Tricuspid Valve - Pathophysiology

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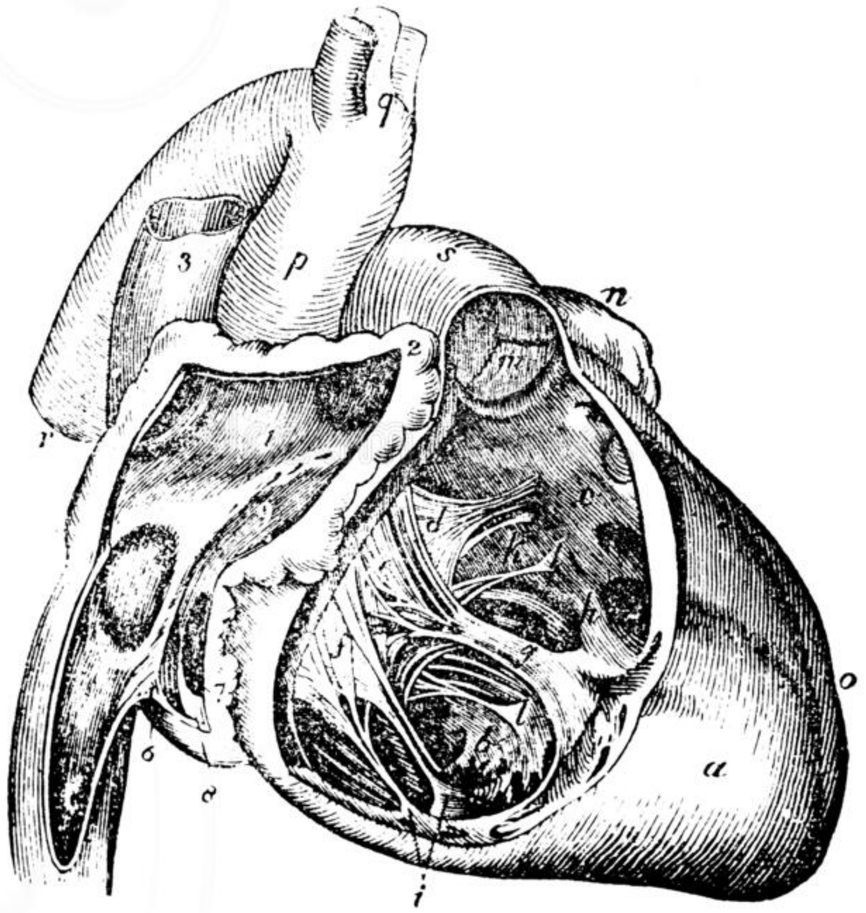


