

Ultrazvuk plic



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BLUE points

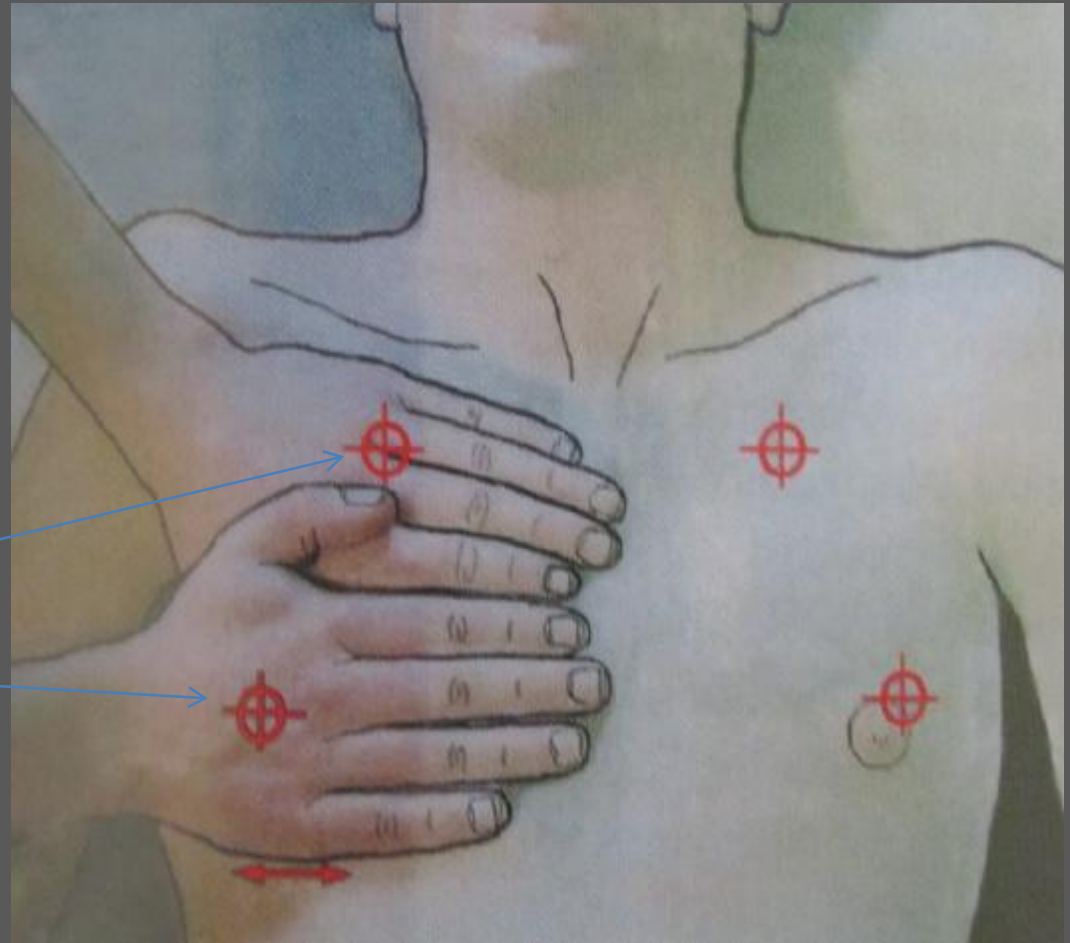
Daniel A. Lichtenstein

Standardizace
základního
vyšetření

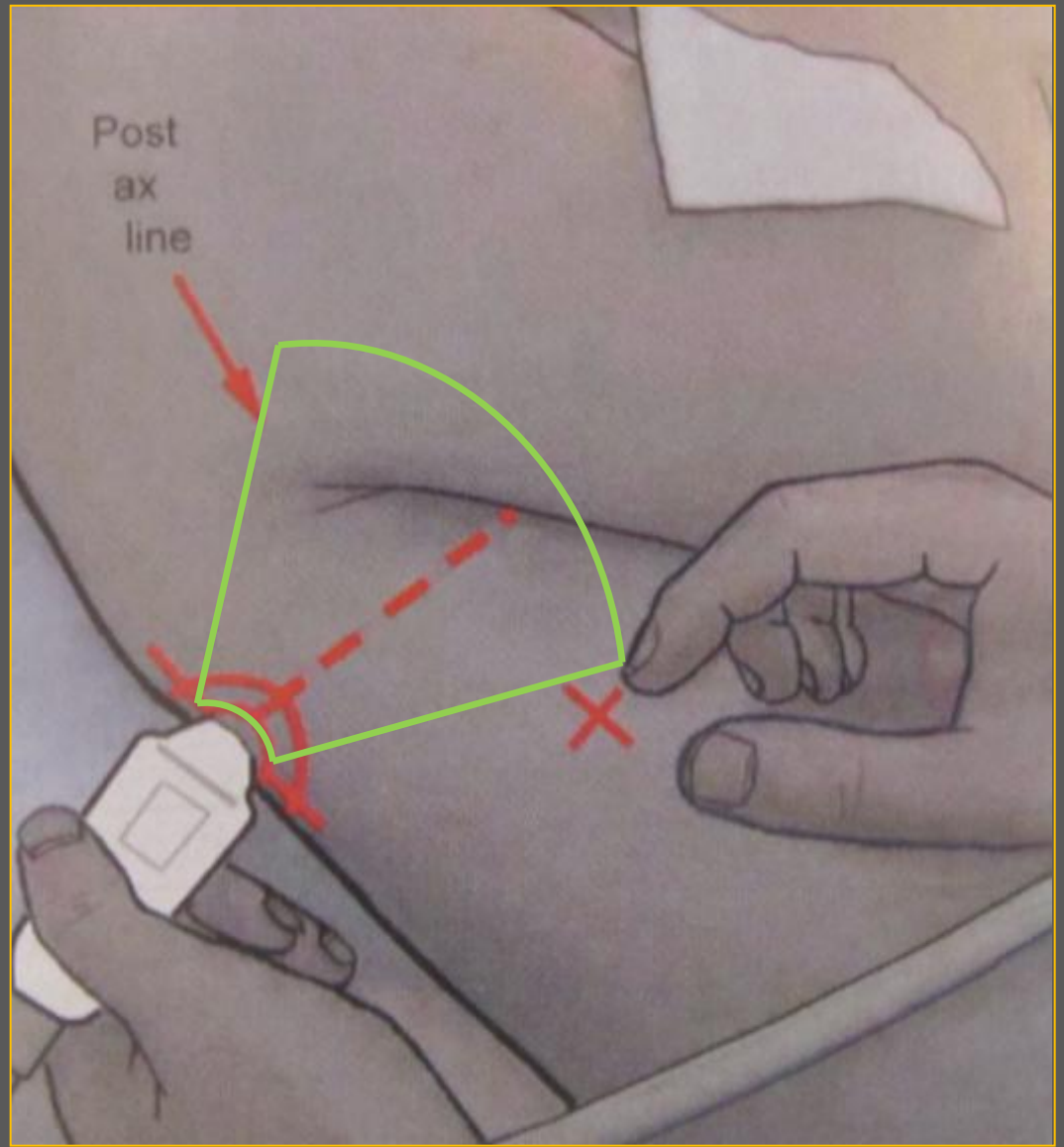
Horní BLUE point

Dolní BLUE point

PLAPS point

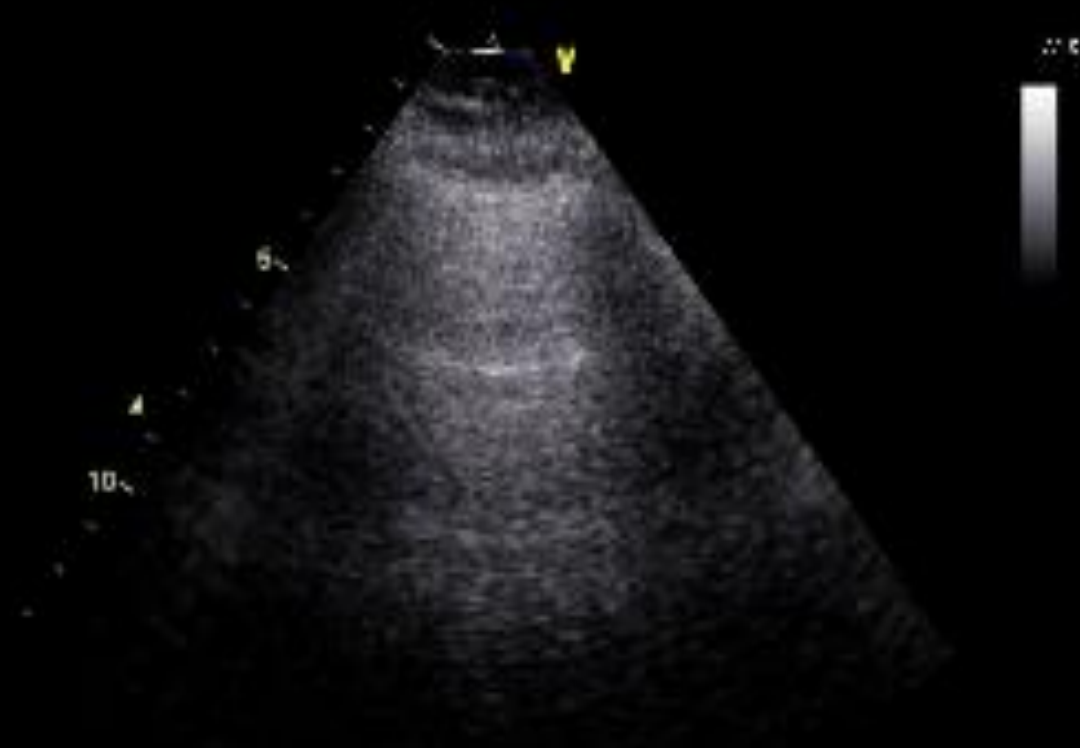


PLAPS point



Normální plíce

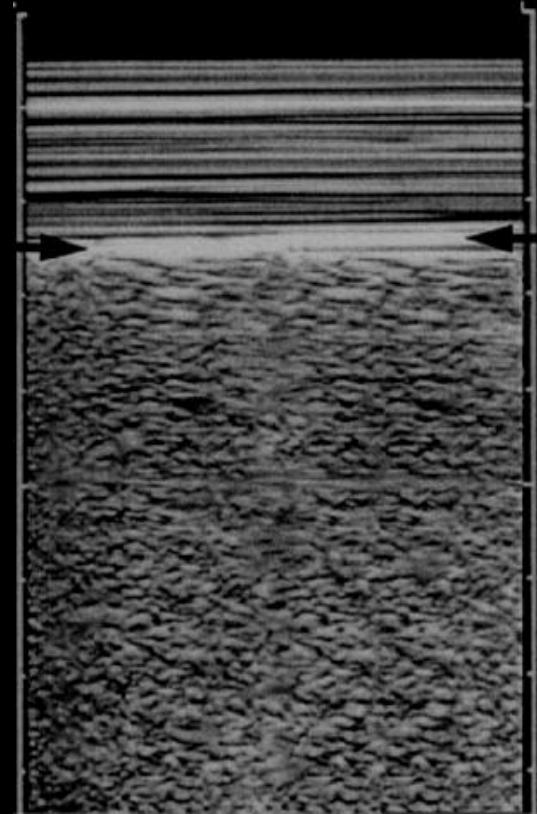
- Pleurální linie
- Lung sliding
- A linie
- Seashore sign



