Advanced Optimization of Your Echo Images and Doppler Evaluations

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This webinar is designed to:

– Provide a brief review of basic optimization
– Discuss advanced optimization including:
  • Evaluation of Prosthetic Valves
  • Use of Contrast for Sub-optimal studies
Optimizing the 2D Image

No Harmonics

Harmonics
Image Colorization
Optimizing the 2D Image

• “If contrast is used, there must be a written policy for the use of contrast agents.”
• “If contrast is not able to be used there must be a policy for alternative imaging.”
• “Contrast should be used in the presence of poor endocardial border definition for quantification of chamber dimensions, volumes, ejection fraction and assessment of regional wall motion.”
LVO Contrast

- Endocardial border definition
  - Stress
  - Ejection Fraction
  - Enhancement of intracardiac structures
- RV enhancement
- Enhancement of the aorta
- Doppler enhancement
  - AS, TR
Optimizing the 2D Image
Chemo Patient

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Contrast Thrombus
Left Atrial Volume

- Optimize apical 4 & 2 chamber views
- Do not foreshorten
- Measure at end-systole or just prior to MV opening
- Trace the atrial endocardium beginning at the MV annulus and ending at the opposite MV annulus
- Do not trace into Pulmonary veins or LAA
Apical 4 & 2 Chamber - LA Volume

- LA Length: 6.0 cm
- LA Area 1: 28.0 cm²
- LA Area 2: 24.9 cm²
- LA Volume: 98.8 cc
- LA Volume Index: 46.4 ml/m²
Right Ventricle

- Measure from an Apical 4 Chamber view
- At the level of the LV papillary muscles
Right Ventricular Free Wall Measurement
Optimizing Your Doppler Signal
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Color Doppler

Adjust 2D Gain

Adjust Color Gain Often
Color Doppler

Adjust color box size
Color Optimization with PISA

- Adjust color baseline between 20-40cm/s in direction of regurgitant flow
Improving Your Doppler Exam

• Adjust 2D image to become parallel to flow
  – Center image over valve
  – Foreshorten
• Utilize Color Doppler for sample volume placement
• Utilize saline contrast or LVO contrast to improve Doppler signals
Optimizing Your Doppler Signal

Spectral Doppler
- CW
- PW
Optimizing Your Doppler Signal

Expand the Doppler Scale
Optimizing Your Doppler Signal

Increase the Sweep Speed

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Optimizing Your Doppler Signal

- Ped Off
- Aortic Stenosis
Doppler Tracings

Bad Trace

Good Trace
Spectral Doppler

- Expand the scale
- Increase sweep speed
- Utilize color Doppler to place spectral Doppler cursor
- Check gain settings
Mitral Valve Inflow

• Mitral Flow Velocities
  – Pulsed Doppler
  – Sample Volume 1-2 mm in size
  – Parallel to direction of mitral valve inflow
    • Mid to Distal portion of lateral wall of LV
    • LV dilated directed more lateral
  – Place SV between the tips of the MV during diastole
  – Move SV towards MV annulus to optimize duration of the A velocity
Optimizing your Doppler Exam

Sample Volume Placement

Mitral Leaflet Tips
Tissue Doppler Imaging - TDI

- Myocardial velocities are much lower than blood flow Doppler (1-20 cm/s)
- Their amplitudes are greater than blood flow Doppler
- Develop Tissue Doppler preset
- TDI requires a high frame rate
- Lower gain setting for TDI
Tissue Doppler Imaging

• TDI records longitudinal motion of MV annulus; Measures velocity
• Use apical windows to become parallel to motion of MV annulus
Optimizing Your Doppler Exam

Tissue Doppler
Parallel to wall motion
Optimizing Your Doppler Exam

Sample Volume Placement
Parallel to flow & not in flow acceleration
Tricuspid Regurgitation

Not parallel

Parallel with TR
Pulmonary Venous Flow

• Pulsed wave Doppler
• Sample Volume size 2-5 mm and placed 1 to 2 cm into the pulmonary vein
• Use color Doppler to guide placement of sample volume and confirm you are parallel with flow
Pulmonary Venous Flow
Inferior Vena Cava
Inferior Vena Cava

IVC with Gas

IVC obtained through ribs

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Measuring the IVC

- Measure at end expiration
- Just proximal to the junction of the hepatic vein
Hepatic Vein Doppler

• Use a subcostal image while angling to be parallel to flow
• 2-5 mm pulsed wave sample volume
• Place 1 to 2 cm proximal to the junction with the inferior vena cava
• Use color Doppler to guide and confirm parallel to flow
Hepatic Vein
Foreshortened vs Non-Foreshortened Apical
Suprasternal Notch Imaging

• Images the aortic arch
• Required view for IAC in the presence of:
  – Aortic Stenosis
  – Bicuspid Aortic Valve for Coarctation
  – Suspected Aortic Dissection
Improve SSN Image Quality

• Position patient for SSN view
  – Pillow underneath shoulders
  – Hyperextend neck
  – Turn head to one side
• Use high frequency transducer
• Position focal zone in near field
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SSN Spectral Doppler

- Locate landmarks
- Use pulsed wave Doppler
- Pulse through descending aorta to rule out coarctation
- Place pulsed Doppler sample volume in correct location when checking for flow reversal in descending aorta with AI
Saline Contrast

- Evaluates for atrial shunts
- Evaluates for persistent left superior vena cava that drains into the coronary sinus
  - Inject into left arm vein
  - Enlarged coronary sinus will be opacified
- Enhances right sided Doppler flow, such as TR
Saline Contrast
Saline Enhanced TR
Prosthetic Valves
Clinical Information Needed

- Date, type, and size of valve
- Symptoms and related clinical findings
- Blood pressure
- BMI
- Make sure to review previous or post-operative studies
Imaging of the Prosthetic Valve

• Evaluate motion of the leaflets or occluder
• Evaluate the structure of the valve
• Evaluate the sewing ring
Doppler of the Prosthetic Valve

- Peak Velocity and Mean Gradients
- Presence, location, and severity of regurgitation
Thank-you for joining us today!