

Pulmonary Venous Anomalies



Norman H Silverman MD. D Sc (Med),FACC, FASE. FAHA.

Professor of Pediatrics

Stanford University Lucile Packard Children's Hospital



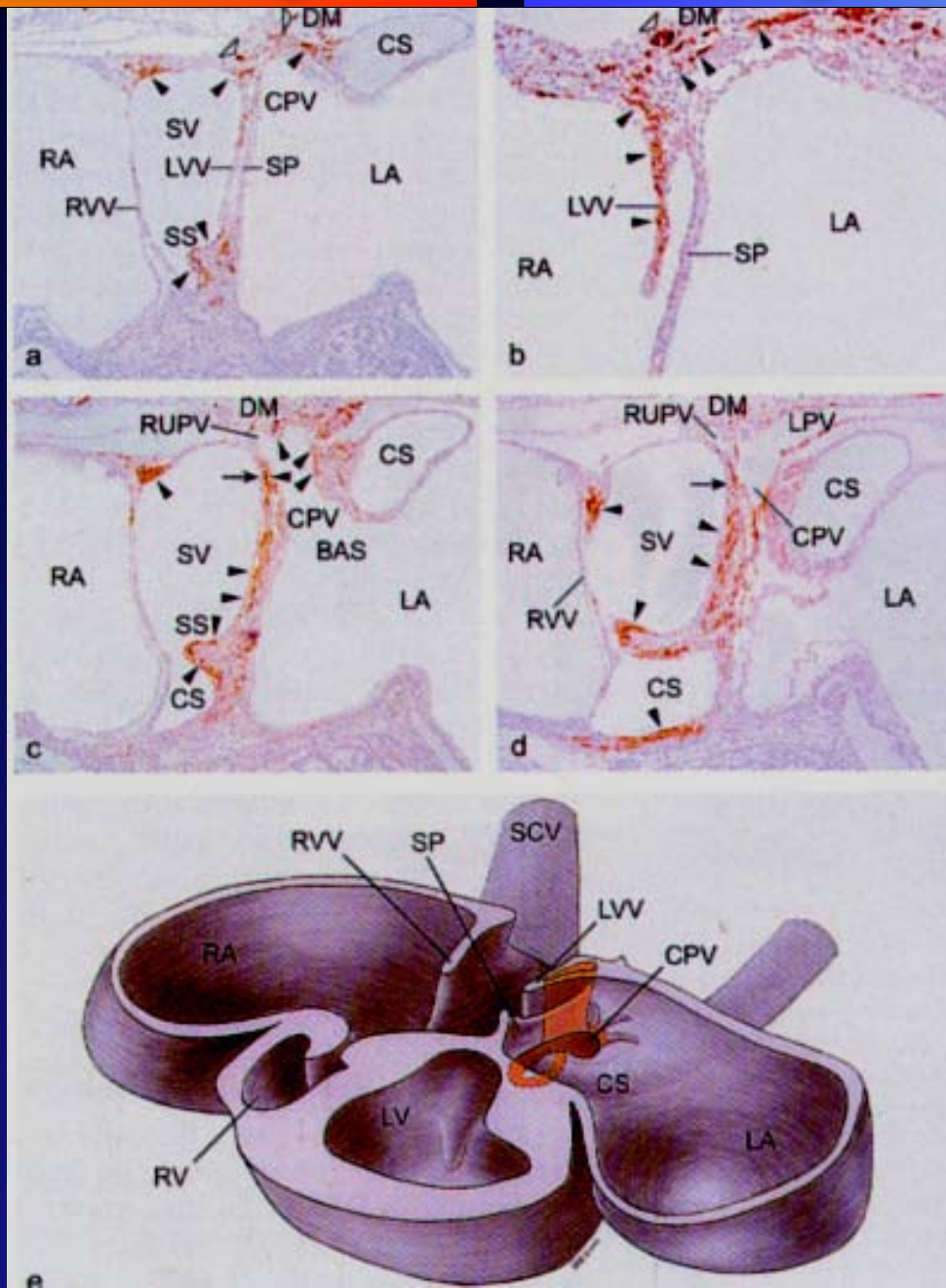
Totally Anomalous Pulmonary Venous Connections.

- Have a variety of clinical presentations from neonatal respiratory distress and pulmonary hypertension to a presentation of clinical features similar to an atrial septal defect.
- In the neonate the features may be indistinguishable from respiratory distress or pulmonary hypertension with many diagnosis made by echocardiography as a prelude to placing patients on ECMO.
- As this is an emergency cardiac presentation and can be cured surgically this diagnosis must always be considered prior to placing infants on ECMO.
- This “obstructive pattern” may also be seen in Right Isomerism (Asplenia, or Ivermark’s Syndrome)

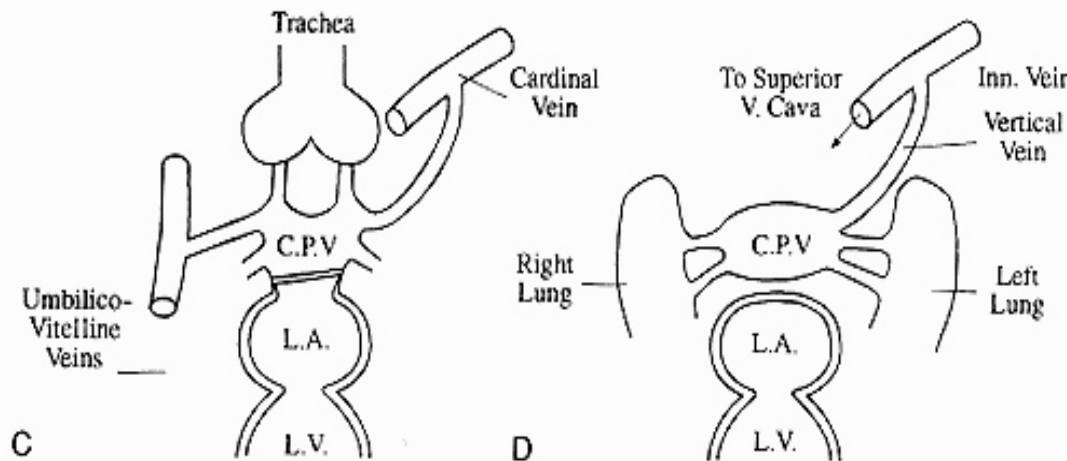
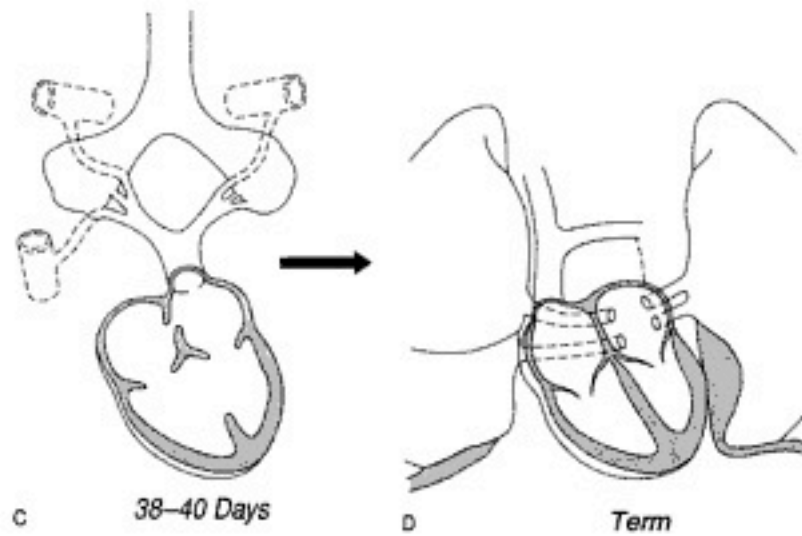
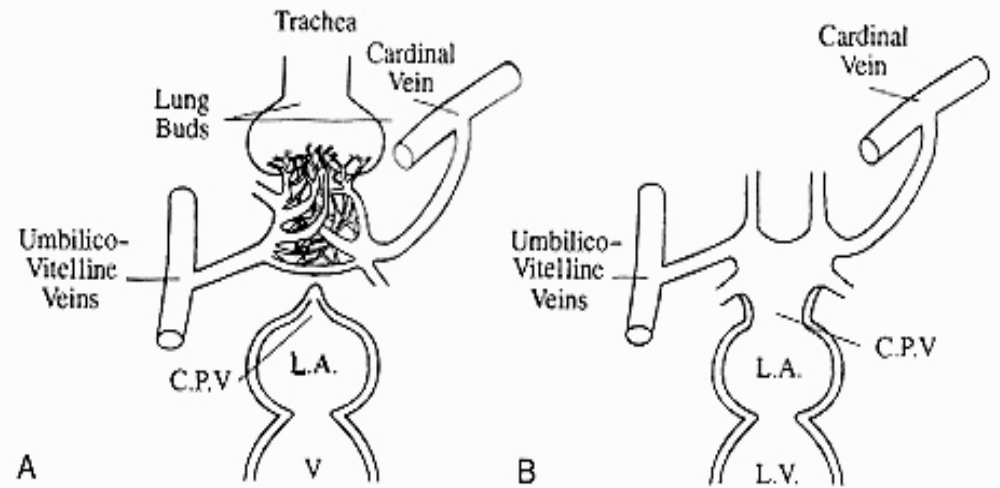
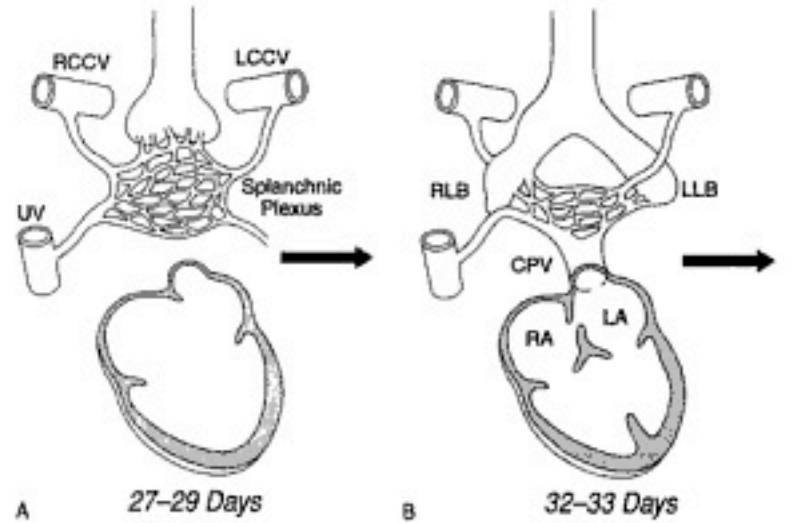
Totally Anomalous Pulmonary Venous Connections.

- The lesion is classified according to the site of drainage. The sites of drainage may be:-
 - Above the heart (The Commonest)
 - To the Heart (The Rarest)
 - Below the heart
 - There may be mixed drainage to differing sites. Commoner than believed
 - Always think of this!
- Lesions may be obstructed at differing sites. Although the infradiaphragmatic site is invariably obstructed, the commonest site for obstruction is to a left vertical vein.

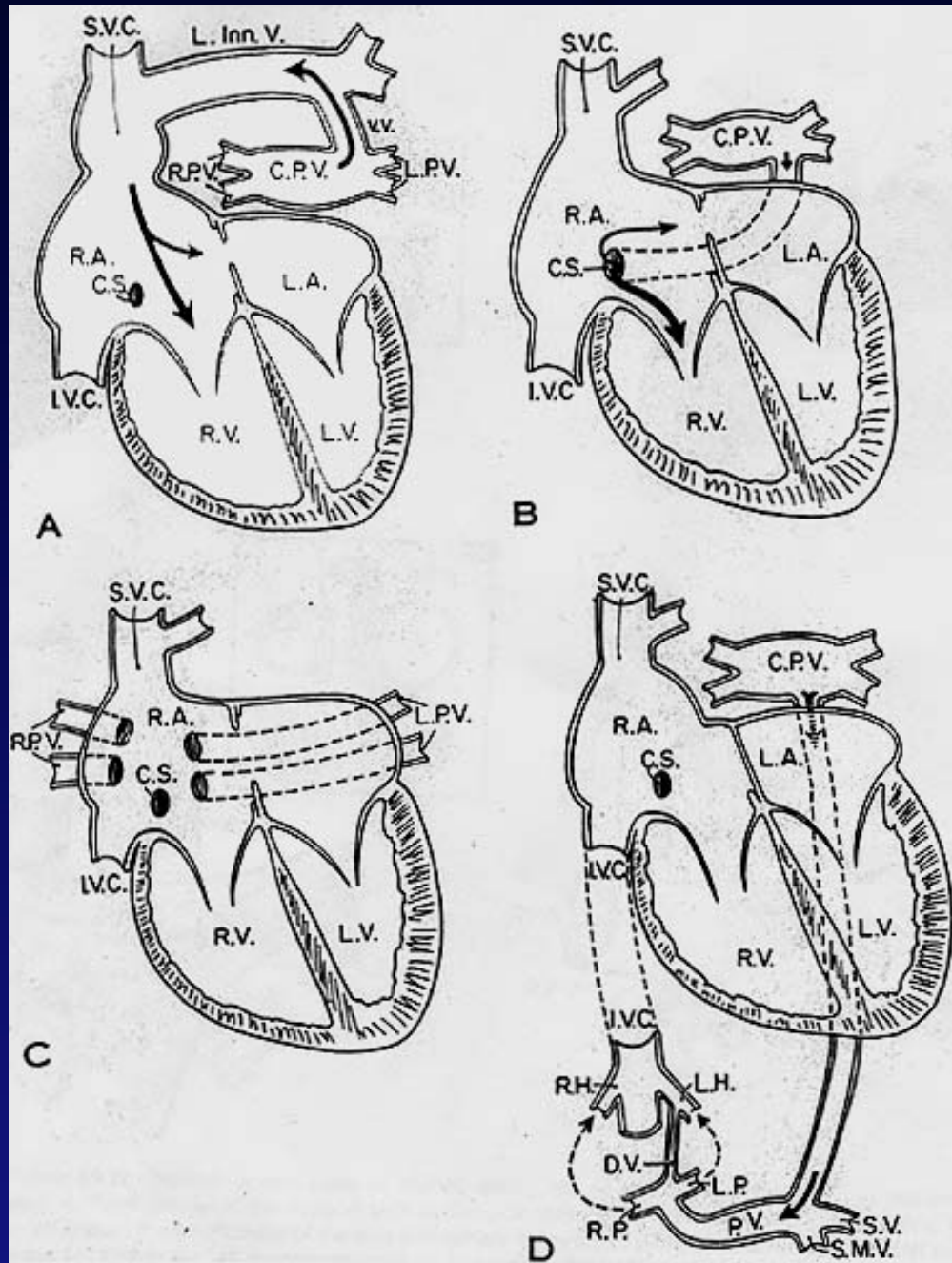
Pulmonary Vein Embryology

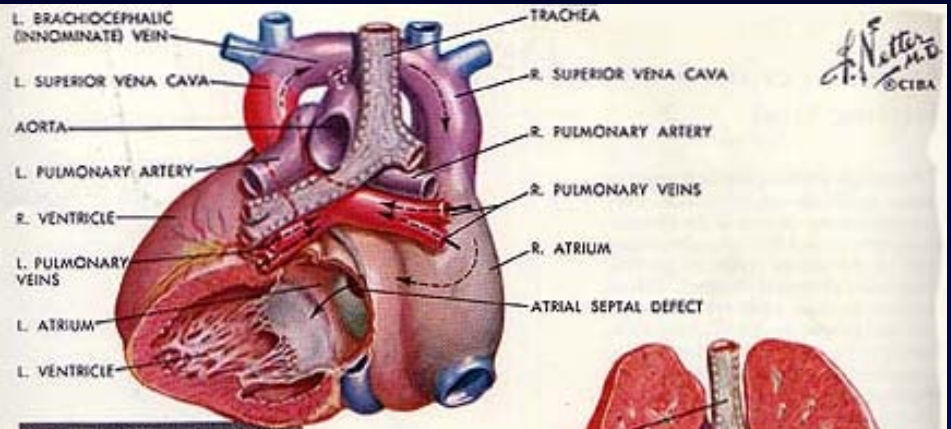


Pulmonary Vein Embryology



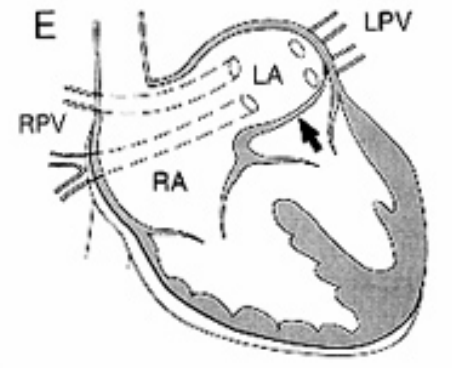
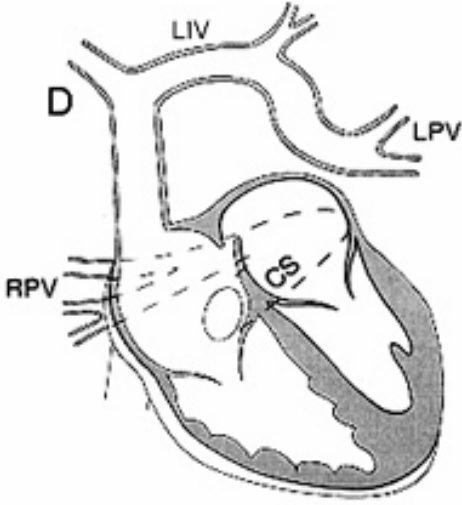
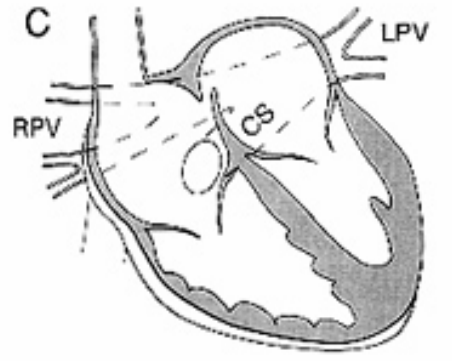
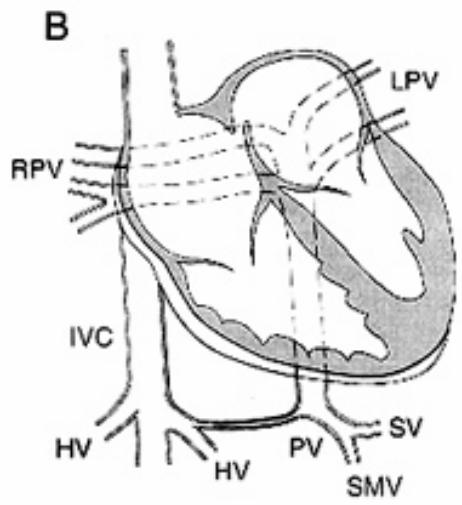
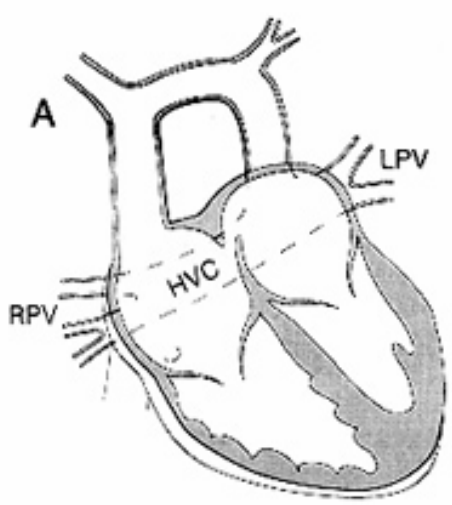
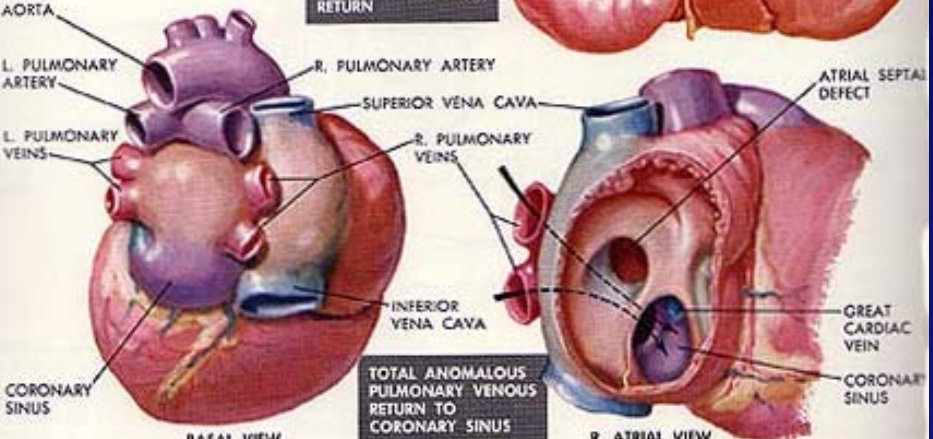
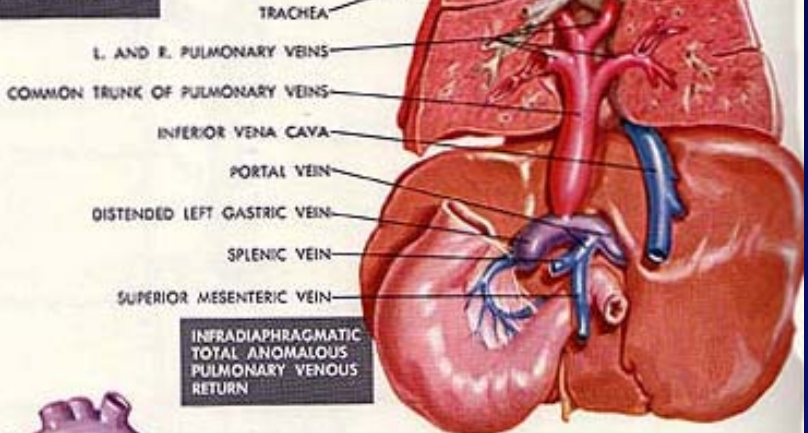
Totally Anomalous Pulmonary Venous Connections.



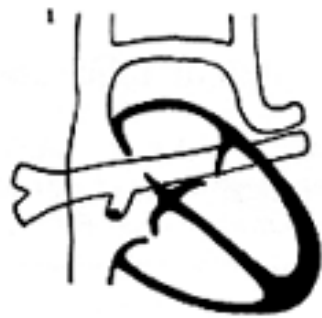


F. Netter M.D.
© CIBA

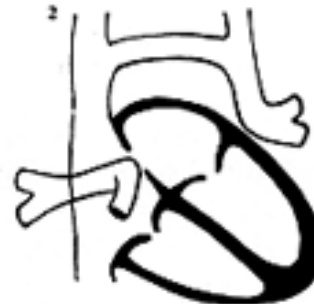
TOTAL ANOMALOUS PULMONARY VENOUS RETURN TO L. SUPERIOR VENA CAVA



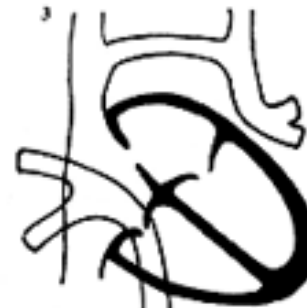
Pulmonary Venous Anomalies



7 (35%)



5 (25%)



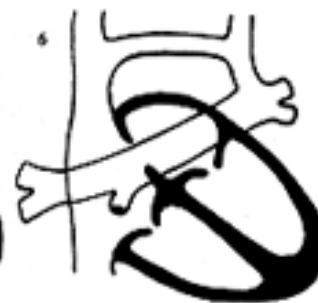
2 (10%)



1 (5%)



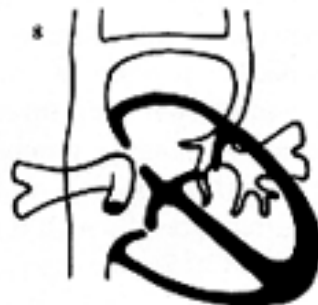
1 (5%)



1 (5%)



1 (5%)



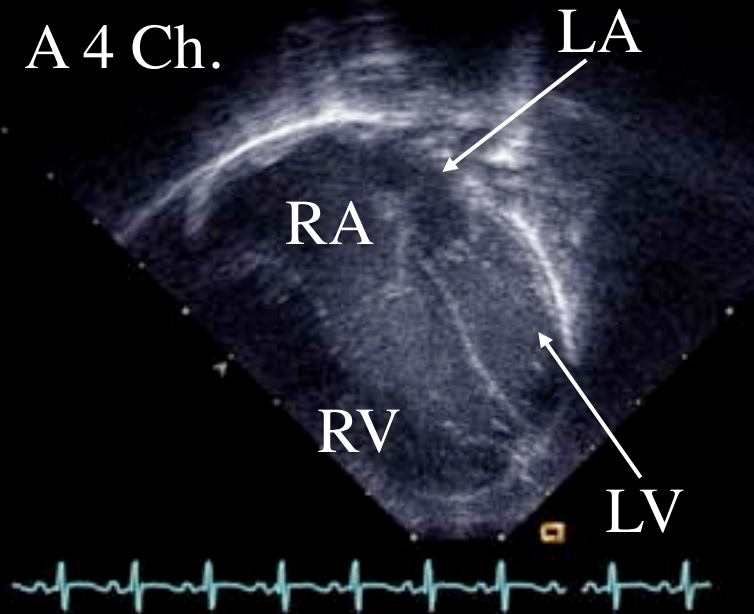
1 (5%)



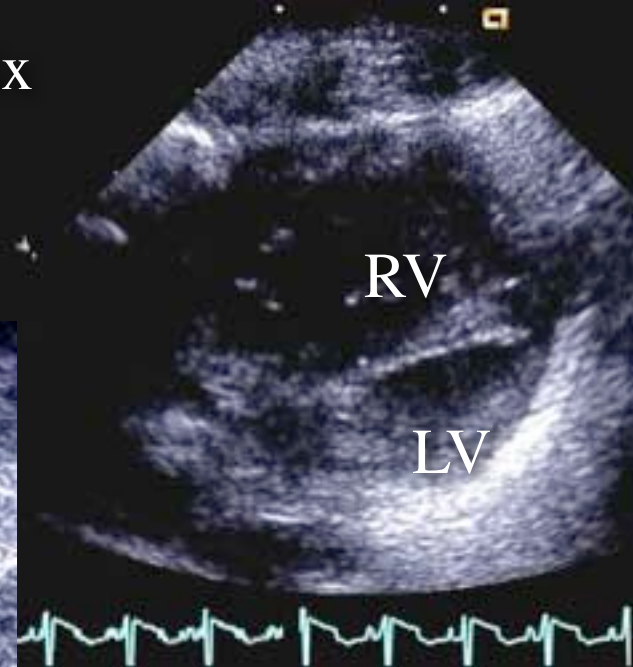
1 (5%)

General Features of TAPVR.

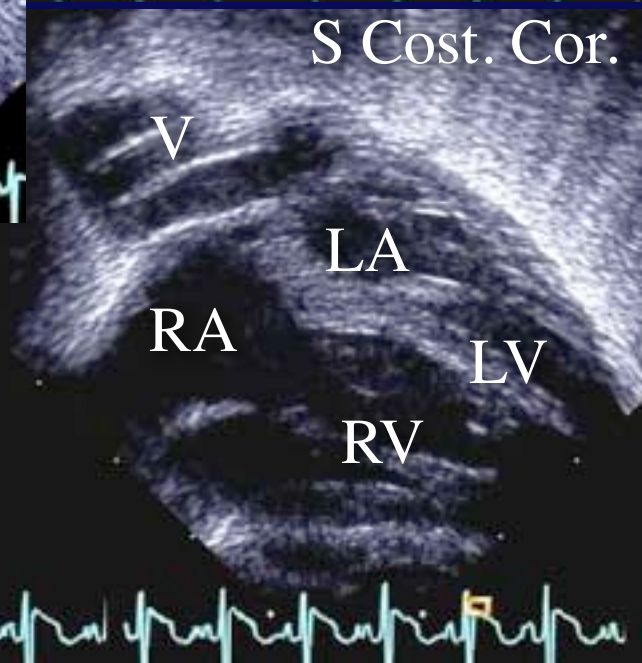
A 4 Ch.



