CHAPTER 1

Comprehensive transthoracic echocardiographic examination protocol

Parasternal long-axis view (Fig. 1)
1 2D image (4 beats) (measure LVOT diameter).
2 Color Doppler through MV and AoV (4 beats).
3 M-mode through Aortic root (measure root and LA diameter, and aortic cusp separation).
4 Color Doppler M-mode through the aortic root (4 beats).
5 M-mode through MV (+ Valsalva test to check for MV prolapse and SAM; measure “E” to “S” separation distance).
6 Color Doppler M-mode through MV (4 beats).
7 M-mode through mid LV (4 beats) (measure septal and inferolateral wall thickness LVEDD and LVESD).

RA/RV view
From parasternal LAX view tilt transducer to point it to right hip:
1 2D image (4 beats);
2 Color Doppler through TV (4 beats);
3 CW Doppler through TV to measure max TR velocity if TR jet present.

Parasternal short-axis view (Fig. 2 and Fig. 3)
1 2D through AoV (4 beats) (to assess structure and mobility; use zoom).
2 Color Doppler through AoV (4 beats).
3 2D through PV (4 beats).
4 Color Doppler through PV (4 beats).
5 PW Doppler at the tips of PV to measure PAT (4 beats).

Figure 1 (A and B) Parasternal long-axis view.
6 CW Doppler through PV to measure PR velocity if present, and maximum outflow velocity through PV.
7 2D through TV (4 beats).
8 Color Doppler through TV (4 beats).
9 PW Doppler at the tips of TV leaflets to assess inflow pattern (4 beats).
10 If inflow jet max velocity is >1.5 m/sec, trace the diastolic flow to measure mean transvalvular gradient.
11 CW Doppler through TV to measure max TR velocity if TR jet present.
12 Serial 2D short axis images through the LV from base toward apex.

Figure 2 (A and B) Parasternal short-axis view.

Figure 3 (A and B) Parasternal short-axis view.
**Apical 4-chambers view (Fig. 4)**

1. 2D image (4 beats).
2. Color Doppler through the MV (4 beats).
3. Color Doppler M-mode through the MV at the end expiration (4 beats).
4. PW Doppler at the tips of MV leaflets to assess inflow pattern and velocity (4 beats); if pseudonormal or restrictive inflow pattern observed, decrease the preload and reassess the inflow pattern; in impaired relaxation act opposite.
5. PW Doppler at the right/left upper PV to assess inflow pattern (4 beats).
6. PW tissue Doppler at the basal and mid septal and lateral walls (4 beats).
7. If inflow jet max velocity is > 1.9 m/sec, trace the diastolic flow to measure mean transvalvular gradient, then measure PHT of the jet in CW mode.
8. CW Doppler through MV to measure max MR velocity if MR jet present. (Obtain simultaneous SBP measurement to calculate mean LAP.)
9. PW tissue Doppler at basal lateral walls of the RV to assess TEI index and systolic velocity.
10. M-mode through the RV basal lateral wall to measure TAPSE.

**Apical 5-chambers view**

From apical 4-chambers view tilt transducer slightly anteriorly; examiner’s hand moves downward toward the patient’s bed:

1. 2D image (4 beats).
2. Color Doppler through AoV and MV (4 beats).
3. PW Doppler through LVOT and trace the flow (4 beats).
4. CW Doppler through AoV and if outflow max velocity is > 1.9 m/sec, trace the flow for mean and peak gradients (4 beats).
5. CW Doppler through AoV to measure AR max velocity and pressure half-time if AR jet present. (Obtain simultaneous DBP measurement to calculate LV diastolic pressure.)

![Figure 4](image-url)
**Apical 2-chambers view (Fig. 5)**
From apical 4-chambers view rotate transducer counter-clockwise until the RV is completely gone:
1. 2D image (4 beats).
2. Color Doppler through the MV (4 beats).
3. PW tissue Doppler images at 4 points: basal and mid inferior, basal and mid anterior walls of the LV.

**Apical 3-chambers view**
From apical 2-chambers view rotate transducer counterclockwise and administer anterior tilt, examiner’s hand moves downward toward the patient’s bed, until the AoV comes into the view:
1. 2D image (4 beats).
2. Color Doppler through AoV and MV (4 beats).
3. PW Doppler through LVOT and trace the flow (4 beats).
4. CW Doppler through AoV and if outflow max velocity is >1.9 m/sec trace the flow for mean and peak gradients (4 beats).
5. CW Doppler through AoV to measure AI max velocity and pressure half-time if AI jet present. (Obtain simultaneous DBP measurement to calculate LV diastolic pressure.)
6. PW tissue Doppler images at 4 points: basal and mid anteroseptal, basal and mid inferolateral walls of the LV.

**Subcostal view**
1. 2D 4-chambers image with and without color Doppler over it (4 beats).
2. Color Doppler across the IAS and IVS.
3. Serial 2D short axis images through the LV from base toward apex.
4 PW Doppler of the hepatic vein.
5 Measure IVC diameter on inspiration and expiration.

**Suprasternal notch view**
1 2D image (4 beats).
2 PW and CW Doppler through descending and ascending Aorta.
3 Color Doppler through descending and ascending Aorta.