Lung and Pleura Online Class with Jeffrey Burch, 4-14-20

Notes by Holly Krebs

Pleura

Parietal pleura – lining of the chest wall
Visceral pleura - wrapping around the lung
Two layers together are a continuous structure wrapped around itself to create two layers
Pleura is adjacent to the chest wall on the sides and adjacent to the diaphragm on the bottom
Functional glide plane exists between two layers of the pleura

Mediastinum

Mediastinum means middle place - central compartment of the chest - contains heart, esophagus, major blood vessels and nerves - important plumbing and wires in this space
Three compartments in chest - lateral compartments of the chest each has a lung
Mediastinal pleura is the wall of the mediastinum, continuous with parietal pleura, it's a little thicker than other parts of the endocoelom become

Embryology

- Part of embryonic coelom membrane (outer membrane) folds in through lateral slits in the embryo to get into the body cavity that will become the abdominal and thoracic cavities.
- These two endothoracic envelopes pinch off from the coelom
- The diaphragm enters from the sides, carrying the membrane with it, to separate the pleural and periotoneal cavities and seal up the pleura,
- Heart descends down into space between the two envelopes, in the mediastinal space, and stomach develops before esophagus so esophagus travels up through this space,
- But a rod of tissue travels down from the throat and tissue grows to become a tube of the trachea, this rod branches to become the primary bronchi
- The bronchi push against the wall of the mediastinum, branching into the brochial tree, and taking the mediastinal wall with it
- This mediastinal will becomes the surface of the lung, aka the visceral pleura. So the visceral pleura is an expansion of this small space of the embryonic mediastinal pleura at the hylum
- This entry spot to the lungs is the hylum (upside down teardrop shape) and also carries blood vessels and vagus nerve
- 95% of the lung has serous fluid (like blood plasma or interstitial fluid) around it, except for the hylum
- Hylum as grommet for blood vessels, nerves, lymphatics, airway

Holly note – watched video that said pleura comes from mesoderm layer embrologically; the visceral pleura comes from the splanchnic mesoderm layer (FYI splanchnic nerves from the mid-thoracics help innervate the abdominal organs – part of the sympathetic NS); the parietal pleura comes from the somatic mesoderm layer, which also generates bones and muscles

Fibroblasts

When tissue has been injured by any cause (illness, force injury), body must repair
Fibroblasts - migratory repair cells, look like amebae that crawl around and leave threads behind them like silk worm, in tissue damage, fibroblasts "smell" that tissue damage and congregate and produce more tissue, they can lie down too much fiber, bias towards collagen rather than the right mix of collagen and elastin, gradually the body will remodel this tissue towards a better mix, but still tends to be higher in collagen
Fibrosity – general term overgrowth of fibers,
Adhesion - when fibers grow across a lubricated glide plane so the two layers are adhered together and the appropriate glide is reduced in that space, excess fiber, but loss of glide between two structures
Contracture - fibrosity inside of an organ or structure, not elastic enough tissue, reduction in ability to elongate

Lungs and Adhesions

Lungs - breath ~25,000x/day, they're delicate structures, easy to develop adhesions; in medical literature, assumption that we develop more adhesions gradually through life, Intense illnesses create lots of adhesions, this lack of glide limits ability to breathe, More adhesions means less breath and more energy required for breath

Mobility test glide of pleura

- Rib movement with inhalation
- Bucket handle up on the side and pump handle up in the front,
- Diaphragm goes down stretching the lungs vertically at the same time the ribs are swinging up,
- There's an up-down glide between lungs and chest wall
- How to test for restriction
- put hand on chest, sink into layer between lung and chest wall, with that layer engaged, take chest wall superior and ask if it can slide up against the lungs
- Can test this in very specific spots along the chest wall too and more precisely identify the shape of the adhesion

How to reduce the adhesions

- Different strengths of adhesions based on seriousness of injury and how strong the body's response was
- Wispy fibers are easier, always proceed gently and gradually with this, always temptation to work harder when what you're doing doesn't work, but avoid this
- Lungs are not the sturdiest tissue in our body, so be gentle with them, may need to do repeated treatments to work through thicker issues

Several different treatment methods
- JPB listen and follow technique, sink into the chest wall and allow an unwind to occur
- Harold Hoover, osteopath method ??
- Jeffrey's technique

Breath Actuated Shear Technique (a type of First Barrier Shear Technique)

