

Lung US Podcast Notes - PTX

FUN FACT 1st US report of PTX was in a horse in 1986

Which probe? linear? curvilinear? phased array? micro convex

Lung presets are helpful or turning of tissue harmonics and **WEIMERSHEIMER** or just use a soft tissue preset

Where do u put it? Jerry Hoffman pattern recognition, hypothesis testing- so depends on what I'm looking for

Accuracy of POCUS vs CXR (1,2) US way more sensitive ~90% vs ~50% for CXR, but specificity was roughly the same ~99%.

LUS for PTX is based on four basic signs (Volpecelli et al 2012):

1. Absence of lung sliding,
2. Absence of B-lines,
3. lung point,
4. Absence of lung pulse

caveats -> obesity, subcutaneous emphysema can make the exam impossible.

1. Lung sliding

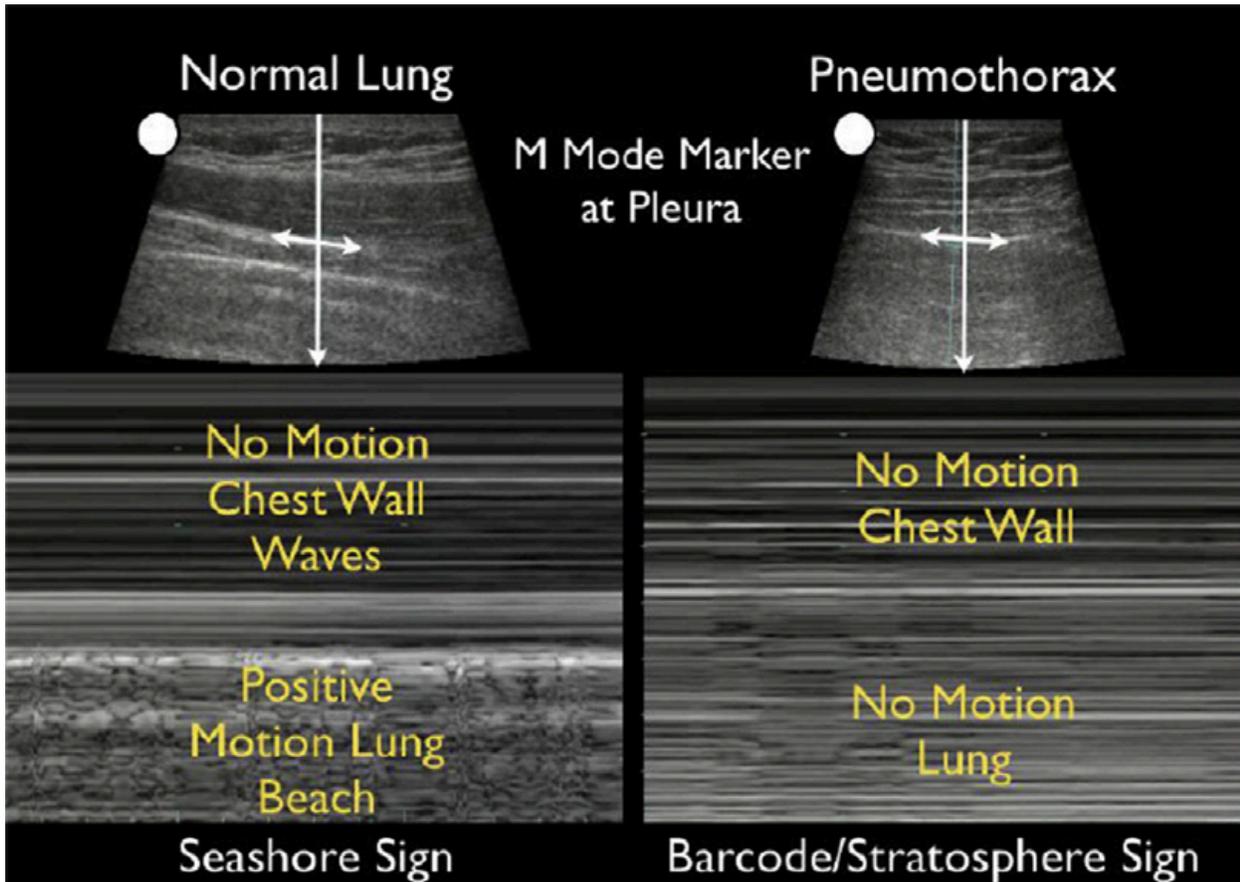
The pleural line is a bright (hyperechoic) line just beneath the ribs and sonographically represents the visceral and parietal pleura. Beneath it (far field on the US screen) you can see regular reverberation artifacts called A lines.