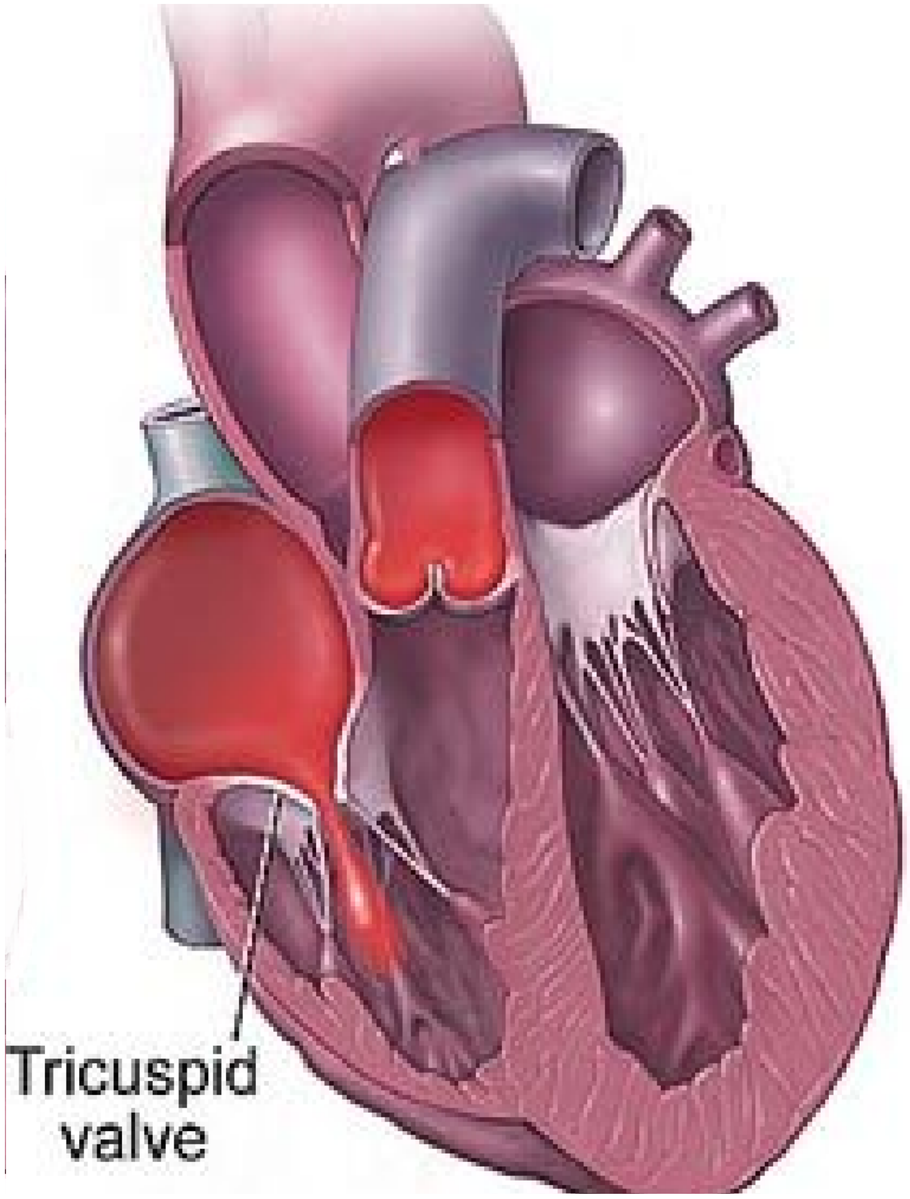
Aims & Objectives

- Tricuspid Stenosis
  - Causes
  - Consequences
- Tricuspid Regurgitation
  - Causes
  - Consequences

Quiz

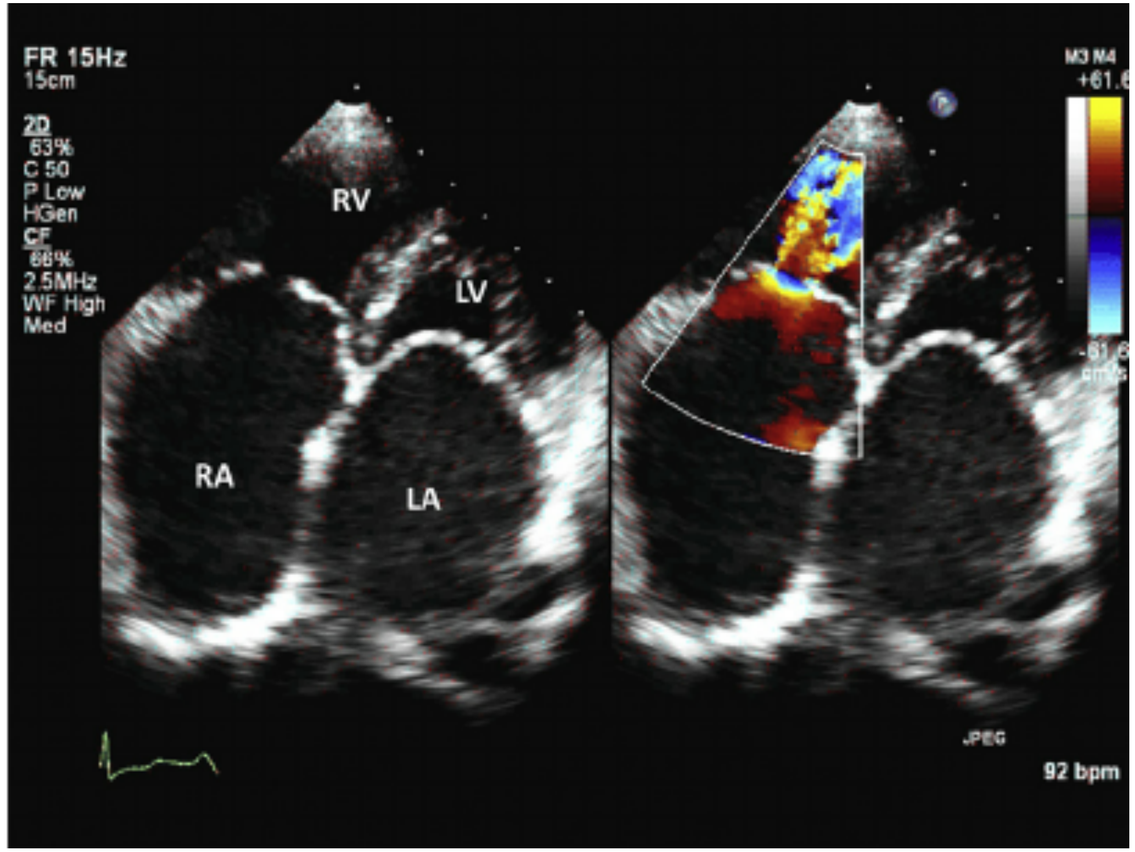
Tricuspid Stenosis

- Rare
- Most often part of multi-valvular pathology
- Usually organic
- Commonly occurs in conjunction with TR.
- Suspect if multi-valve disease without pulmonary oedema