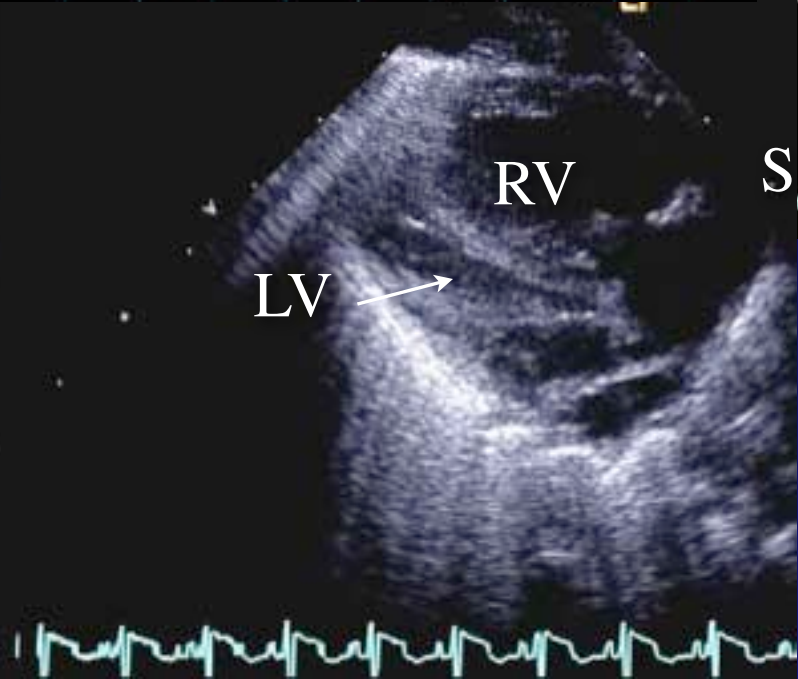
P Sx



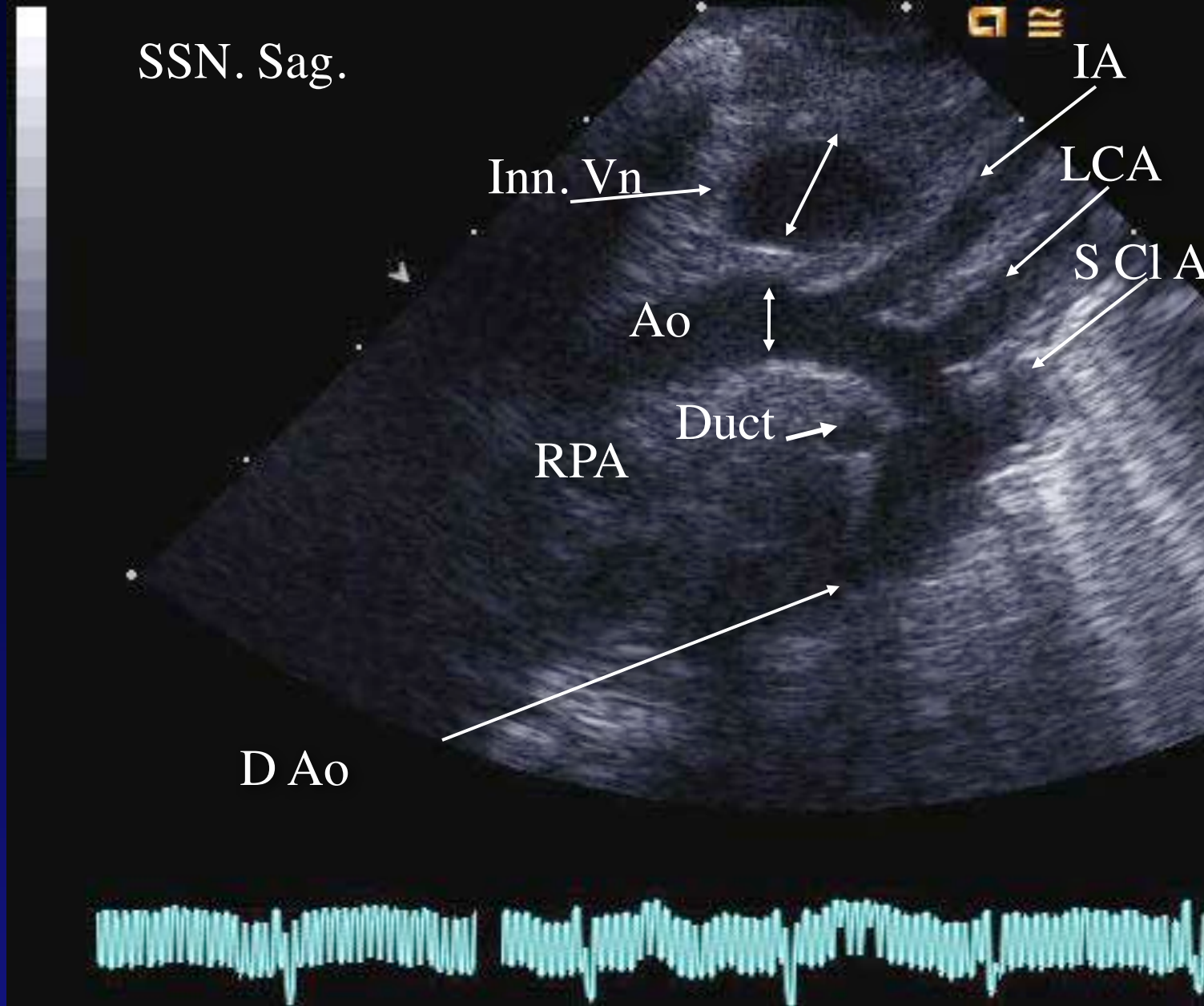
S Cost. Cor.



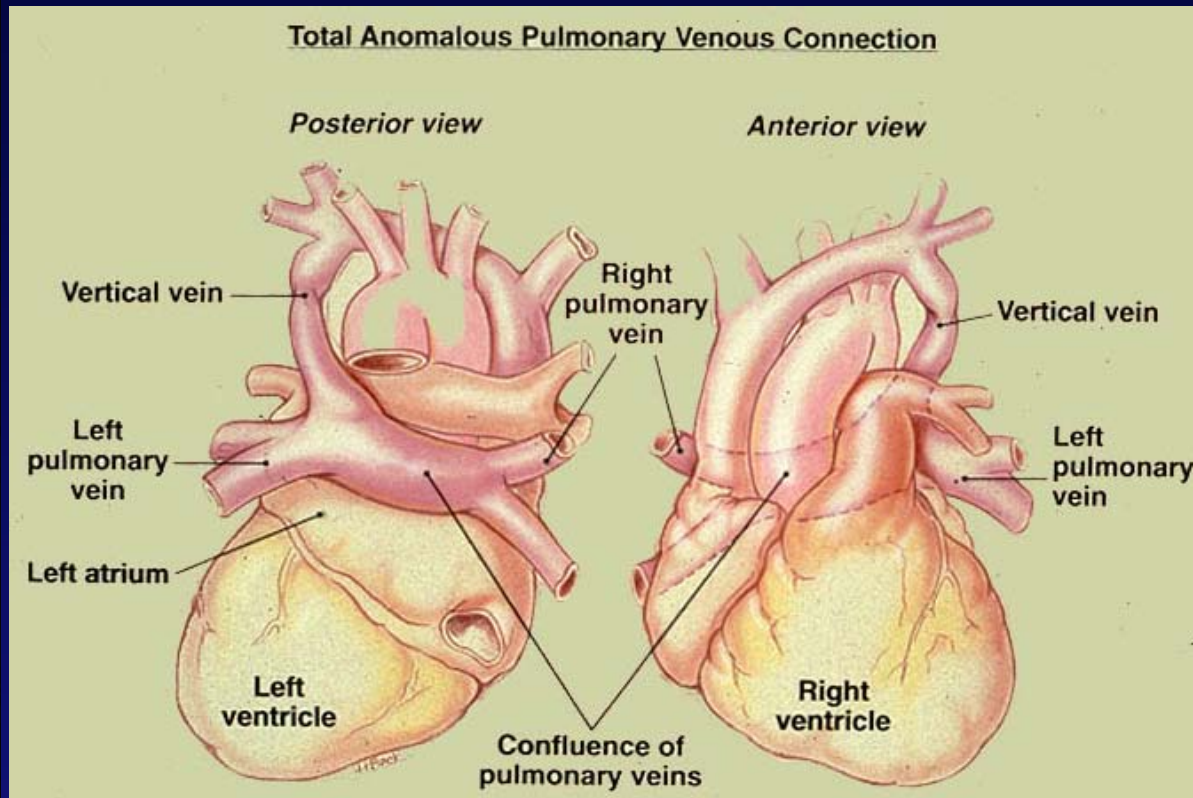
S Cost. Sag.



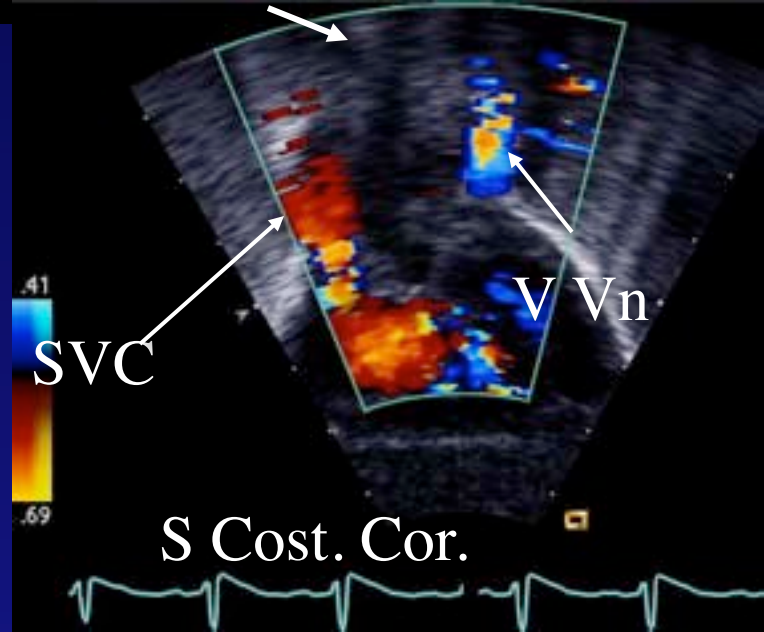
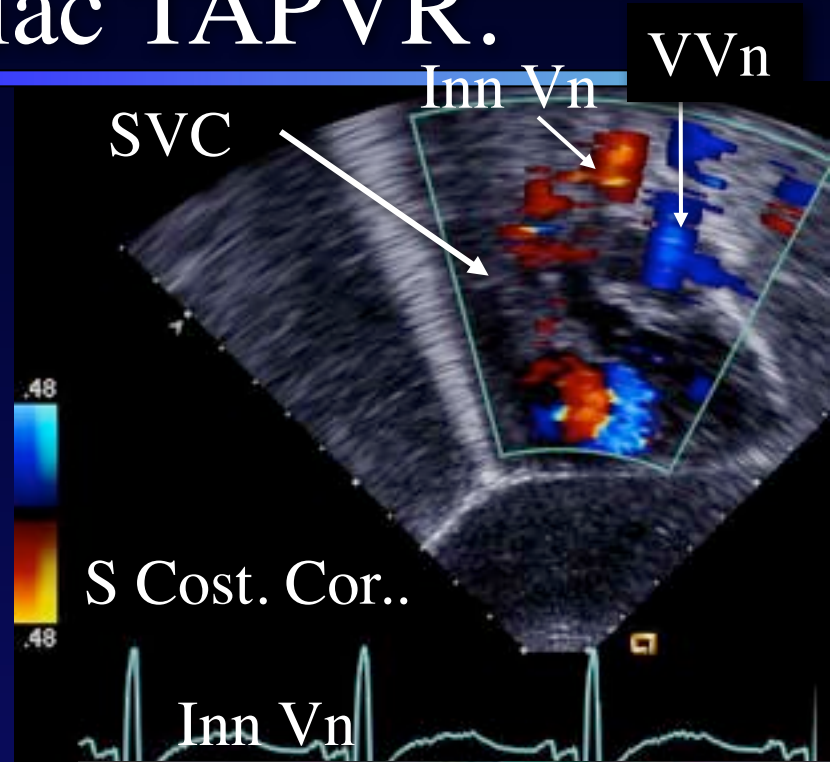
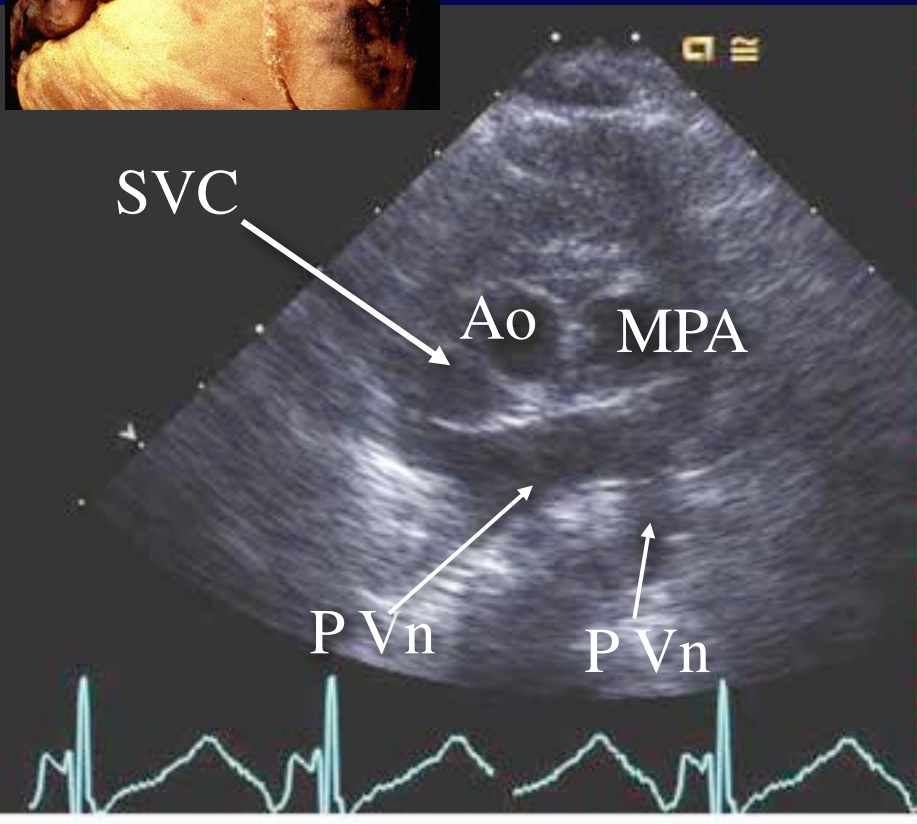
Supracardiac TAPVR: Large Innominate Vein.



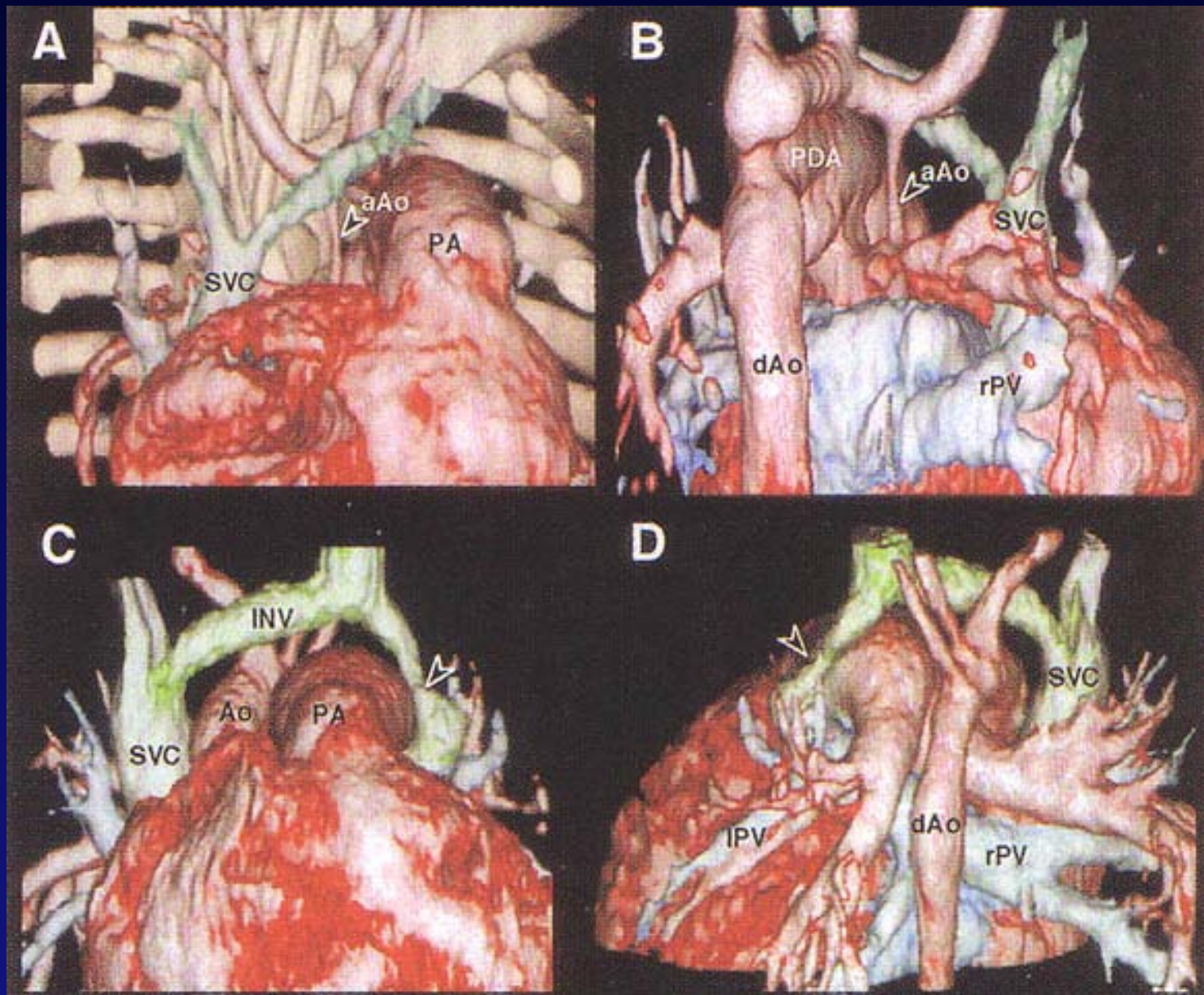
Supradiaphragmatic TAPVR



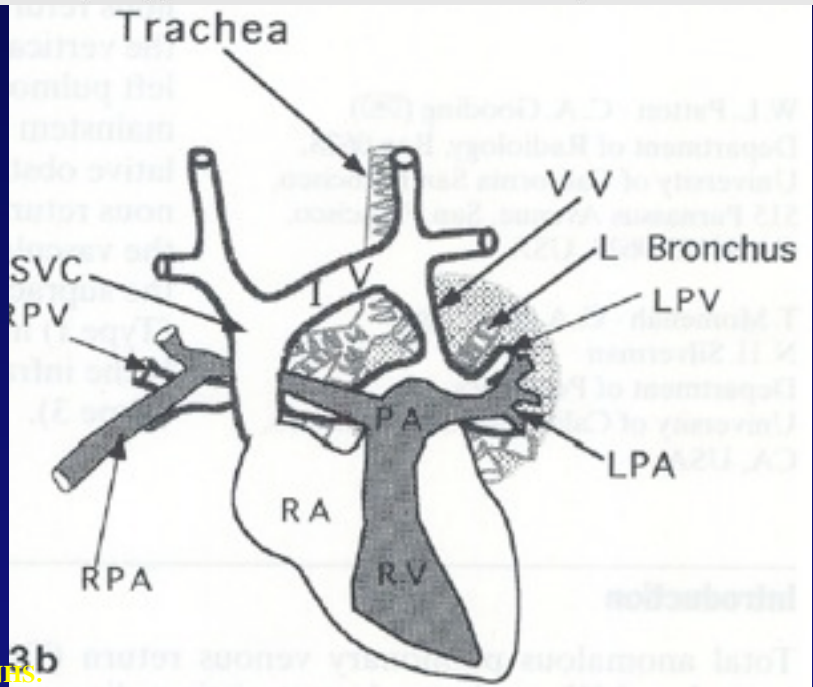
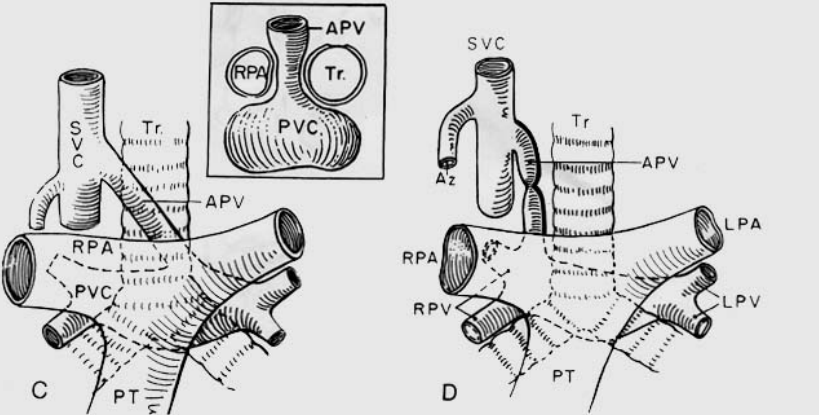
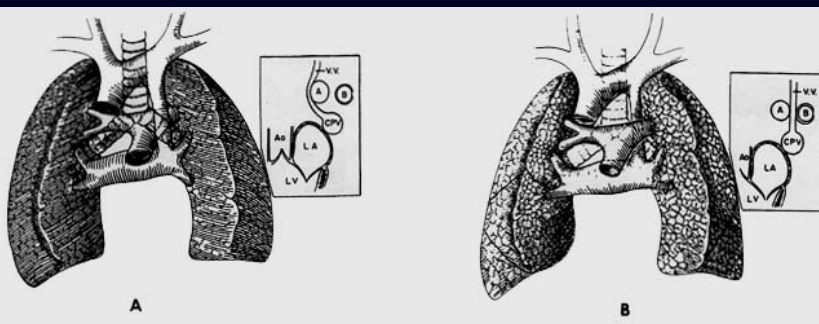
Usual Supracardiac TAPVR.



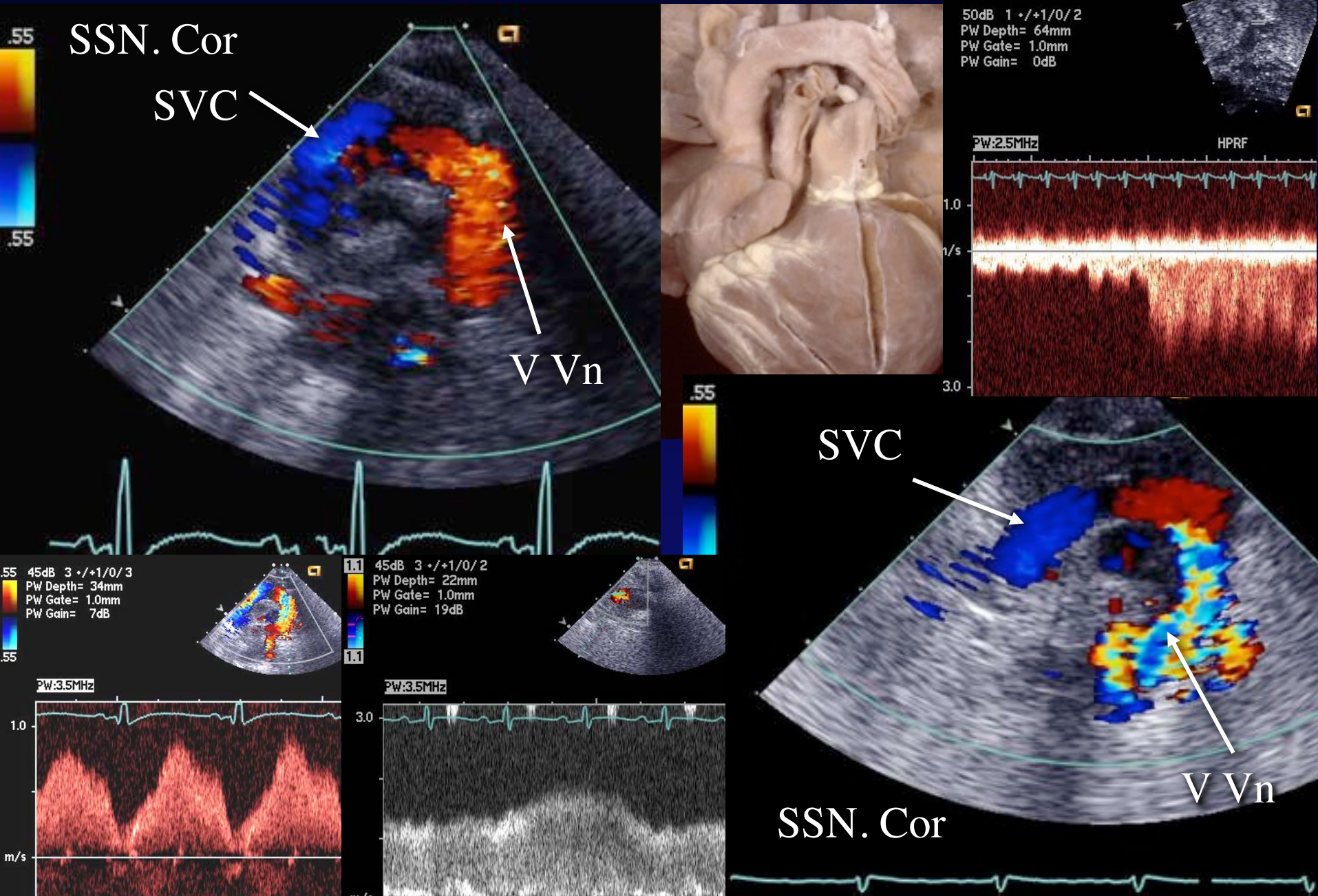
MRI of Supradiaphragmatic TAPVR



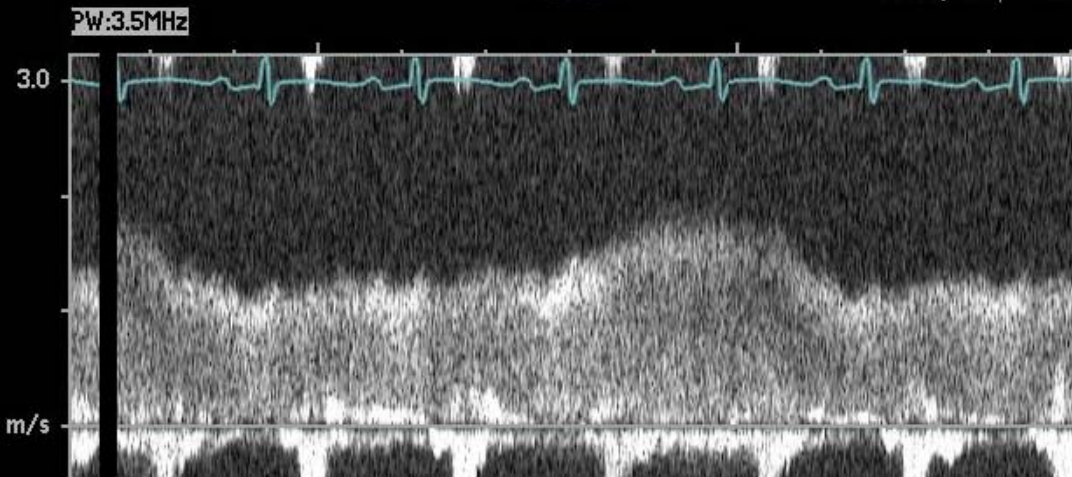
The Hemodynamic Vise



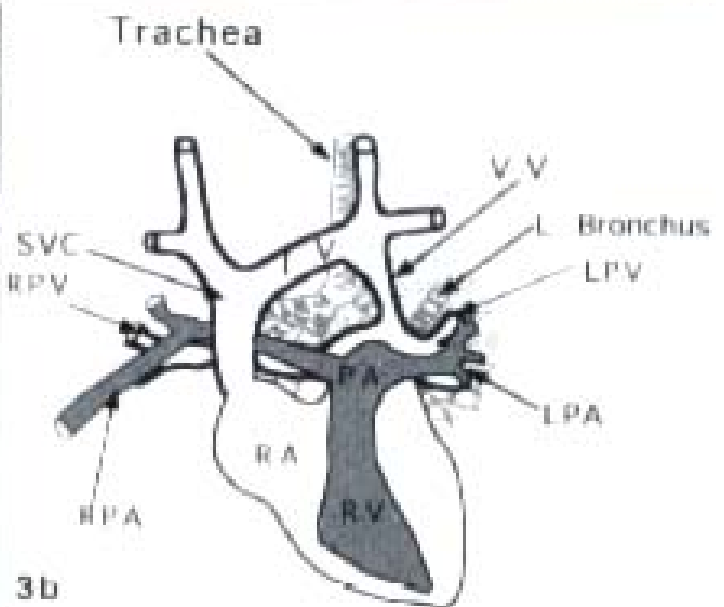
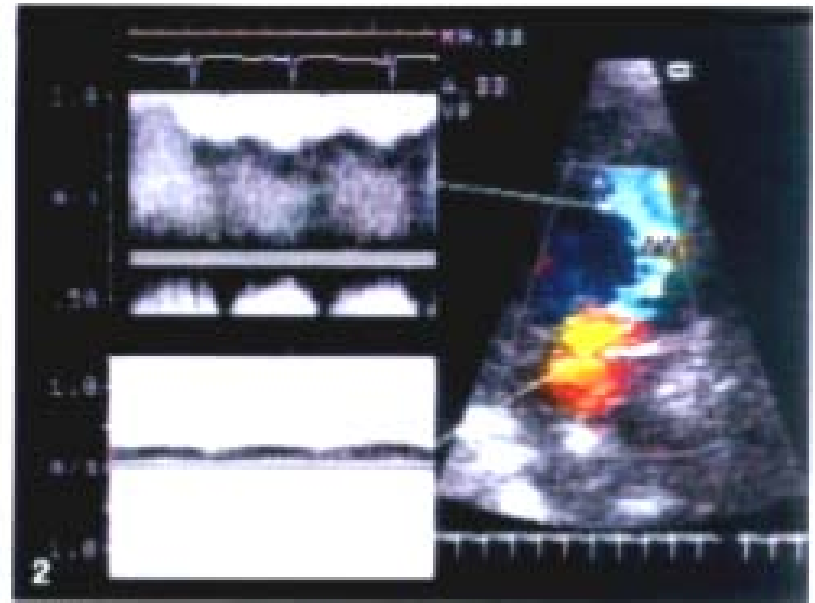
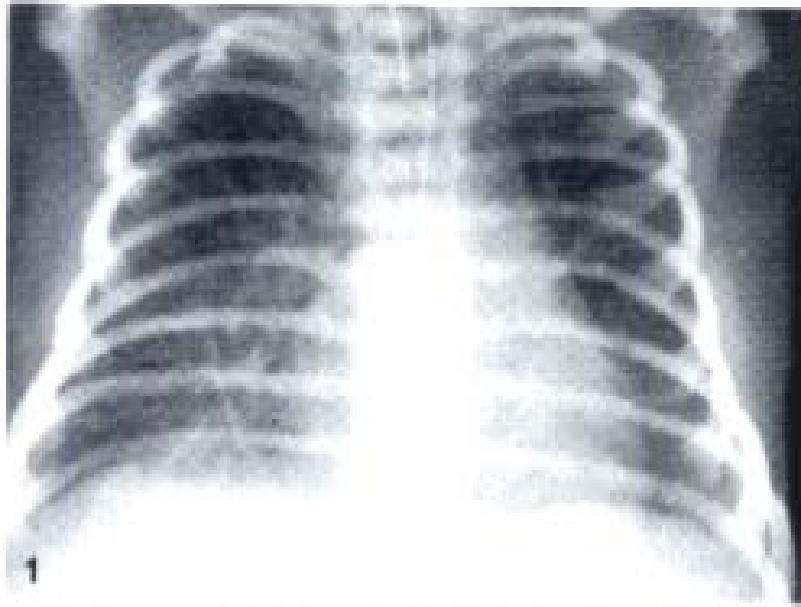
Supracardiac TAPVR, with Obstruction.