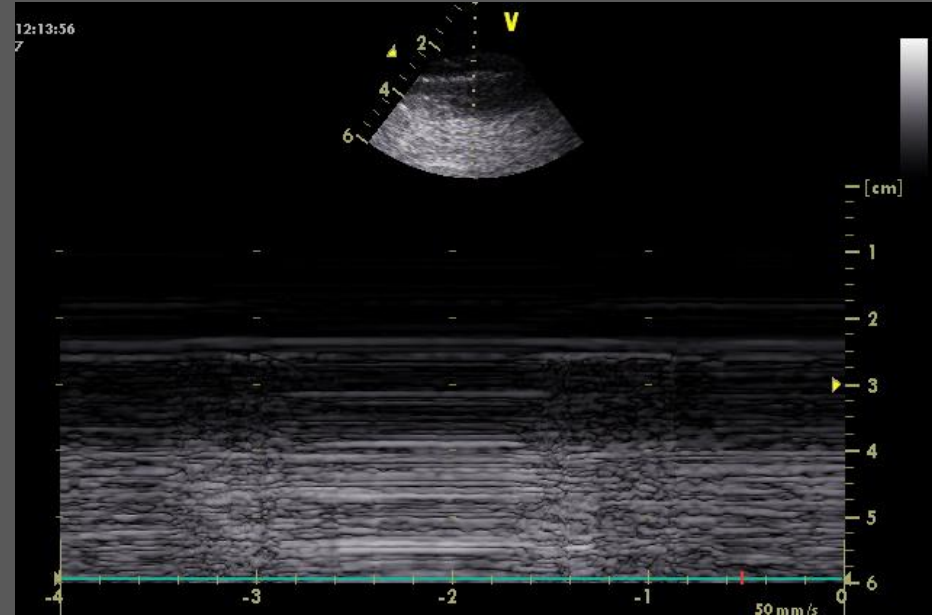
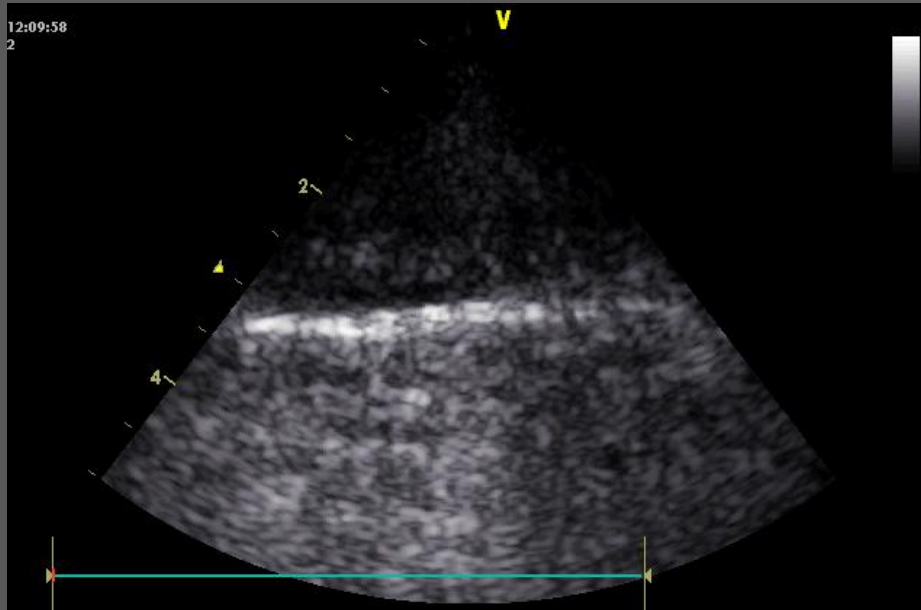
Seashore sign



- M mód



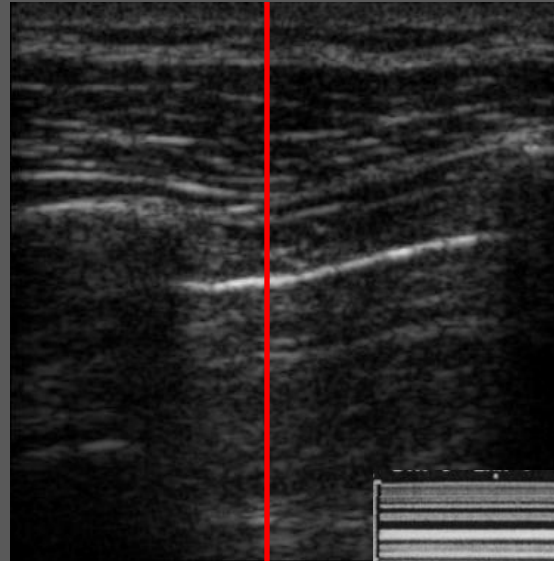
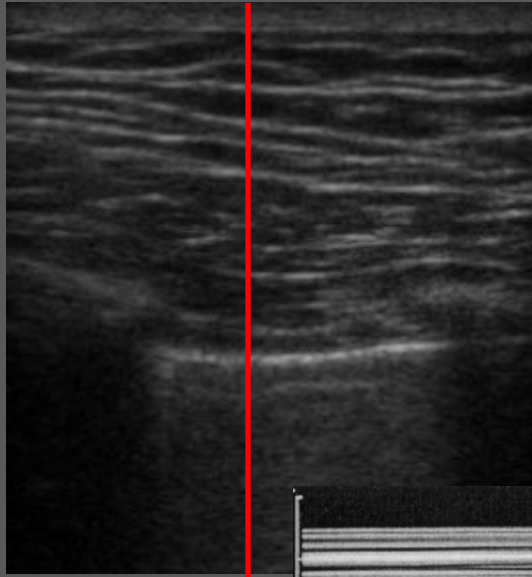
Pneumothorax



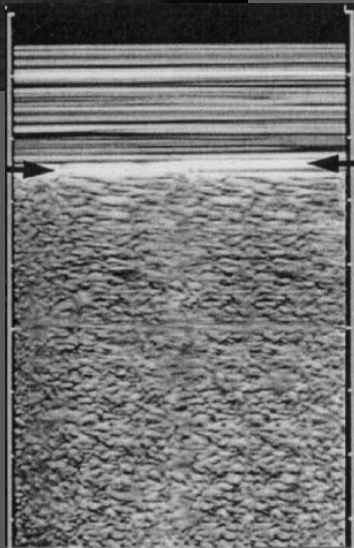
- Pleurální linie
- A linie
- Není Lung sliding
- Stratosfere sign
- Lung point



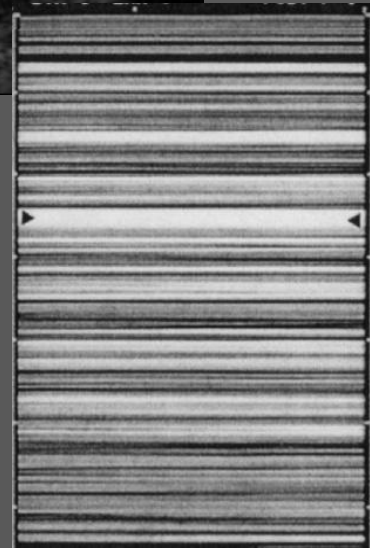
Stratosphere sign



M mód



Seashore sign



Stratosphere sign

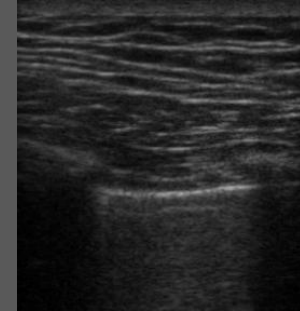


Pneumothorax

- Lung sliding (a/nebo B linie)



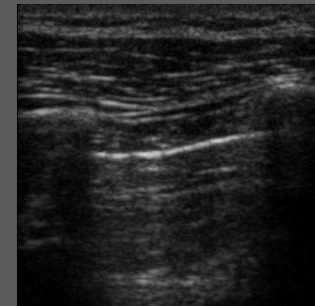
Není pneumothorax

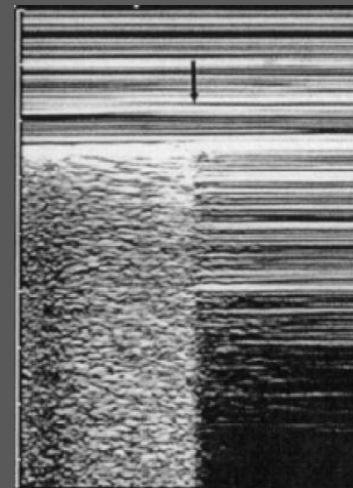
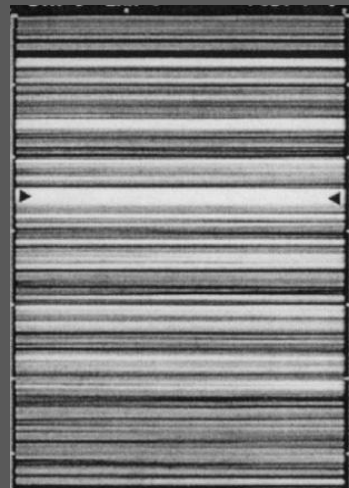
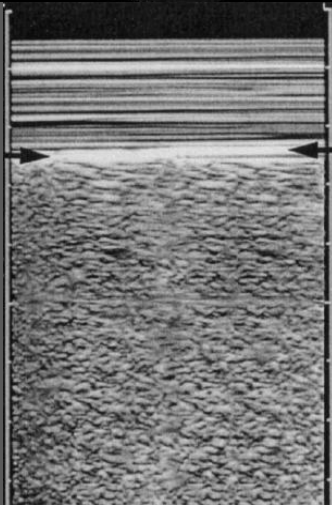
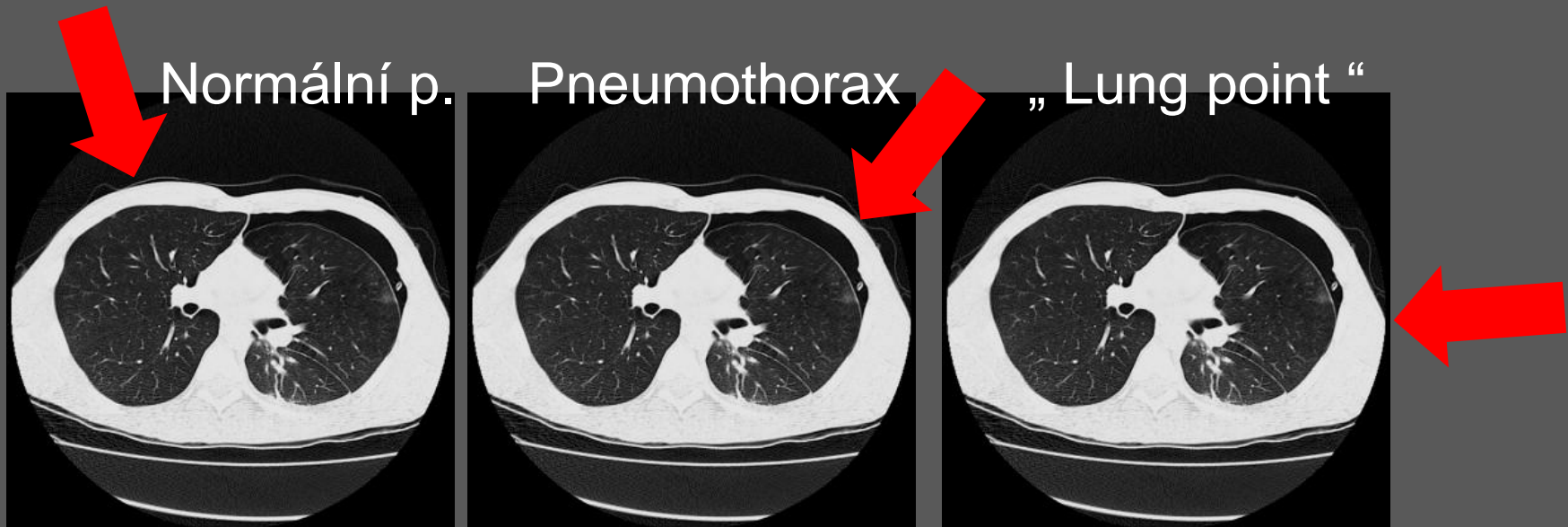


