

Important TEE Parameters in Clinical Practice

Normal Intracardiac Dimensions(cm):

	Men	Women
LA (left atrium):	3.0-4.5	2.7-4.0
LVID _d (LV internal diameter in diastole):	4.3-5.9	4.0-5.2
LVID _s (LV internal diameter in systole):	2.6-4.0	2.3-3.5
IVS _d (Interventricular septum):	0.6-1.3	0.5-1.2
PW _d (Posterior wall):	0.6-1.2	0.5-1.1
EDV(ml):	62-170	55-101
ESV(ml):	14-76	13-60
SV(ml):	70-100	
LVOT (LV outflow track diameter):	2.0 ± 0.1	1.9 ± 0.1
VTI (Velocity time integral) LVOT:	18-22	
IVRT (Isovolumic relaxation time)(ms):	76 ± 13	

Aortic Diameters (cm):

Aortic Annulus:	1.4-2.6
Sinus of Valsalva:	2.1-3.5
Sinotubular Junction:	1.7-3.4
Ascending Aorta:	2.1-3.4

LV Systolic Function:

Fractional Shortening (%):	$(LVID_d - LVID_s) / LVID_d \times 100$	Normal: 28-41 %
FAC (%):	$(EDA - ESA) / EDA \times 100$	Normal: 36-64 %
EF (%):	$(EDV - ESV) / EDV \times 100$	Normal: 45-75 %

dP/dt (mmHg/s): Normal: >1200 Abnormal: <1000

Wall motion:	Endocardial movement	Myocardial thickening
Normal:	normal	>30%
Mild hypokinesis:	decreased	10-30 %
Severe hypokinesis:	slight	<10%
Akinesis:	none	none
Dyskinesis	outward movement	thinning

Normal Doppler Velocities:

Transmitral Inflow:

E (Early diastolic filling)(m/s):	0.7-1.2
A (Atrial kick)(m/s):	0.4-0.7
E/A:	1.0-2.0
DT (Deceleration time of E)(msec):	150-200
IVRT (msec):	50-100

Pulmonary Vein Flow:

S (Systolic wave)(PV _s)(m/s):	0.4-0.7
D (Diastolic wave)(PV _d)(m/s):	0.4-0.6
S/D:	0.7-1.5
A (Reversal flow during atrial kick)(PV _a)(m/s):	0.15-0.33

Tissue Doppler Values:

E _m (Mitral annulus early diastolic movement):	≥ 12 ± 2.8 cm/sec
A _m (Mitral annulus movement during atrial kick):	≥ 8.4 ± 2.4 cm/sec
S _m (Mitral annulus movement during systole)	≥ 10 ± 1.5 cm/sec
E _m /A _m :	1-2

LV Diastolic Function:

	Normal	Grade I	Grade Ia	Grade II	Grade III
Decreased relaxation:		+	+	+	+
Increased LV-EDP:			+	+	++
Decreased Compliance:				+	++
E/A ratio:	1-2	<1	<1	1-2	>2
E _m /A _m ratio:	1-2	<1	<1	<1	>1
IVRT (msec):	50-100	>100	50-100	<50	<50
DT (msec):	150-200	>200	>200	150-200	<150
PV _s /PV _d :	≥1	>1	>1	<1	<<1
PV _a (m/s):	<0.35	<0.35	≥0.35	≥0.35	≥0.35
PV _a _{dur} /A _{dur} (msec):	< 1	< 1	> 1	> 1	> 1

Evaluation of Valve Abnormalities:

Grading Mitral Stenosis (ASE Guidelines):

	Mild:	Severe:
Mean Gradient (mmHg):	<5	>12
Pulmonary Pressure (mmHg):	<30	>60
Valve Area (cm ²):	>1.5	<1.0
Pressure half time (msec)	<150	≥ 220

Grading Tricuspid Stenosis

	Mild:	Severe:
Mean Pressure Gradient (mmHg):	<2	>6
Tricuspid Valve Area (cm ²)		<2

Grading Mitral Regurgitation (ASE Guidelines):

	Mild:	Severe:
Jet area (cm ²):	<4	>8
Percentage of LA area (%):	<20%	>40%
Vena Contracta (cm):	<0.3	≥0.5
Regurgitant Volume (ml):	<20	≥60
Regurgitant Fraction (%):	<20	≥60
Regurgitant orifice area (PISA)(cm ²):	<0.1	≥0.35

Grading Tricuspid Regurgitation:

	Mild:	Severe:
Regurgitant Volume (ml):	<20	>60
Regurgitant Fraction (%):	<20	>60
Regurgitant Jet Area/RA Area (%):	<20	>34

Grading Aortic Stenosis (ASE Guidelines):