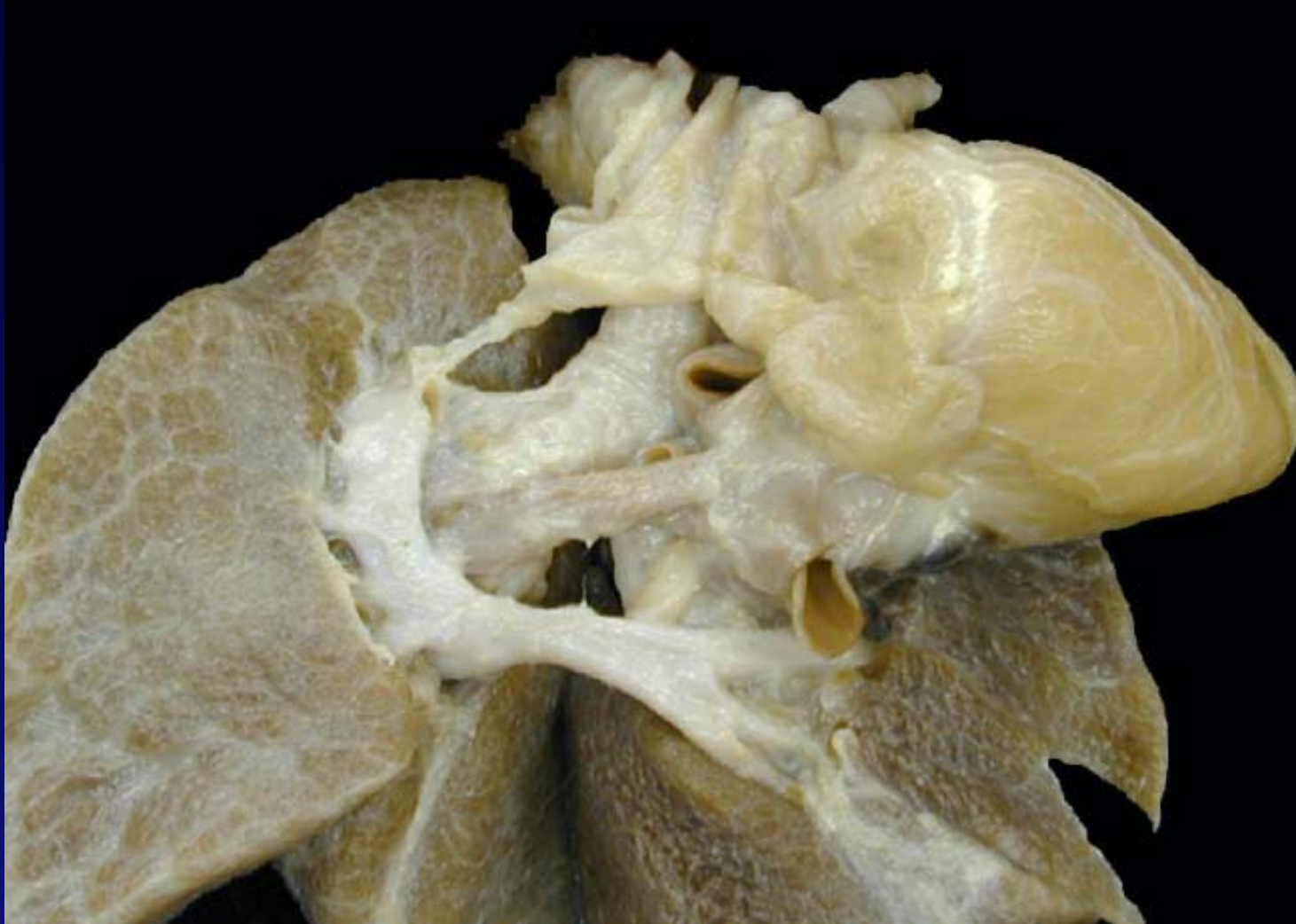
Supracardiac TAPVR, with Obstruction.



The Hemodynamic Vise.



Azygos Pulmonary Venous Drainage.



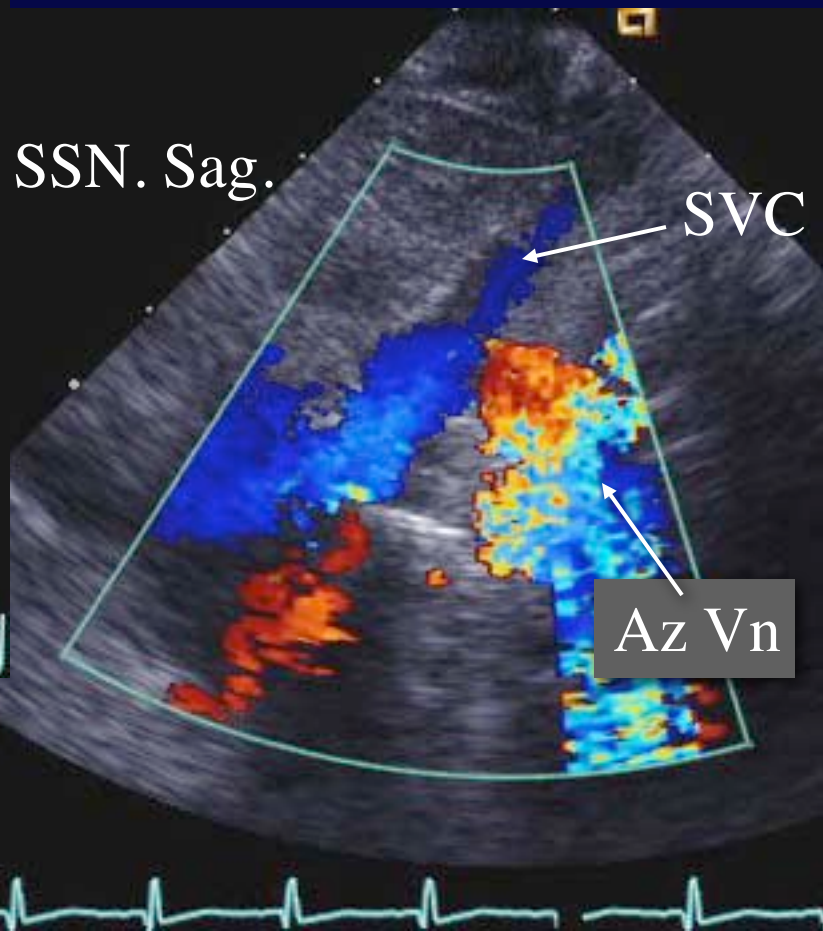
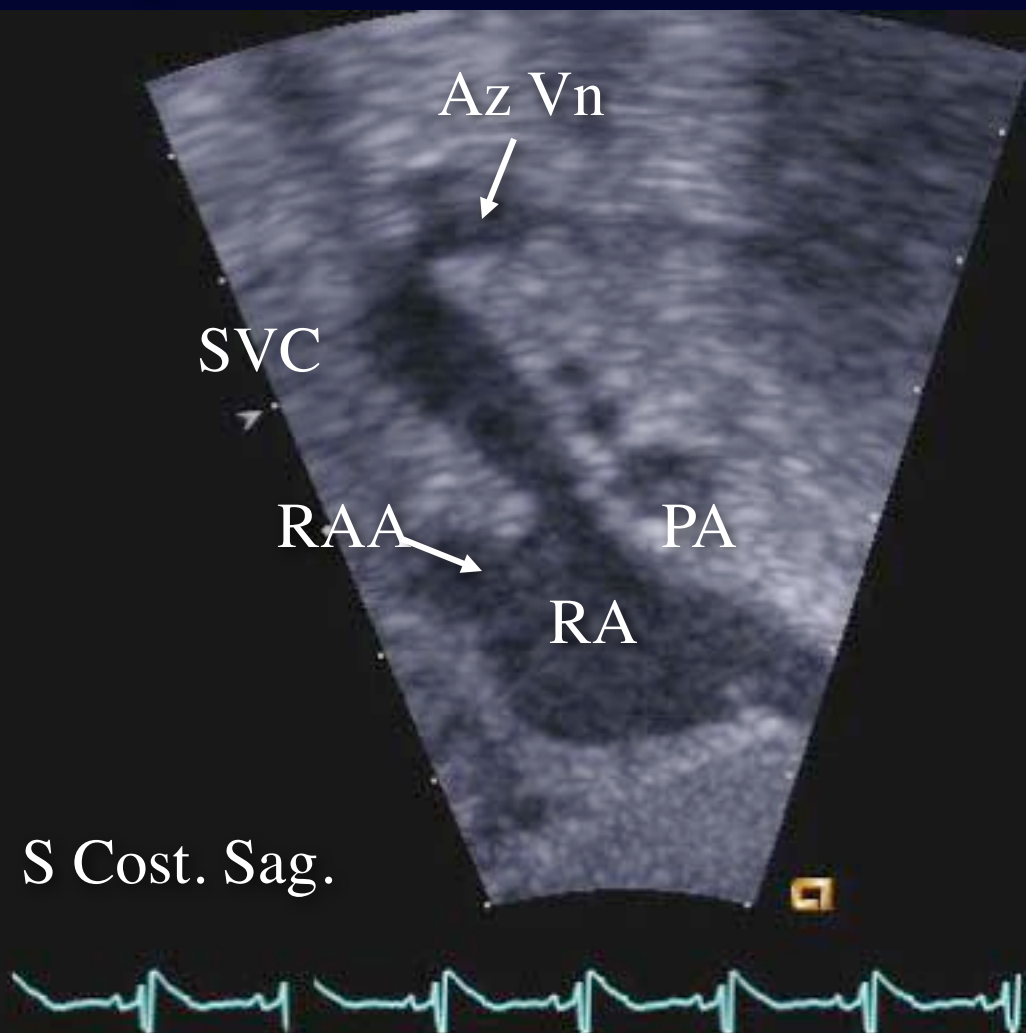
3/7 Asplenia

Musolino AM, Santoro G, Marino B, Formigari R, Guccione P, Pasquini L.

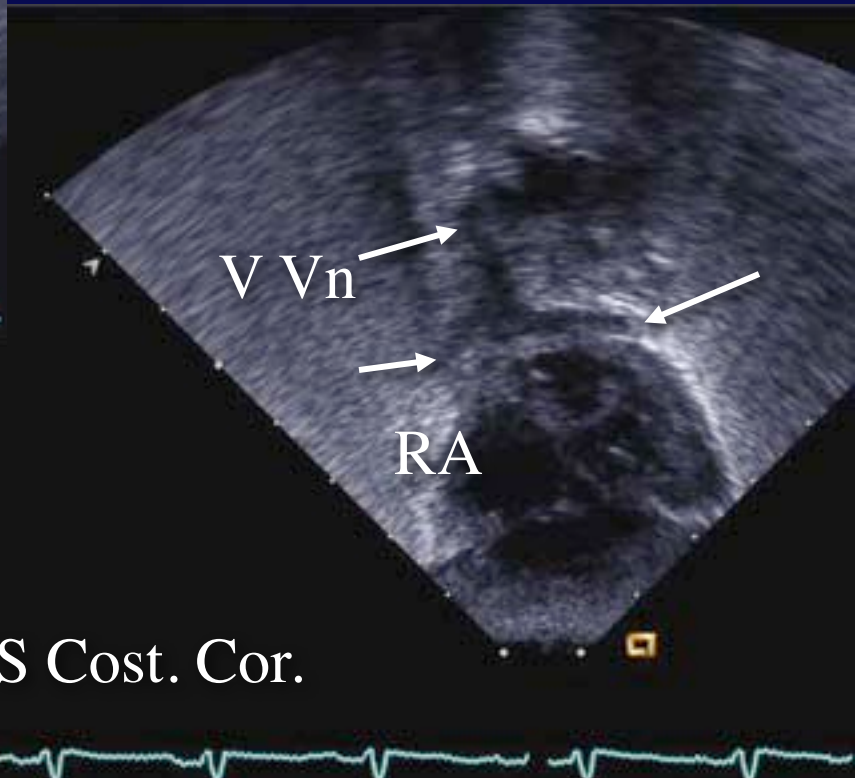
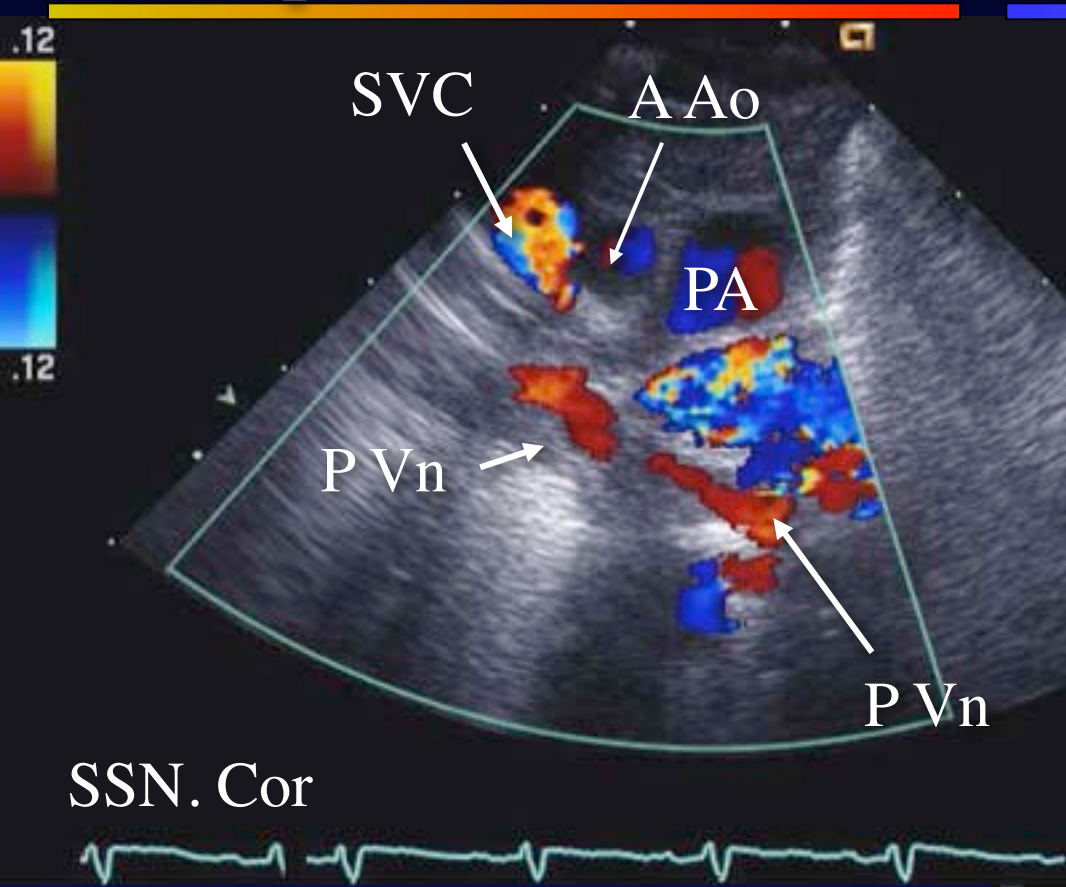
Echocardiographic diagnosis of totally anomalous pulmonary venous connection to the azygos vein.

Cardiol Young 1999;9:305-309.

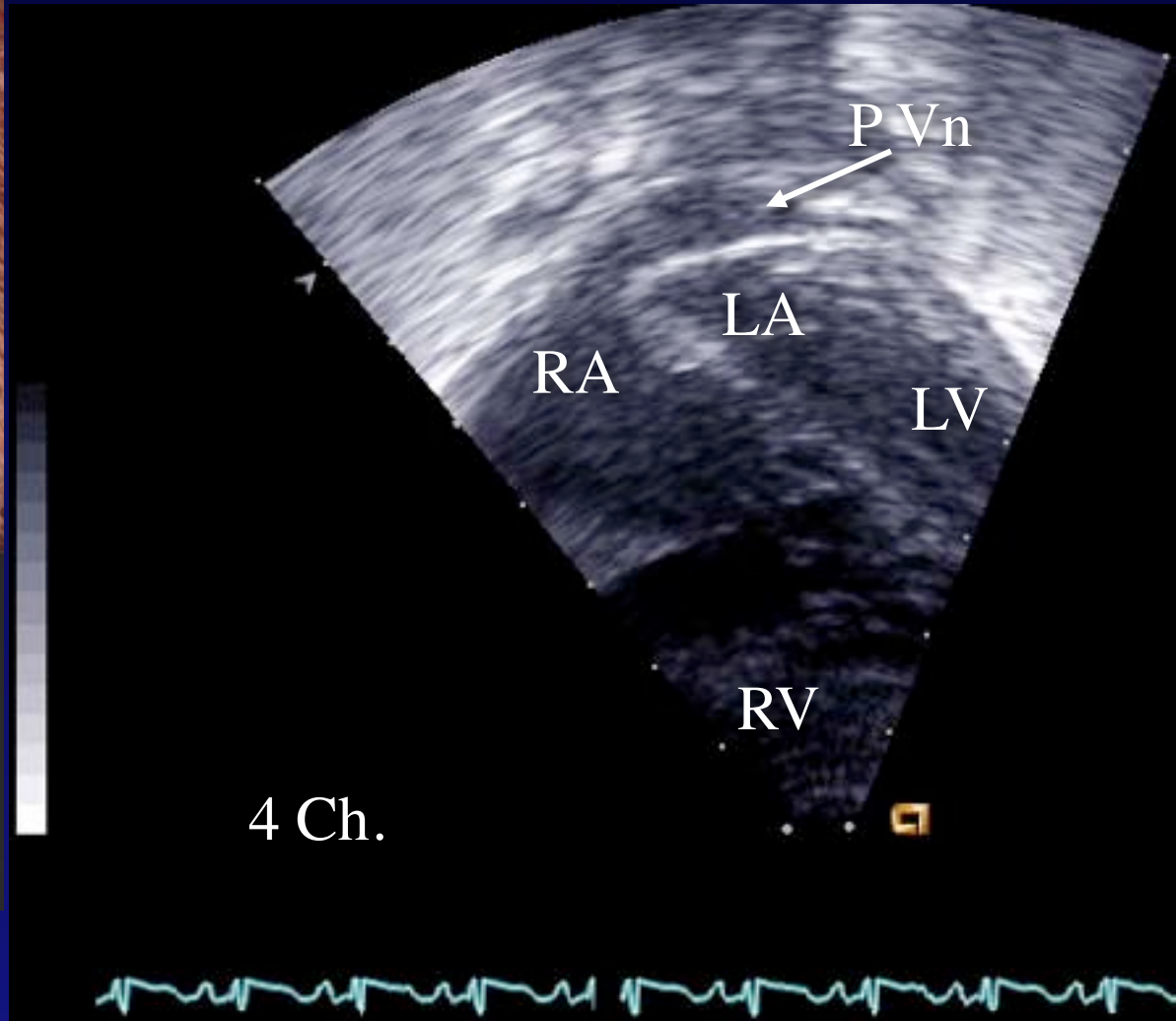
Supracardiac TAPVR: Azygos Drainage



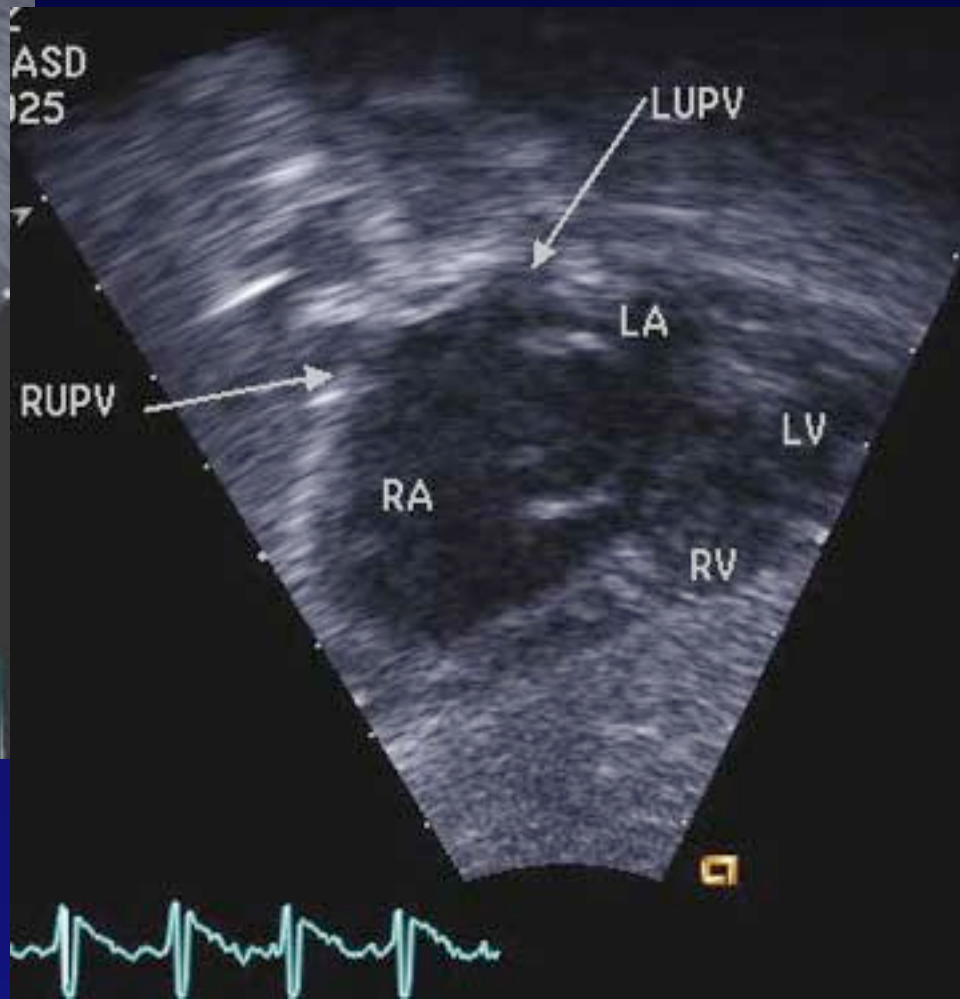
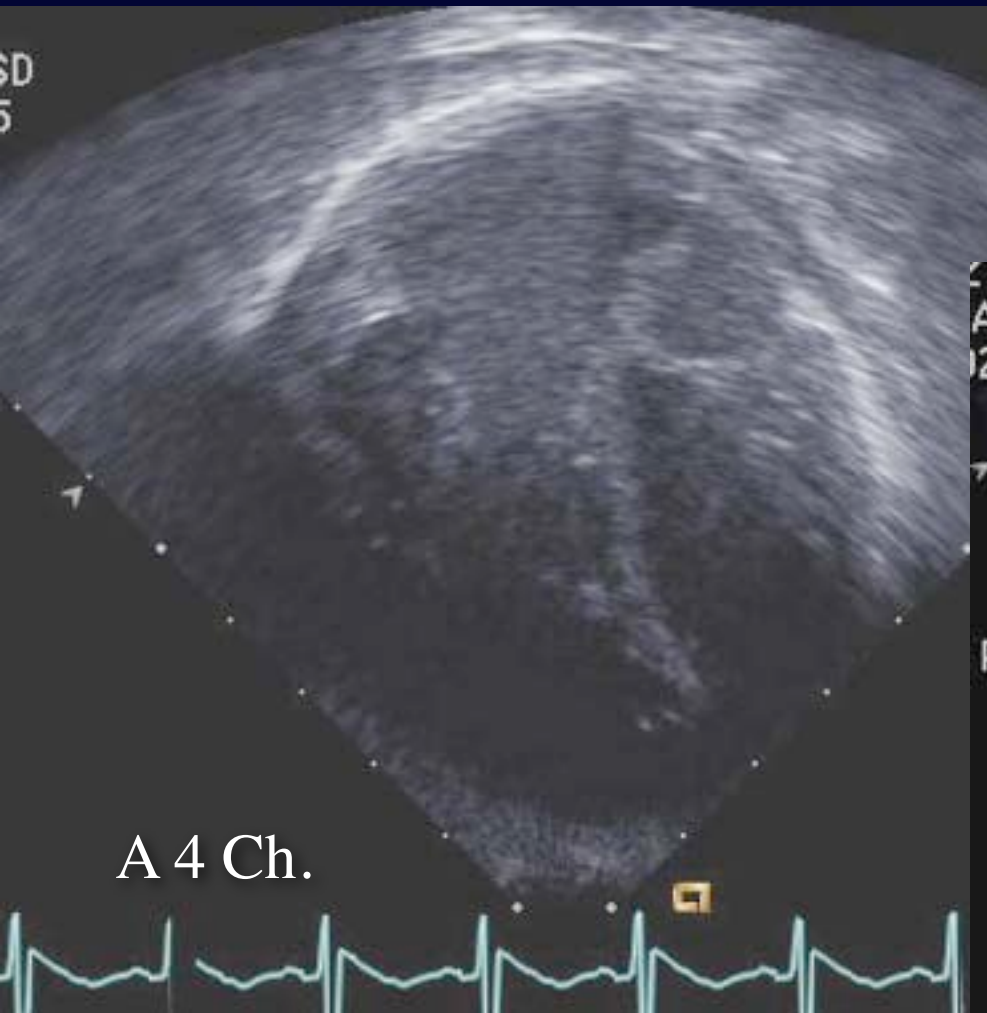
Supracardiac TAPVR: Drainage to R SVC



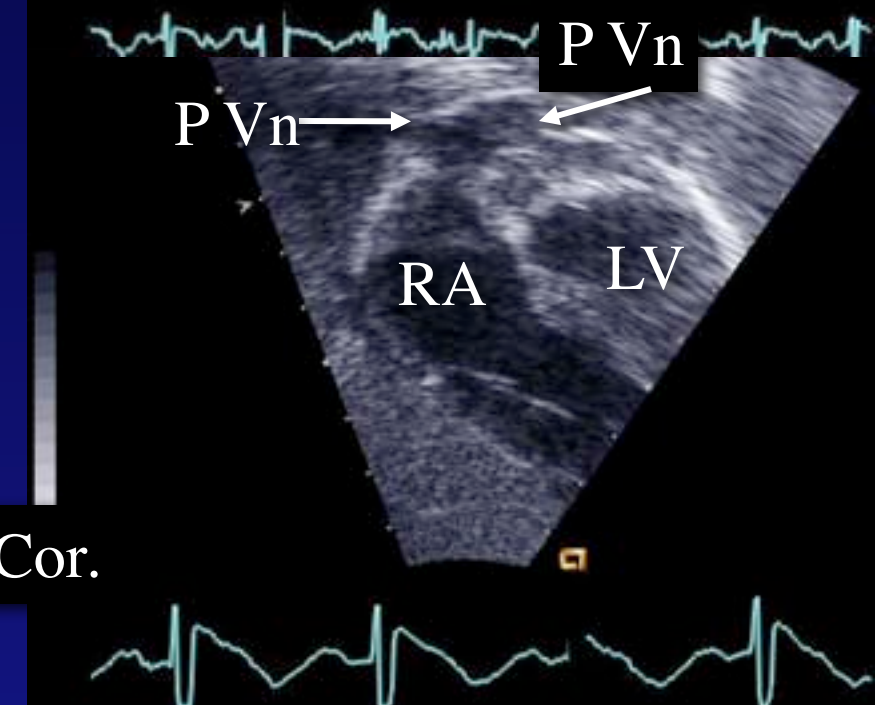
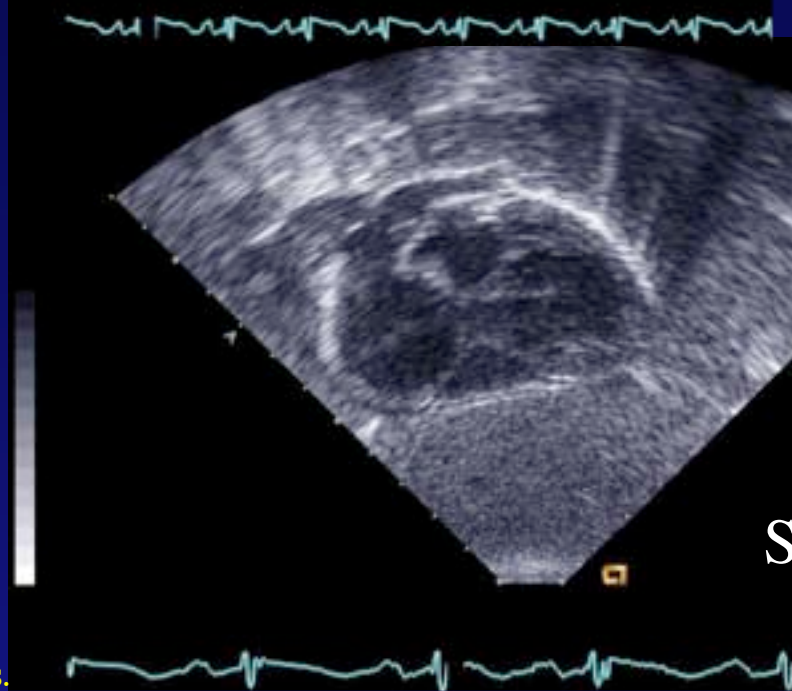
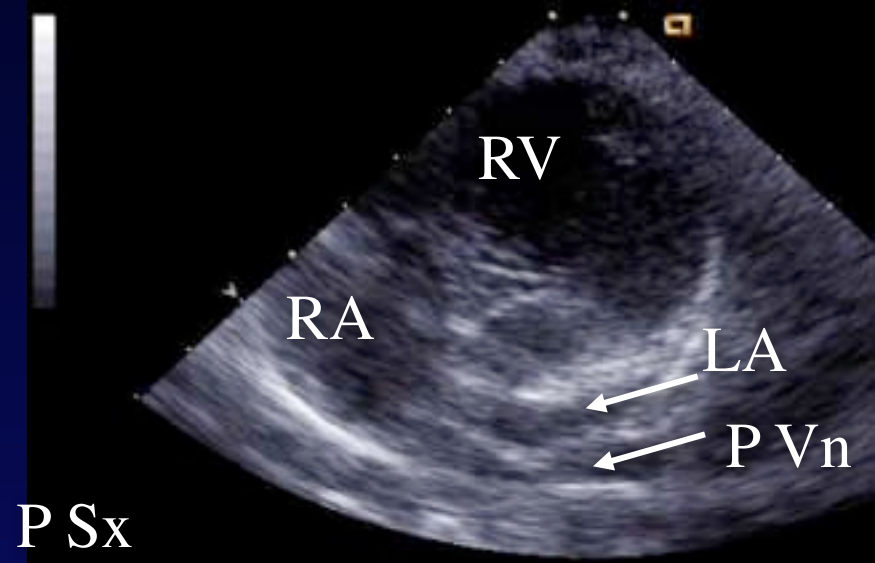
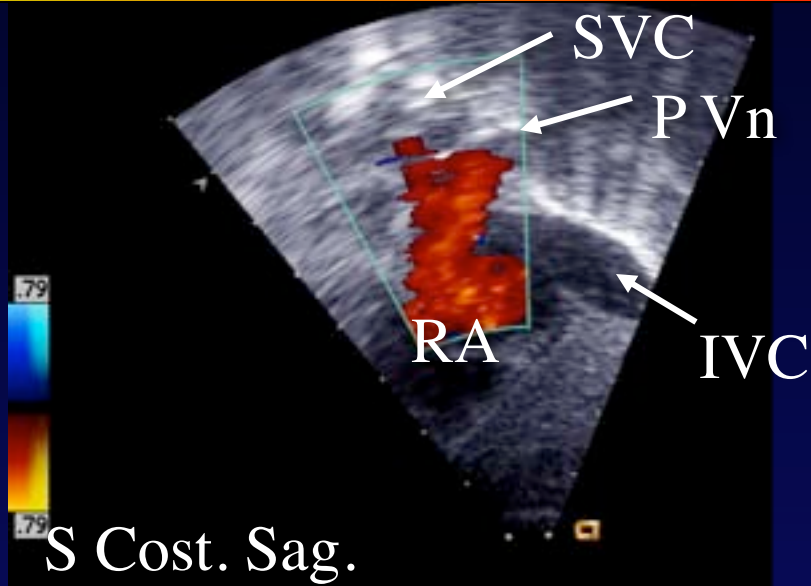
Pulmonary Veins to the Right Atrium.



