

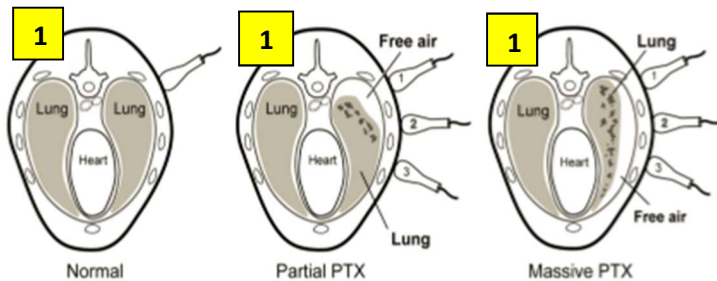
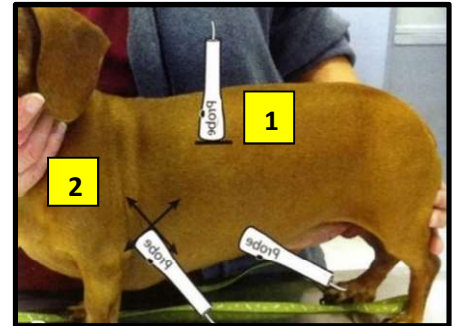
For each viewpoint, **wet the fur** with alcohol, **part the fur** to prevent air trapping prior to placing the probe, and **add gel if needed**. There is no need to shave, or turn the room lights off. Unless otherwise indicated, orient the probe in the **sagittal** plane, with probe **maker toward the head**. Abdominal preset and microconvex probe are ideal. If video clips are always done in the same order, minimal alphanumeric labeling is needed, unless to clarify abnormal findings.

### Tips for TFAST<sup>®</sup> Chest Tube Site (CTS) & Pericardial Slide (PCS)

- TFAST<sup>®</sup> should be done in sternal/standing position, if at all possible. Very mild pneumothorax (PTX) may be best assessed in right lateral recumbency, but this position can cause respiratory compromise in the patient with PTX, pericardial effusion (PCE) or PLE.
- If PTX is present, TFAST<sup>®</sup> should be repeated at intervals to track LP. LP falling ventrally over time despite tapping indicates thoracostomy tube is likely necessary

### STEP 1: TFAST<sup>®</sup> Left Chest Tube Site (LCTS)

- The Chest Tube Site (CTS) is the highest point on the thoracic wall where the cap of air would rise, in case of pneumothorax (PTX).
- **Place** the probe at the **Left CTS** (see **Point 1 (LCd)** above and/or “2” in the image at the right – they are assessed the same location). Obtain the **Gator Sign**. If **Lung Rockets** or **Glide Sign** are present, **PTX** is ruled out. PLE is almost never seen at this dorsal point in the live patient, as fluid falls and PLE that severe is usually fatal.
- If **A lines** are seen as in dry lung, with no lung rockets or glide sign, the dog likely has PTX at that point. **Search for the Lung Point (LP)** where contact is re-established between lung and thoracic wall, by continuing ventrally on the thorax until LP is found, to confirm

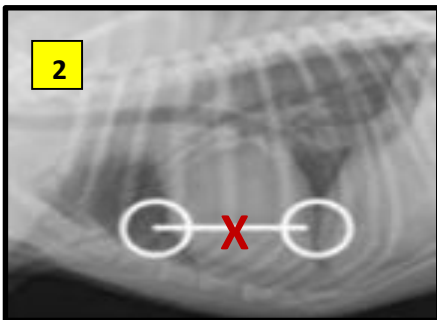


PTX. Locating a **Curtain Sign** of PTX can help to find the LP.

- When LP is found, **score PTX** as **mild** (dorsal third of thorax), **moderate** (middle third) or **severe** (lower third). Presence of lung beat with no LP found indicates **massive pneumothorax**.
- Take **Video Clip 5** at LCTS and **Optional Video Clip 5b** if/when LP found.