- Není lung sliding



Může být pneumothorax





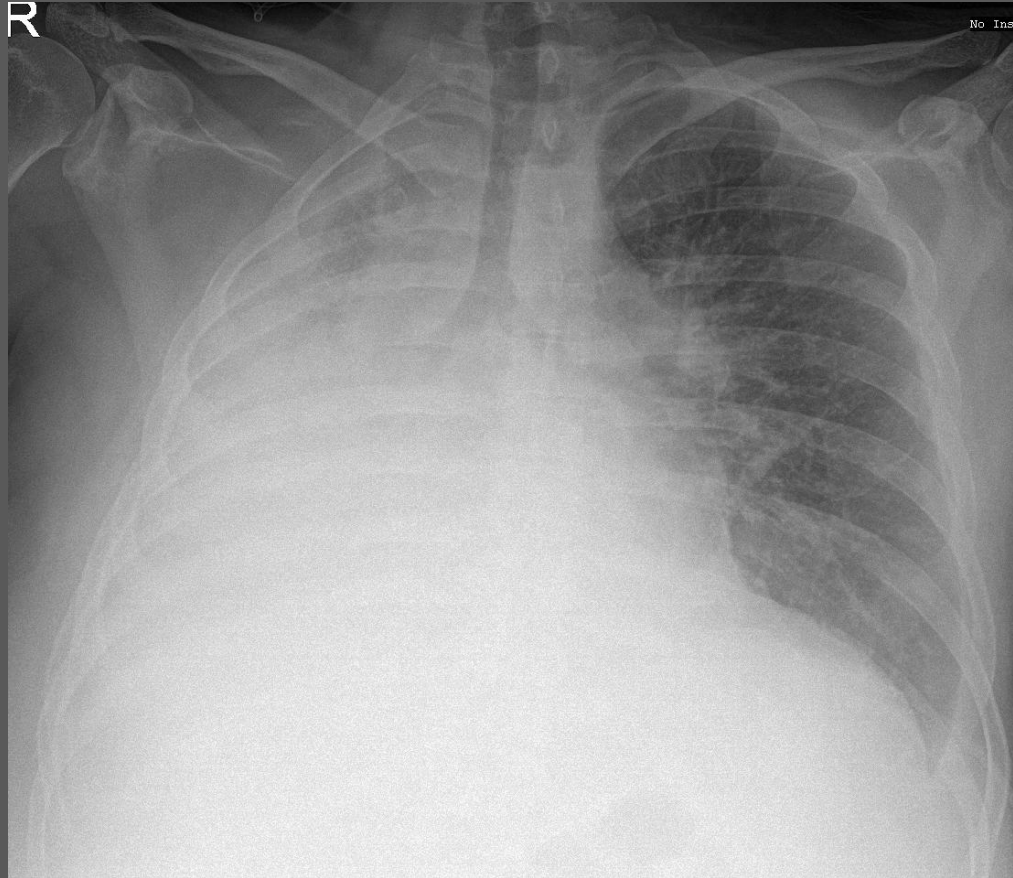
USG diagnostika PTX - lung point Senzitivita 85,7%, Specifita 98%

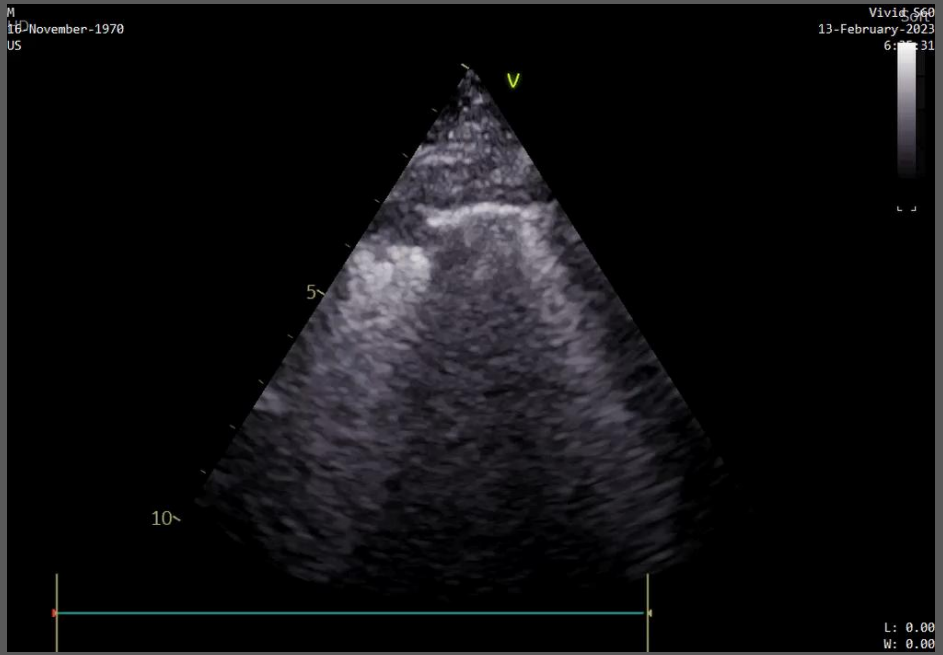


Lung sliding chybí

- zástava dechu
- pleuritidy
- talkáže
- těžkého emfyzému
- kompletní atelektázy
- bazálně u těžkých ARDS (přítomen však ventrálně)

43-letý pacient s adenocarcinoma P plíce st.p. dekortikaci plíce a talkáži





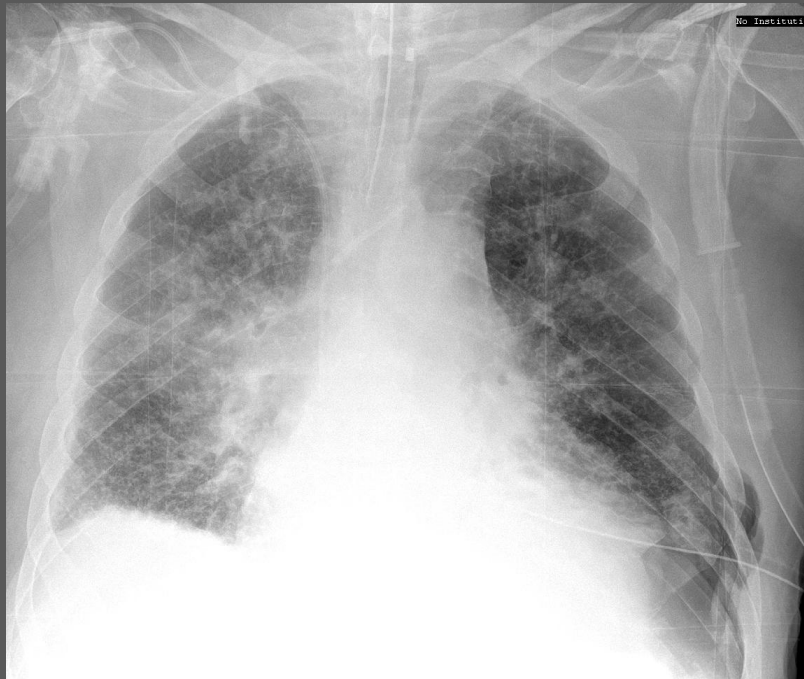
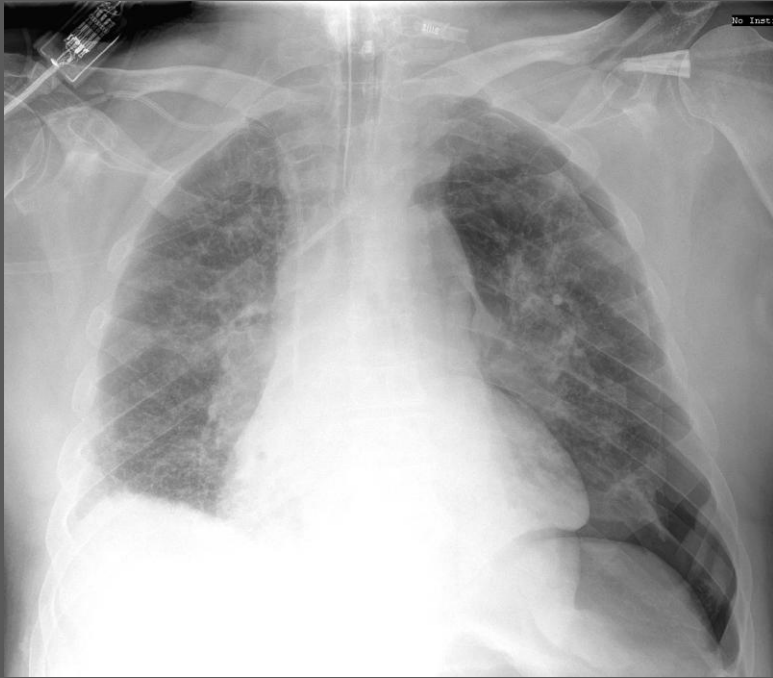


11:42:42
HD

Soft
11:42:26
HD

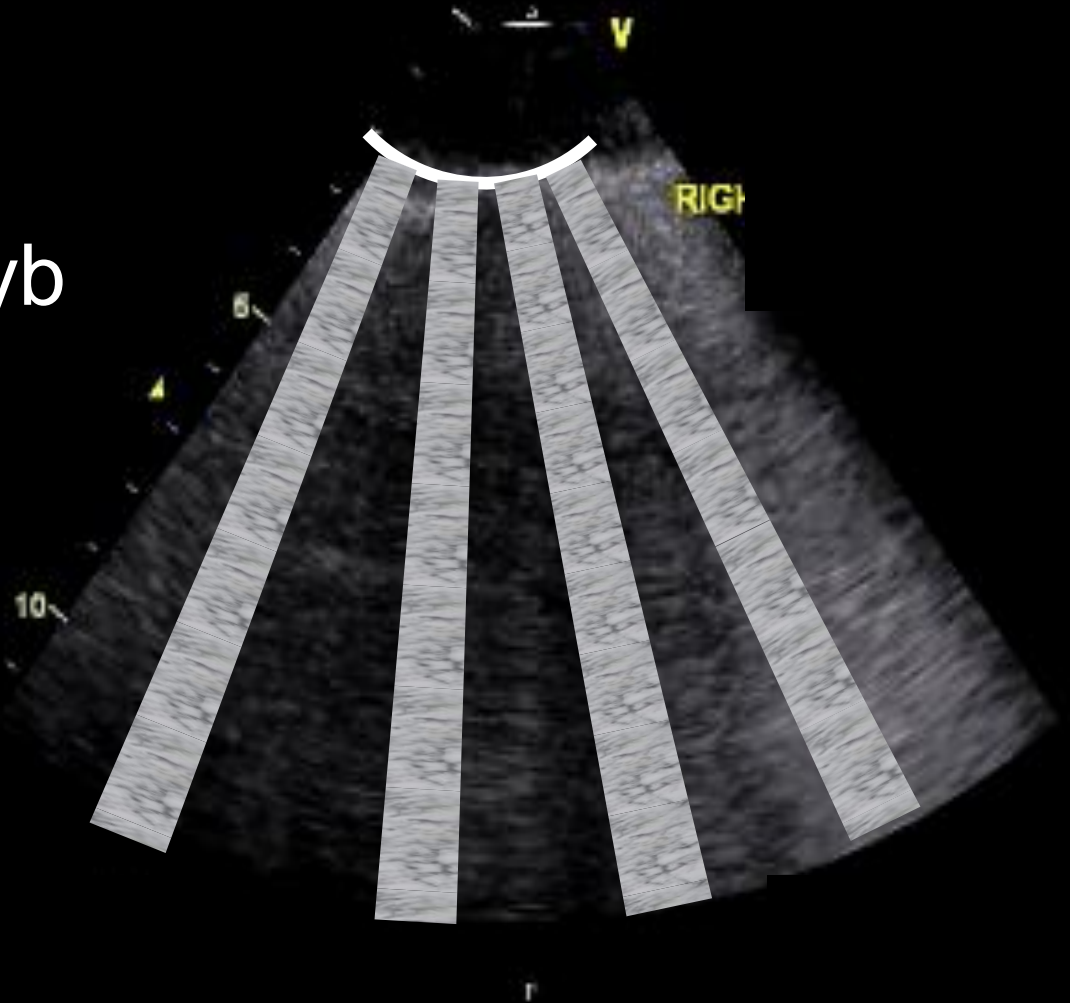
So





Intersticiální syndrom

- B linie
- Kyvadlový pohyb
- Z pleurální linie
- Dosahují až k „bazi“



Intersticiální syndrom

- Plicní otok (kardiogenní i jiné příčiny)
- Bronchopneumonie
- ALI/ARDS
- Intersticiální plicní proces (pneumonie, pneumonitidy, fibróza)