How can you tell if it is sliding?

- **visual observe** “ant’s marching” “Sliding”
- **power slide:** Color power doppler can detect motion. Cunningham 2002 J of Trauma coined this concept of using color power doppler to see movement at the “ thoracopleural interface.”
- **normal comet tail or reverberation artifacts (beads on a string):** This artifact arising from the deeper visceral pleura should normally move with

the lung during respiration and is absent when air or pneumothorax is present

- **M mode** to detect Sandy beach where sea over sand is good - all sea is bad. (Or as the esteemed Justin Cook says - do you wanna be lost at sea or on the beach!?)



From LOBO DOI 10.1016/j.ccc.2013.08.002

What if it isn't sliding?

Multiple causes -> PTX, severe COPD/Asthma, effusions, empyemas, hemopneumothoraces, apnea, chest tubes, main stem tubes, adhesions/consolidations

2. B Lines.

Another form of reverberation artifacts. Multiple names -> lung rockets, comet-tail artifacts, headlight in fog, but for the purist we go with Lichtenstein..."The B line

is the name given to an artifact with seven features: a hydroaeric comet-tail artifact; arising from the pleural line; hyperechoic; well defined; spreading up indefinitely; erasing A lines; and **moving with lung sliding** when lung sliding is present” (DOI: 10.1378/chest.07-2800)

- By definition they originate from the visceral pleura, so if at the point of the probe you see them then obviously the parietal pleura and visceral pleura are together i.e., no PTX.

3. Lung points

- “Movement of pleural line in and out of the frame is described as a lung point sign, and is commonly often (but not always) pathognomonic for pneumothorax.
- Diaphragm, heart, blebs can make you think you are seeing a lung point of PTX origin. If you go too low on the chest you can get the “Curtain Sign” or too close to the heart-> another false lung point
- How can you tell? look deep to the non-sliding pleural line. If you see movement or tissue and absence of a-lines, your scan does not represent a true positive lung point” US of the week

Pro Tip - go short axis to get more of the pleural line

- 100% specific and predictive of PTX if you see it
- Hydropoint where you have sub pleural air and fluid excellent review from Farkas Like a lung point (US probe over area of both a PTX and normal lung) a hydro point shows a PTX on one side and fluid on the other. This fluid can obviously be blood, pus, effusion. Obviously this makes more sense if you scan from anterior to posterior (in a supine patient)