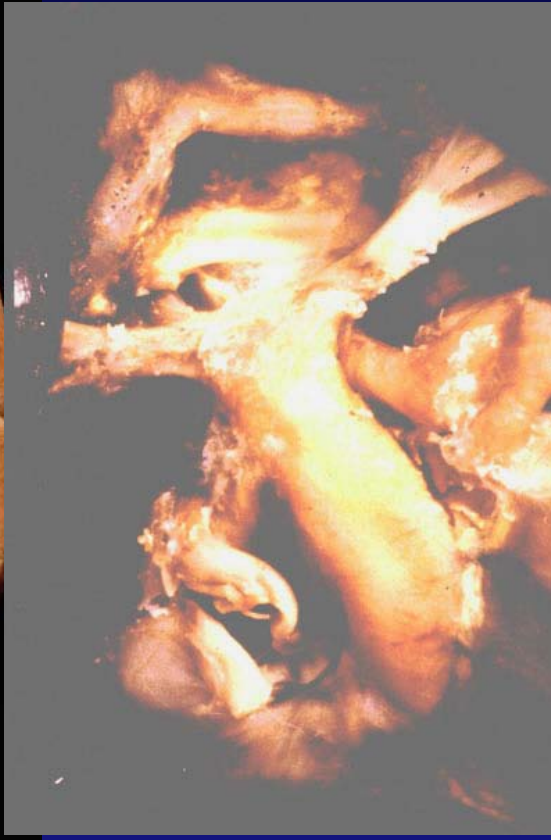
TAPVR: to Right Atrium



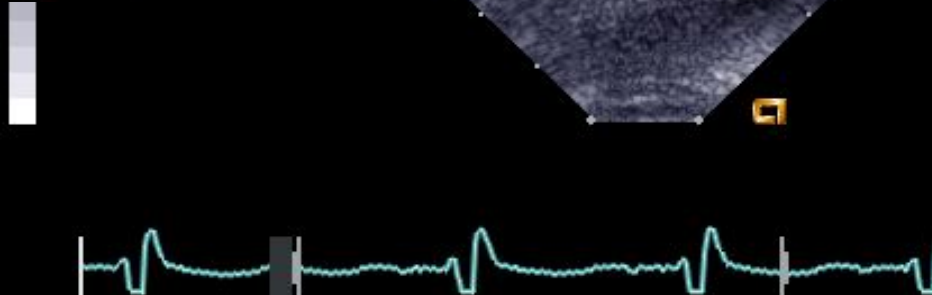
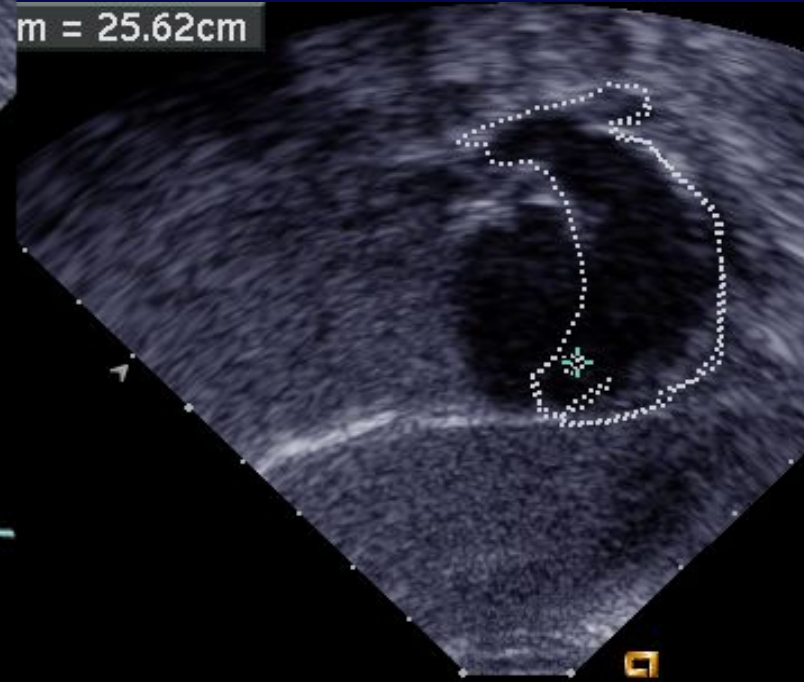
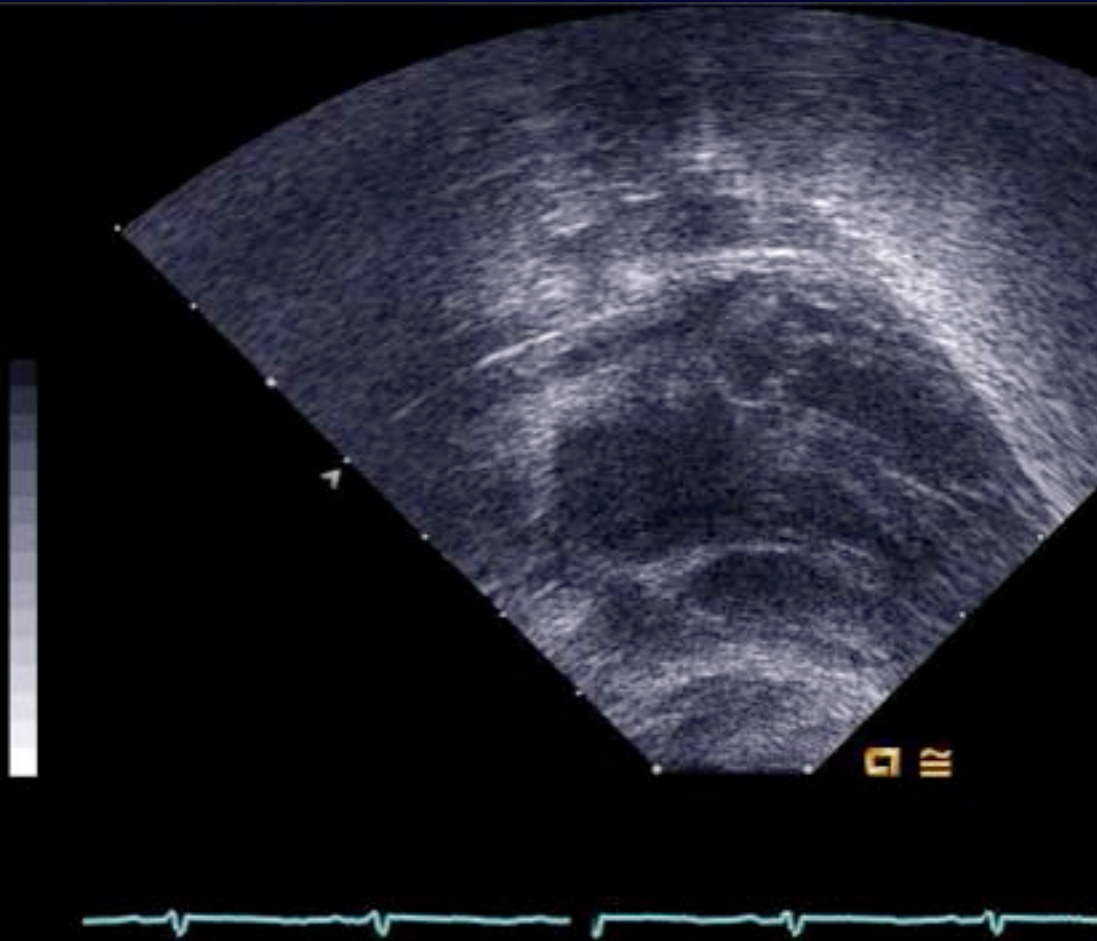
TAPVR: to Right Atrium



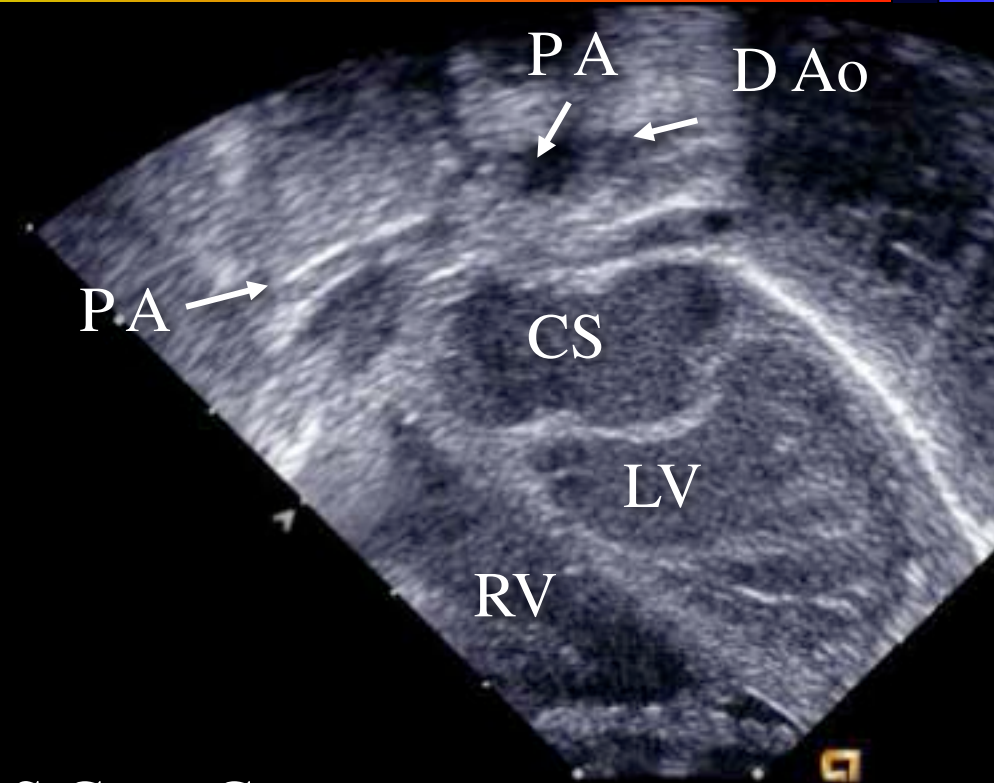
Drainage to the Coronary Sinus.



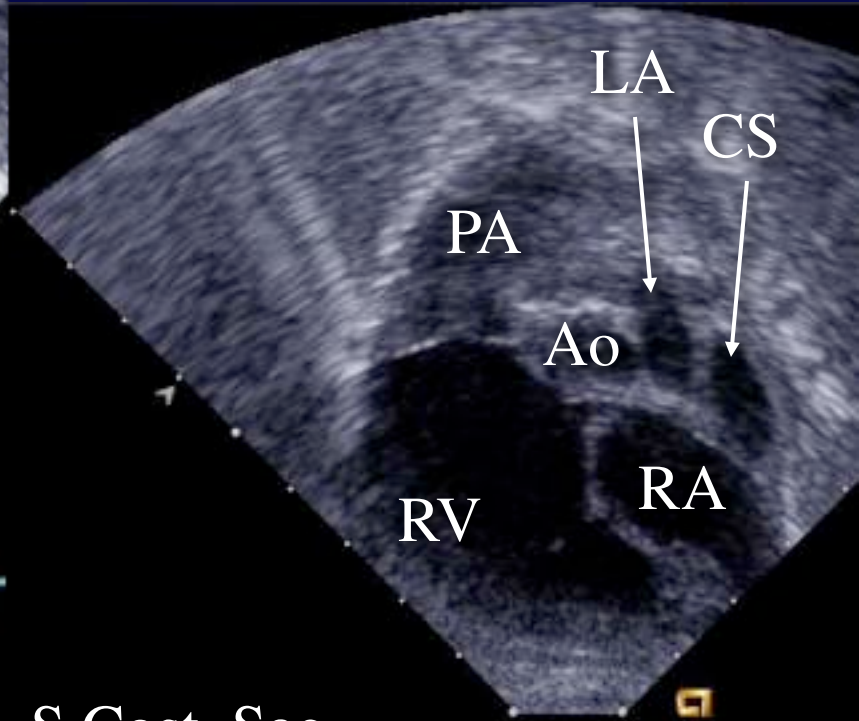
TAPVR: to Coronary Sinus



TAPVR: to Coronary Sinus



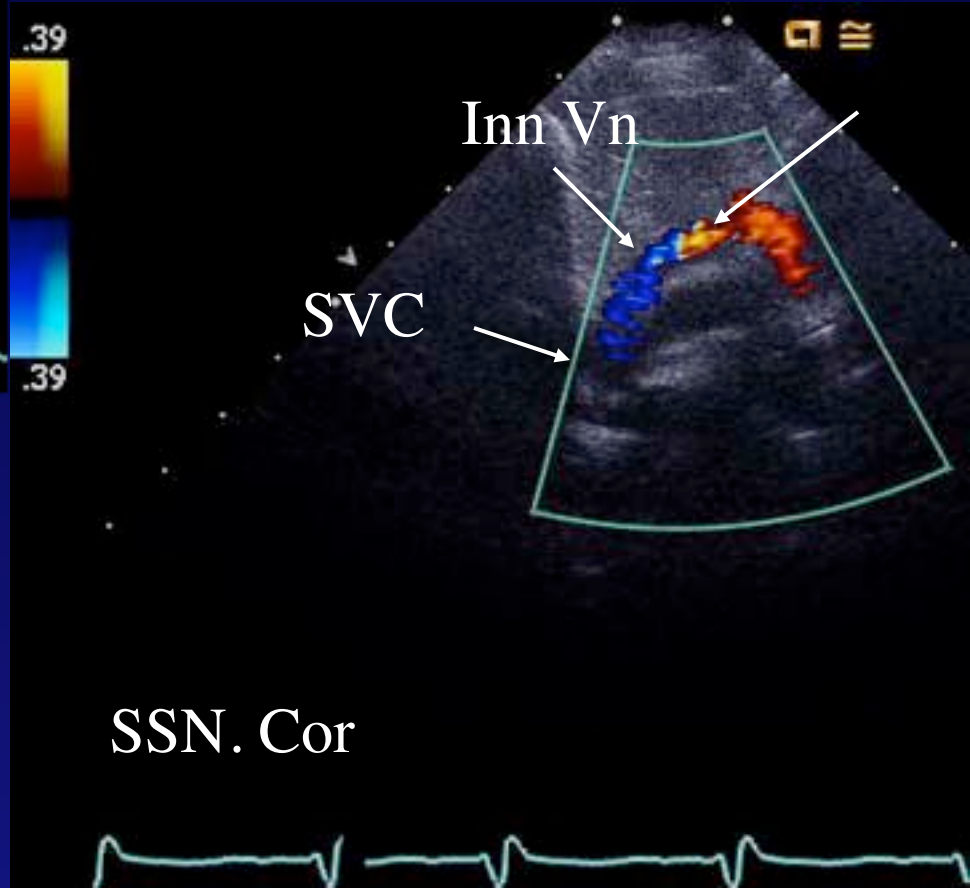
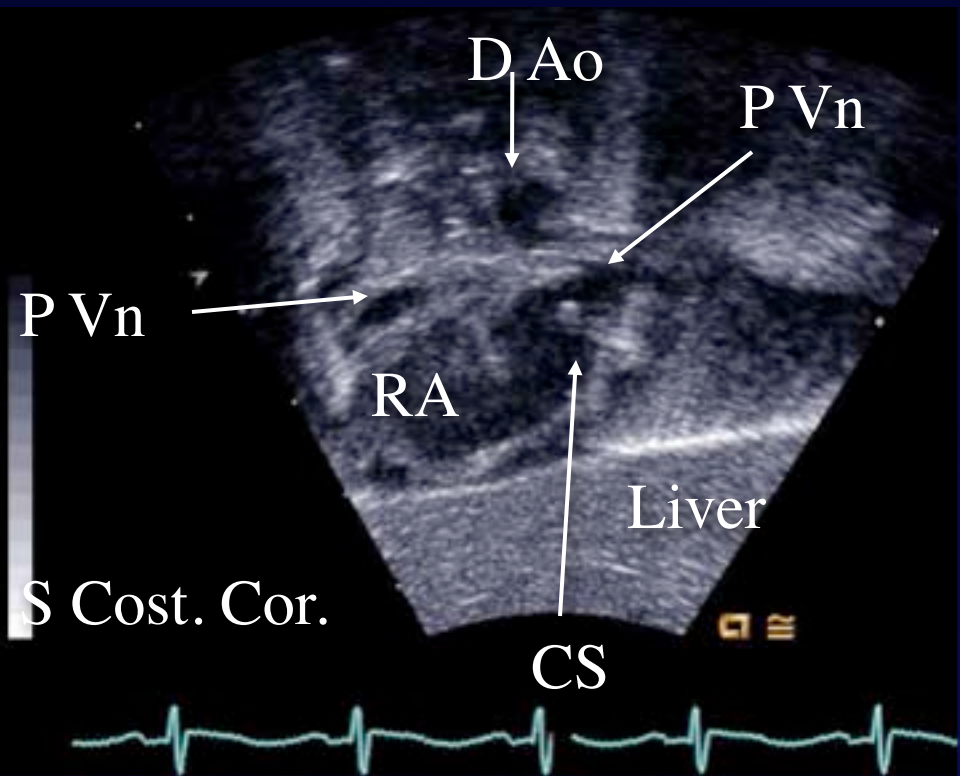
S Cost. Cor.



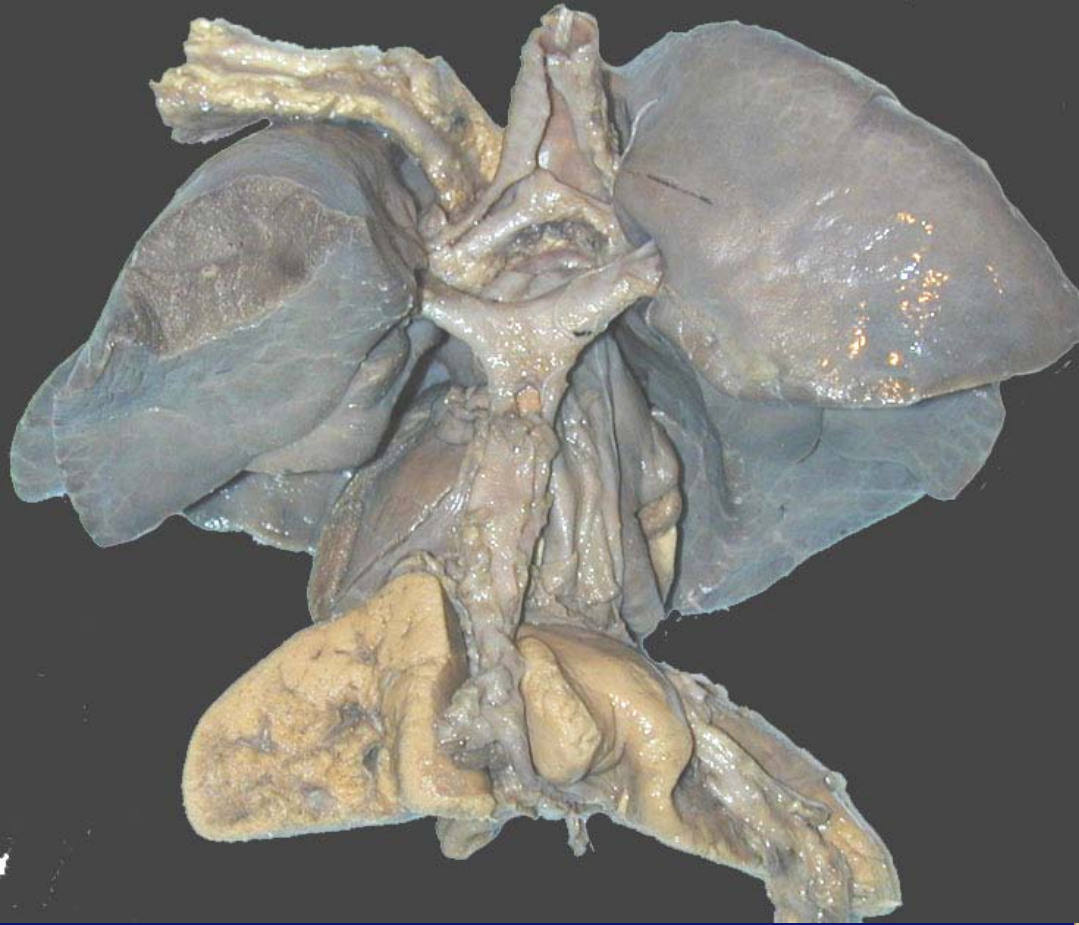
S Cost. Sag.



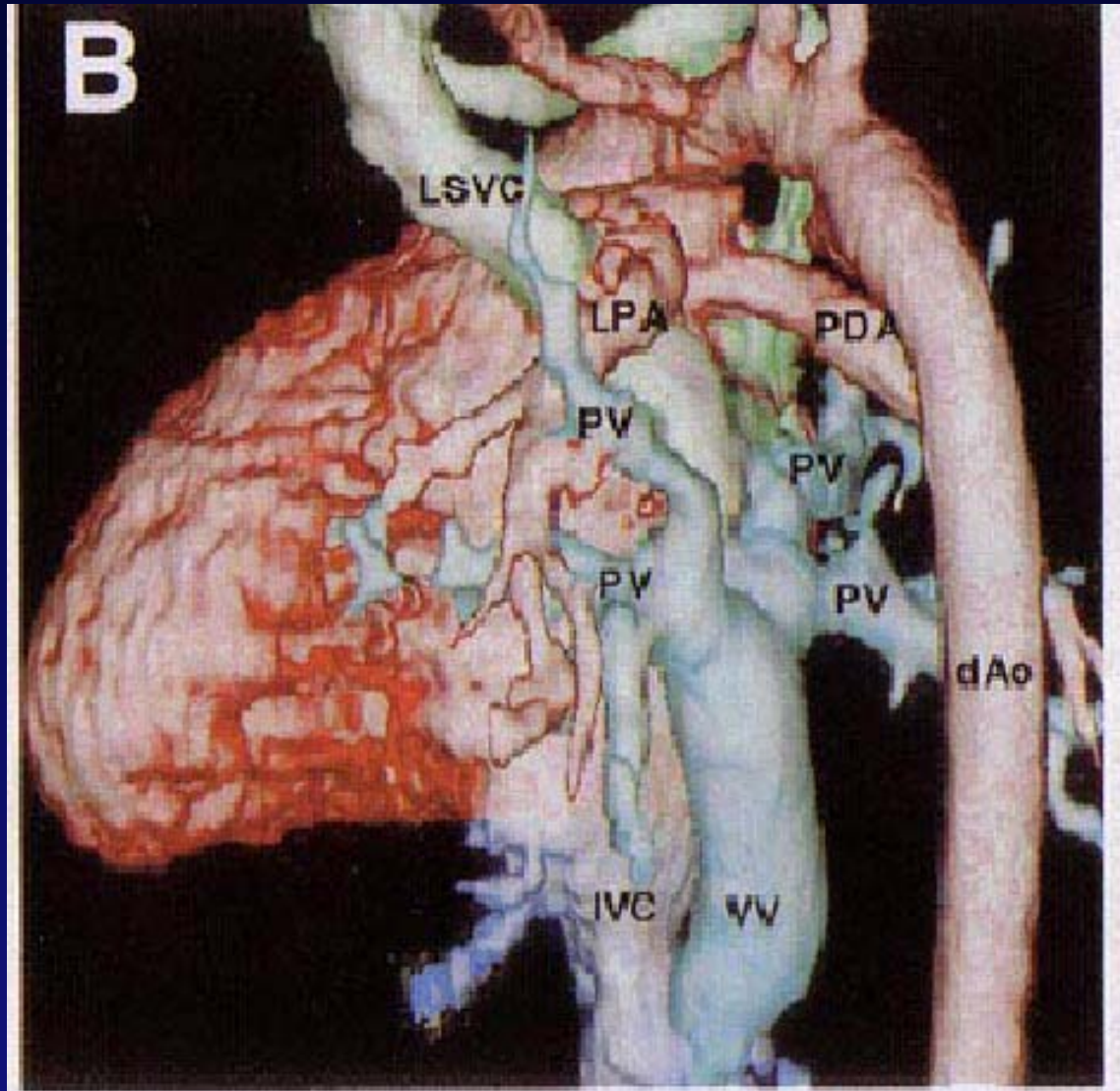
TAPVR: to Coronary Sinus



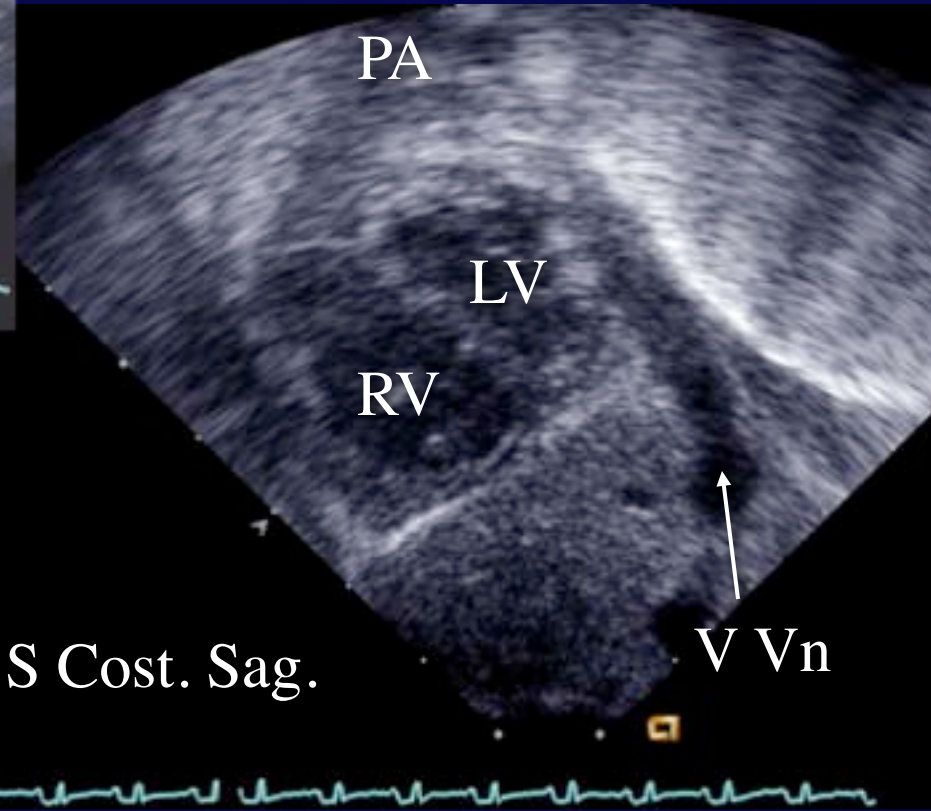
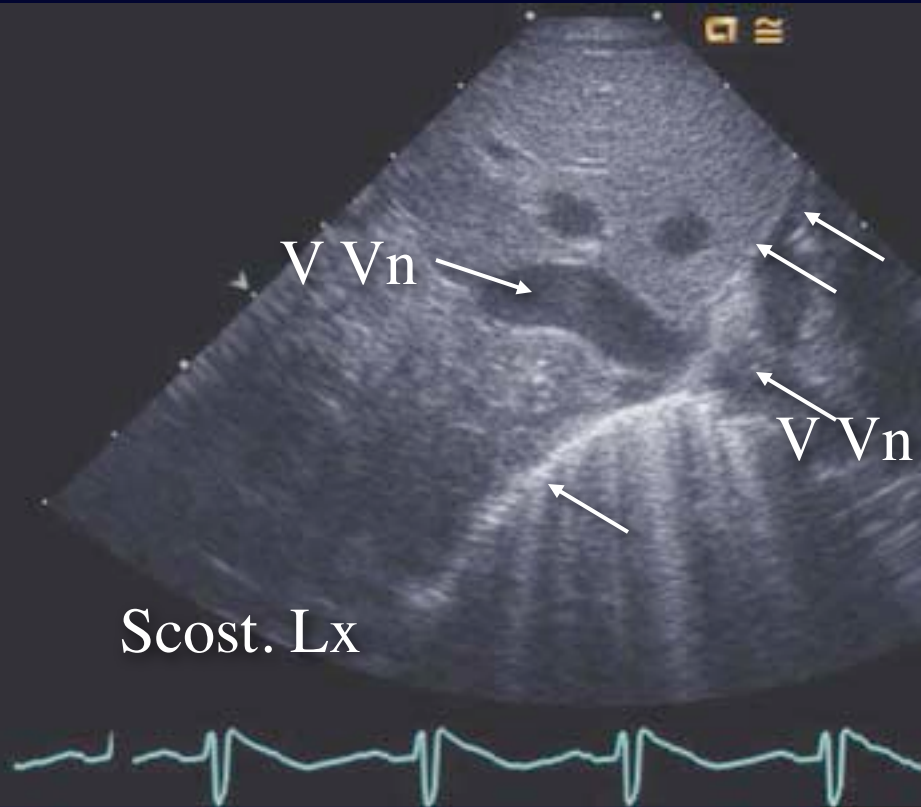
Infradiaphragmatic TAPVR.