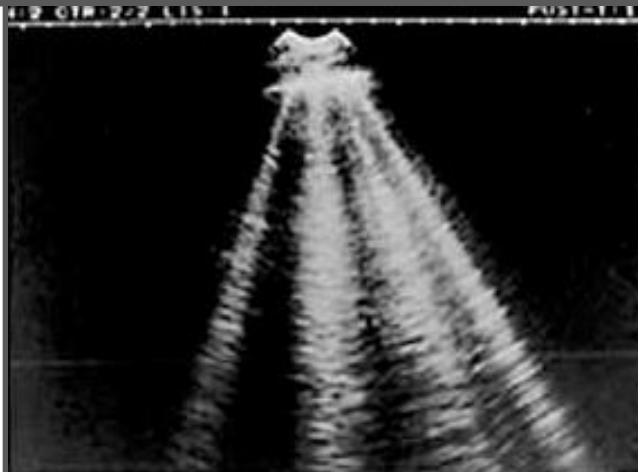


Lung rockets - intersticiální syndrom

Plicní otok



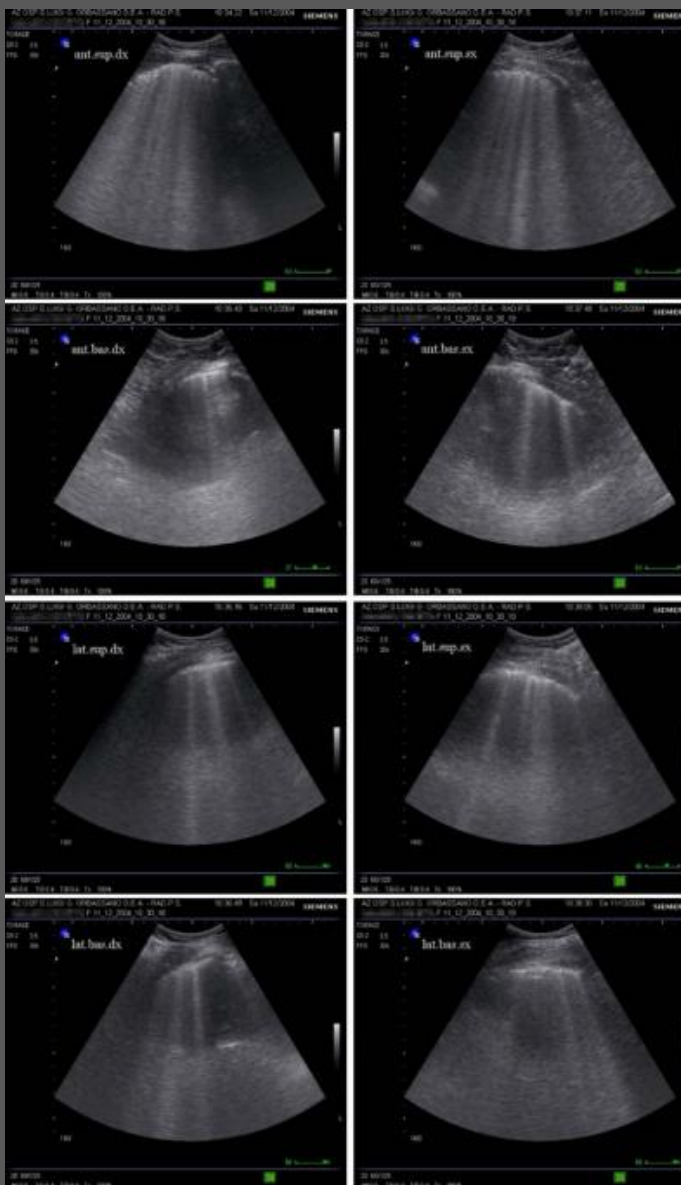
Fibróza



Lichtenstein et al. The comet-tail artifact: an ultrasound sign of alveolar-interstitial syndrome. Am J Respir Crit Care Med 1997;156:1640-6



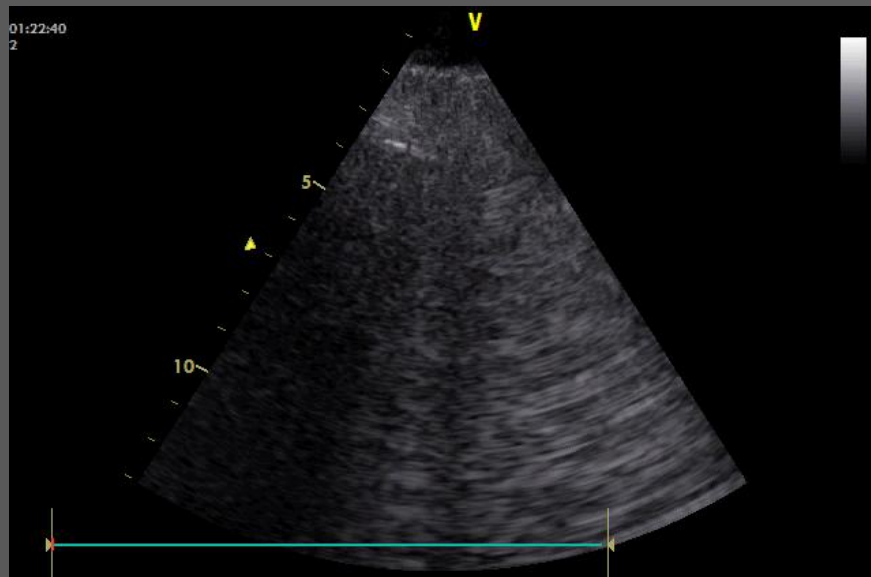
Idiopatická plicní fibróza



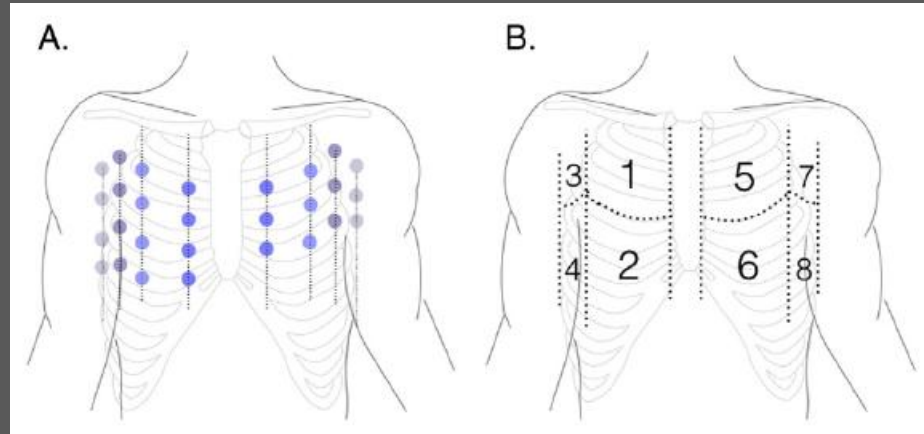
Volpicelli et al. Bedside lung ultrasound in the assessment of alveolar-interstitial syndrom. American Journal of Emergency Medicine (2006) 24, 689 – 696



Plicní edém

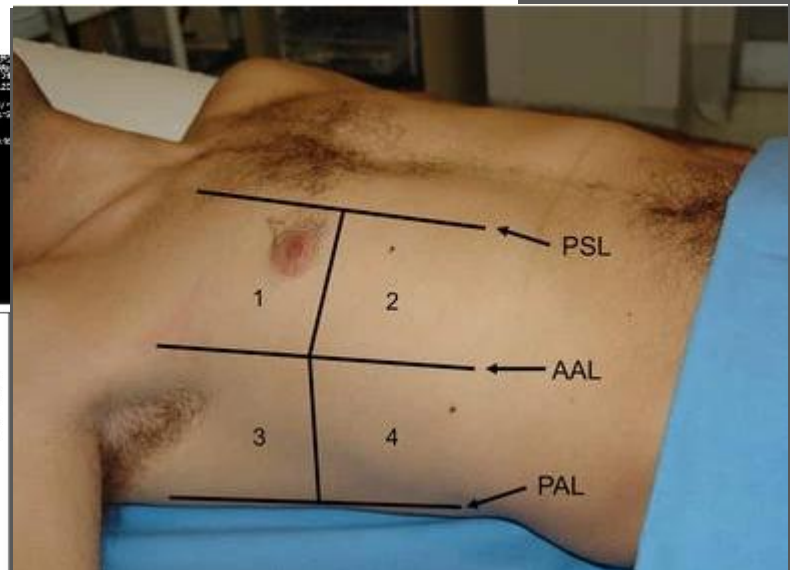


Intersticiální syndrom



Normal: no ULCs **Abnormal: ULCs**

	Mid-axillary	Anterior axillary	Mid-clavlear	Para-sternal	Inter-costal space	Para-sternal	Mid-clavlear	Anterior axillary	Mid-axillary
right side					2				
					3				
					4				
					5				
									left side



Volpicelli G, Cardinale L, Garofalo G, Veltri A. Usefulness of lung ultrasound in the bedside distinction between pulmonary edema and exacerbation of COPD. *Emerg Radiol* 2008;15:145–51.



Intersticiální syndrom

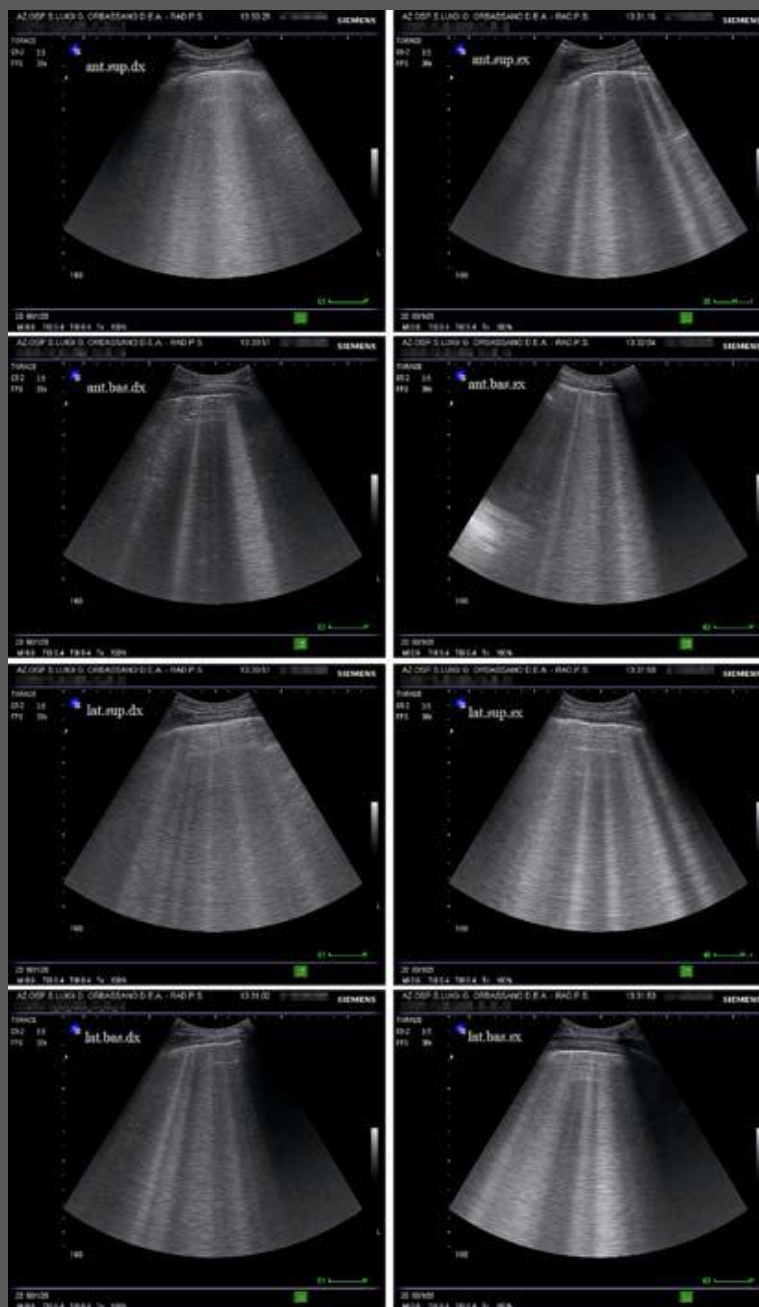
linie B odpovídají zesíleným interlobulárním septům o šířce ne více než 700 μm , velikost, která je pod rozlišením ultrazvuku, ale umožňuje generování artefaktů

sensitivita 85.7% a specificita 97.7%



Volpicelli et al. Bedside lung ultrasound in the assessment of alveolar-interstitial syndrom. American Journal of Emergency Medicine (2006) 24, 689 – 696