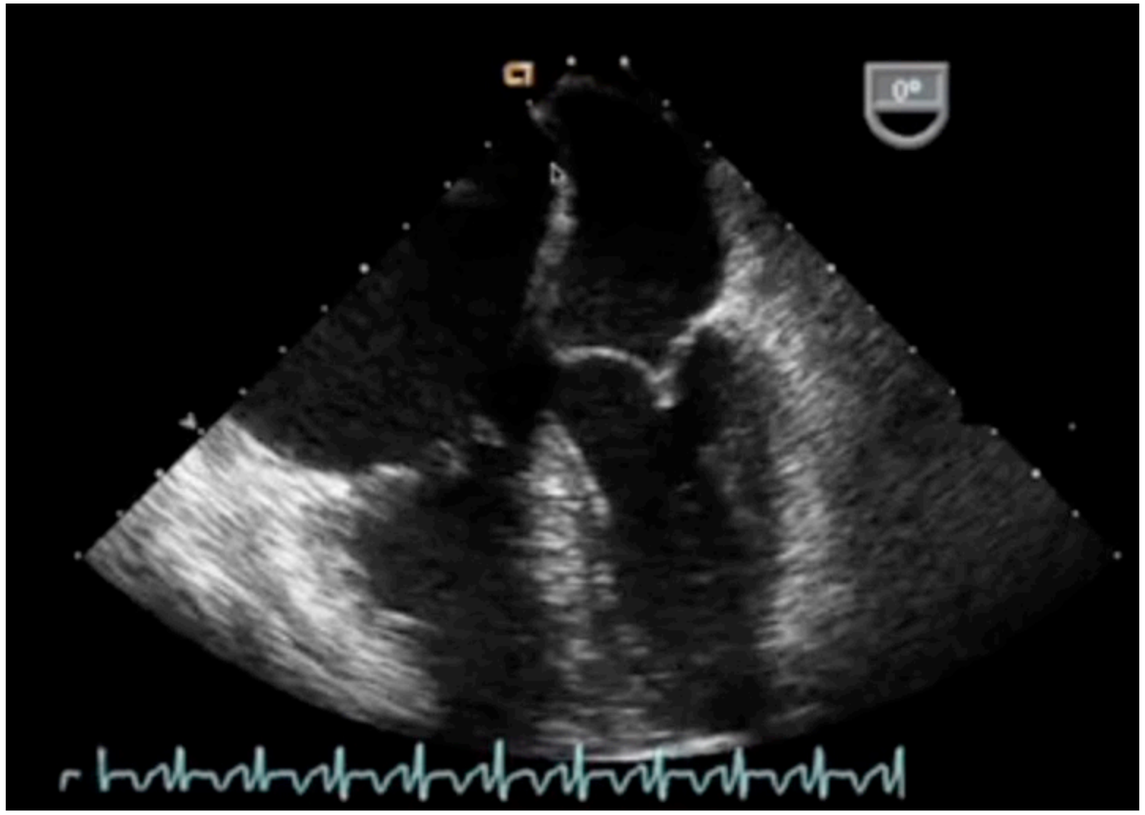
TS - Aetiology

- Rheumatic heart disease
  - Most common - >90% cases of TS
  - Isolated TS uncommon
    - Usually TS & TR
  - Majority also have left sided valve involvement
  - Clinically significant TS presnt in only 5% of RHD pts.
  - Fibrosis & thickening of valve leaflets → leaflet contracture and commissural fusion



TS - Aetiology

- Carcinoid heart disease
  - Mixed TS & TR
  - Thickened, fibrotic, retracted and shortened leaflets – may be fixed.
  - PV usually also involved
  - Left-sided valves usually spared
    - Unless pulmonary primary or pulmonary receptors saturated