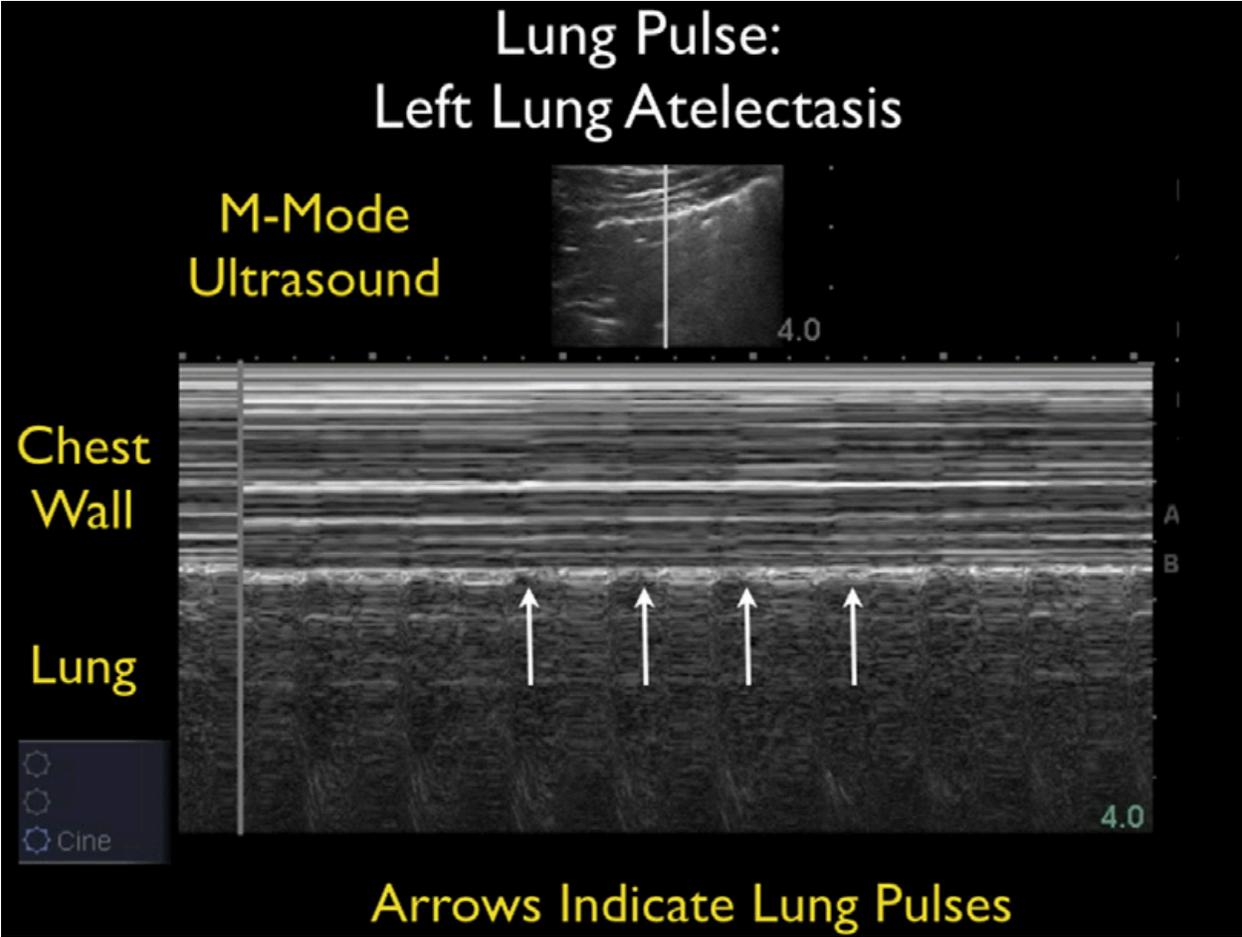
Complex PTX (according to Vopicelli 3)

a double lung point is when you can see both points where sliding and non sliding occur in the same image.

