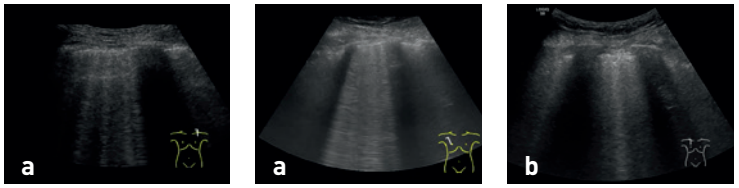
Fragmented pleura
Irregular, interrupted (mm) and thickened pleural line, partly subpleural, hypoechoic areas.



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 pnemoniae: a case report and potential applications during COVID-19 outbreak**. Eur Rev Med Pharmacol Sci. 2020 Mar;24(5):2776-2780. doi: 10.26355/eurrev_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

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