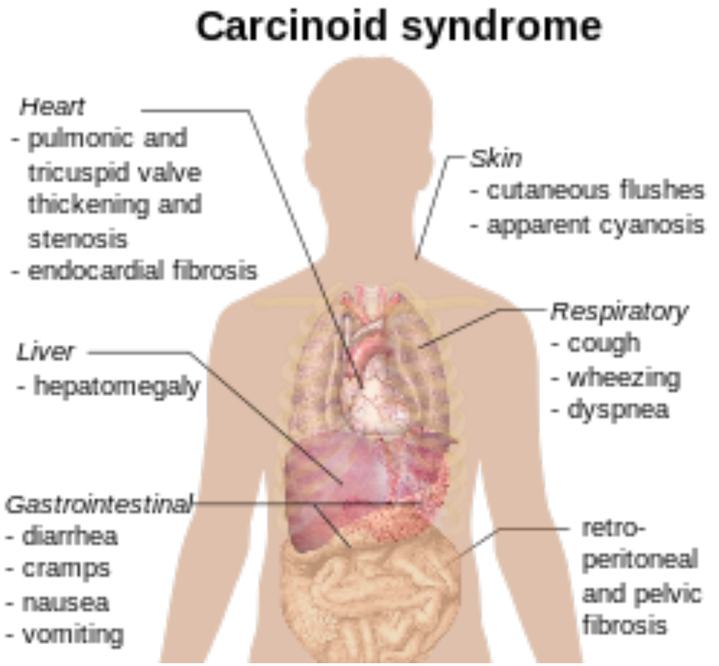
Carcinoid Heart Disease - In 1 slide

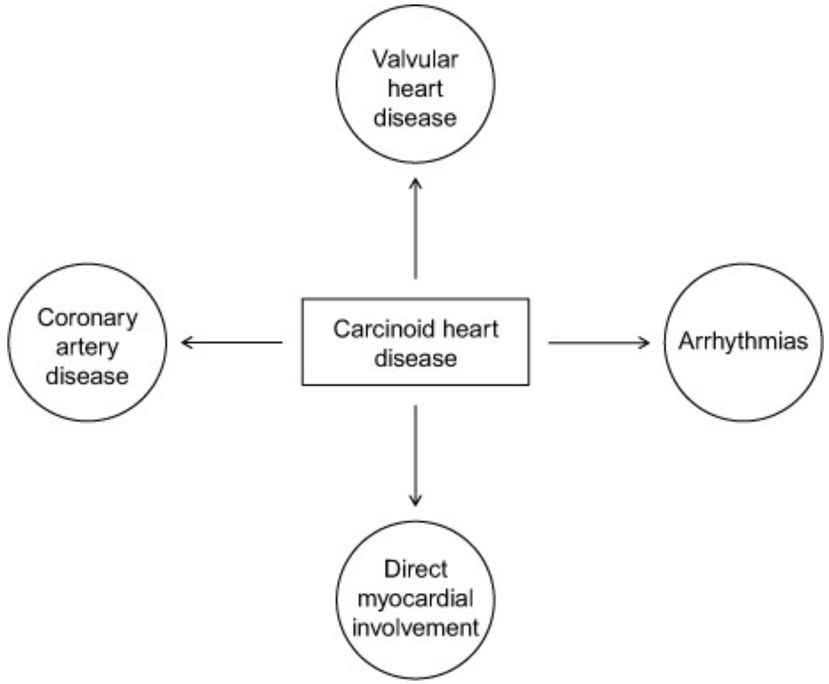
- GI (RH) or lung (LH) **neuro-endocrine tumour**
  - Local mass symptoms
  - **Liver mets** - reduced absorption of vasoactive tumour products - serotonin, histamine, bradykinin, prostaglandins, transforming growth factor-beta.
  - **Systemic symptoms** - flushing, diarrhoea

- **Cardiac involvement** in up to 60% - poorer long-term prognosis

  - **Valves**
    - Plaque deposited - fibroblasts, smooth muscle cells on downstream side of valve. Fibrosis induced by serotonin
    - Isolated TR most common. PR in up to 80%
    - Valve leaflets - thickened, shortened, retracted, incomplete coaptation - fixed half-open -> TR&TS.
  - **Coronary arteries**
    - vasospasm
  - **Arrhythmias**
    - VT
    - atrial arrhythmias
  - **Direct myocardial involvement**
    - cardiac mets 3.8%
    - endomyocardial fibrosis

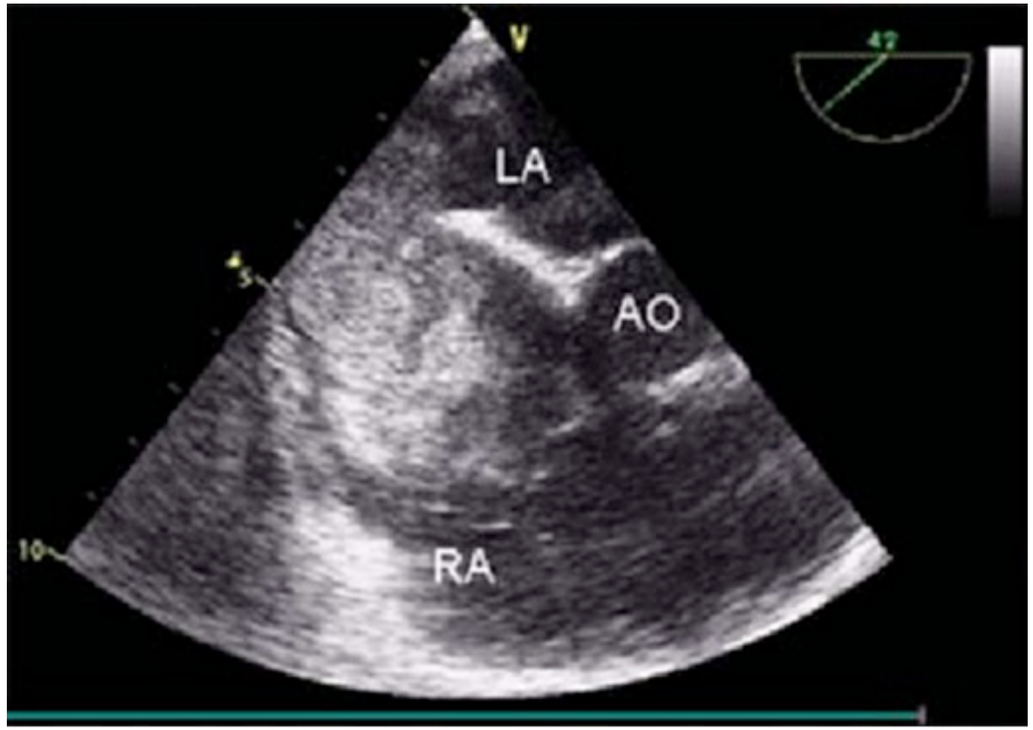
- Octreotide required to avoid carcinoid-syndrome crises