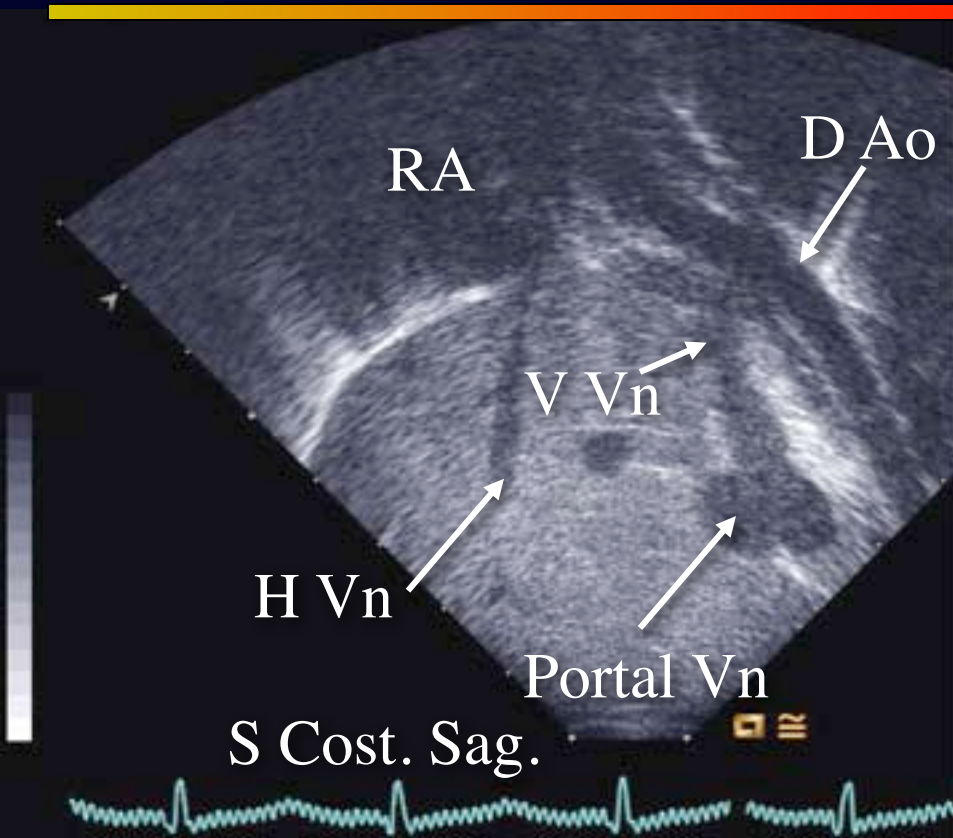
CT for TAPVR below the diaphragm



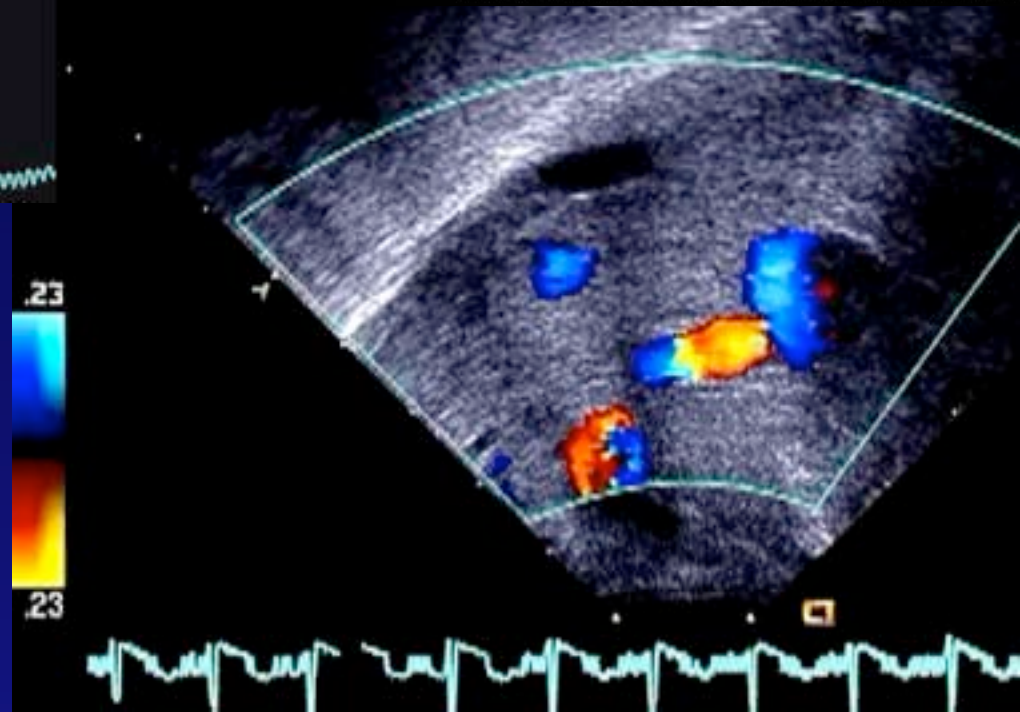
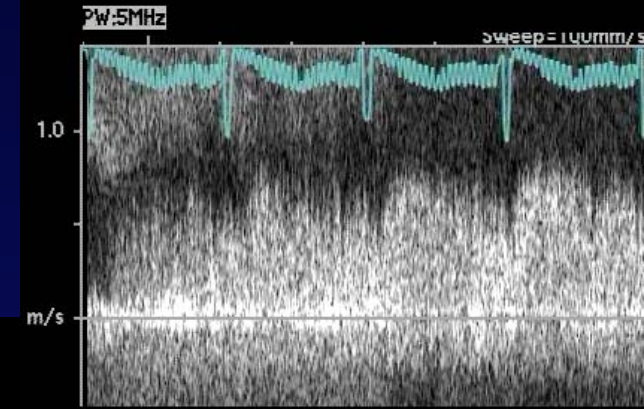
TAPVR: Below Diaphragm-The Descending Vein



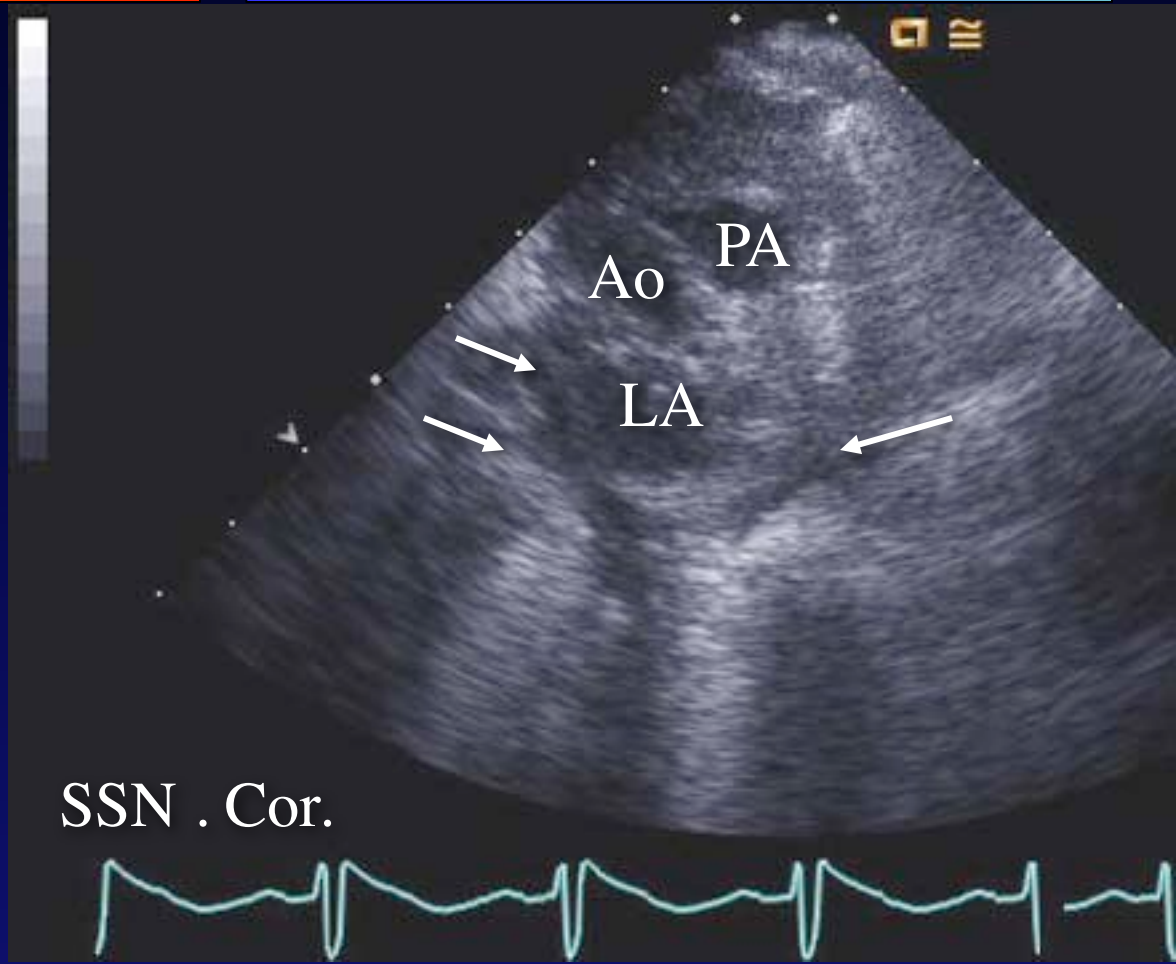
TAPVR: Below Diaphragm



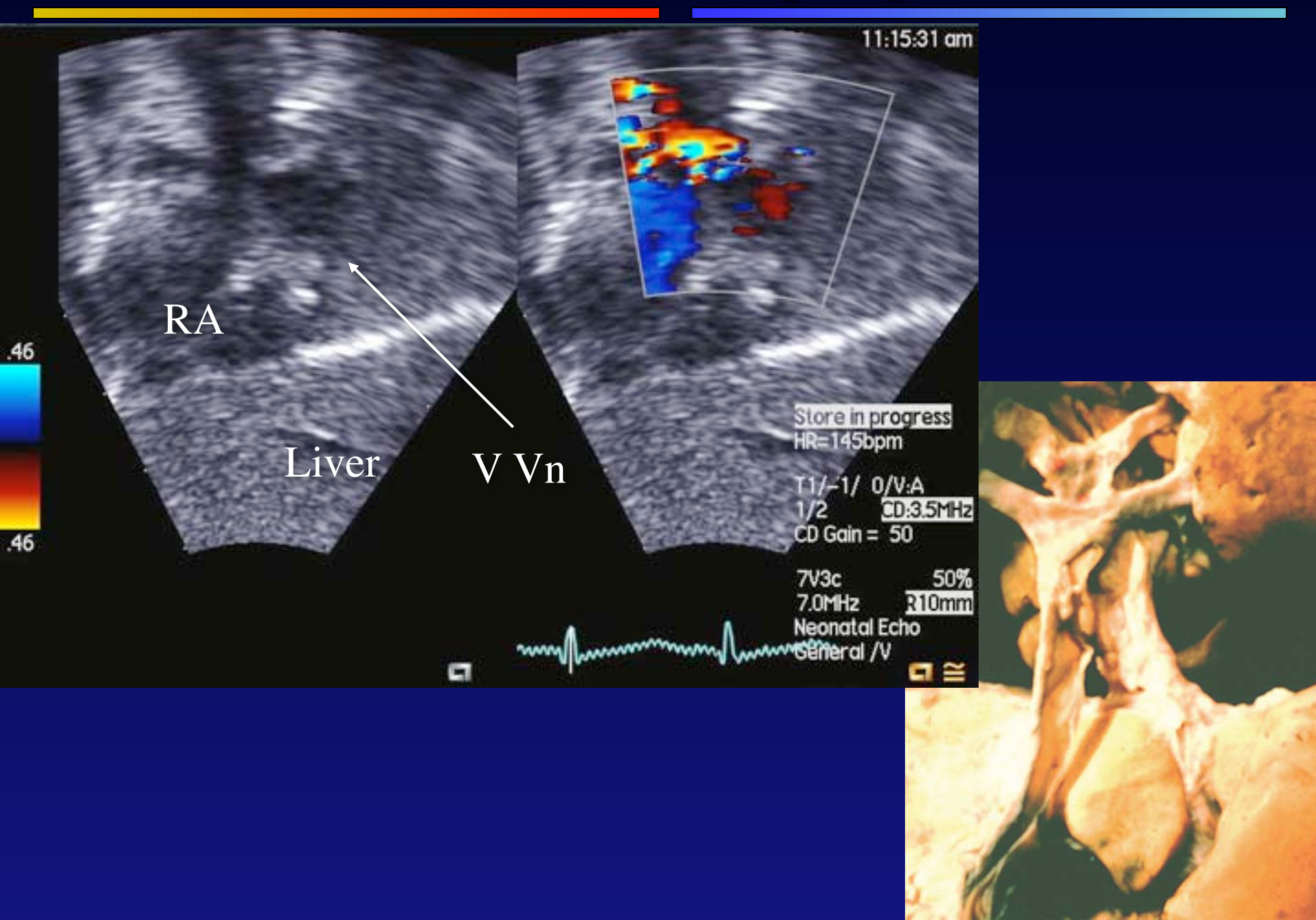
53 50dB 1.0/+1.0/2
PW Depth= 21mm
PW Gate= 1.0mm
PW Gain= 9dB
53



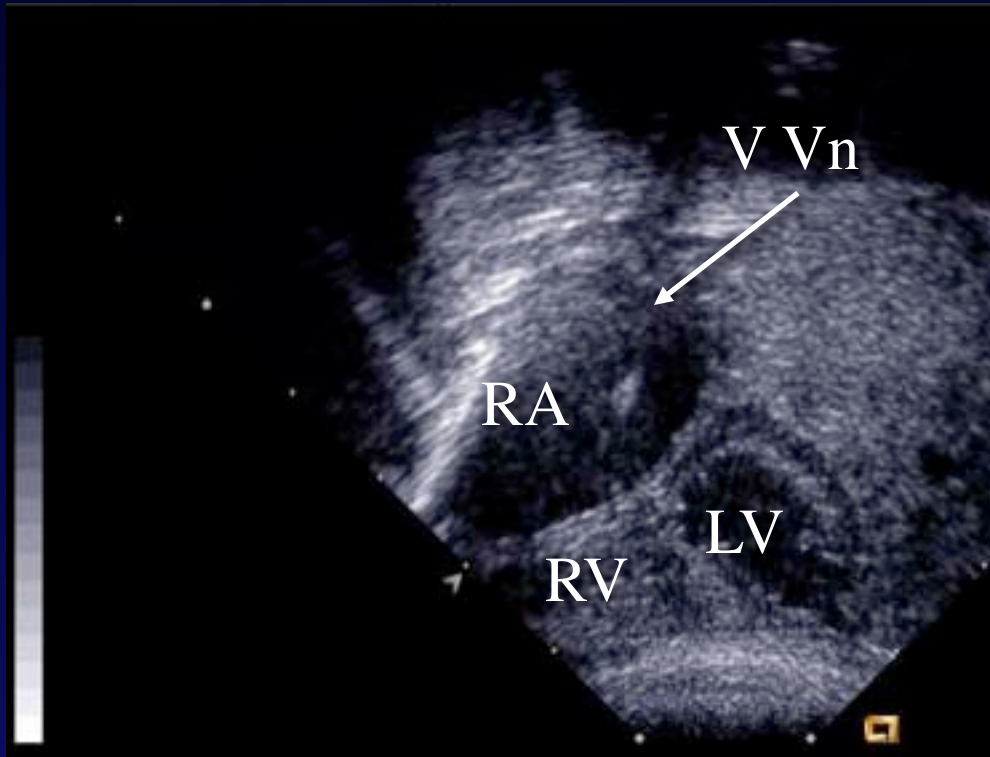
TAPVR: Below Diaphragm



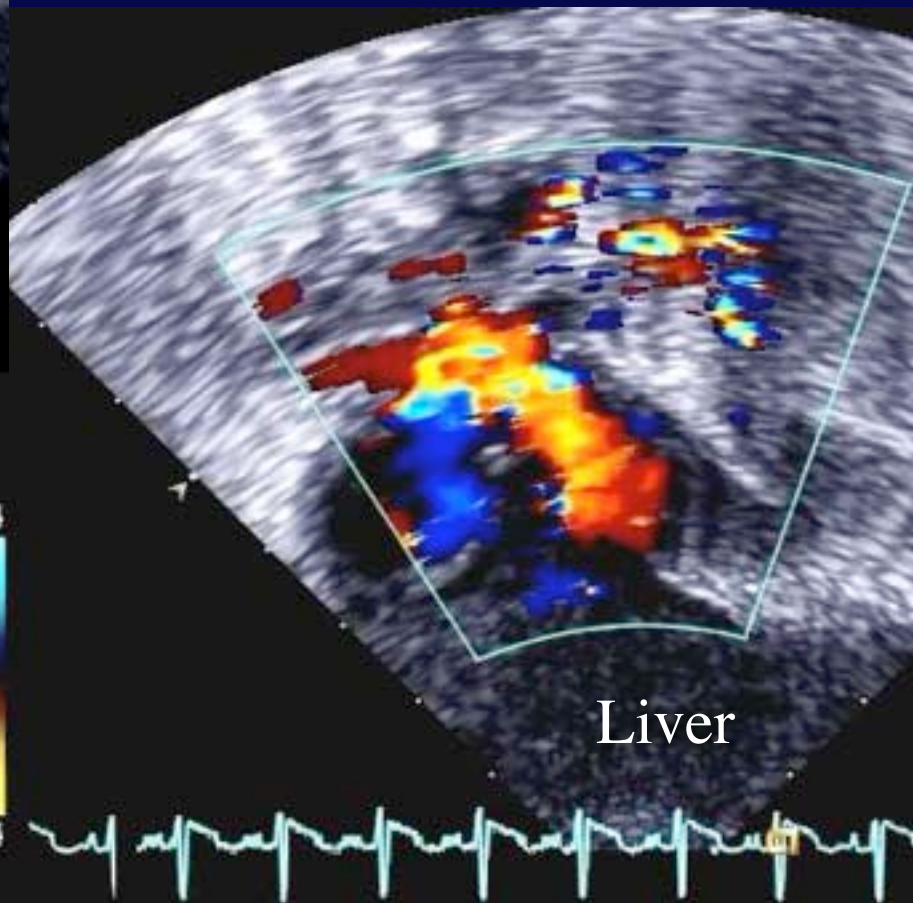
TAPVR: Below Diaphragm



TAPVR: Below Diaphragm

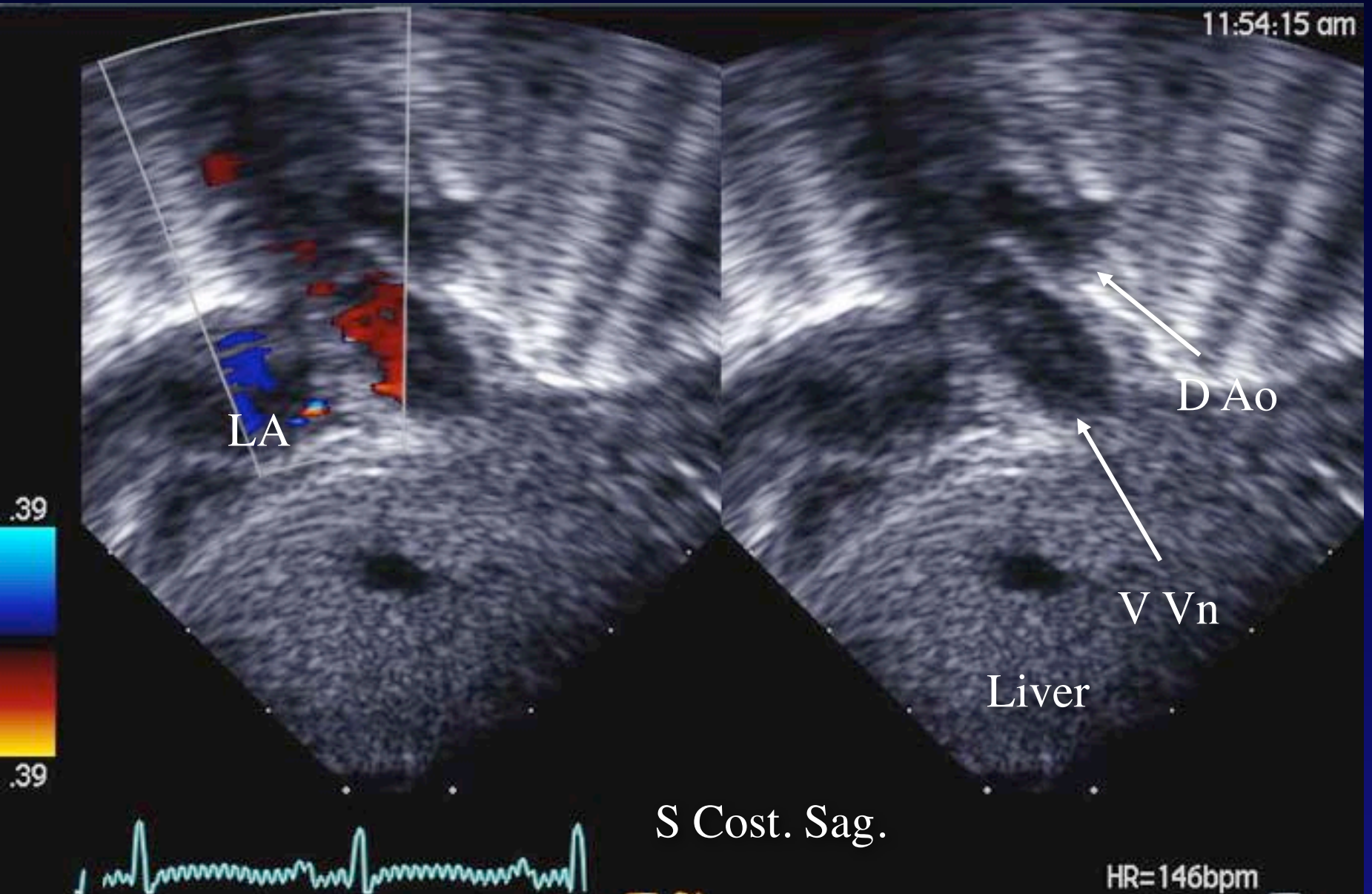


Posterior view behind atrium

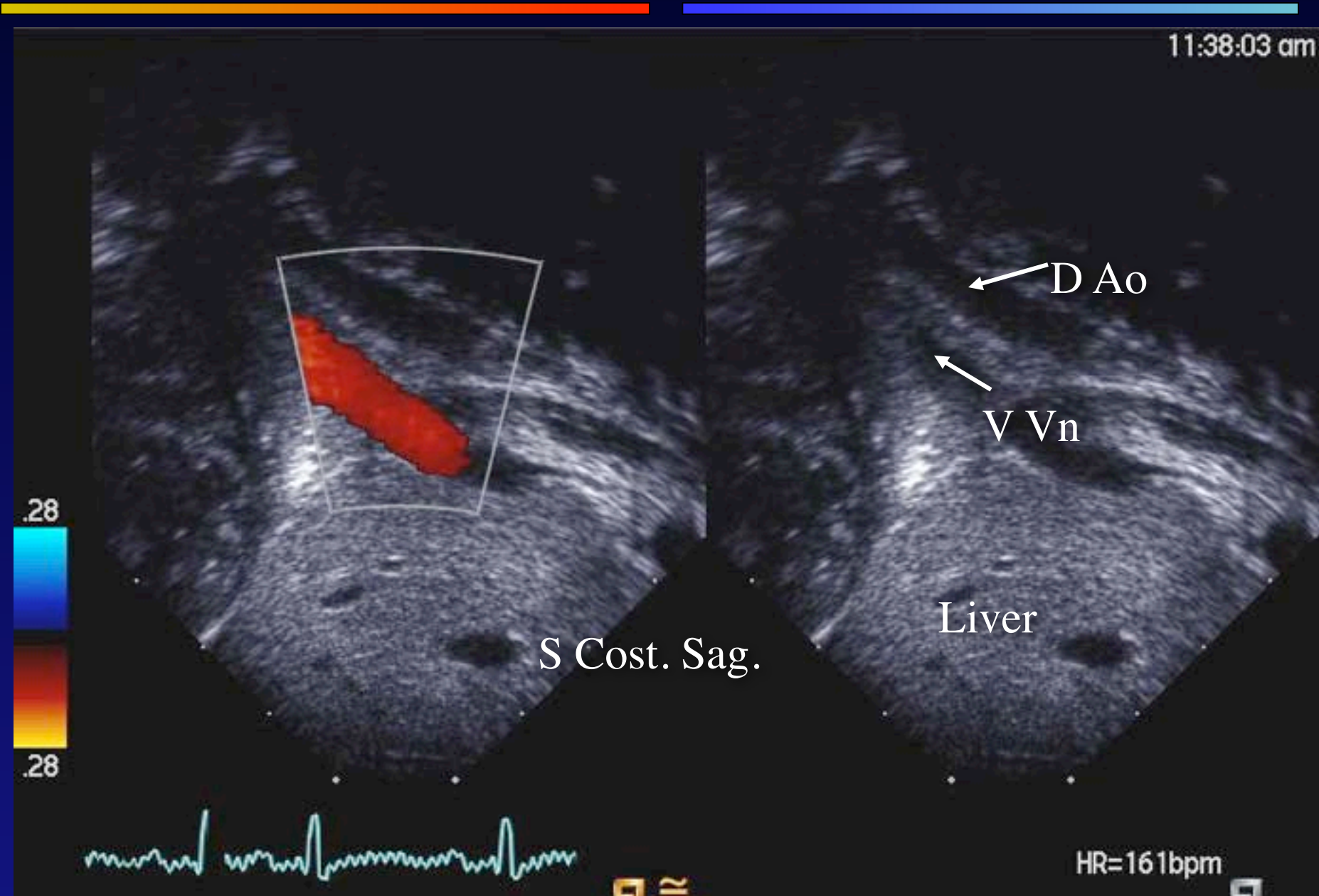


Contrast Echocardiography

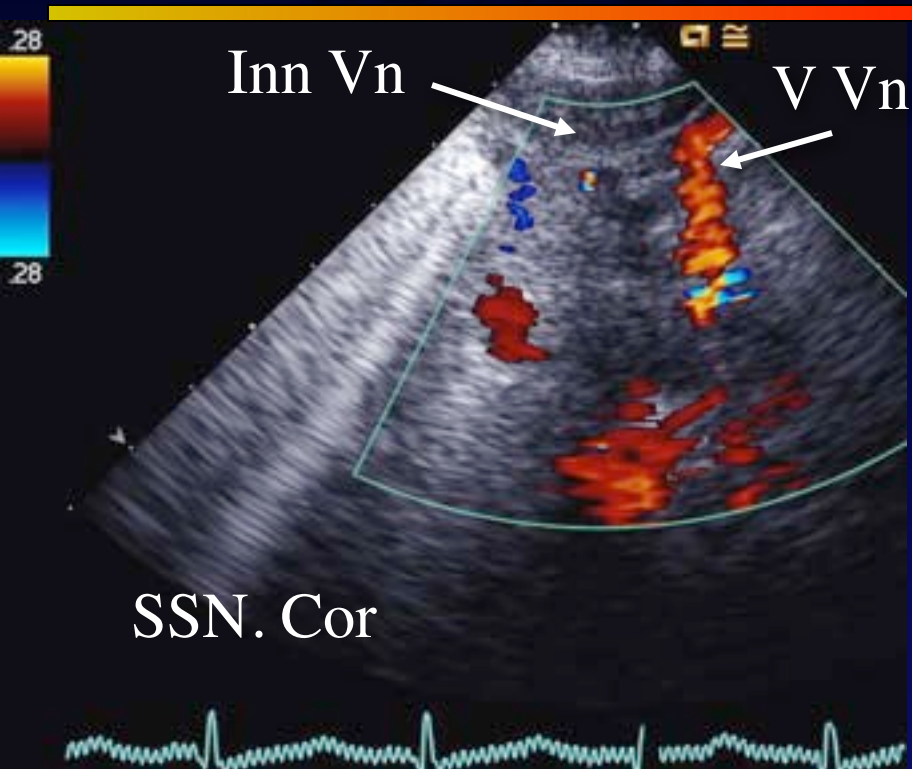
TAPVR: Below Diaphragm



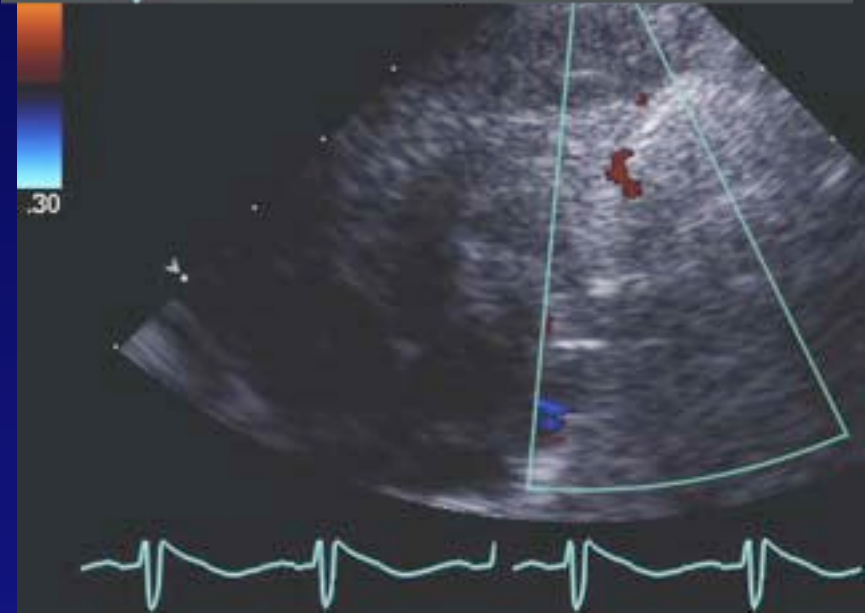
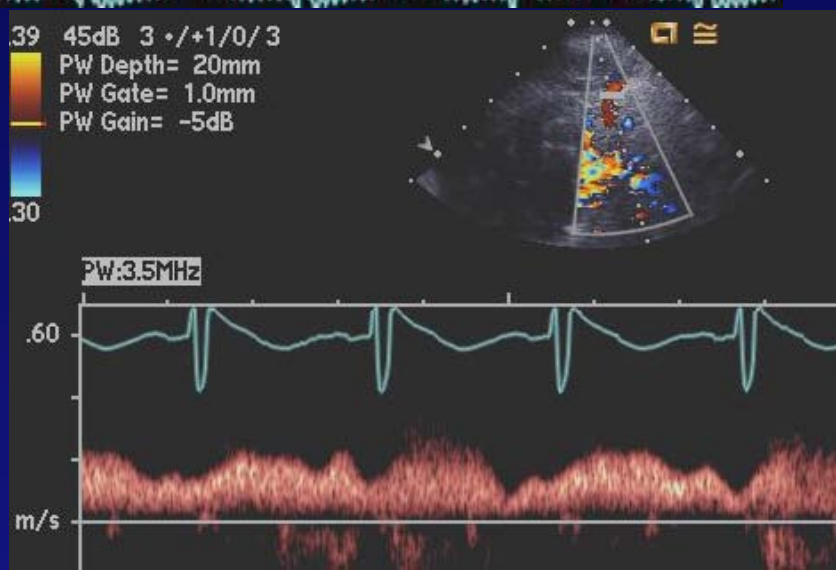
TAPVR: Below Diaphragm