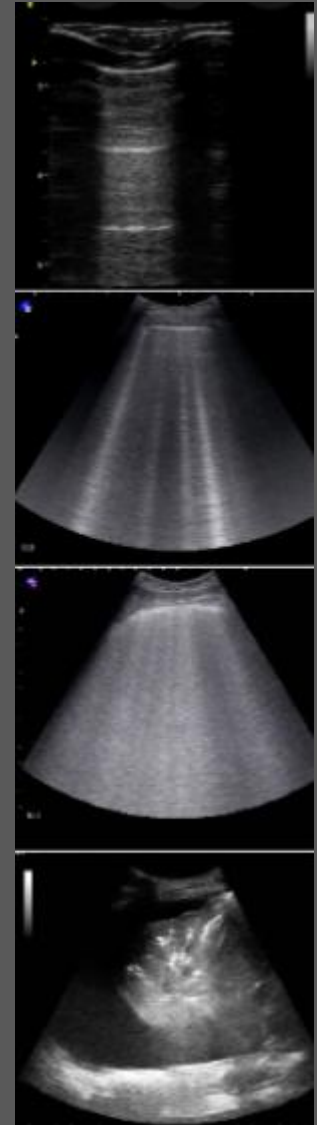


Volpicelli et al. Bedside lung ultrasound in the assessment of alveolar-interstitial syndrome. American Journal of Emergency Medicine (2006) 24, 689 – 696



Lung ultrasound score

- 0** přítomnost pleurálního slidingu s liniemi A nebo maximálně 2 izolované linie B
- 1** mírná ztráta provzdušnění plic: několik dobře definovaných linií B (linie B1)
- 2** těžká ztráta provzdušnění plic: více splývajících linií B (linie B2)
- 3** plicní konsolidace: přítomnost dynamického bronchogramu

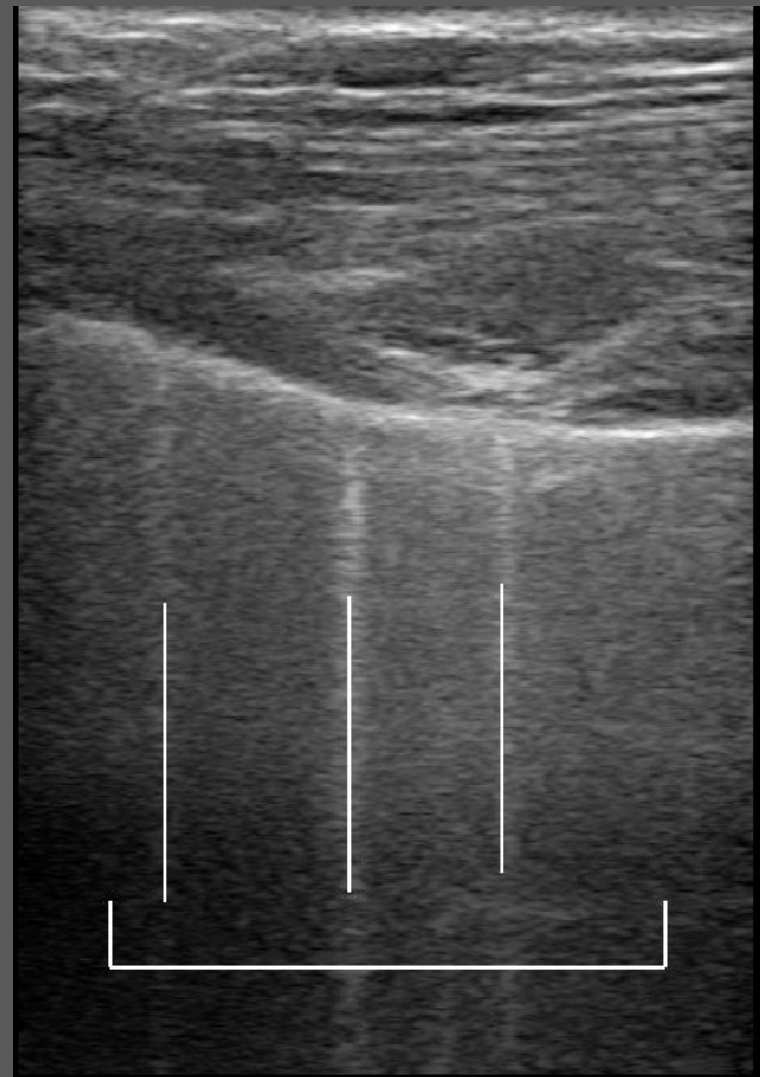
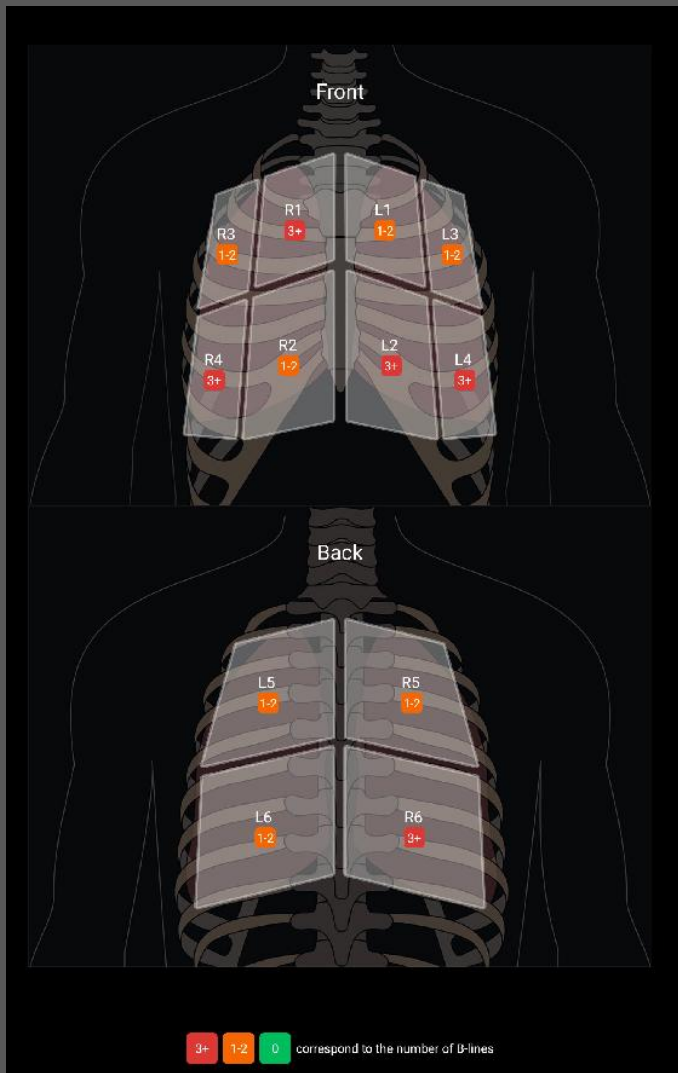


	cLUSS	qLUSS
score 0 – normal aeration	A lines – max 2 B lines	A lines – max 2 B lines
score 1 – moderate loss of aeration	≥ 3 well-spaced B lines	artefacts ¹ occupying ≤ 50% of the pleura
score 2 – severe loss of aeration	coalescent B lines	Artefacts ¹ occupying > 50% of the pleura
score 3 – complete loss of aeration	tissue-like pattern	tissue-like pattern

LUSS: Lung ultrasound score; cLUSS: coalescence score – traditional score where the switch from score 1 to score 2 is determined by the presence of B-lines coalescence; qLUSS: quantitative score – the new modified score where the switch from score 1 to score 2 is determined by the percentage of pleura occupied by artefacts.

¹ Artefacts considered for the assessment of percentage of occupied pleura: well-spaced B lines if ≥ 3, coalescent B lines, subpleural consolidations.



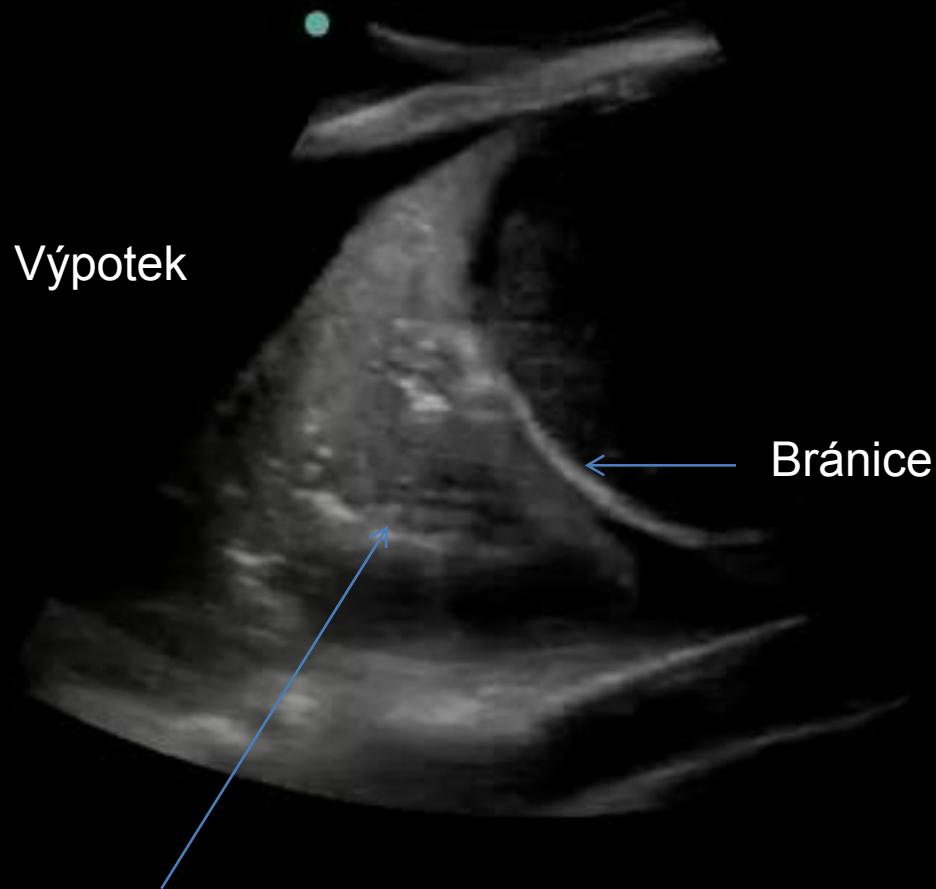


Alveolární syndrom

- Konsolidace (tekutina v alveolech)
 - těžký edém
 - krev
 - infekce
- Atelektáza (kolaps alveolů)
 - bronchiální obstrukce
 - zevní útlak výpotkem



Konsolidace plíce



Plíce se zobrazuje jako parenchymatózní tkáň (hepatizace)

Konsolidace plic

- „Hepaticizace“
- Má nepravidelnou echogenitu
- +/- Bronchogram
- +/- Výpotek
- Ztluštění pleury, **není Lung sliding !**