TS - Aetiology

- Other causes
  - Infective Endocarditis
  - Prosthetic valve failure
  - Tumour/masses
    - RA Myxoma
    - Renal / ovarian tumour IVC spread
  - Whipple’s disease
  - Fabry’s disease
  - SLE
  - Congenital



Tricuspid Stenosis - Pathopysiology

- TS produces a diastolic pressure gradient between RA and RV.
  - Typically when TVA <1.5cm2.
  - Increased with increased transvalvular flow
    - Spontaneous inspiration, exercise.
- Small increase in mean diastolic pressure gradient (>5mmHg) can → increased RAP → systemic venous congestion
- Limited RV preload → reduced CO
- AF may → increased RAP due to absent atrial contraction.

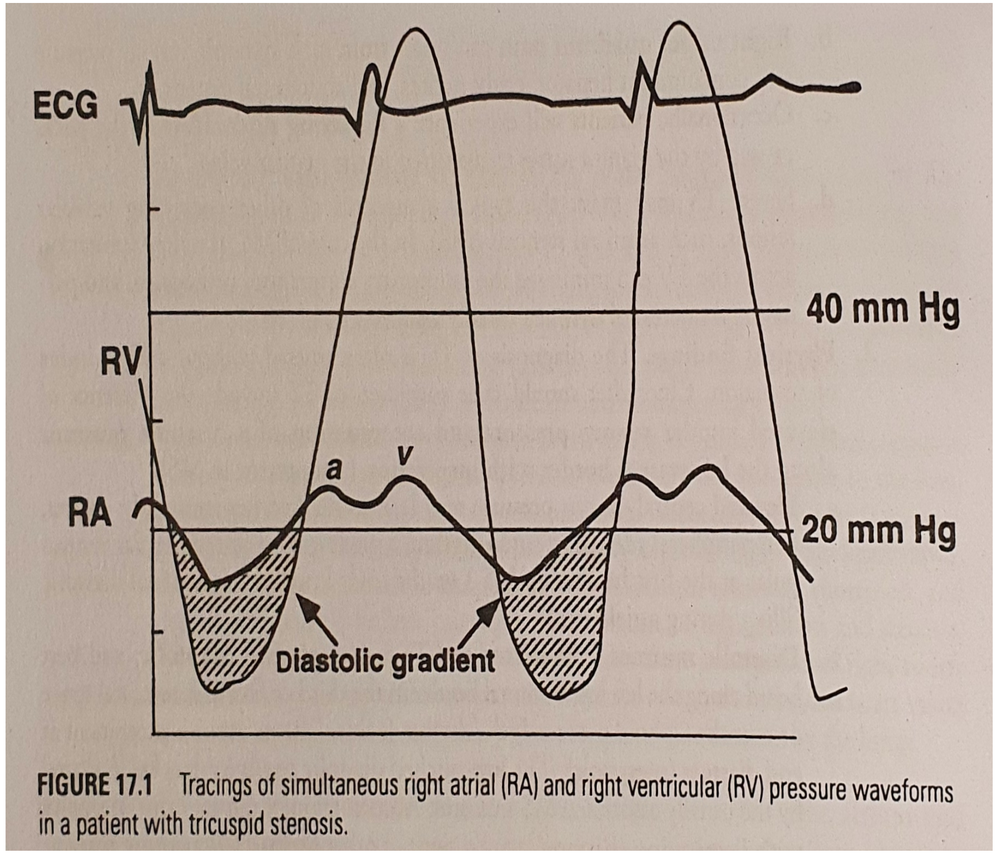
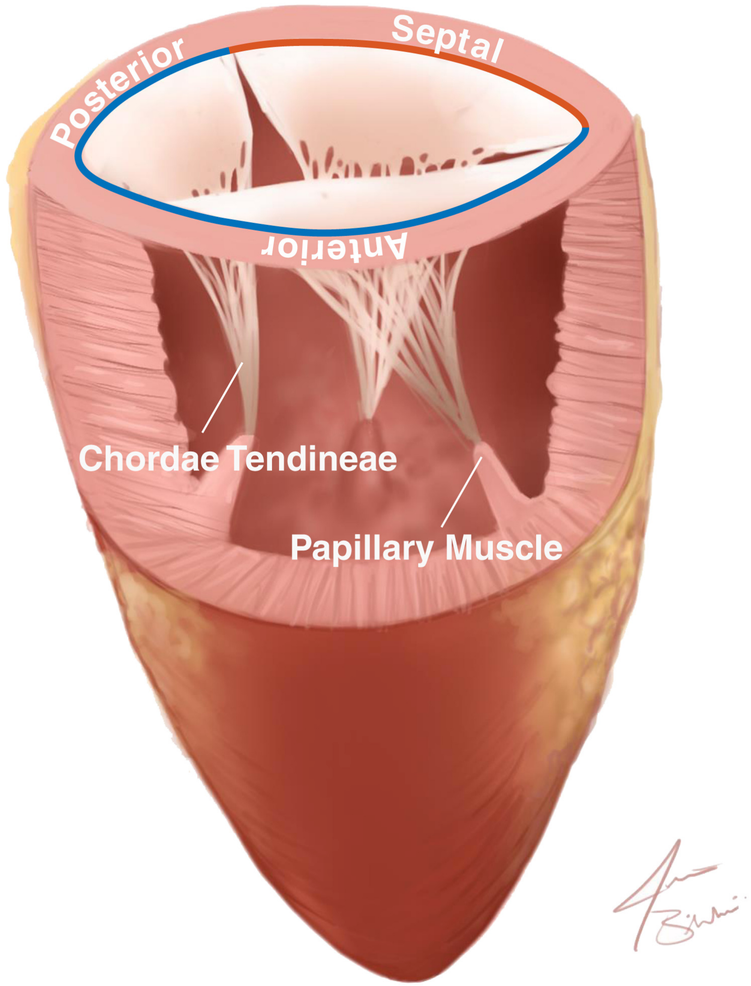