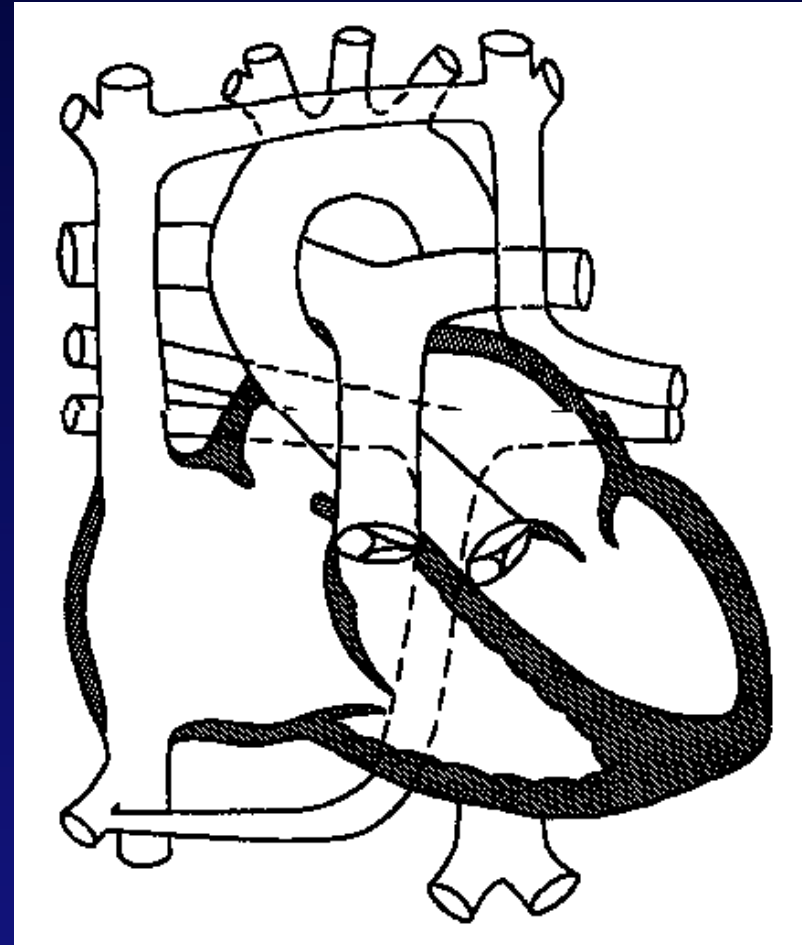
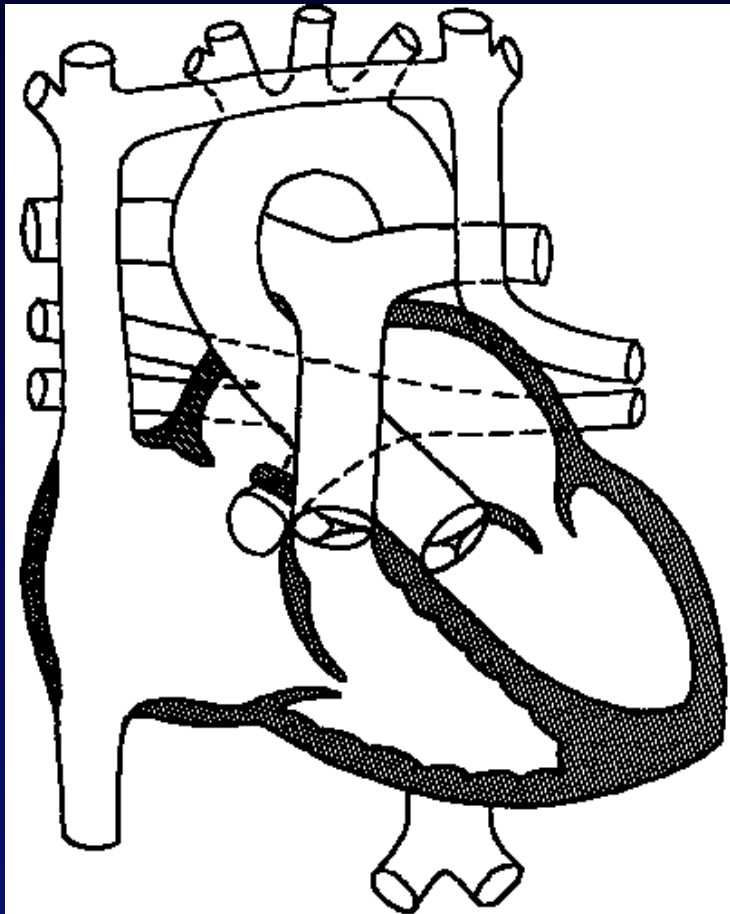
TAPVR: Below Diaphragm (Surprise!)



39 45dB 3 +/-1/0/3
PW Depth= 20mm
PW Gate= 1.0mm
PW Gain= -5dB



Mixed TAPVR



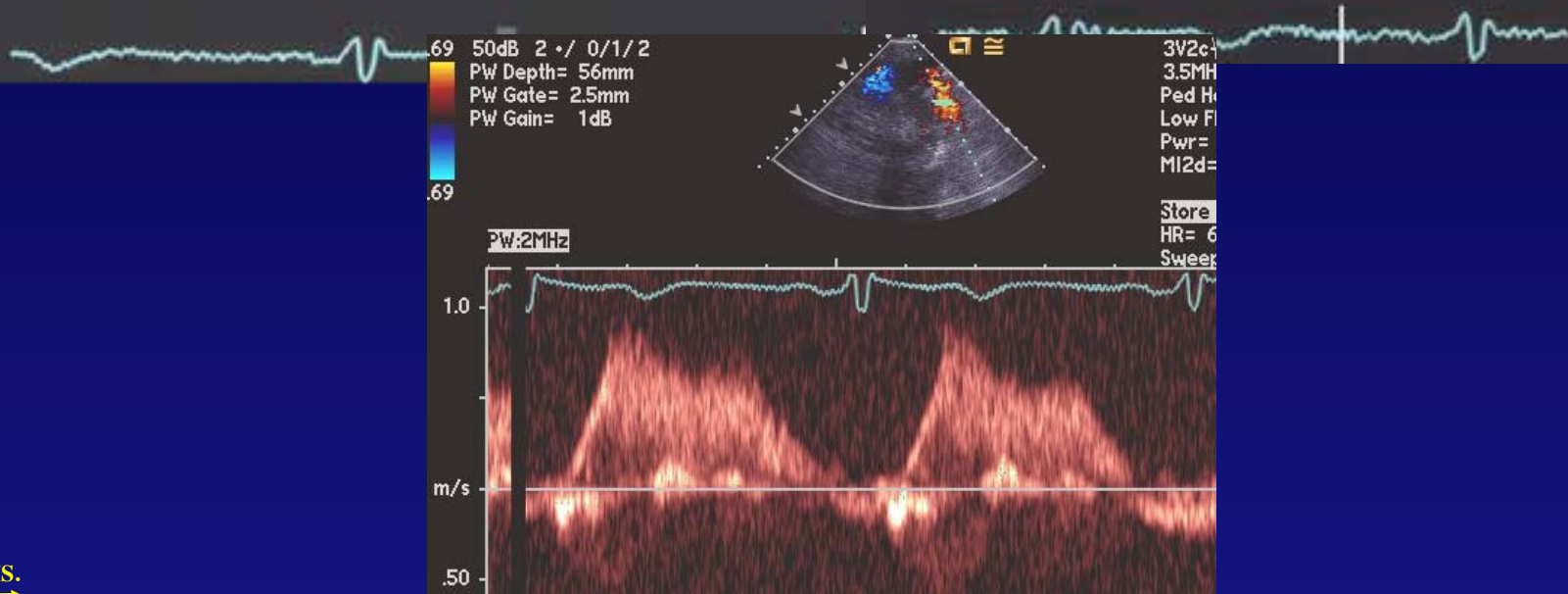
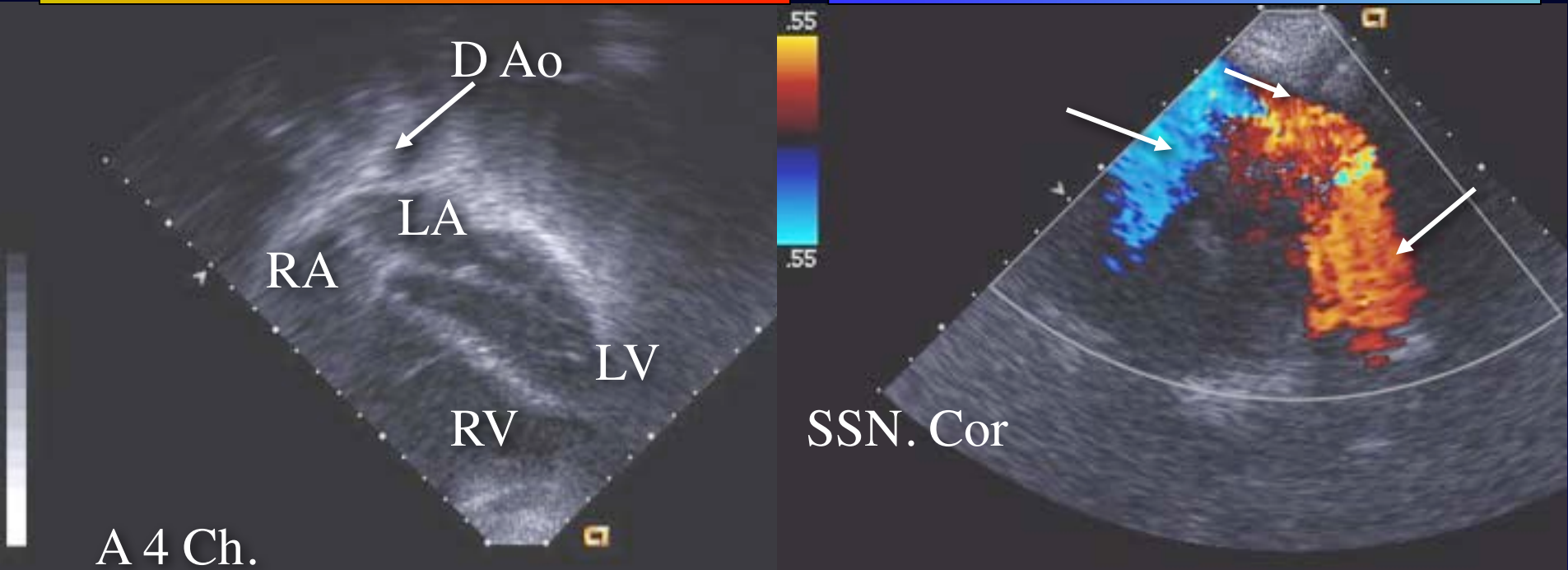
Partial Anomalous Pulmonary Venous Connection.

- Variable presentation from no symptoms to the symptoms associated with atrial septal defects
- Echocardiography requires systematic search for all pulmonary venous connections

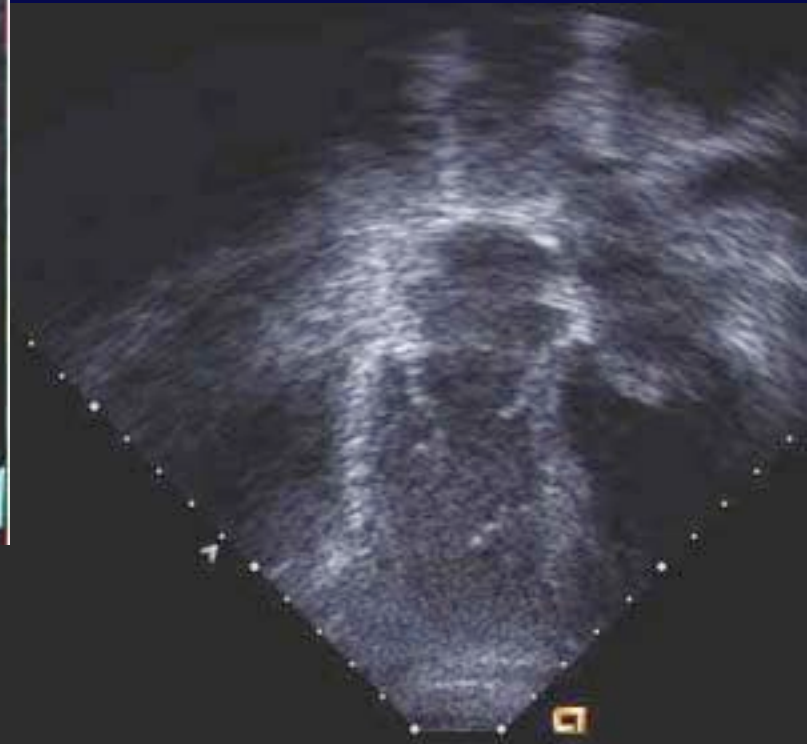
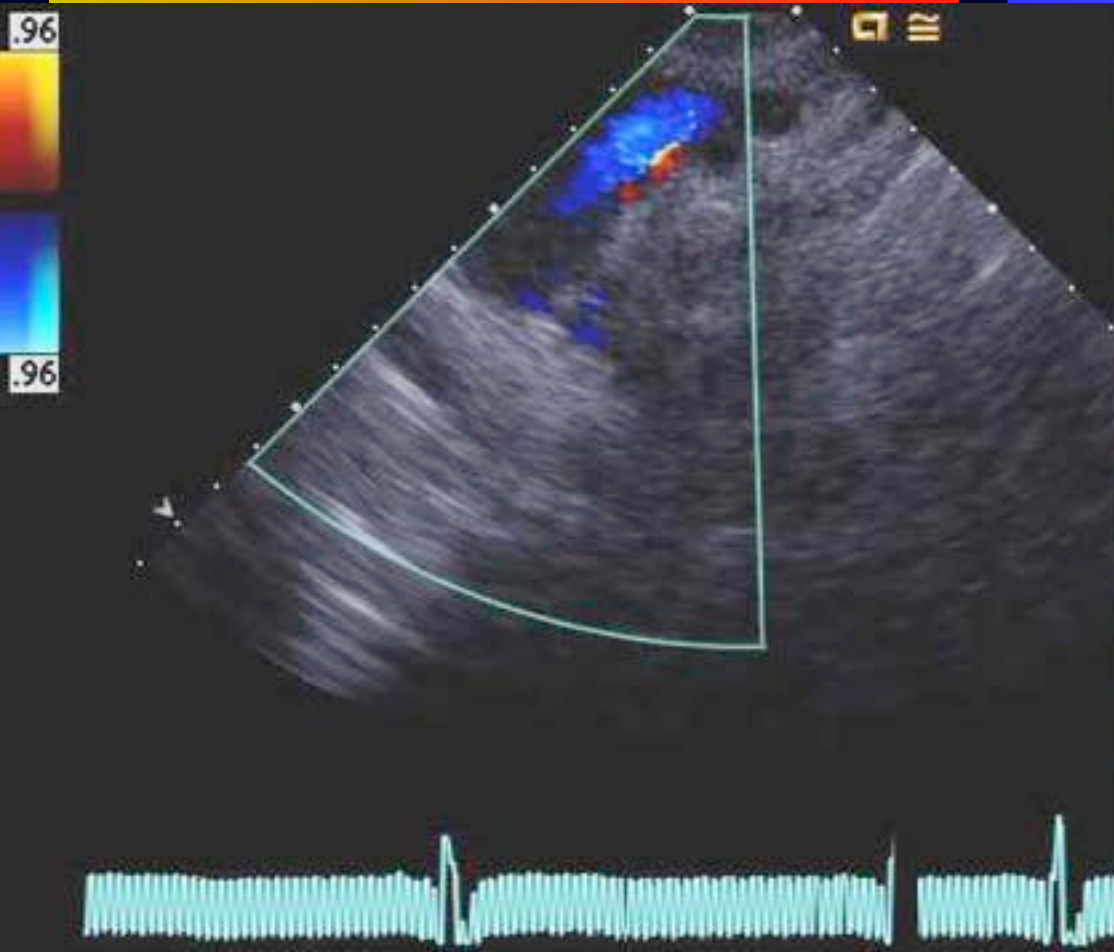
Anomalous Left Upper Pulmonary Vein.



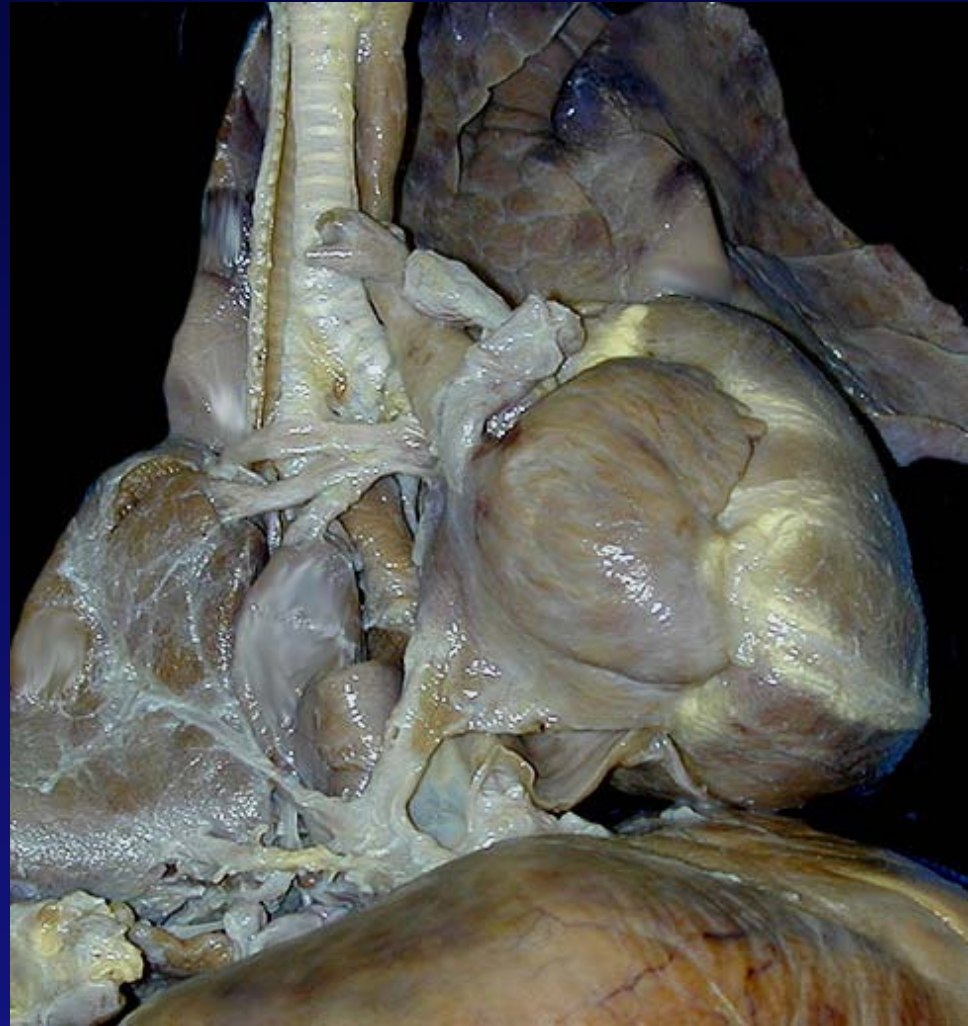
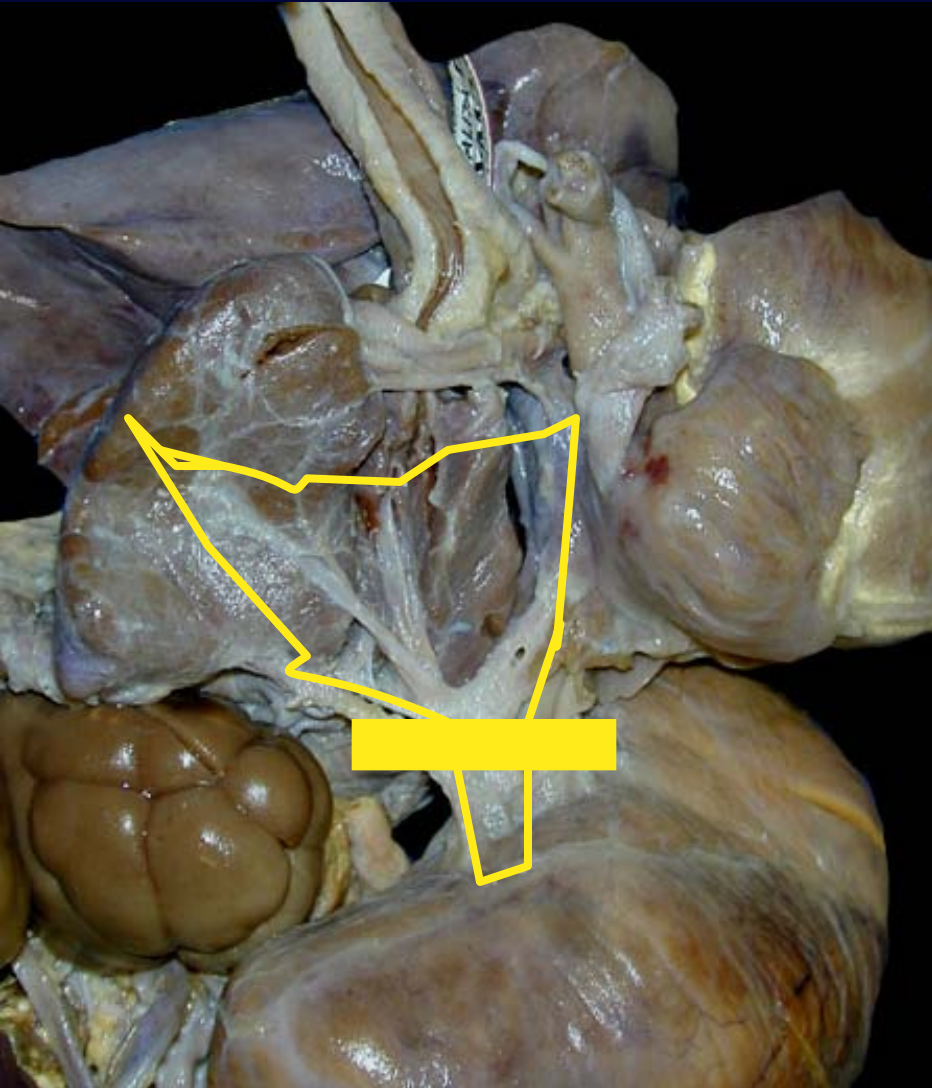
Partial Anomalous Veins to Innominate Vein



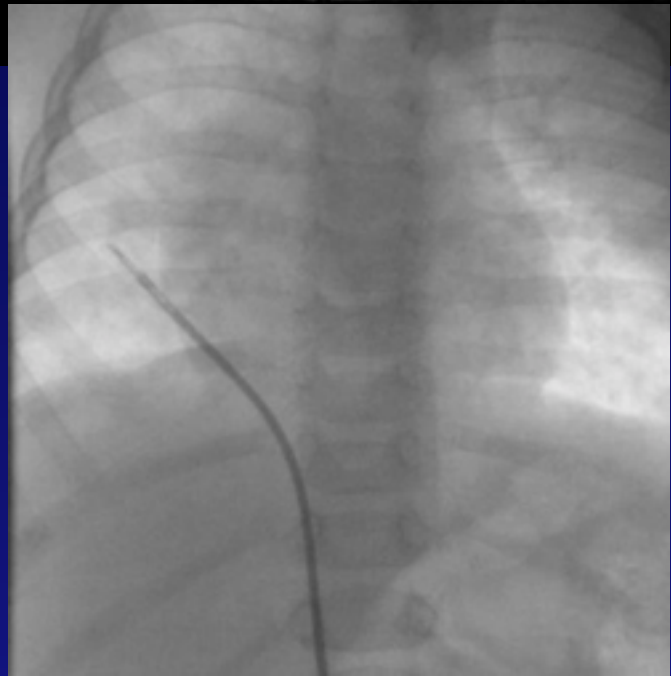
L Vertical Vein.



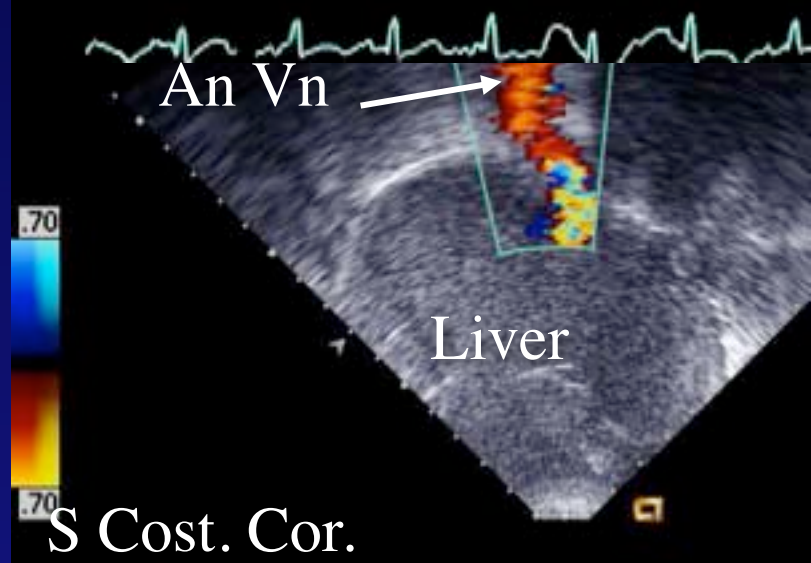
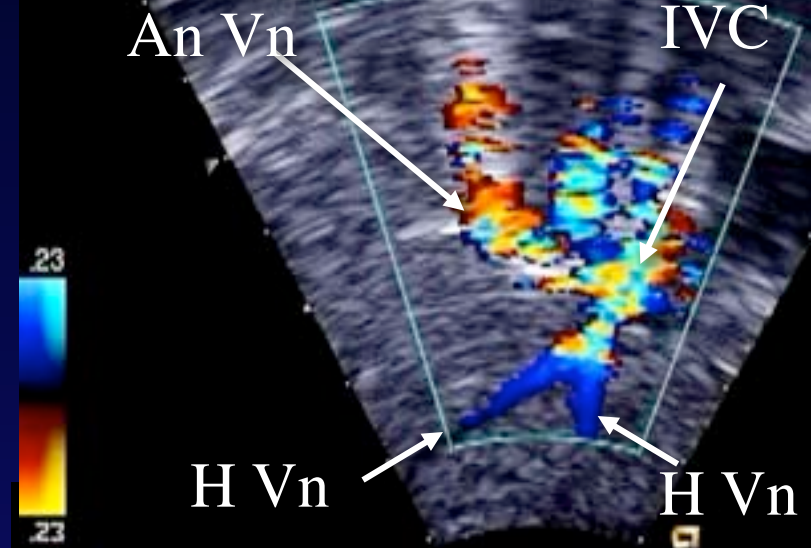
Scimitar Syndrome: Anomlaously Draining Right Pulmonary Veins to IVC.



Scimitar: MRA

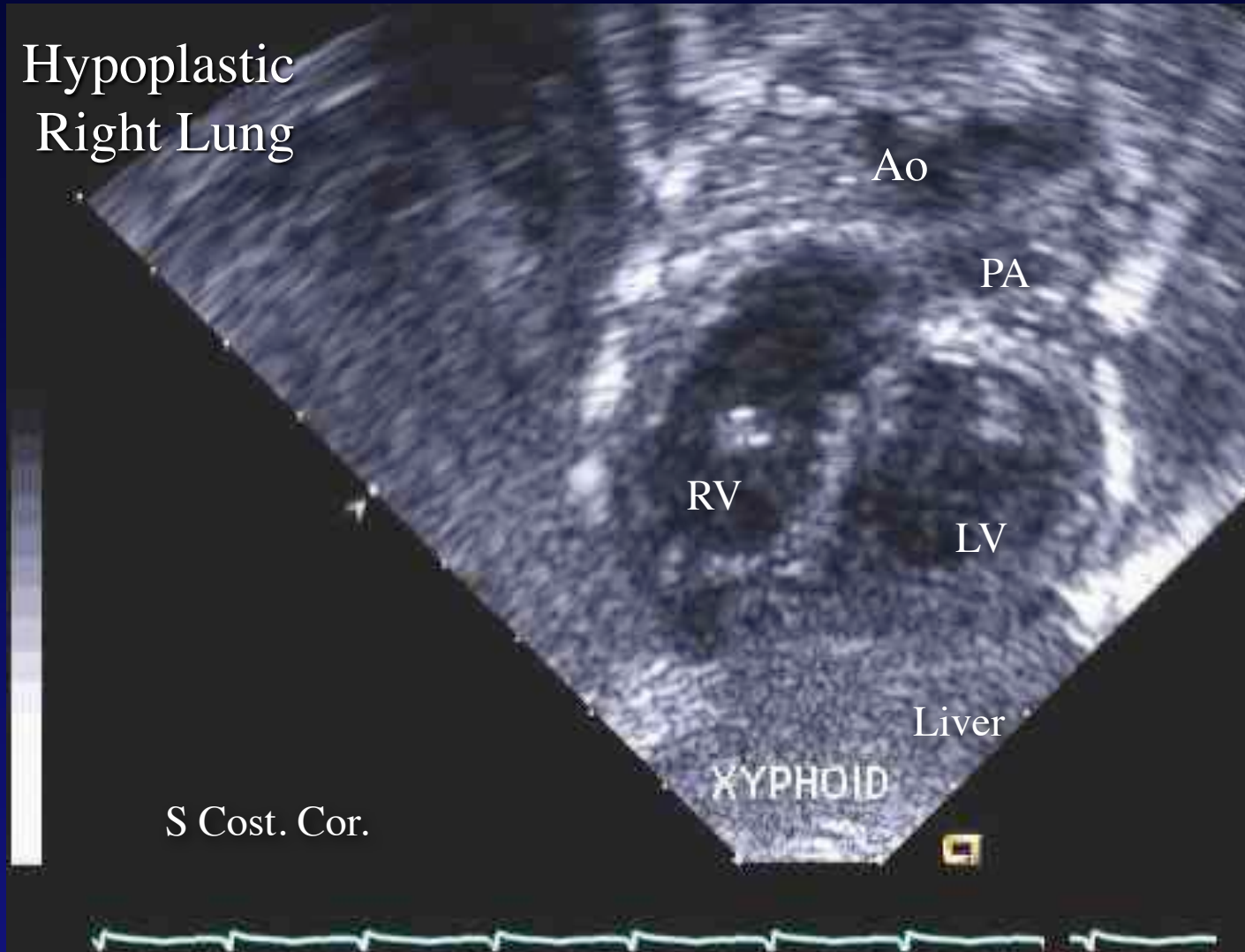


S Cost. Cor.