Pneumonie - USG senzitivita 90%, specifita 98%



Konsolidace plic

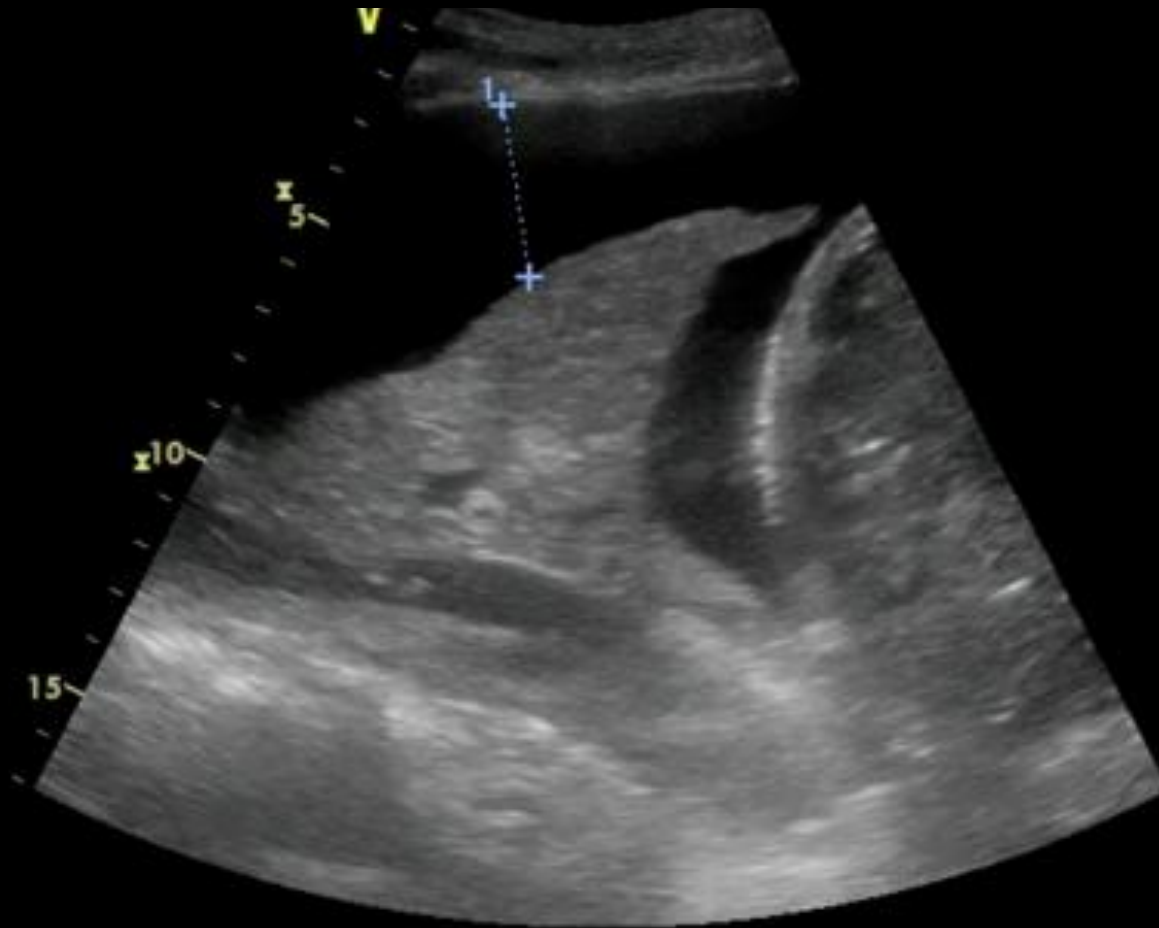
Bronchogram



Konsolidace plíce



Pleurální výpotek



Pleurální a perikardiální výpotek



20:53:48
HD



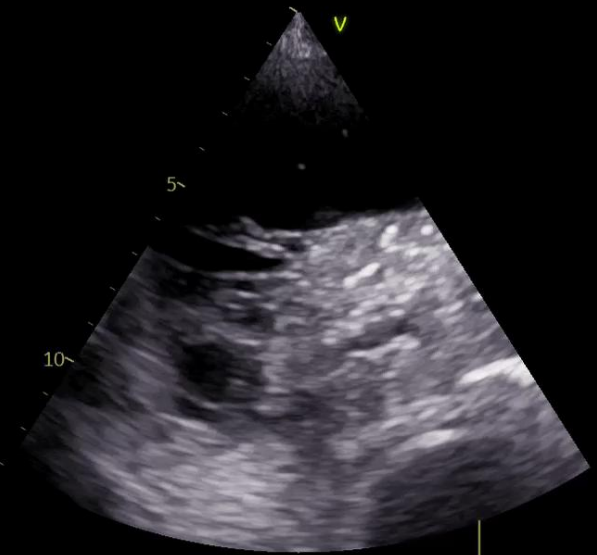
Soft 20:53:27
HD



Soft



20:20:08
HD



Soft
20:20:59
HD



Soft





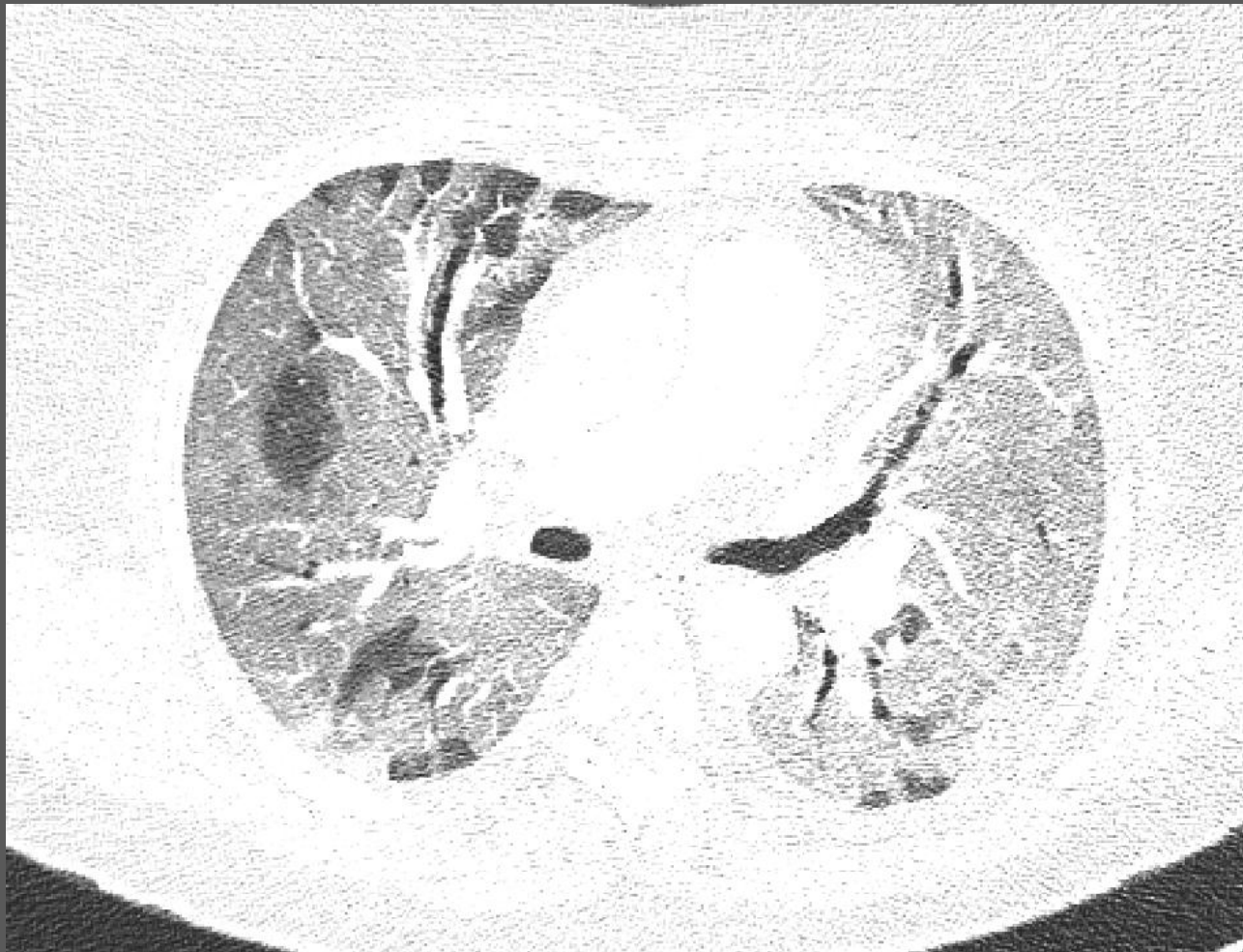