FIGURE 17.1 Tracings of simultaneous right atrial (RA) and right ventricular (RV) pressure waveforms in a patient with tricuspid stenosis.

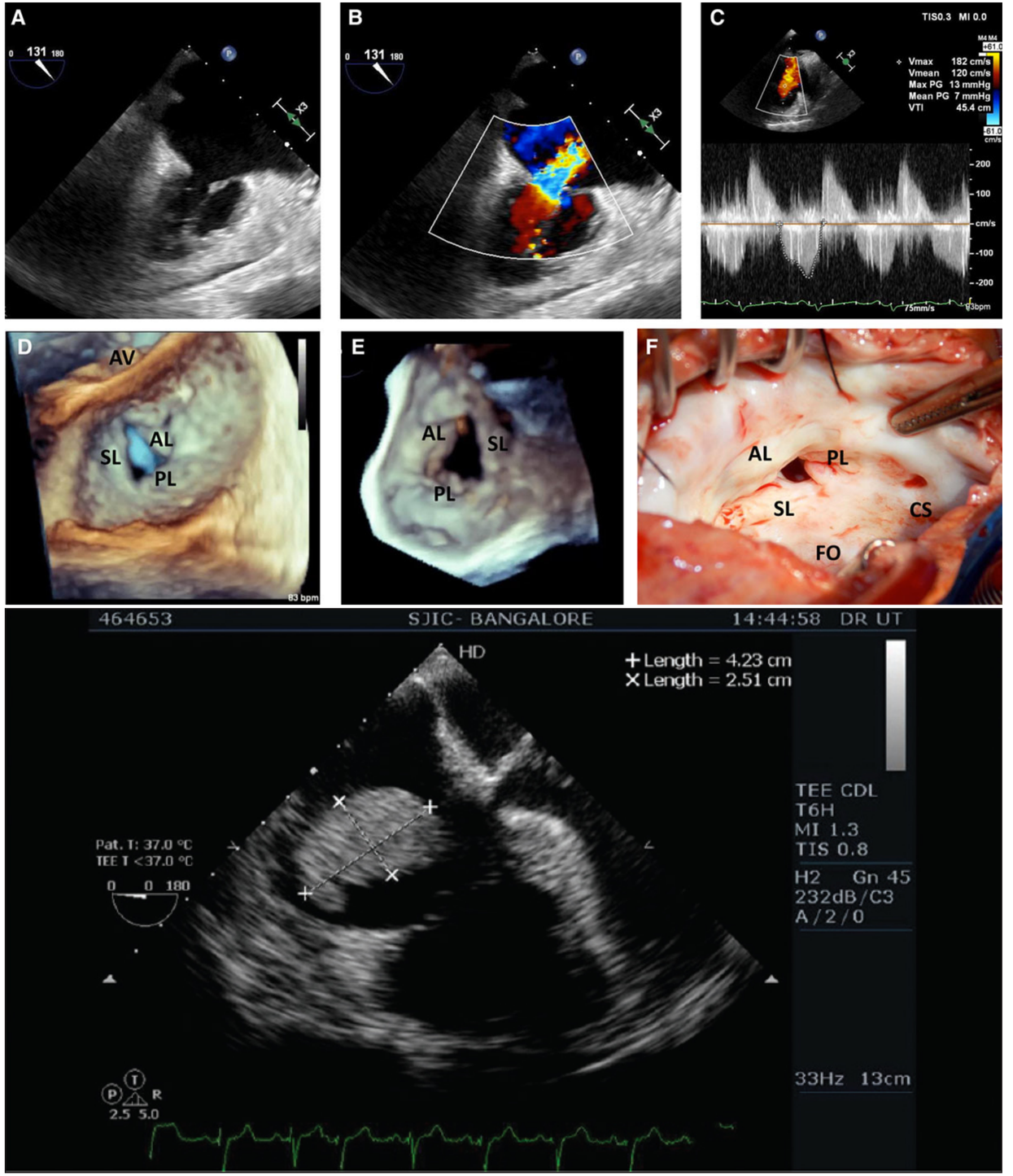
Primary TR - 8-10%

- **Abnormal anatomy of TV complex**
  - TV
    - annulus
    - leaflets
  - and / or subvalvular apparatus
    - chordae
    - papillary muscles



Primary TR

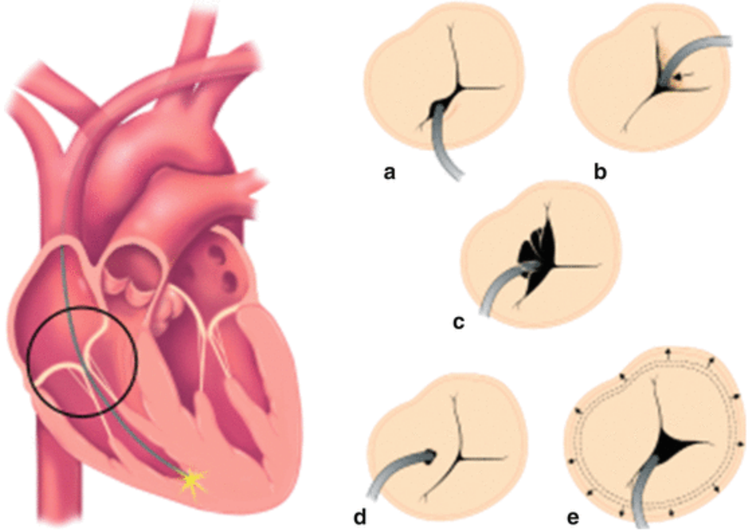