- Sink to the layer of the adhesions, just inside the chest wall ("sink down to level of interest")
- Very gently and slowly take the ribs up towards the head until you reach the very hint of resistance
- Have the person breathe to take the lungs down and shear the lungs down away from the ribs, their respiratory mechanism is pulling on the adhesions and separating the plueral layers ()
- DO NOT ask people to breath more deeply and take conscious control of the breath because that always adds tension to the system, can distract them with stories at this time so their breath is as easy and natural as possible
- This technique doesn't work at the sternum because the mediastinal pleura doesn't move the same way
- Can do this technique laterally with person on their side, can try to glide scap out of the way to access the upper ribs, if you can't, need to use lower ribs as a long lever
- Can do this technique prone to access back pleura

Parietal Pleura

Parietal (means wall, like partition) pleura can become fibrotic within itself, stiff (contracture); and it can become stuck to visceral wall; if the two are stuck together, you can't assess whether the parietal pleura is rigid

Assess the parietal pleura

To assess the parietal pleura, can use the ribs to stretch a portion of the chest wall, since parietal pleura is attached directly to the chest wall, must sink to the right layer to access this, can have an irregularly shaped area to work

Used First Barrier Stretch Technique

- stretch ribs until very first hint of resistance,
- sit with very gentle stretch until it relaxes,
- do mobility testing before so you can test again and see if you made sufficient change

Lung-Diaphragm pleural technique - Glide plane between the inferior surface of lungs and the parietal pleura on the surface of the diaphragm and into the diaphragmatic recess

- Diaphgram attaches to the inside surface of the lowest ribs - costal arch inferiorly, when we breath the ribs move laterally and the diaphragm moves down, which opens the diaphragmic recess of the pleura to let the lung move into that space
- If pleura is stuck near the sternum/mediastinum, lung can’t expand into the diaphragmic recess space
- For technique imagine the two curved surfaces of the lung and the diaphragm meeting each other, like two bowls nesting
- Top of the diaphragm at R5 (half a rib space higher on right due to liver space)
- He held lung with upper hand and diaphragm with lower hand and sheared them away from each other by pivoting the lung laterally while moving the diaphragm medially and vice versa

- Parietal pleura in the diaphragmatic recess – the pocket of parietal pleura between the low lateral chest wall and the lateral diaphragm - can get stuck together; signature symptom is lower flared rib for these costodiaphragmatic recess adhesions
- Heel of hand low on costal border and gather the ribs superiorly, as they breath, they will glide the recess walls against each other

Mediastinal Pleura

Hearts cross the midline, but center of heart is about left 4th costal cartilage

Mediastinal pleura - parts above and below hylum need to be treated differently

Lower mediastinal pleura

- Often does this technique standing but did side-lying, scoop lung towards spine and then up
- Gently move them around a little; there's not a lot of movement with breath here so gently tease the restrictions apart

Glide plane between the mediasinal pleura and lungs doesn't move with breath because they both elongate with breath; restrictions show up as trunk movement restrictions

How to treat the mediastinal pleura above the hylum

- Walls of the mediastinal have continuities up into the neck, so can use the neck as long lever to access the mediastinum
- Other hand on thoracic inlet very medial
- Turn neck one direction while rotating the rib cage the opposite direction to shear the mediastinal pleural layers
- Stop at first layer of resistance, work gently to release

To address parietal pleura stiffness in Respiratory diaphragm

- Hold costal margin and slack the diaphragm by gathering it in and up along the curve of the diaphragm,
- Then observe how it releases back and can even it stretch it gently (must release adhesions between the pleural layers first

To address mediastinal pleura stiffness

- Hold mid-thoracic spine and the sternum, rotate the spine towards your hand and up while rotating the sternum the opposite direction and down
- Can also hold neck, hold sternum, lift neck, take sternum down, then slowly lower neck (and play with angles to focus work on stiffest areas) to stretch anterior portion of mediastinal pleura

Glide planes of the lobes of lungs

- Work between rib 3 and 7 (maybe 8)
- Ribs are angled; lines of the fissures do not correspond to the angles of the ribs
- Can use adjacent rib pairs to explore portions of the lung fissure system to find where sticky ribs may be

- Fissure movement is really important for trunk movement; so movement is in these glide planes rather than straining the tissue of the lungs
- Technique - hold lateral ribs with hands capturing two ribs right next to each other, rotate them away from each other to test the portion of the fissure that crosses those two ribs
- Technique is first barrier shear methods - many other techniques will work

