

Therapeutic Thoracocentesis – Butterfly Catheter

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Once you have identified the presence of clinically significant pleural fluid or fluid with the *diagnostic* thoracocentesis procedure, the next step is to remove it. This may be accomplished with the ‘butterfly’ style catheter described here, or with a fenestrated plastic catheter (described in another handout). The advantage of the ‘butterfly’ catheter technique is that it is quicker and may be accomplished with little or no skin preparation. It is an effective method to remove the majority of air from the pleural space, but may be less effective for removing fluid. It may often be accomplished without local anesthesia. The primary disadvantage for the novice is that failure to focus all of your attention on proper technique and positioning of the catheter will result in laceration of the lung. Furthermore, the catheter must be removed at the end of the procedure – if there is rapid reaccumulation of air the procedure must be performed again from scratch.

Materials needed:

60 ml syringe
3-way stopcock
19 ga, 7/8” (dogs) or 22 ga 5/8” winged
needle (cats) catheter with two flexible
‘butterfly’ style wings.
An assistant to work the syringe

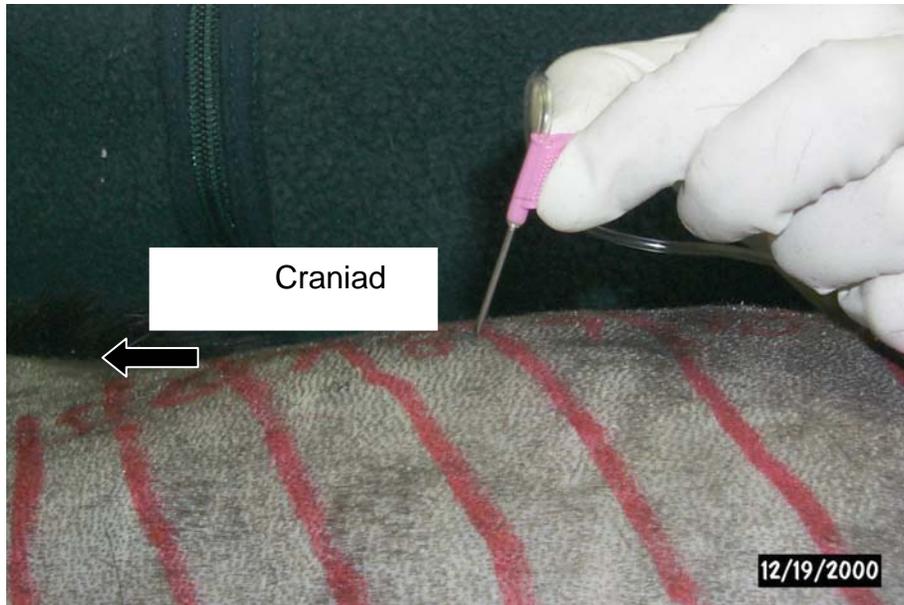
Be sure to use the style of catheter that has 2 folding wings. Some needle catheters have only 1 rigid wing – these are not suitable for this procedure!



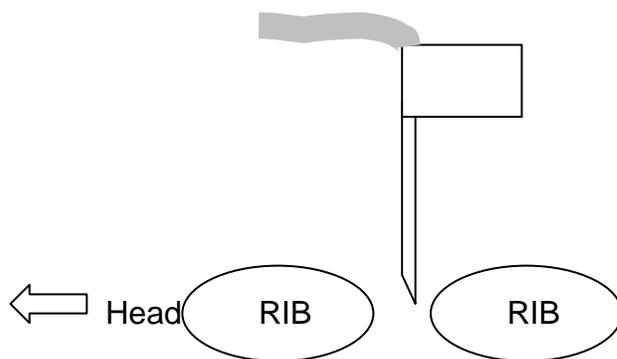
Procedure:

Assemble the stopcock between the syringe and the needle as shown above. Identify the optimal location for thoracocentesis as described in the handout on *Diagnostic Thoracocentesis*. Fold the wings of the catheter so that they point away from the open bevel of the needle. Position your body and hands so that you hold the folded wings of the catheter between the thumb and index finger of your dominant hand, and orient the catheter so that the orifice of the bevel is oriented toward the head as the catheter enters the skin (“Mouth to Mouth”). You’ll need to ‘arc’ the catheter with wrist action as you enter the pleural

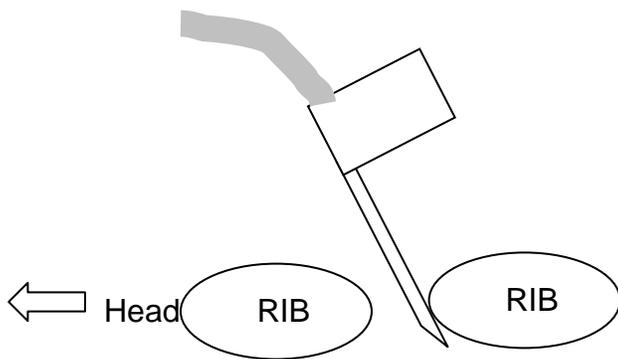
space, so position yourself on the correct side of the dog to accomplish this without being awkward!