### STEP 2: TFAST<sup>®</sup> Left Pericardial Slide (LPCS)

- The **Pericardial Site (PCS)** is used mainly to detect fluid in the pericardial and/or pleural spaces. PCE/PLE can and should be confirmed at other points below, used to detect both.
- **Palpate** the apical beat near the left sternum if standing/sternal, and **place** the probe there (see red “X” in figures at left). The beam is parallel to the sternum (see white line in figure at left). If in right lateral, palpate the apical beat on the down right side with the forefingers, and place the probe where the thumb natural falls on the right thoracic wall (see red “X” in photo at right and below).
- **Increase depth** to include the bright white **pericardium** in the far field, so the entire heart and pericardial space are seen. If the heart is severely enlarged (left ventricle >5cm), the pericardium may fall off the bottom of the screen, even when set to maximum depth.



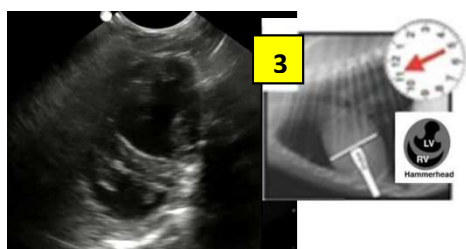
- **Slide the probe caudal** to find the caudal most aspect of the heart where it contacts the **diaphragm** (see white circle at right end of white line in figure above). If present, **Pericardial Effusion (PCE)** will be seen as a **Racetrack Sign** (black ring of fluid between the gray L myocardium and the bright white pericardium). If present, **Pleural Effusion (PLE)** will appear as black polygons or ribbons, the latter at the top of the screen, and/or you might see a **Curtain Sign of PLE**. Check for **Glide Sign** and **lung pathology** at the diaphragm, as you would with VetBLUE<sup>®</sup>.
- Take **Video Clip 6** of the left caudal pericardial slide, including any abnormalities seen.
- **Slide the probe cranial** to find the cranial most aspect of the heart where it contacts **lung** (see white circle at left end of white line in figure above). Check for PCE (**Racetrack Sign**) and PLE (**black polygons**, **black ribbons**, or **Curtain Sign of PLE**).



- **HINT:** o detect very small amounts of PLE, **rotate the probe 90°** (parallel to the ribs) at the end of the cranial and caudal pericardial slide, and look **for fluid polygons** (see white circles at ends of the white line in figure above and left).
- Take **Video Clip 7** of the left cranial pericardial slide, including any abnormalities seen.

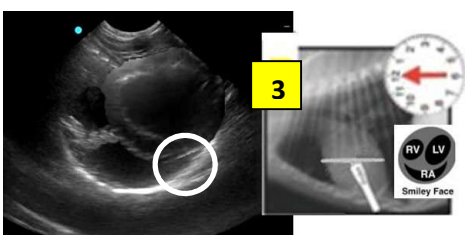
### Tips for TFAST® Echo Views

- The TFAST® left echo views are best obtained standing or sternal.
- The TFAST® right echo views can be obtained standing, sternal or in right lateral recumbency. Right lateral may be necessary if lungs are well inflated and there is no pleural effusion, especially for the short axis Pulmonary Artery view.
- Never diagnose PCE based on right sided short axis echo views only, as PCE can be confused with heart chambers. Confirm with other views – the right sided Bullseye and 4 Chamber views, as well as the left sided Hammerhead view.



### STEP 3: TFAST® Left Echo Views

- **Hammerhead View** – **Place** the probe at the left apical beat, as described above for **Left PCS** (see red “X” in photo and radiograph above). Orient the probe across the short axis of the heart with the probe marker toward the left elbow (see white line in figure at left). You will see the round **Left Ventricle (LV)** in the near field and the crescent shaped **Right Ventricle (RV)** in the far field. Look for **PCE** and/or **PLE**. This is a good view for seeing **heartworms**, if they are there.
- Take **Video Clip 8** of the Hammerhead View.
- **Smiley Face View** – **Rotate** the probe clockwise, until the marker points toward the head, and the beam is parallel to the long axis of the body. You will see the round **RV** in the near field and on the left of the screen, the round **LV** in the near field and on the right of the screen, and the crescent shaped **Right Atrium (RA)** in the far field. Look for **PLE** and **PCE**. If a **heart base tumor** is present, it is often best seen in this view at the **Right Auricle** (see white circle in figure at left).
- Take **Video Clip 9** of the Smiley Face View.

