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FOSTERING THE ART OF VETERINARY MEDICINE™

Scanning Pearls

Part 1 - E. Lindquist & P. Modler

As a result of our recent Austrian summit Peter and I discussed a list of pearl concepts to remember when scanning and evaluating your patient. We hope you find them helpful. This list is based on the imperfections that we see while supporting our clients as well as concepts to remember while interpreting the presentation.
To start here is a great link that reminds us of the physics of ultrasound and concepts we should have working knowledge of in order to adjust and optimize our images.

http://www.wikiradiography.net/page/Ultrasound_Physics

Peter's Echo Pearls

2--d measurements taken from the inner edge and m--mode measurements are taken from the leading edge.

1. Normal echo interpretation concepts:
   a. LVFW is 3.5 to 4.5 of LVIDd
   b. RV is 1/3 of LV in 4--chamber view
   c. RVFW is ½ of IVS or LVFW width
   d. LV must be straight as is the Atrial Septum
   e. RA must be < LA diameter
   f. If all this is true then no hemodynamically significant problem will be present with exception of arrhythmias.

• Patient with heart murmur: The right parasternal 4--chamber view is most important view to assess if the murmur is significant or not
• M--mode must be performed form right parasternal 4--chamber and LV short axis view. The measurements must be similar. Don't use 5--chamber view for dogs in m--mode.
• PW Doppler used to find turbulence and local velocities, CW Doppler is used to find maximum velocities
• Keep an eye on the frame rate, reduce the imaging depth as far as possible and reduce the sector angle as much as possible.
• Reduce the line density to optimize the image and color flow

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Lindquist Pearls

Quick Scanning Tips Based On Common Difficulties

- Minimize "real estate" (distance probe>target structure) to optimize image quality.
- Manual displacement while scanning, make own window.
- Work with the patient and don't punish him with the probe.
- Once you have learned the maneuvers and landmarks give yourself 3 seconds to get where you need to be with an efficiency clip. i.e Ao>left renal artery>left adrenal. Train yourself to get all views and maneuvers within 3 seconds to increase speed and scanning precision. The probe hand should be in constant motion and free hand on p1 or similar to save clips as you go along capturing the ideal organ image within each clip. Then go back and clean up repetitive clips to minimize file size.

- Keep measurements perpendicular. The cursor must transect the LV and AO at a perpendicular angle.
- Progressive measurements to minimize degree of adjustments and maximize speed. Right lateral recumbency. Start 4--chamber long axis: LV m--mode in 4--chamber long axis, EPSS, LA/AO, LA--Max, Doppler MV, slide caudal 1 rib space & raise tail>Doppler PA, Lower tail>Doppler TV, slide caudal to Xyphoid process, spread manual pressure and push to apical>Doppler AV. If necessary, LV m--mode in short axis, slide to heart bas LA/AO.
- Efficiency clip 5 and 4 chamber long axis to short axis heart base first. Same with LV long and short axis. Then measure. Then refine the scan after you have these vies done so if the patient is agitated you already have the meat of the scan done.
- Time yourself from 20 min to 15 min to 10 min. Keep the probe moving & don't dwell on imperfect images as you can go back to them after getting what you can first. Its like skipping questions you don't know in an exam and then going back later.
- Ensure spectral Doppler is angled at < 15 degrees parallel to flow otherwise the velocity will be underestimated and colors on CF will mean nothing regarding direction.

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Key Velocities

Pulmonic Stenosis (PS)

- Mild 2.5 - 3.5 m/sec
- Moderate 3.5 - 4.5 m/sec
- Severe > 4.5 m/sec (Needs Tx-Balloon)

LVOT 1 - 2 m/sec (up to 2.5 normal for Boxers)

- if submornal velocity, ensure Doppler angle <15 degrees, lower the frequency or change to LFr probe.

RVOT 0.5 - 2 m/sec

MR > 5 m/sec (>6 m/sec check hypertension)

TR/PHT

- 3 - 3.5 m/sec = Mild
- 3.5 - 4 = Moderate
- > 4.0 = Severe

Subaortic Stenosis (SAS)

- Mild 2.5 - 3.5 m/sec
- Moderate 3.5 - 4.5 m/sec
- Severe > 4.5 m/sec (Needs Tx)

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Valve Disease B1, B2, C1, D1

B1: no LAE
- Recheck Echo 6 mo earlier if Murmur accentuates or clinical signs, Check BP

B2: LAE, LVE, VHS > 10.5 Tx Pimo +/- other
- Recheck Echo 1 - 3 mo

C1: LVE, LAE, Tachypnea, Full CHF wet Lung
- Tx Triple Tx +/- Spiro

D1: LVE LAE PHT Left +/- Right CHF
- Kitchen Sink Tx - Torsamide?

Valve Disease Consensus Bullets

1) B2: enlarged LV & LA
2) Lateral radiograph VHS score > 10.5

Historical MST for B2 patients: B2 to C is 800 days then once in CHF MST is 200 days.

Epic study focused on this 800-day period between B2 to C

Stage C is wet lung (traditional CHF) with both increased HR at rest & increased respiratory rate.