- **Due to acquired or congenital causes**
  - **Tumours / Masses**
    - RA Thrombus
    - RA Myxoma
    - Carcinoid disease



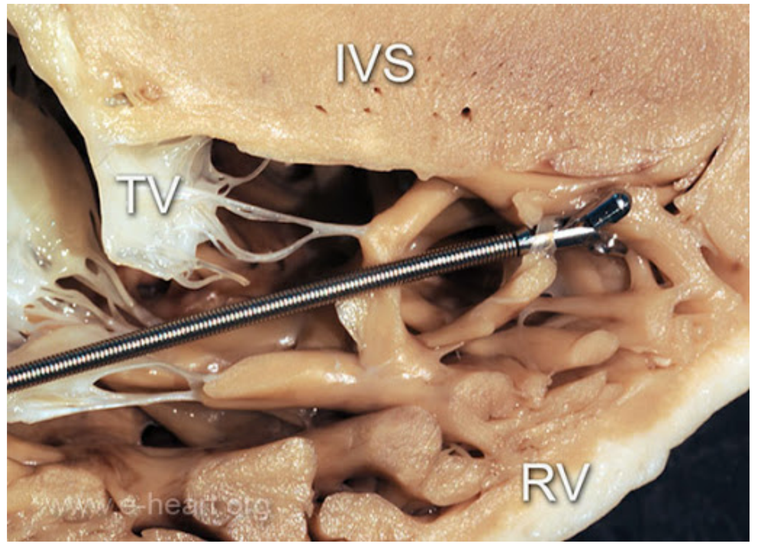
Primary TR

- **Drug-induced leaflet damage**
  - ergot alkaloids - migraine / tension headaches
  - dopamine agonists - prolactinomas
  - anorectic drugs - appetite suppressants
- All produce syndrome similar to carcinoid