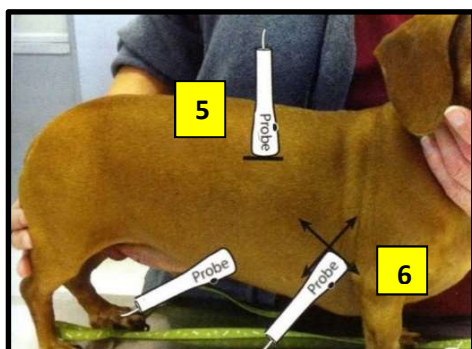


### STEP 4: Take Blank **Video Clip 10**

to indicate that you are moving from the patient's left to right side.

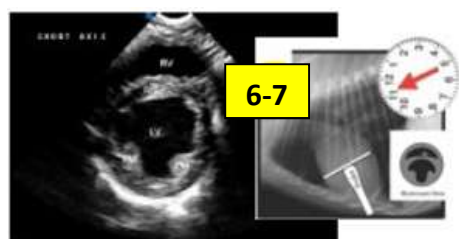
### STEP 5: TFAST® Right Chest Tube Site (RCTS)

- See **Step 2** and repeat on the right side (see figure 7 below and left). Take **Video Clip 15** of the right CTS, and if PTX present, **Video Clip 15b** of the right LP.



### STEP 6: TFAST® Right Pericardial Slide (RPCS)

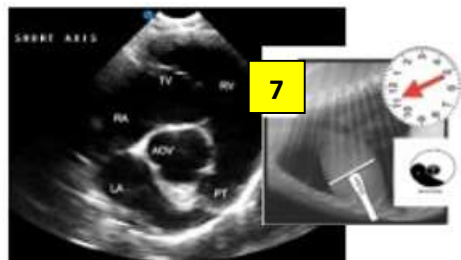
- **Mushroom View** - See **Step 3 – Hammerhead View** - and repeat probe positioning and pericardial slide on the right. You will see the round LV with papillary muscles that make the LV lumen look like a mushroom in the far field, and the crescent shaped RV in the near field (see echo figure 6-7 below and left).
- Take **Video Clip 16** of the right caudal pericardial slide, and **Video Clip 17** of the cranial pericardial slide, including any abnormalities seen.



### STEP 7: TFAST® Right Short Axis Echo Views - “Down & Up the Ladder”

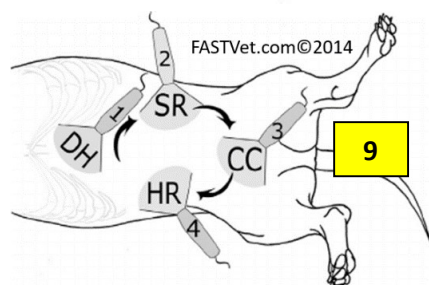
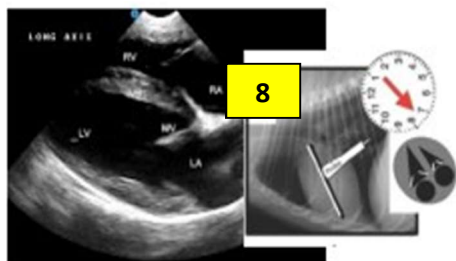
- **Mushroom View** - Without moving the probe position from right PCS, **fan** up toward the heart base and down toward the heart apex to find the place in the LV where both **papillary muscles** are seen, and the crescent shaped RV wraps around the LV in the near field (see figure 8-9 at left). The LV lumen looks like a black mushroom. Optimize the view by rotating the probe in either direction, until the papillary muscles appear symmetrical and the LV is round rather than oval. Assess LV **volume status** and **contractility**. Take **Video Clip 18**.
- **Batman Sign View** - **Fan** toward the heart apex until you see **the papillary muscles** take up more of the **LV** lumen, so that it looks like a black Batman Sign (see drawing below at left). You may or may not see RV. Look for **PCE**.