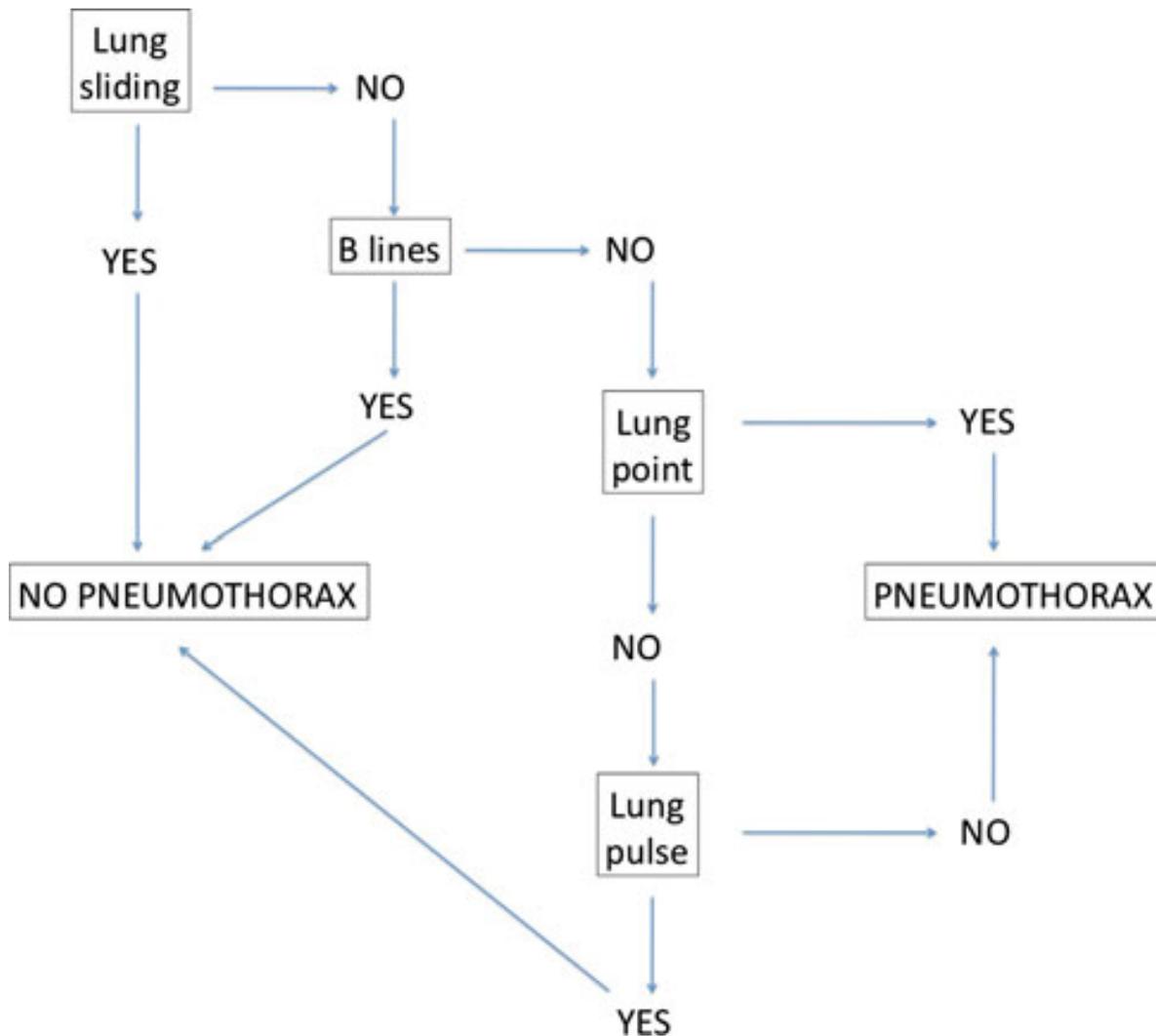
This can occur with small air trapping from pleural adhesions, blebs or acute traumatic lung contusions. Tiny spontaneous pneumothoraces may not completely detach the pleural layers.

4. Lung Pulse.

subtle rhythmic movement of the visceral upon the parietal pleura with cardiac beating



From LOBO



FROM Vopicelli et al (6)

Additional PTX US quick learning videos

- [Justin Cook's](#)
- [REBEL EM](#)

Great general thoracic US vodcasts

- 1) Vicki Noble, MD on Ultrasound Podcast [here](#) and [here](#)

- 2) Jacob Avilla, MD [5minute Sono lung](#)
- 3) Dr. Fox The Godfather [here](#)

1. Cunningham J, Kirkpatrick AW, Nicolaou S, et al. Enhanced recognition of “lung sliding” with power color Doppler imaging in the diagnosis of pneumothorax. *J Trauma* 2002; 52:769–771.
2. Ding W, Shen Y, Yang J, et al. Diagnosis of pneumothorax by radiography and ultrasonography: a meta- analysis. *Chest* 2011;140:859-66. [Epub 2011 May 5]
3. Alrajhi K, Woo MY, Vaillancourt C. Test characteristics of ultrasonography for the detection of pneumothorax: a systematic review and meta-analysis. *Chest* 2012; 141:703-8.
4. Volpicelli G, Boero E, Stefanone V, Storti E. Unusual new signs of pneumothorax at lung ultrasound *Crit Ultrasound J.* 2013; 5:10. Available [free here](#)
5. Lee FCY. Lung ultrasound—a primary survey of the acutely dyspneic patient in intensive care. 2016; 4(1). Available free [here](#)

6. Volpicelli G, Elbarbary M, Blaivas M et al. International evidence-based recommendations for point-of-care lung ultrasound. *Intensive Care Med.* 2012; 38(4):577-591.
7. Lobo V, Weingrow D, Perera P, Williams SR, Gharahbaghian L. Thoracic Ultrasonography *Critical Care Clinics.* 2014; 30(1):93-117.