	Mild:	Severe:
Jet Velocity (m/s):	<3.0	>4.0
Peak Pressure Gradient (mmHg):	<36	>64
Mean Pressure Gradient (mmHg):	<30	>50
Valve Area (cm ²):	>1.5	<0.7

Grading Pulmonic Stenosis:

	Mild:	Severe:
Peak Pressure Gradient (mmHg):	<30	>64

Grading Aortic Regurgitation (ASE guidelines):

	Mild:	Severe:
Jet Height (cm)	<0.4	>1.0
Jet Height/LVOT (%):	<25	≥65
Jet Area/LVOT Area (%):	<40	≥65
Vena Contracta (cm):	<0.3	>0.6
Pressure Half Time (ms):	>500	<200
Regurgitant Volume (ml/beat):	<20	≥55
Regurgitant Fraction (%):	<20	≥55
Regurgitant orifice area (PISA)(cm ²):	<0.10	≥0.35

Grading Pulmonary Regurgitation:

	Mild:	Severe:
Jet length (cm)	1-2	>2

Prosthetic Heart Valves:

Mitral Valve Position:

Abnormal:

Peak Velocity (m/s):	>1.8
Mean Pressure Gradient (mmHg):	>10
Pressure Half-Time (msec):	>180
Mitral Valve Area (cm ²):	<1.8
Mitral regurgitation:	> mild or periprosthetic leak

Aortic Valve Position:

Abnormal:

Peak Pressure Gradient (mmHg):	>45
Mean Pressure Gradient (mmHg):	>25
Aortic Valve Area (cm ²):	<1.0
Velocity Ratio:	<0.35
Aortic Regurgitation:	>mild or periprosthetic leak

Tricuspid Valve Position:

Abnormal:

Pressure Half-Time (msec):	>160
Tricuspid Regurgitation:	> mild or periprosthetic leak

Pulmonic Valve Position:

Abnormal:

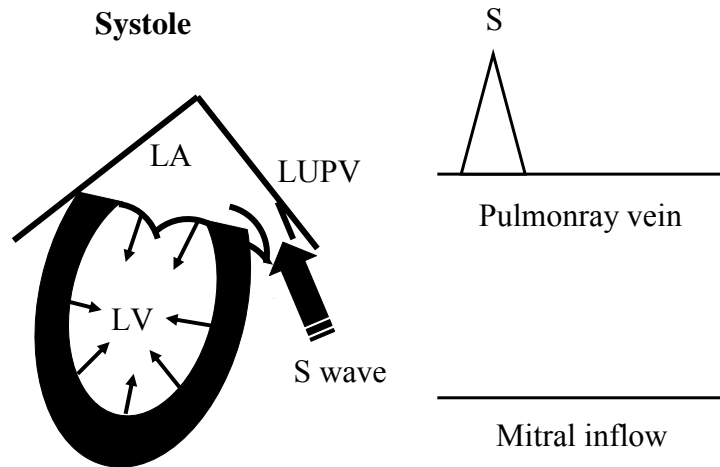
Peak Velocity (m/s):

>2.5

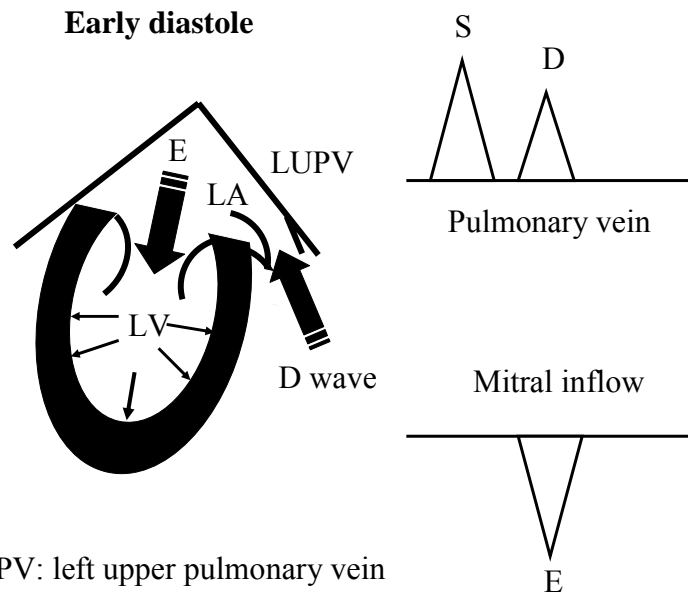
Pulmonic Regurgitation:

> mild or periprosthetic leak

Understanding LV Diastolic Function

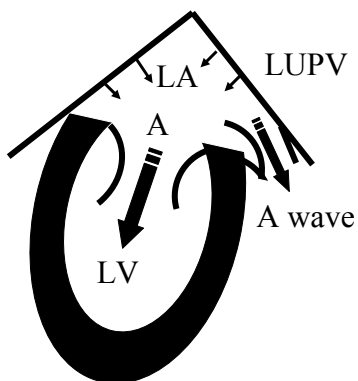


LUPV: left upper pulmonary vein
 LV: left ventricle
 LA: left atrium

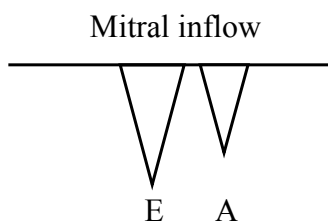
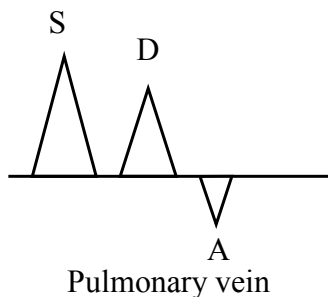


LUPV: left upper pulmonary vein
 LV: left ventricle
 LA: left atrium

Atrial systole



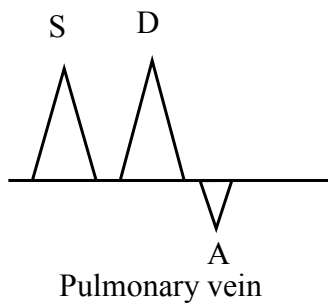
LUPV: left upper pulmonary vein
 LV: left ventricle
 LA: left atrium



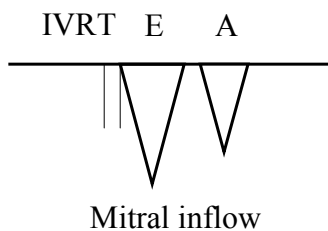
Patterns of Pulmonary Vein and Mitral Inflow

Normal

S/D Ratio: 0.86 ± 0.28
 Reversal: 0.17 ± 0.03

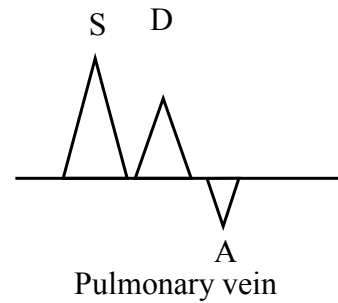


E: 0.7-1.2 m/s
 A: 0.42-0.7 m/s
 E/A ratio: 1-2.0
 Deceleration time: 150-200 ms
 IVRT: 50-100 ms

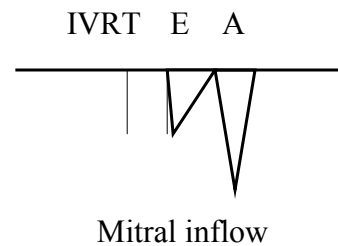


Impaired Relaxation

S/D Ratio: 1.63 ± 0.41
Reversal: 0.21 ± 0.03 m/s

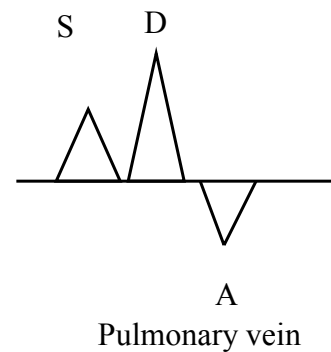


E: < 0.7 m/s
A: > 0.7 m/s
E/A ratio: < 1
Deceleration time: > 200 s
IVRT: > 100 ms

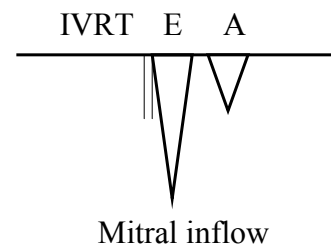


Restrictive Pattern

S/D Ratio: 0.40 ± 0.18
Reversal: > 0.35 m/s

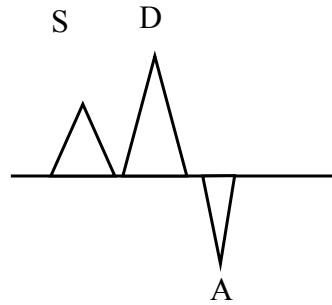


E: > 1.2 m/s
A: < 0.42 m/s
E/A ratio: > 2.0
Deceleration time: < 150 s
IVRT: < 50 ms



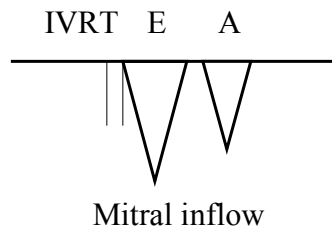
Pseudonormal

S/D Ratio: < 1
Reversal: > 0.35 m/s



Pulmonary vein

E: 0.7-1.2 m/s
A: 0.42-0.7 m/s
E/A ratio: 1-2.0
Deceleration time: 150-200 ms
IVRT: 50-100 ms



Mitral inflow