S Cost. Cor.

Scimitar Syndrome: Mesocardia!.



Scimitar



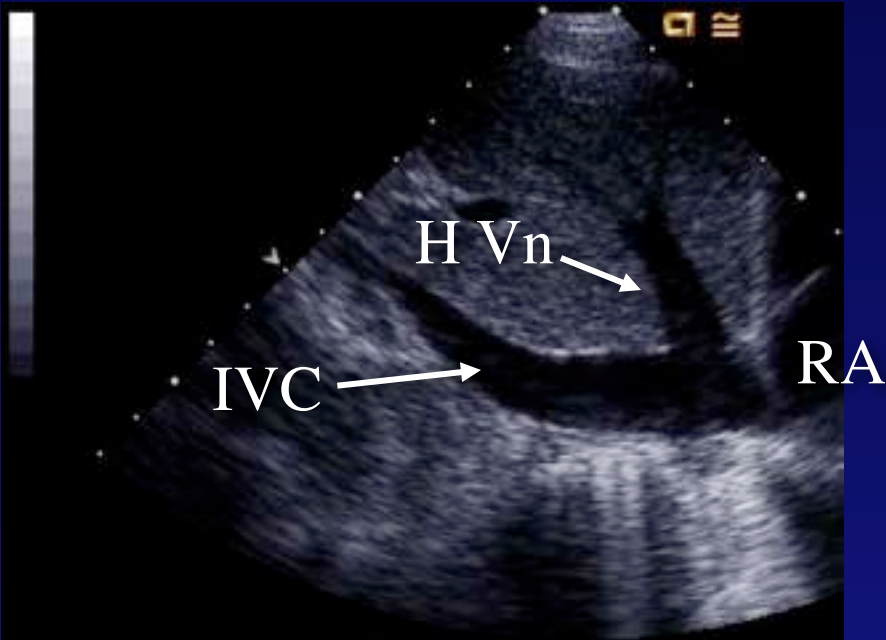
RT PARAST

RV

RA

H Vn

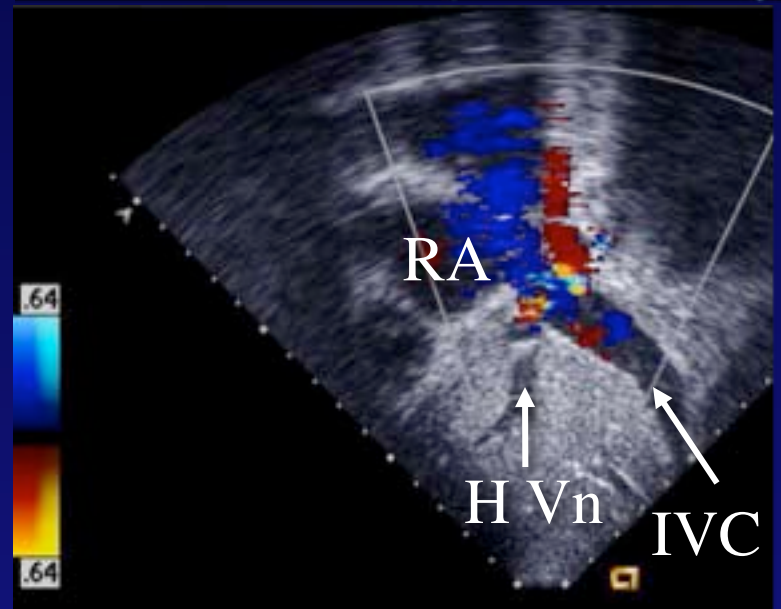
IVC



IVC

H Vn

RA



RA

H Vn

IVC

.64

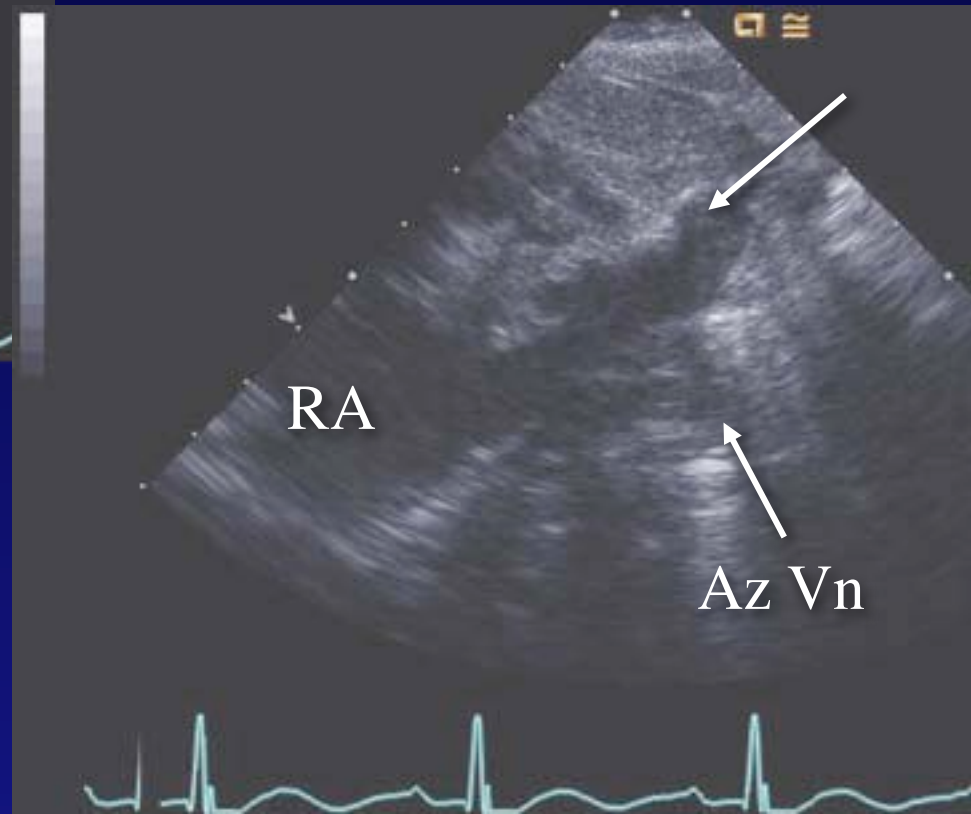
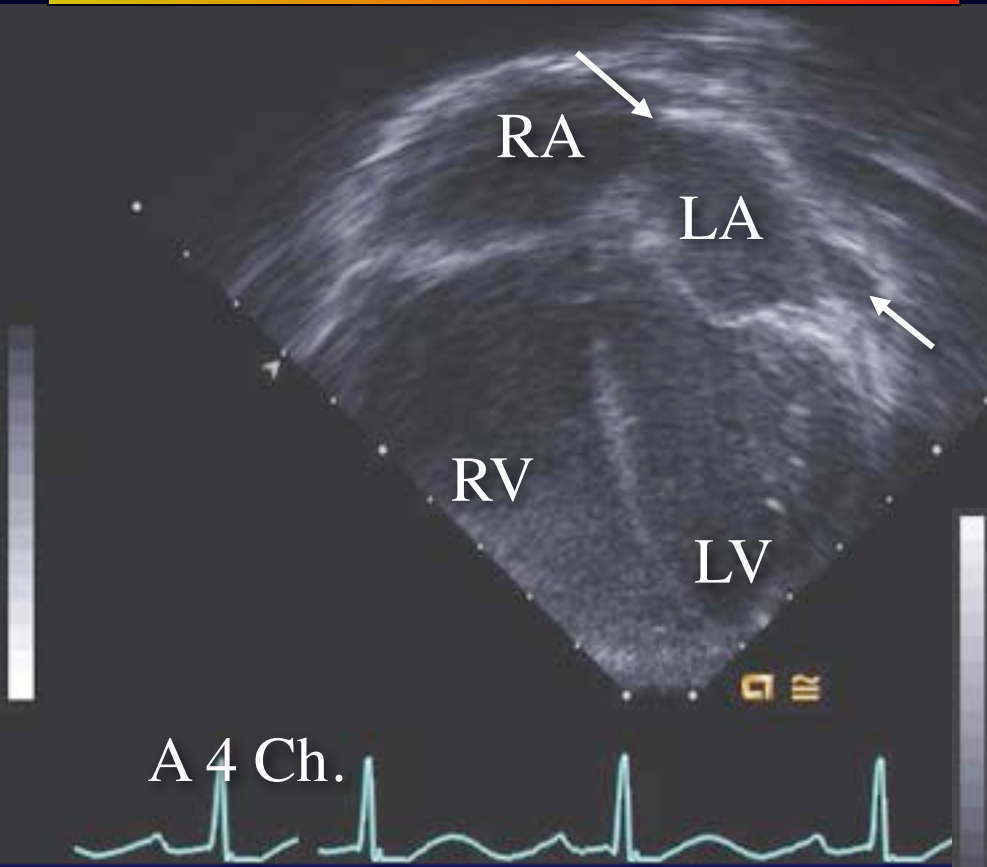
.64



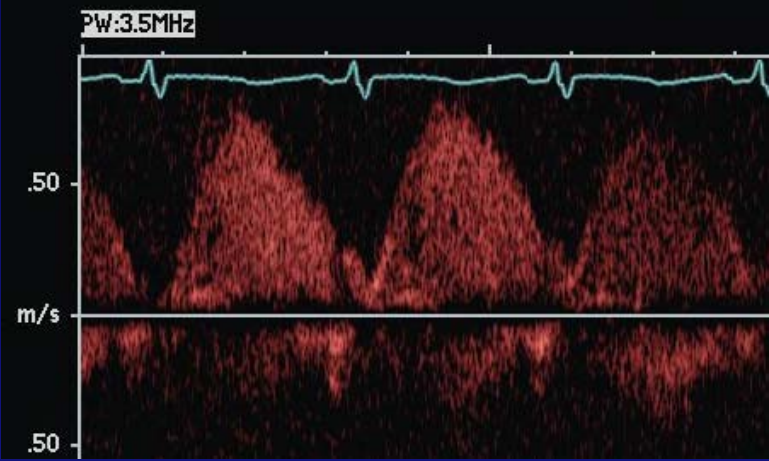
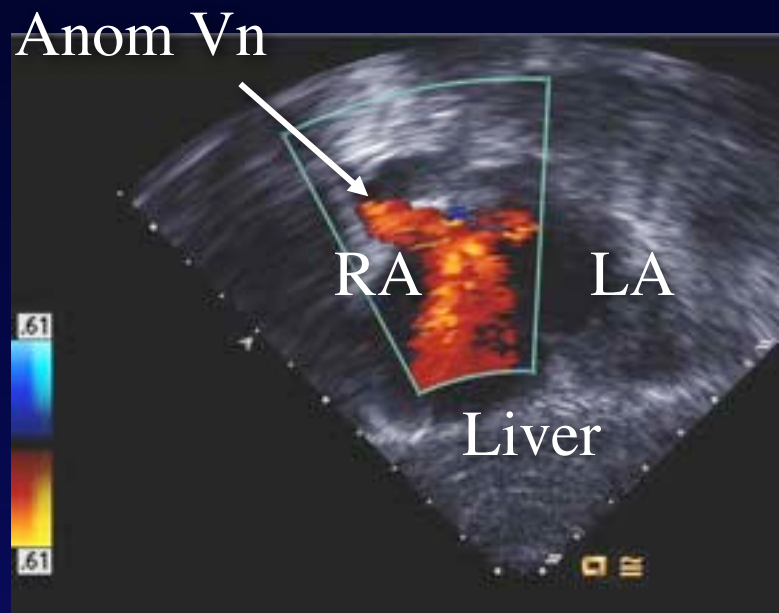
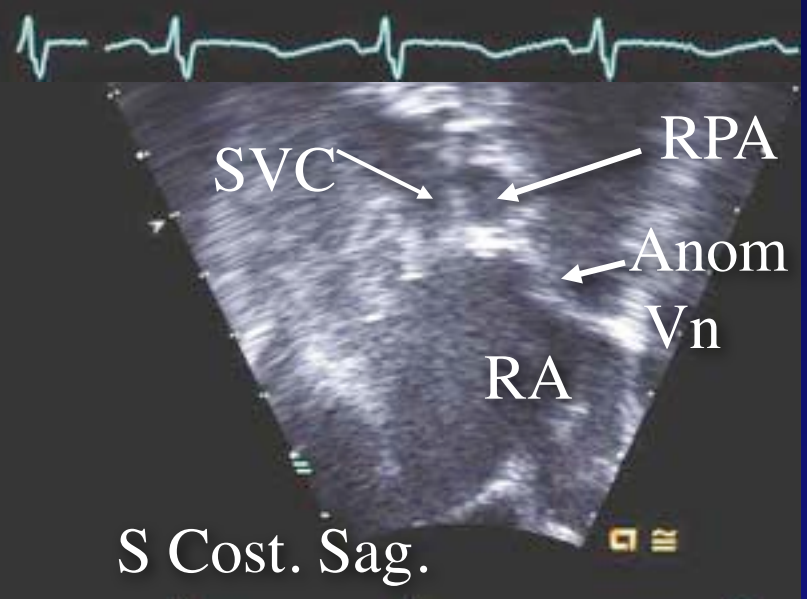
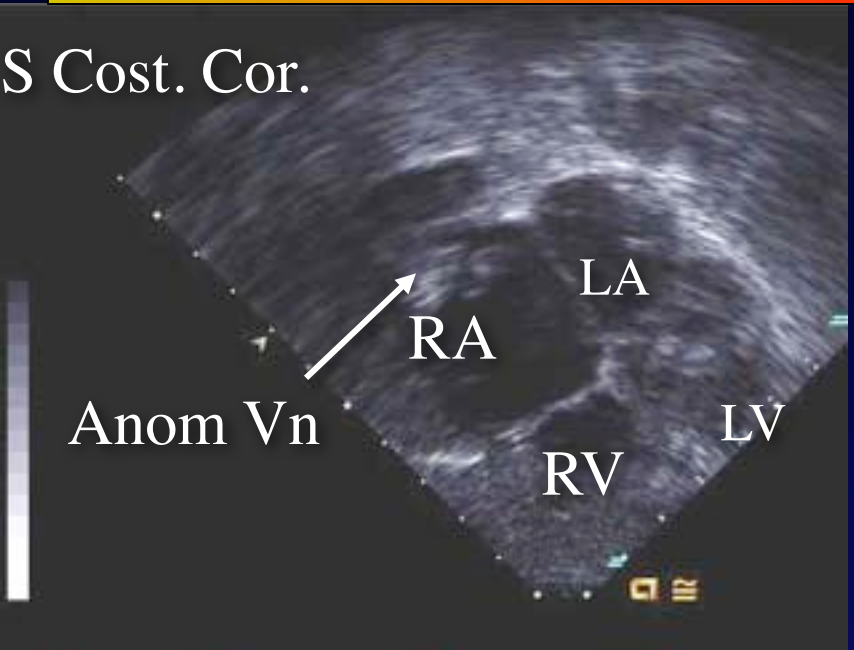
Scimitar Syndrome: Anomlaously Draining Right Pulmonary Veins to IVC.



Partial Anomalous Veins to SVC

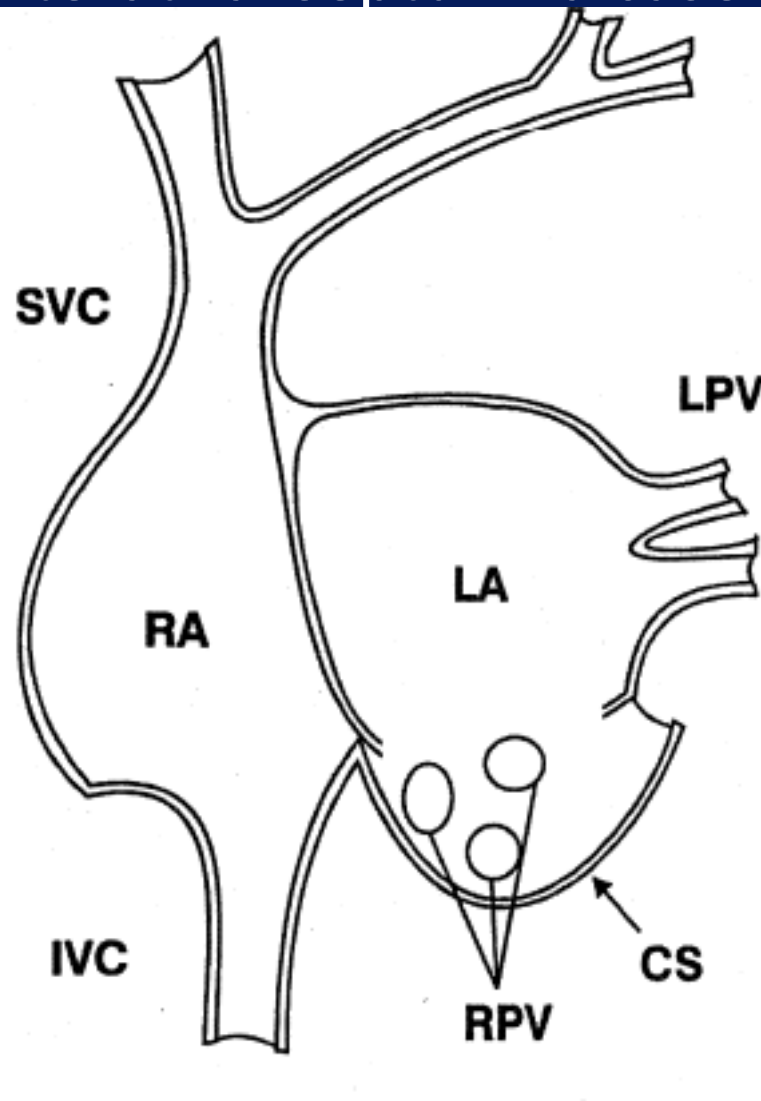
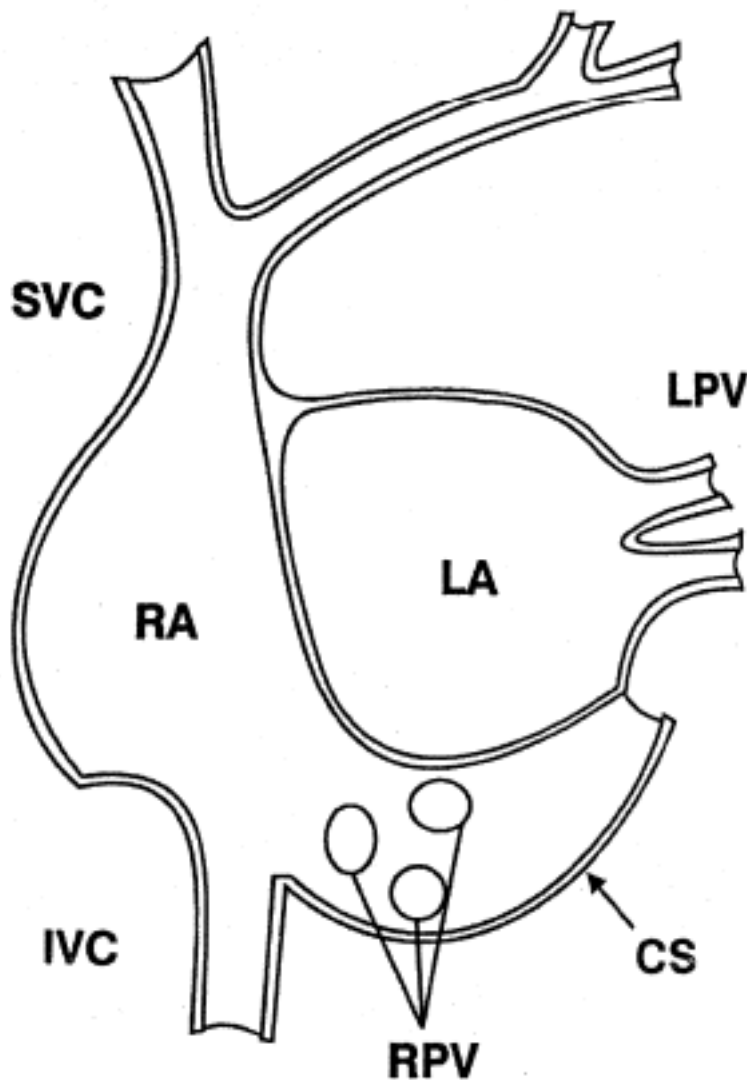


Partial Anomalous Veins to Right Atrium



Ibrahim M, Burwash IG, Morton B, Brais M. Direct drainage of the right pulmonary veins into the coronary sinus with intact interatrial septum: a case

001



Short Communications

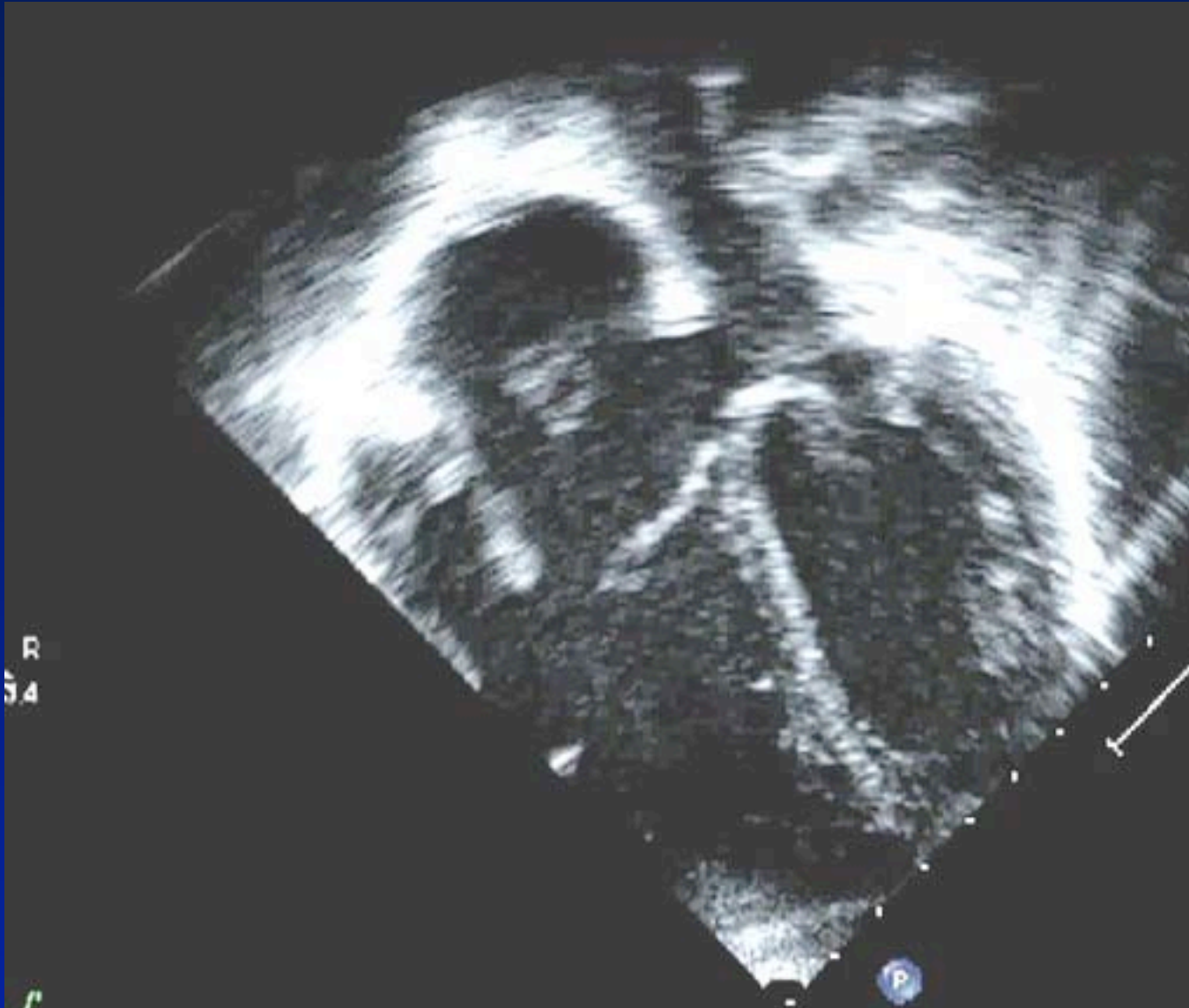
Echocardiographic Diagnosis of Partial Anomalous Pulmonary Venous Connection from Right Upper Lobe to the Coronary Sinus

Y. OTSUI, M.D., A. KISANUKI, M.D., S. ARIMA, M.D., S. SHIMOKAWA, M.D.,* A. TAIRA, M.D.,* H. TANAKA, M.D.

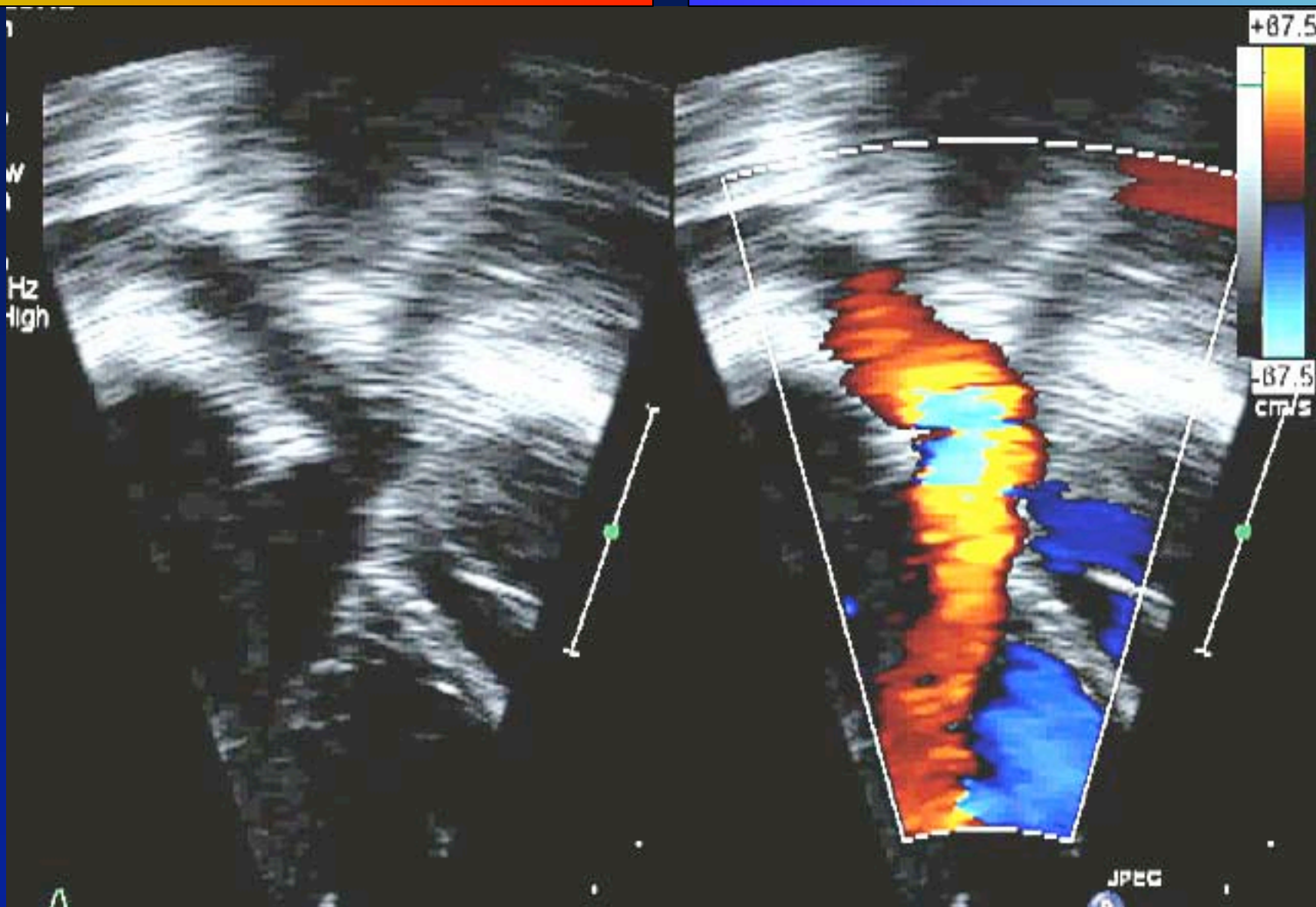
The First Department of Internal Medicine, *The Second Department of Surgery, Faculty of Medicine, Kagoshima University, Kagoshima, Japan

Summary: A 36-year-old woman was admitted because of an enlarged right heart. Echocardiographic examination revealed an abnormal vessel connecting to the dilated coronary sinus. The abnormal vessel traveled in the direction from the right axillary to the left epigastric region. Partial anomalous pulmonary venous connection (PAPVC) from the right upper lobe to the coronary sinus was initially considered as a possible diagnosis by echocardiography. At surgery, diagnosis of an isolated PAPVC of the right upper pulmonary vein to the coronary sinus was confirmed.