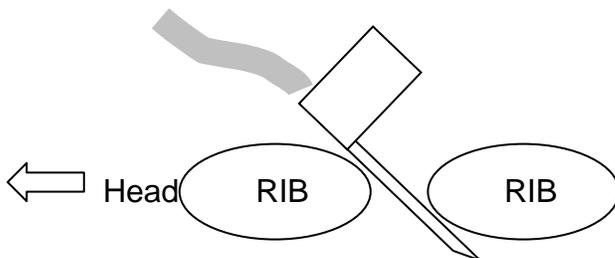
The needle should be advanced into the skin directly over the leading edge of the rib caudal to the interspace you've chosen. As soon as the needle enters the skin, your assistant must apply 2-5 ml of vacuum to the syringe and hold it constantly. As you advance the needle into the interspace, it is the responsibility of your assistant to notify you the instant the needle enters the pleural space. Once you've entered the pleural space, the most important 'finesse' step of the procedure is to wrap the needle around the rib as you advance it deeper, so the tip never strays far from the periosteal surface:



Tail →



Tail →

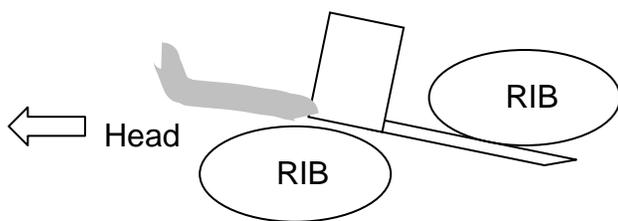


Tail →

As the catheter is advanced, you will actually need to lever the needle against the rib cranial to the space, and push it in a bit, to keep the needle as parallel to the chest wall as possible.



Tail →



PUSH the needle caudally, against the caudal rib, to help keep it from coming out.

You should be able to appreciate why it is so important to have the bevel orifice facing the head – after the needle is in place, this orientation allows it to face the pleural space instead of getting smashed up against the parietal pleura of the rib.

Once the needle is in place, your full and undivided attention must be focused on keeping the needle shaft parallel to the chest wall!! Your next challenge will be to unfold the catheter wings. To accomplish this, use the index finger of your other hand to push down on the connection between needle and tubing to keep it flat on the dog. Release the wings momentarily to let them spread out (while holding the needle down with your other index finger), and once more push down directly on the wings. NEVER RELEASE THIS PRESSURE!

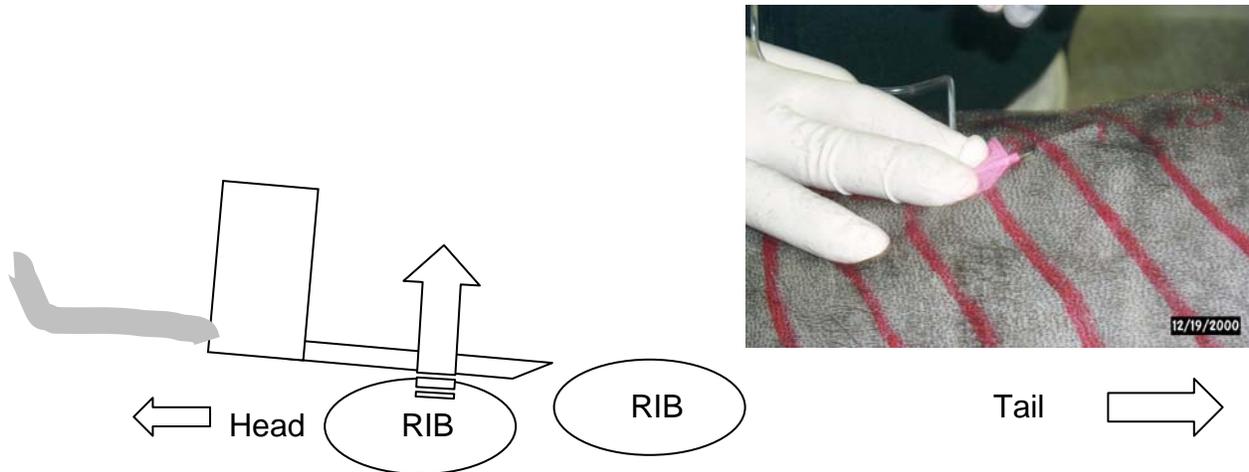


If you accidentally lose your focus and release the needle - even for an instant - the pressure from the ribs causes it to spring to a vertical position. If the lung is near the chest wall, the needle slices through it like a blade:



In big dogs with a thick chest wall, the needle tip may be just barely underneath the rib once you have it properly positioned. A trick to prevent the needle from accidentally popping out from under the rib is to constantly push the catheter towards the tail, to keep the wings butted up against the rib.

After your assistant has emptied the chest, the (moving!) lung will be pulled up tightly against the shaft of the needle, and the only thing standing between success and a lung laceration is your constant attention to needle position. To remove the needle safely, pull the skin and needle together as a unit cranially until you can feel the tip of the needle 'pop' out of the chest cavity. This happens because you've deformed the two adjacent ribs, and their springiness will flip the needle out of the pleural space the instant you lose purchase on the caudal rib:



As soon as the needle has popped into the subcutaneous tissue, you can relax, and simply pull the needle out of the skin:



As you might have guessed from these pictures, it is possible to do this procedure by yourself. Having big hands helps, because it is rather difficult to pull the back plunger while using 1 or 2 fingers of the same hand to push the barrel away. If you do this by yourself, I'd recommend using a 33" IV extension set between the stopcock and the Luer fitting on the short catheter tube, so you have more length to work with. You will fumble a bit with the stopcock as you try to turn it to the correct positions, but it can be done. You can empty the syringe by holding the barrel and pushing the plunger handle against your chest. And always, always focus your main attention on the hand holding the needle!