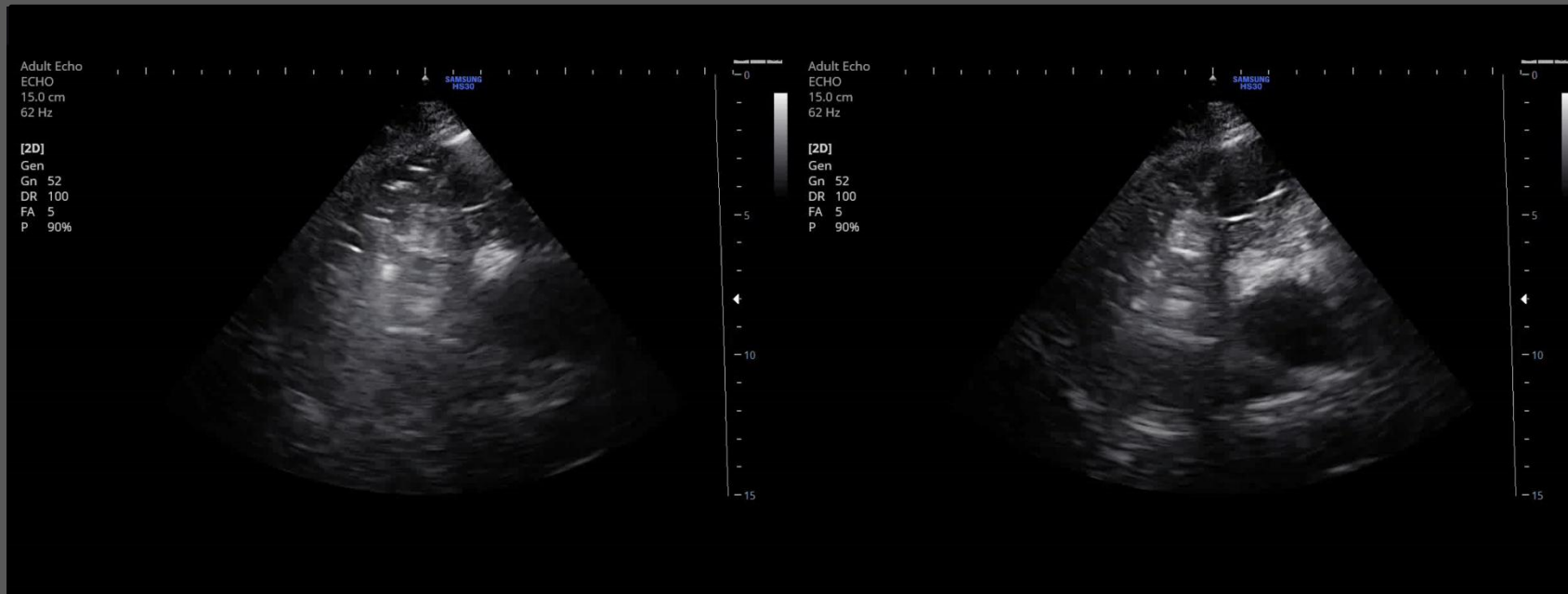
Covid 19



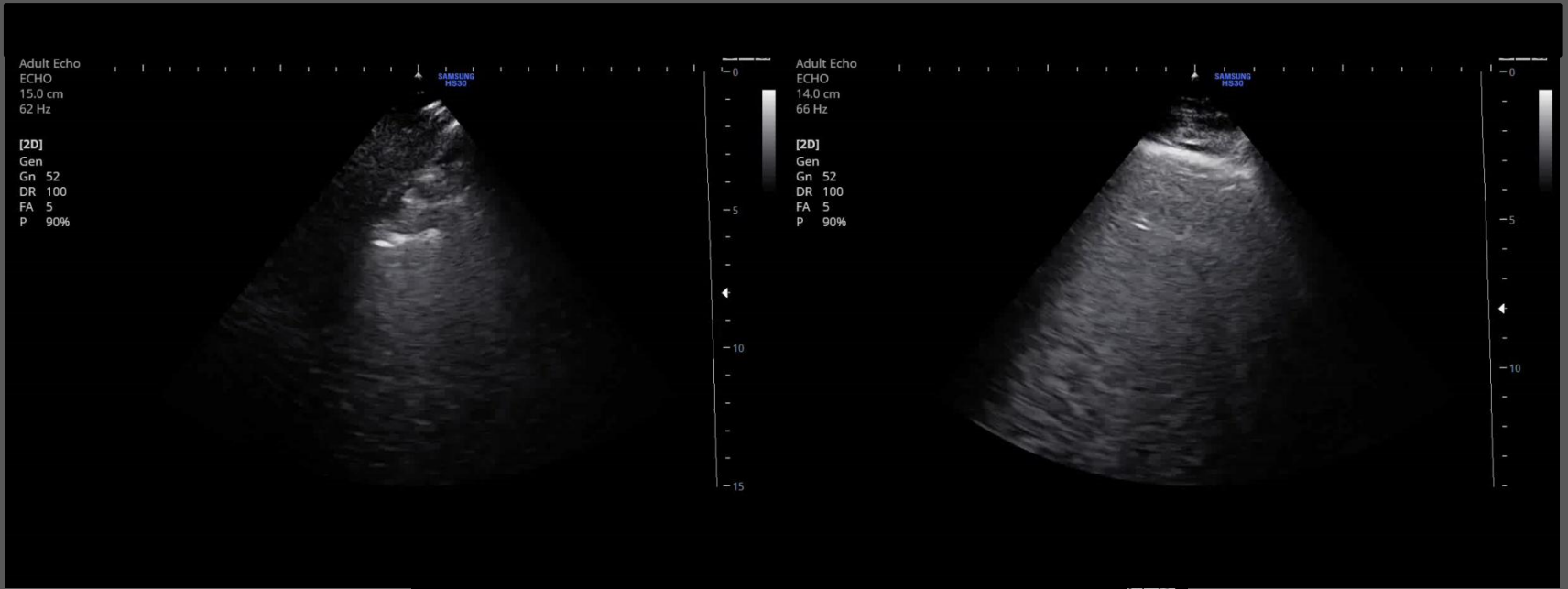
Covid 19



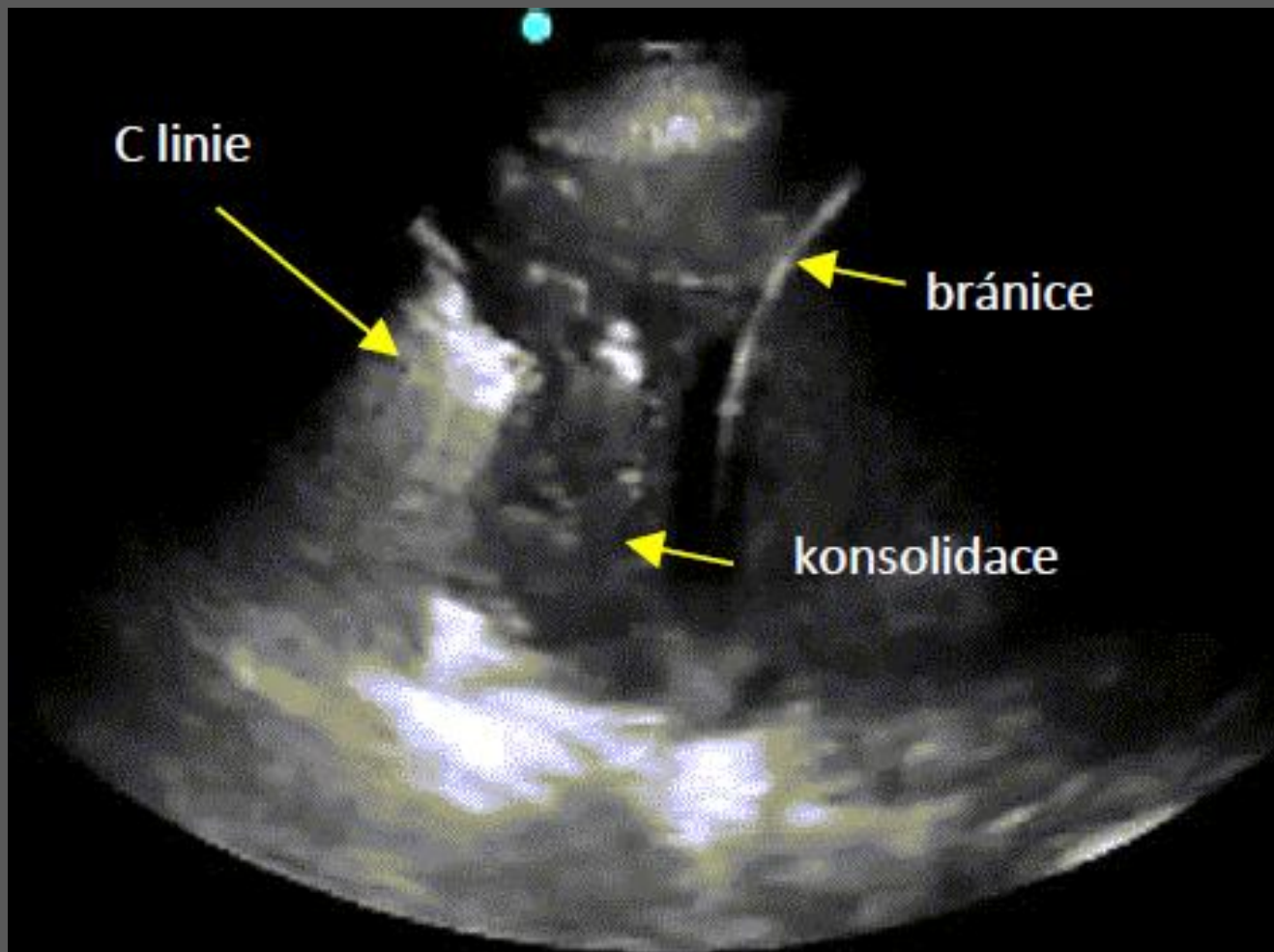
Covid 19



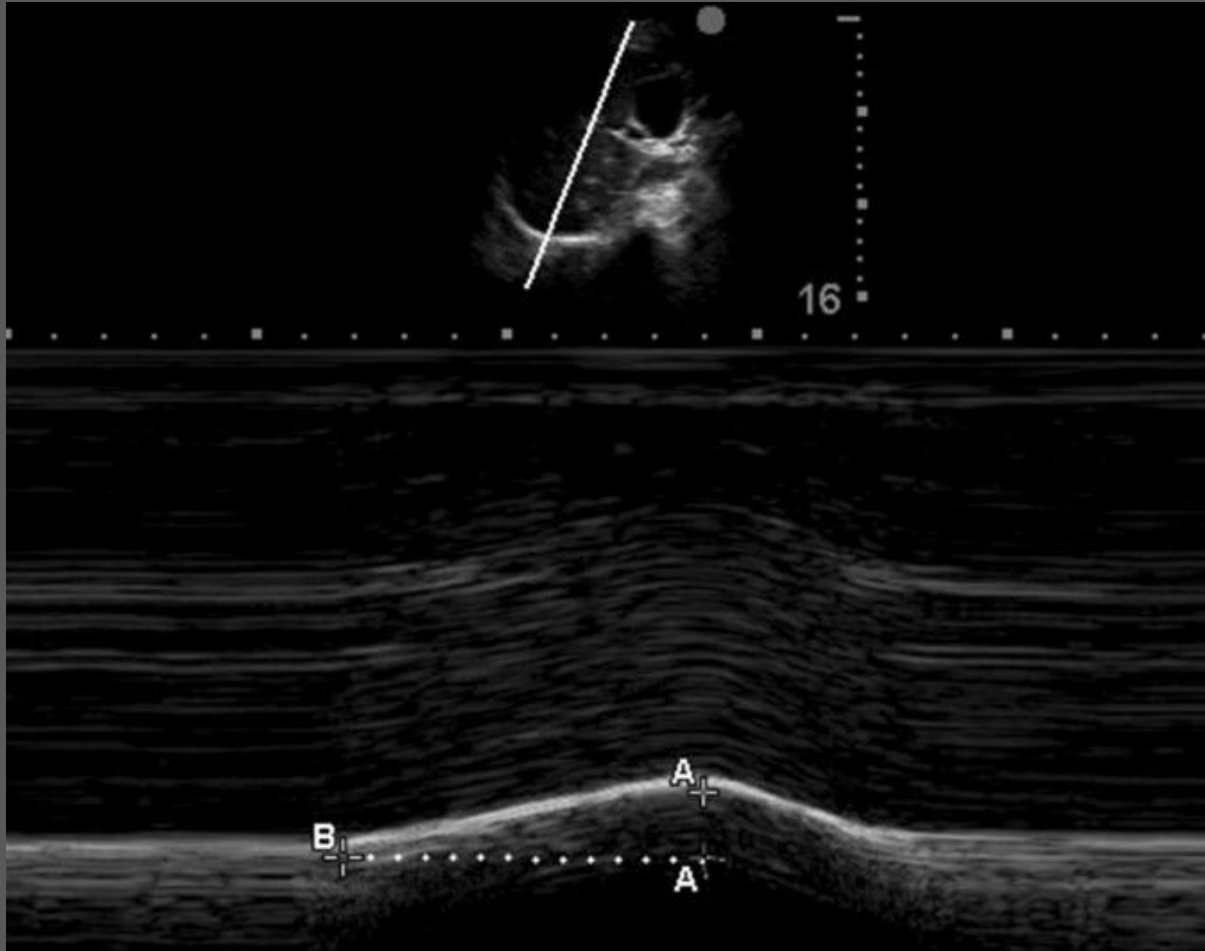
Covid 19



Covid 19



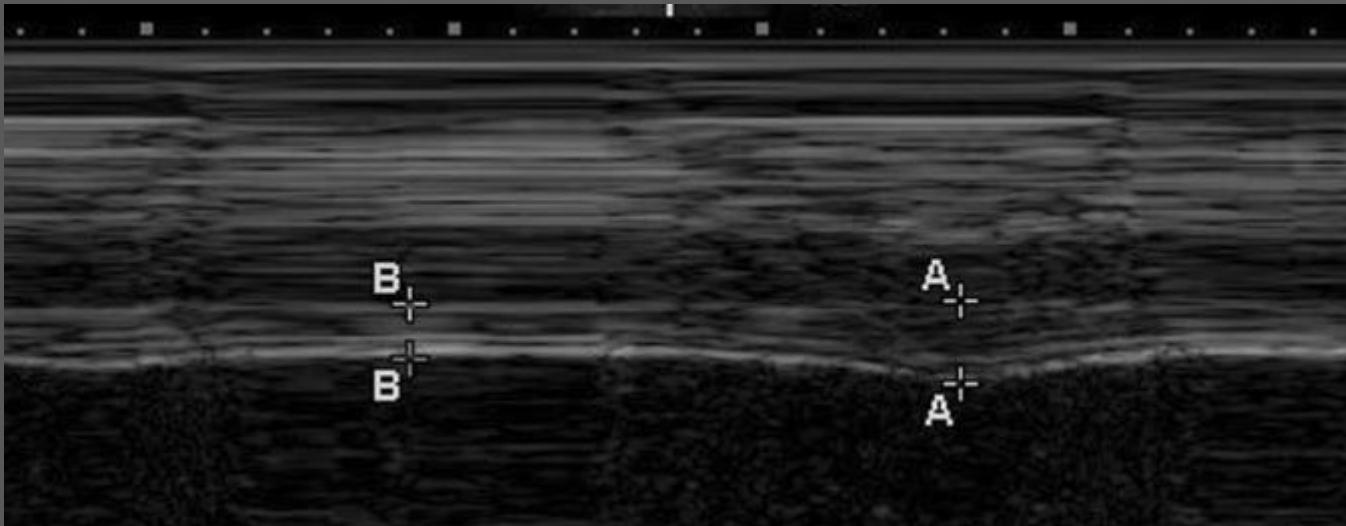
Ultrazvuk bránice



Theerawit, P et al. Diaphragmatic parameters by ultrasonography for predicting weaning outcomes. BMC Pulm Med 18, 175 (2018)