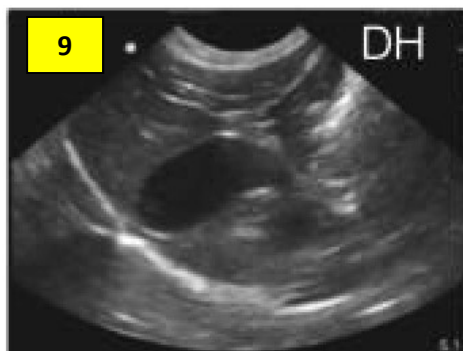
- **Bullseye View** - **Fan** even farther toward the heart apex, until the RV and the papillary muscles disappear (see drawing at left). This is the best short axis view for assessing **PCE**, as there aren't multiple heart chambers present to confuse with PCE.
- **Windshield Wiper View** – **Return** to the Mushroom View, optimize it, and then **fan** slightly toward the heart base until the papillary muscle split up, then the **chordae tendinae** appear as windshield wipers in the LV, running between the **papillary muscles** and the **mitral valve (MV)**.
- **Fish Mouth View** – **Fan** even farther toward the heart base, until you see the **MV** opening and closing in the LV, like a Fish Mouth (see drawing at left), and the **RV** in the near field. If **mitral valve dysplasia** is present, you will see a thickened MV.
- **Mercedes Sign View** – **Continue fanning** toward the heart base until you see the **aortic valve (Ao)**, which will look like a Mercedes Sign in the center of the heart (see figures at left). The **Left Atrium (LA)** will look like a black whale below and to the left of Ao on the screen. Assess for **LA enlargement** (maximum LA width should be less than 1.5X Ao). Take **Image 1**.
- **Pulmonary Artery View** – Continue fanning toward the heart base until you see the branching of the **pulmonary artery (PA)** (see drawing to left). Assess for **PA enlargement** (PA should be the same size as Ao). Take **Image 3**.
- Take **Video Clips Series 19** to capture the entire right short axis heart scan.

### STEP 8: TFAST® Right 4 Chamber View



- **Return** to the Windshield Wiper View, and **then rotate the probe marker 90° toward the sternum**, until you see all 4 chambers of the heart in long axis (see figure at left). The view is optimized when the walls of the LV are parallel and you see the hyperechoic area in the septum where all 4 chambers come together.
- Assess the **LV:RV** lumen ratio (normal is greater than 2-3). LV:RV <2-3 indicates pulmonary hypertension or pulmonic stenosis. **LA** size can also be assessed here, as it is normally about the same size as the RA in this view (normal **LA:RA**=1).
- Take **Video Clip 20**, being sure to capture any abnormalities seen.