Q&A

- Can do all this work with people seated, people's tolerance for pressure here is generally good
- In COPD, lots of fibrosity in that, and this would be an ongoing maintenance work for them
- Emphysema, breakdown of the membranes between the alveolis, so fewer, larger sacks with less surface area for exchange of gas - don't do this on this patients because you risk tearing the lung (bubbles in the membranes)
- How lungs remain inflated against the chest wall - Serous fluid (like plasma or interstitial fluid) leaks into the space around the chest wall, and lymphatics aggressively draw this out creating lower than atmospheric pressure outside the lungs while the lungs have higher atmospheric pressure inside; this pressure differential keeps the lungs inflated against the chest wall; pneumothorax is when the pleura/lung are pierced, you lose the pressure differential, and the lung collapses
- Don't do this work through breast tissue, apply your force tangentially from another direction, effectively using the ribs as a long lever
- Self-treatment options - a little awkward, advantage is that you can feel what's going on inside, so it's a good learning tool
- Don't do these techniques on someone with an active infection, and waiting for a week to a month allow the healing process to stabilize the tissue, and the body has had too much input from the infectious agent
- Interstitial lung disease - different from emphysema, similar effect in limiting capacity to exchange area, but instead of larger aveoli in emphysema, have more fibrosity in the lungs, so not the same contraindications
- Pulmonary embolism - blood clot from anywhere in the body, then stops blood flow to lung so tissue dies, if someone has a history of this, this work may be helpful to them to deal with fibrotic tissue from this injury; if they are prone to pulmonary embolism, don't do these techniques
- Pleurisy - inflammation of the pleura, may be infection in pleural space, also non-infectious pleurisy where it's another cause - like irritant being inhaled; can work a month after cleared from infection, not done during active infection
- Can do you motility work during a more delicate situation? Motility is inherent movement of organs named by JPB (same name as the muscular movement in peristalsis through intestines); 7.8 cycles per minute - rhythm of motility, can be stopped, reduced, or asymmetrical; can do motility work and can do other breath-supportive techniques during illness
- Any other contraindications - be cautious with people who bleed easily or are on blood thinners; EDS - reduced ability to manufacture collagen - can show up as

reduced ability to make collagen in the walls of blood vessels (often causes strokes or other vascular events), might benefit from the lightest versions of CST

Further Q&A's from Ryan Hofer's follow-up email:
Here's a few more answers to questions in the chat.

Can you briefly review "first barrier"?
Briefly, when we slowly load tissue in any way, stretch, compress, twist, shear, there is an initial effort to move the tissue a little, as we gradually increase our load the tissue moves farther, but not in a linear way, rather we feel a stepwise increase in effort required to move the tissue further. These steps are referred to as a succession of 'barriers'. The first step of increased force to create more movement is the 'first barrier. I will send a document on this in a separate email.

Does freeing the upper right lobe of the lung allow better throwing motions?
Yes. Two things about that.
Freeing the upper lobe on the dominant hand side may improve throwing motion, or other motions of the shoulder. But it is not just the upper lobe, adhesions of the lung anywhere can hamper shoulder, and also neck movement.
The movement limitation happens in a couple of ways. If the lung and chest wall can't glide, then in the trunk movement that is part of the throwing motion the chest wall will tug hard on the lung. Mechanoreceptors in the lung may perceive this quick motion as a threat, and they will engage lots of musculature to damp the motion. Also, the pleural dome or apex is anchored to the middle scalene, has attachments to lower cervical vertebrae, and fascial continuity into the deep shoulder. Any lung adhesion will pull into all these areas. I will talk more about this on Thursday.

Is there a lung/kidney glide technique?
There are techniques for the glide planes of the kidney, however the kidney does not have any glide planes to the lungs. The lungs and the kidneys are in different body compartments. Freeing both is important, but these are separate techniques.

Any suggestions for a client with a concave chest?
In pectus excavatum there is always serious mediastinal wall tension. There is also strain in bone in the sternum and ribs. Working with all those makes some difference, however this is a congenital condition. To fully re-shape the chest wall I know of two solutions, surgery and reincarnation therapy.

I have been told that among the Inuit people, a baby born with pectus excavatum is known to be a shaman, as the hollow in the chest is seen as a mixing bowl for the spirit.

What resources do you use for learning physiology or pathophysiology related to lung functioning?
I have learned about lung function and pathology in bits and pieces over 50 years, form courses, books, articles, and fellow practitioners. I regret I am not able to point out

specific sources.

MDs will commonly use pulmonary function tests - how does your understanding of functioning relate to these or how do you use information from these?
Pulmonary function testing is done with a spirometer. There are spirometers of varying levels of complexity ranging from simple handheld devices which measure total volume of air which the lungs can exchange up to complex devices which assess more detail including the separate condition of large airways, middle size airways and small airways in addition to total volume.
I have used a simple hand held spirometer which demonstrate that the techniques I described make prompt improvement in total volume of air exchanged. I would love to have the resources to do this with the more complex test equipment and in a double blind fashion.