Ultrazvuk bránice

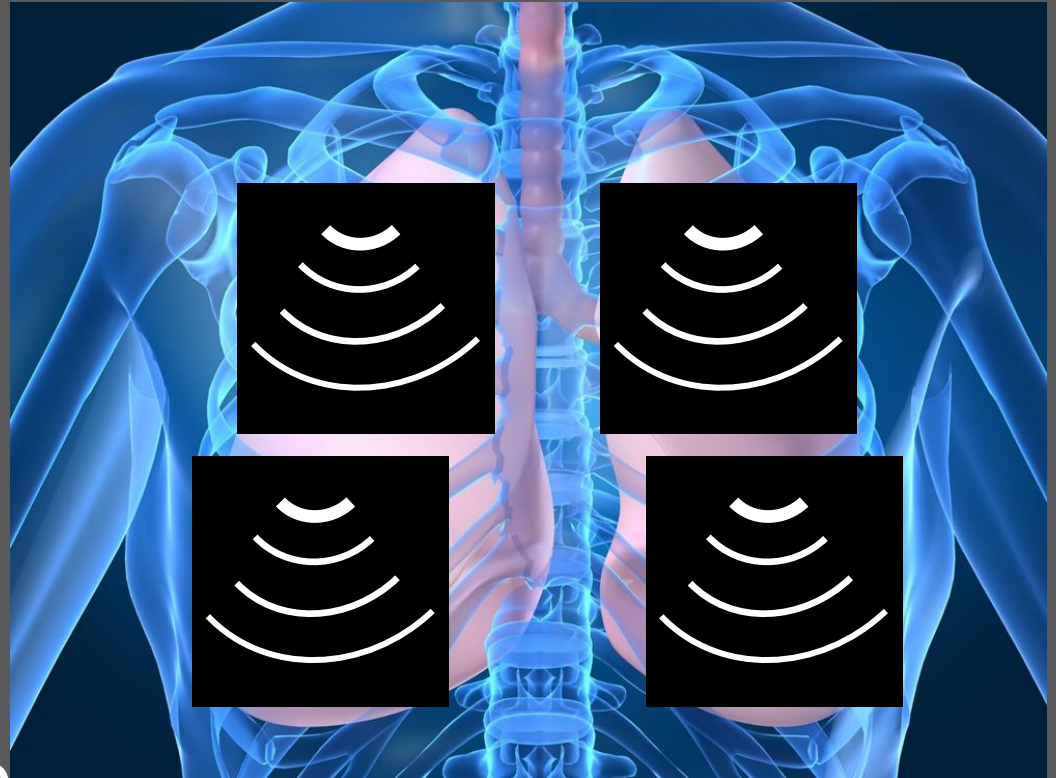


Theerawit, P et al. Diaphragmatic parameters by ultrasonography for predicting weaning outcomes. BMC Pulm Med 18, 175 (2018)



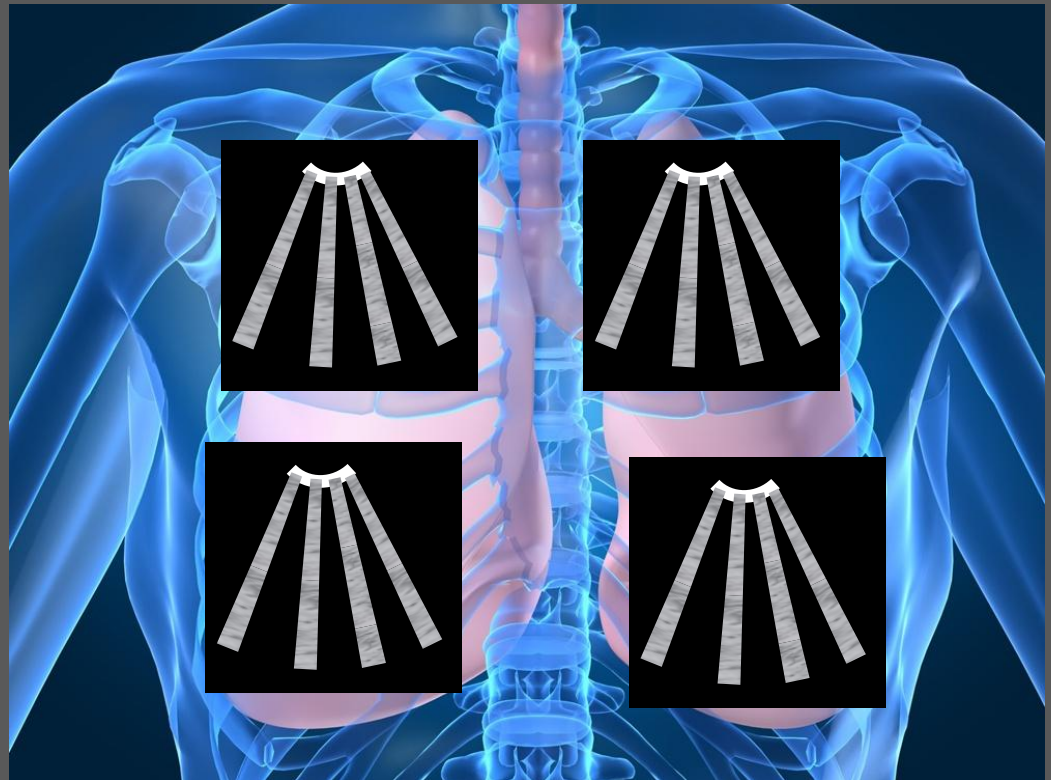
A linie oboustranně + lung sliding

- CHOPN
 - Astma
 - Plicní embolie
-
- vyloučen plicní otok



B linie oboustranně + lung sliding

- Plicní otok

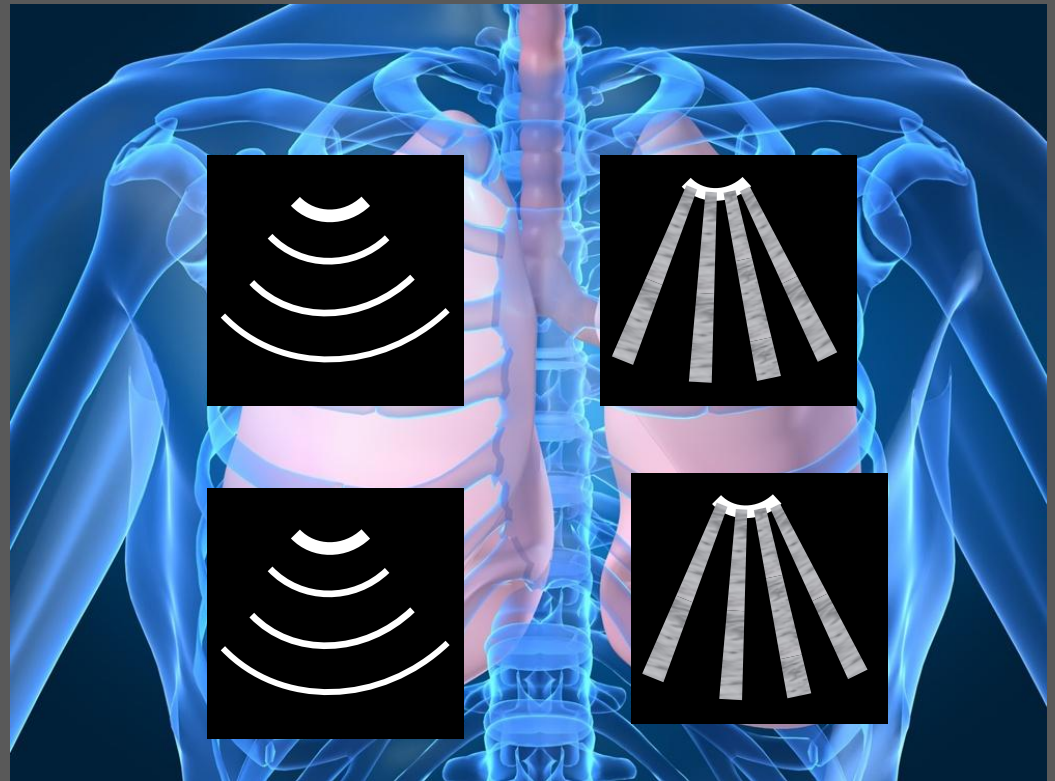


- vyloučeno CHOPN (A linie oboustranně)
- PE
- PTX (nejsou B linie)



B linie jednostranně

- Pneumonie

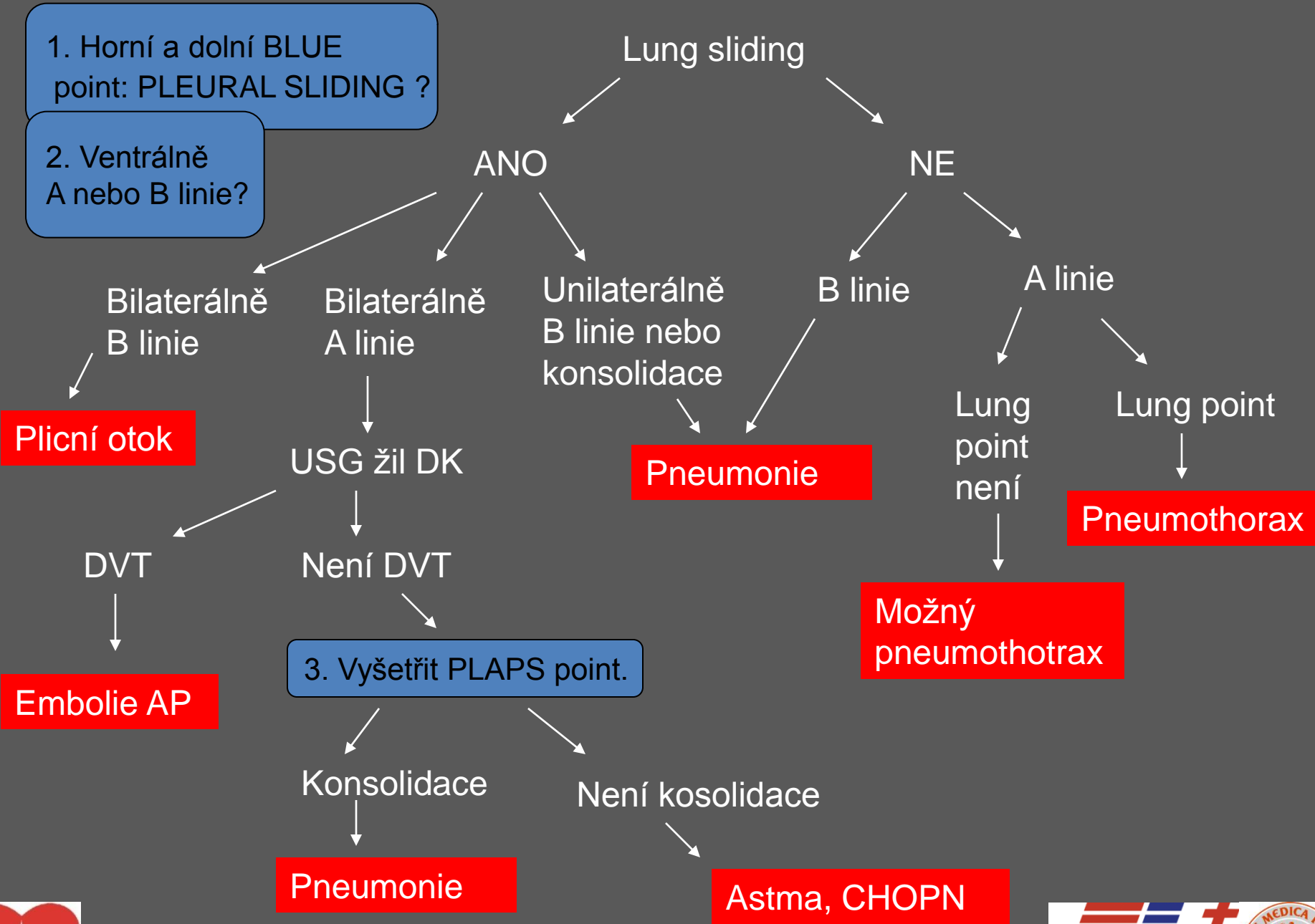


- vyloučen plicní otok (B linie oboustranně)



1. Horní a dolní BLUE point: PLEURAL SLIDING ?

2. Ventrálně A nebo B linie?





Děkuji za pozornost...