### STEP 9: AFAST® & TFAST® Diaphragmatic Hepatic (DH) View

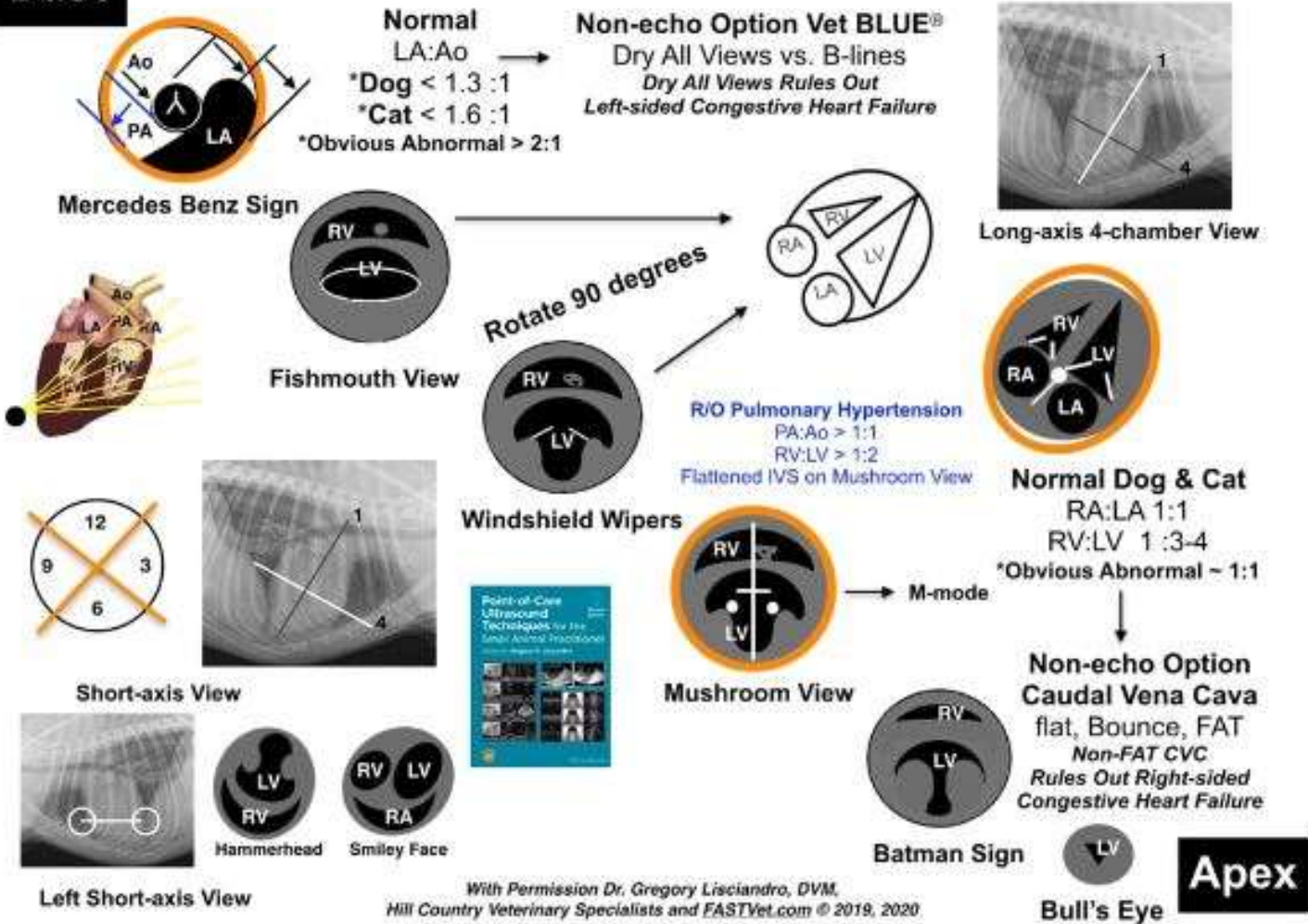


- **Place** the probe with marker toward the pet's head just caudal to the xyphoid, and increase the depth to target the liver filling  $\frac{3}{4}$  of the screen, so that the **diaphragm** and caudal vena cava do not move out of view at the bottom of the screen with breathing.
- Angle the beam cranially until you see the **gall bladder kiss the diaphragm**. Look for fluid triangles around the **gall bladder**, and for gall bladder **halo sign**. Look at the **diaphragm-lung** line for **lung rockets**, **glide sign**, **pleural effusion** and **polygons (ascites)**.
- **Fan** left to right and back again, looking for **fluid triangles** between the **liver lobes**. Take **Video Clip 22**, being sure to capture any abnormalities seen.
- **Rock cranially** to see the **heart** bumping the diaphragm. Look for **pericardial** and **pleural effusion**. Take **Video Clip 23**, being sure to capture any abnormalities seen.
- **Return** to the gall bladder and then point the probe toward mid-abdomen to evaluate the **caudal vena cava** as it passes through the diaphragm (**fat**, **bounce**, or **flat**). Take **Video Clip 24**.
- If fluid triangles are all less than 5mm in the cat or less than 10mm in the dog, add 0.5 to the **abdominal fluid score (AFS)** – see Step 16). If at least one area of free fluid is  $\geq 5$ mm in the cat or  $\geq 10$ mm in the dog, add 1 to the AFS.



**Base**

# TFAST® Echo Views - Rogue Version



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