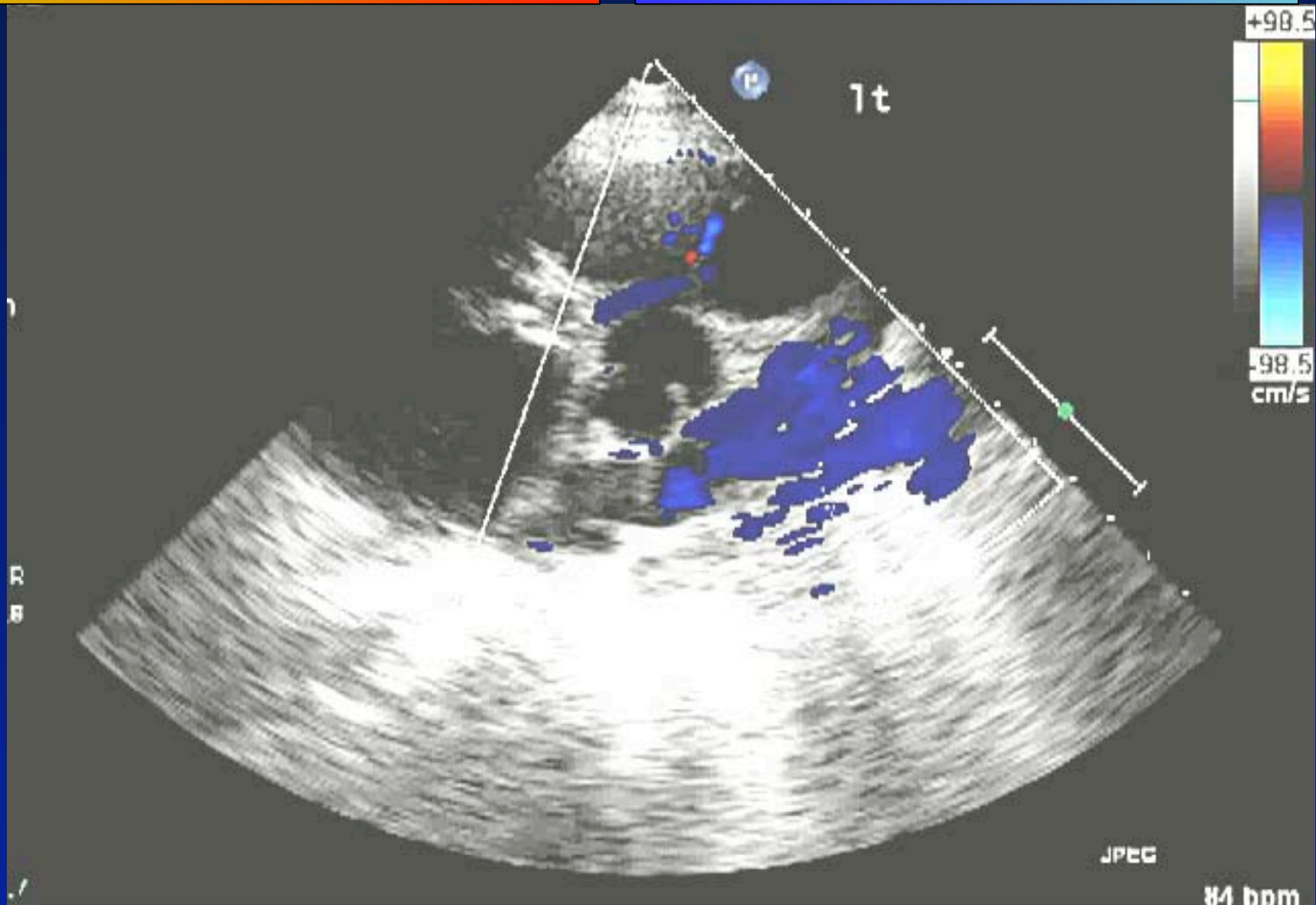
Apical 4 Chamber View



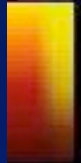
Parasternal 4 Chamber View



Parasternal Short Axis View

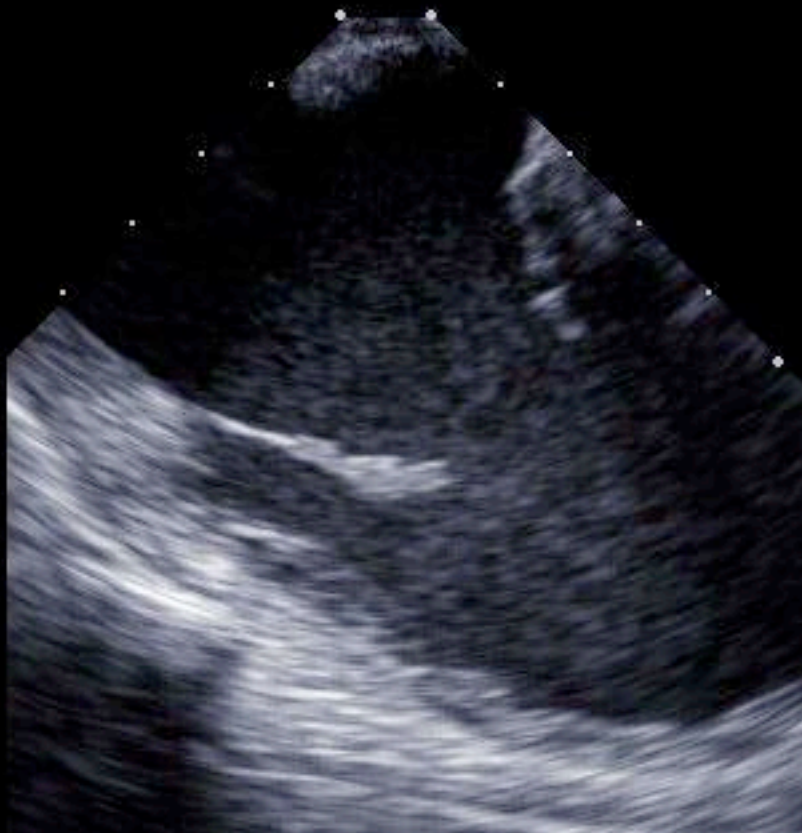


.79



0°

.79



0°

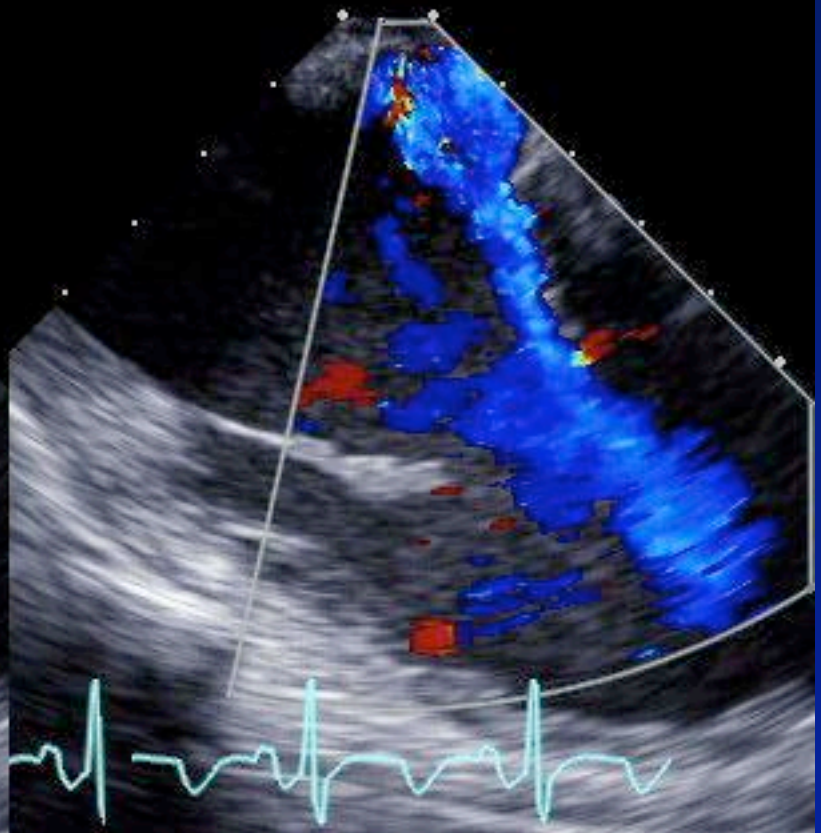
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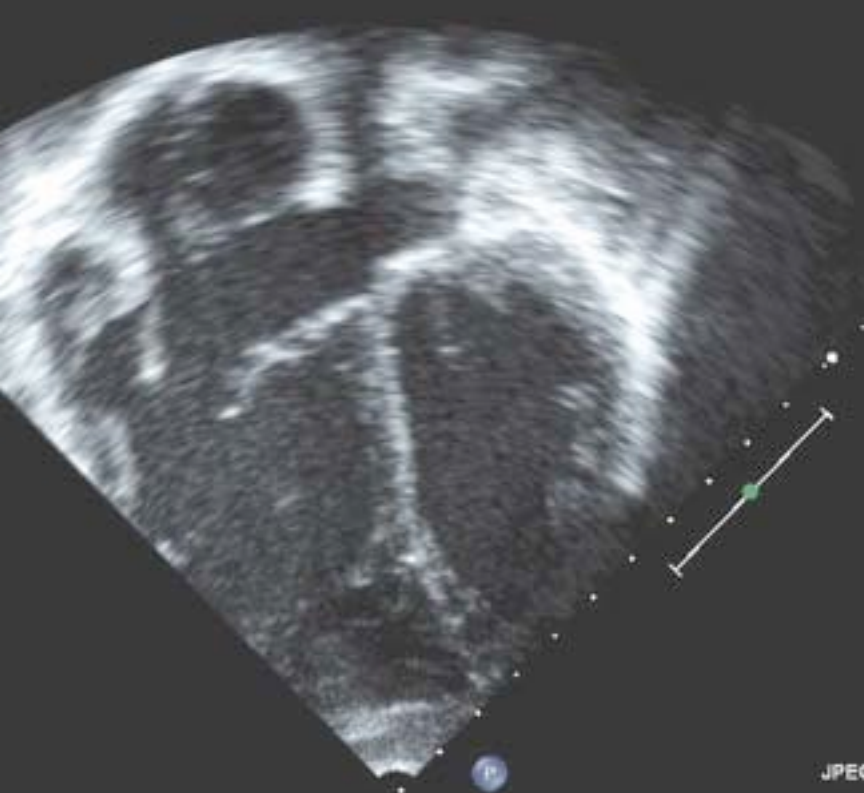
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Lens Temp <37.0°C

HR= 86bpm

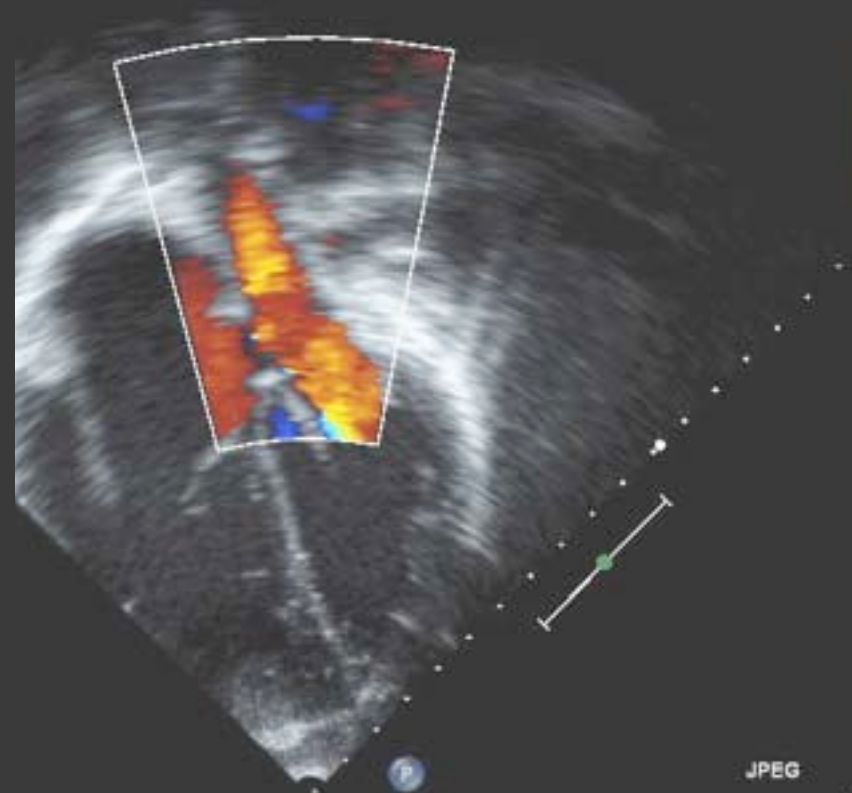


Preoperative Study



JPEG

97 bpm



JPEG

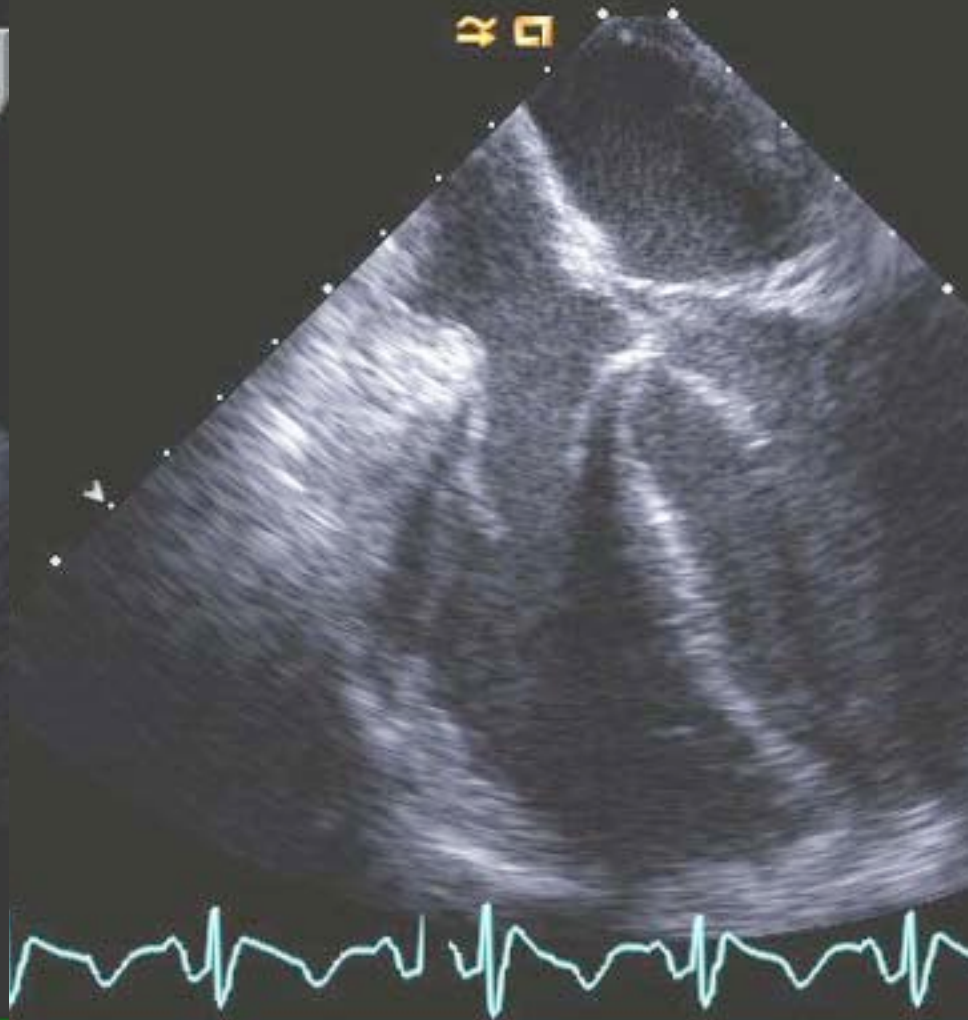
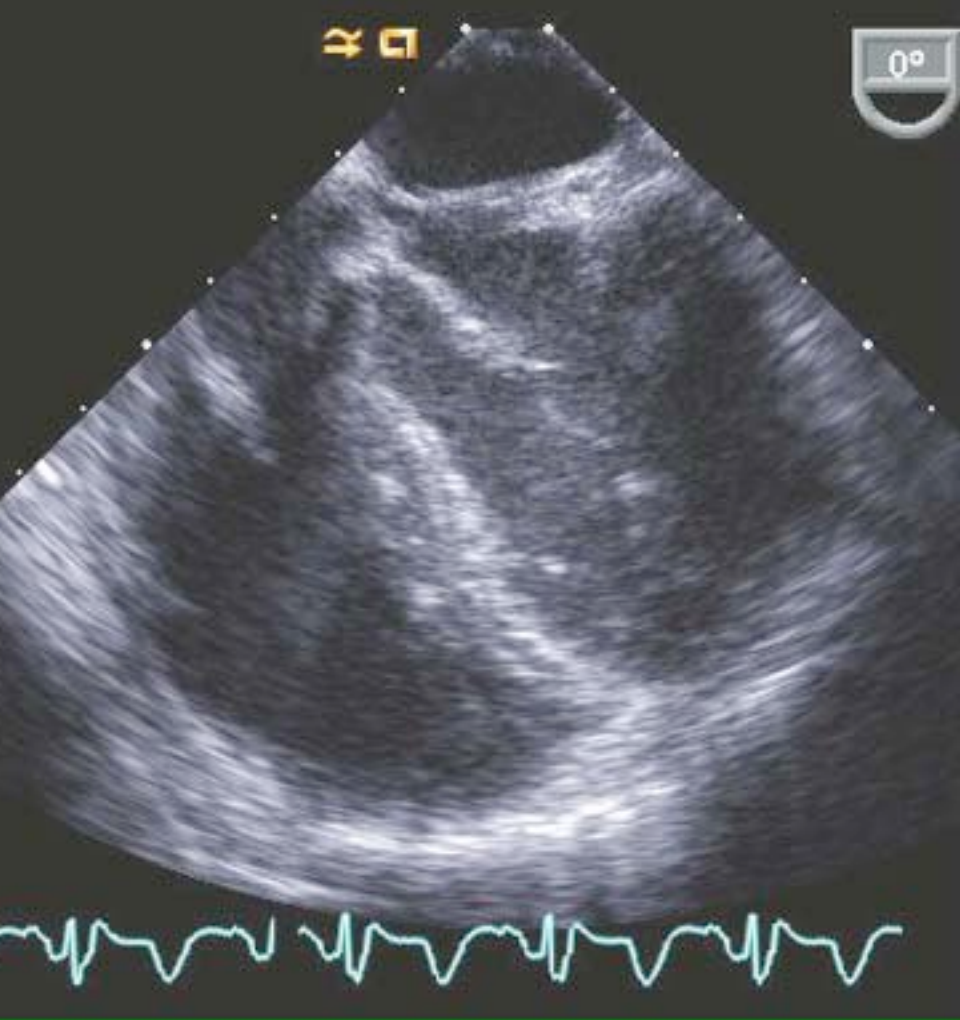
86 bpm

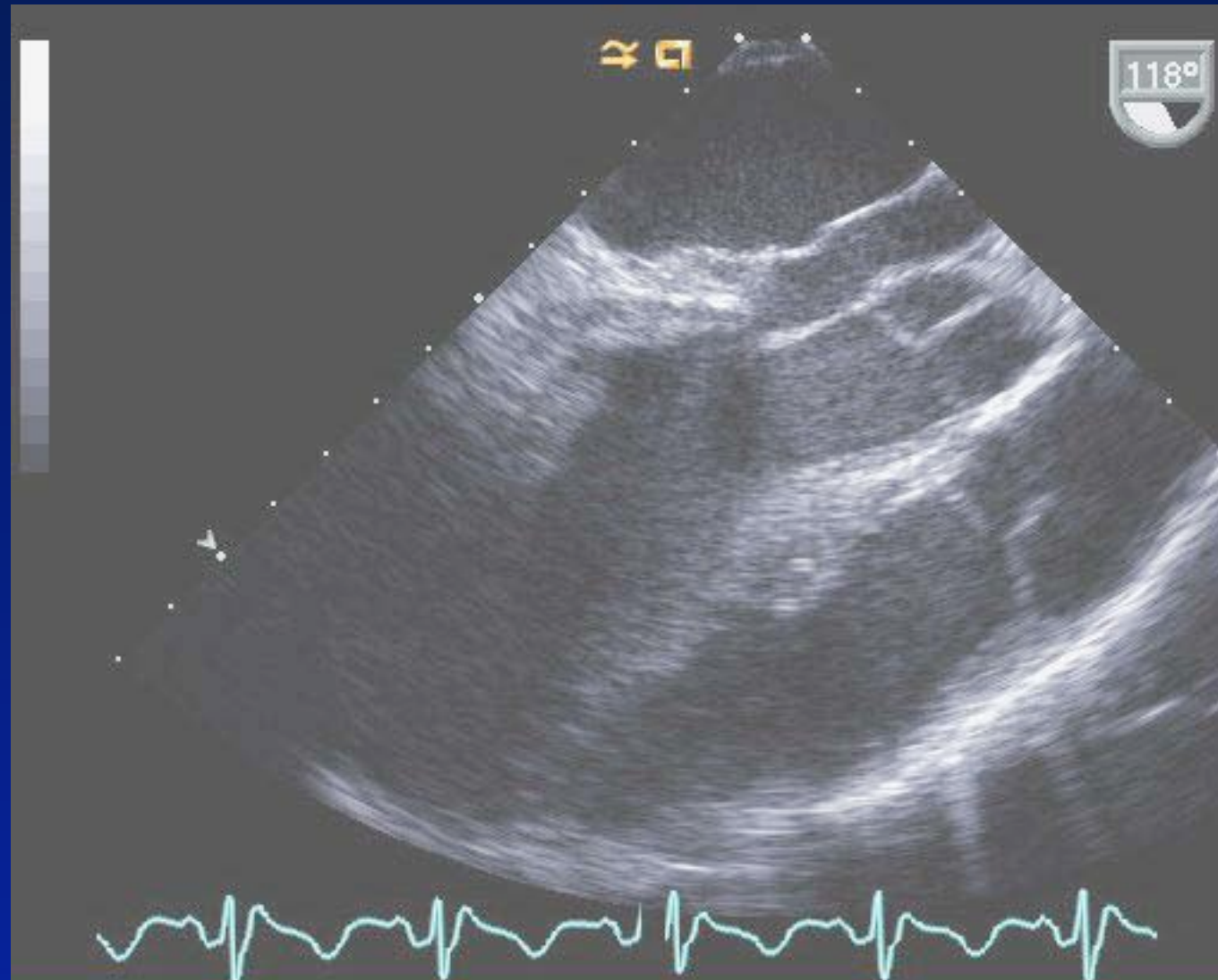


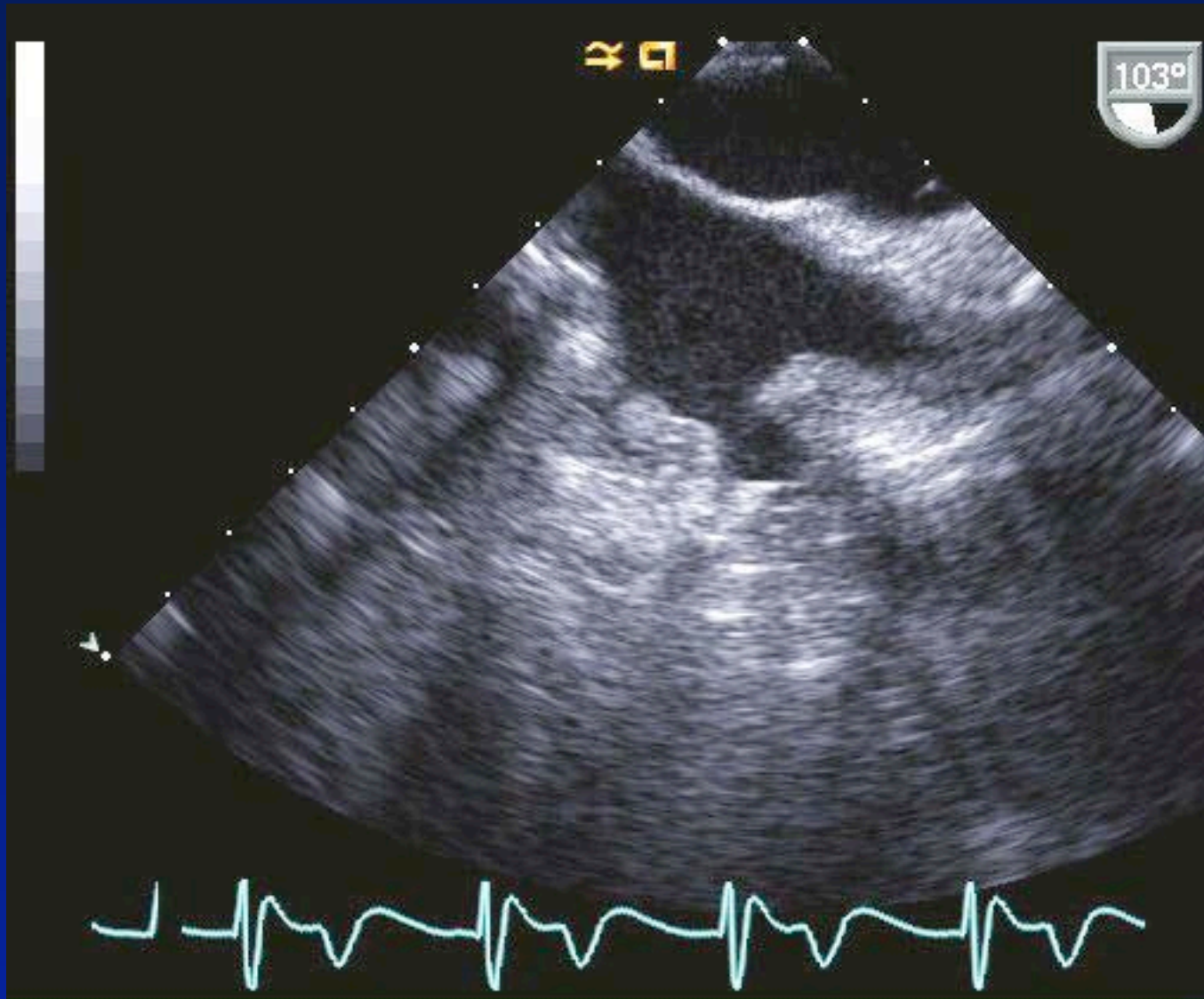
Post Bypass

Early

Late



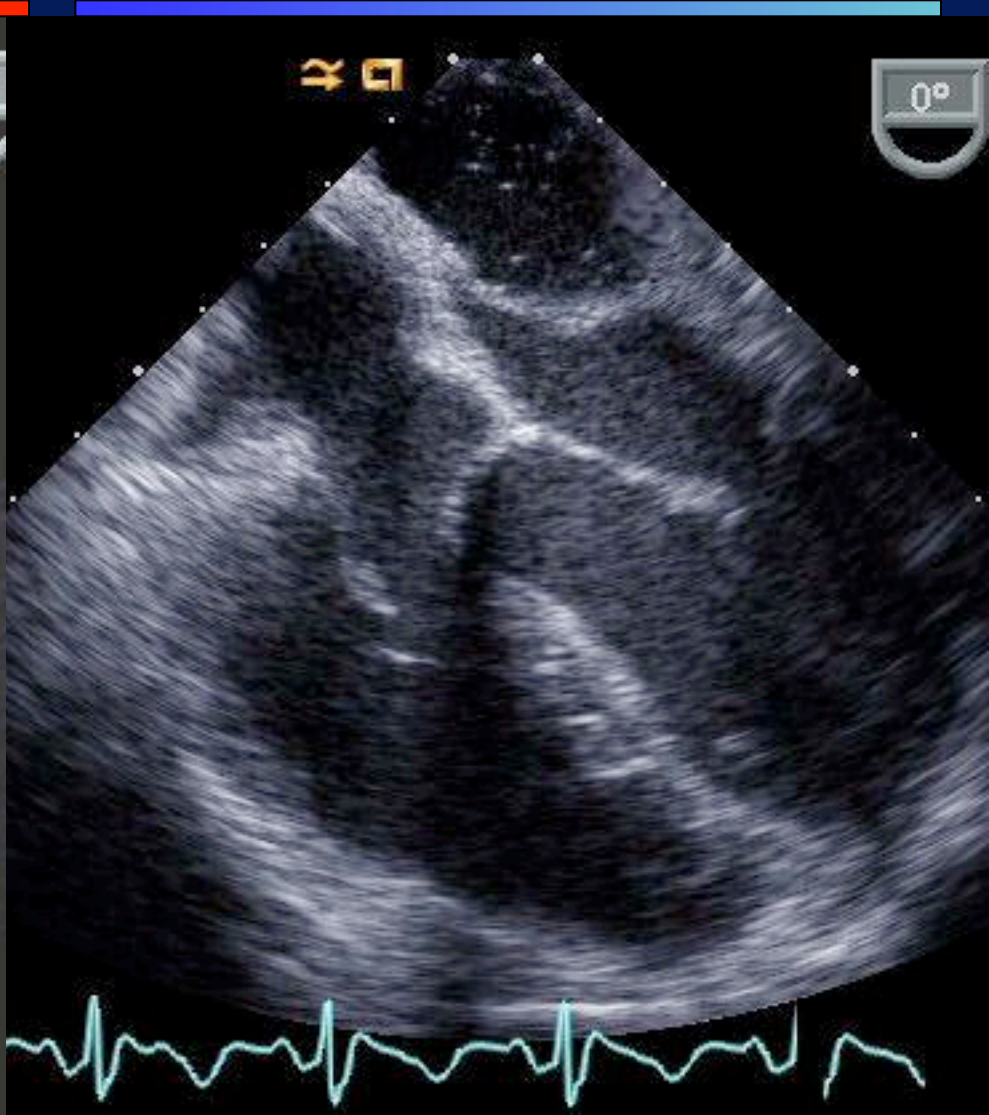




Post Bypass

Early

Late





Thank You!