Primary TR



- **Iatrogenic**
  - Transvenous device leads
    - TR may evolve from trace —> severe in nearly 40% of patients in the 18/12 following device insertion
  - Central venous catheters
  - Endomyocardial biopsy
  - Mediastinal radiotherapy

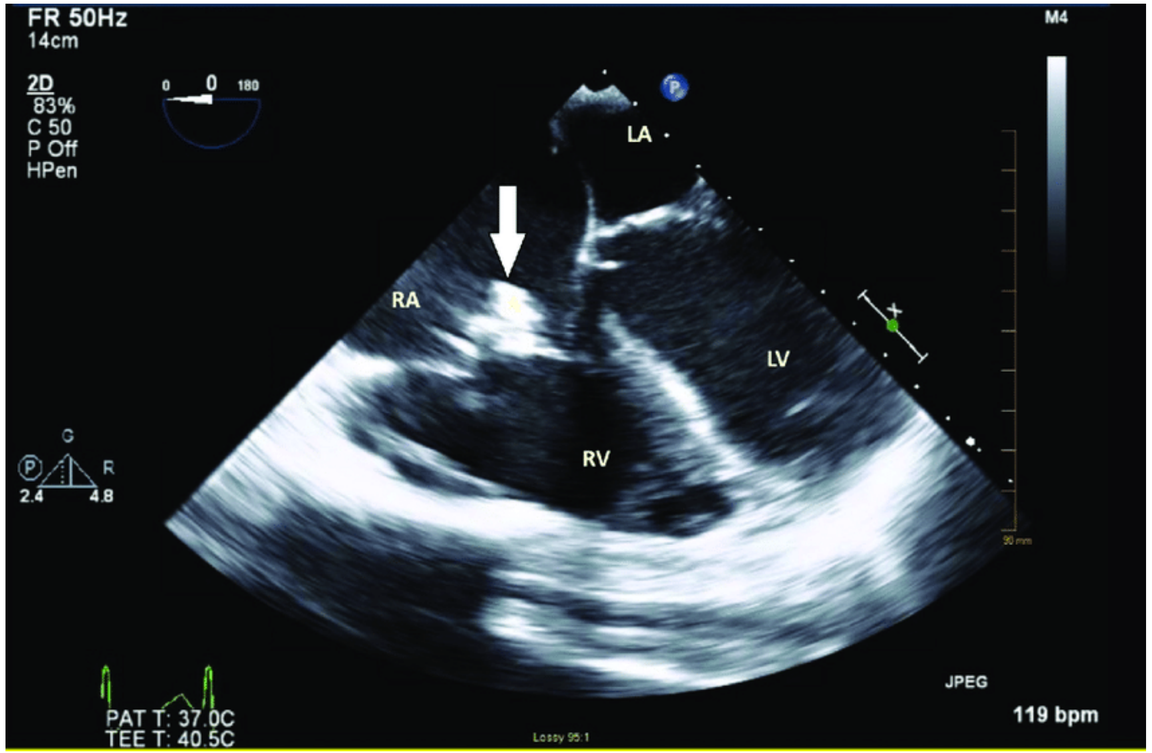


Primary TR

- **Systemic diseases**
  - Lupus
    - TR = 2nd most common cardiac presentation
  - Sarcoidosis
    - Sarcoid granulomas may infiltrate TV

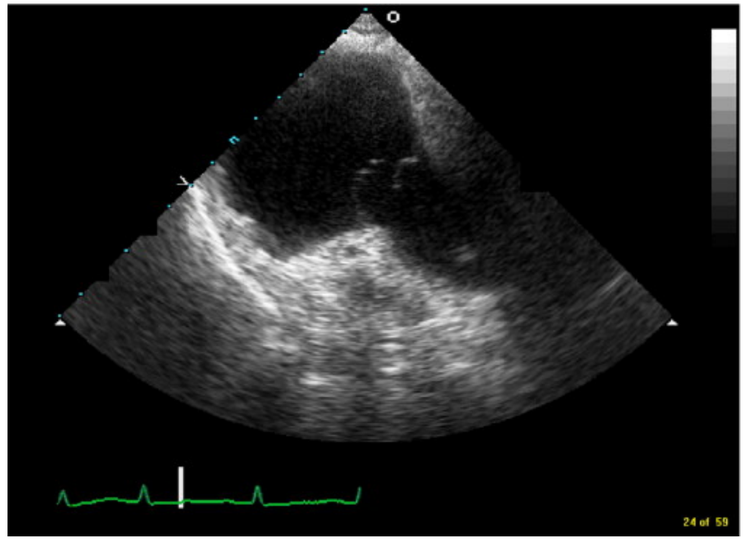
Primary TR

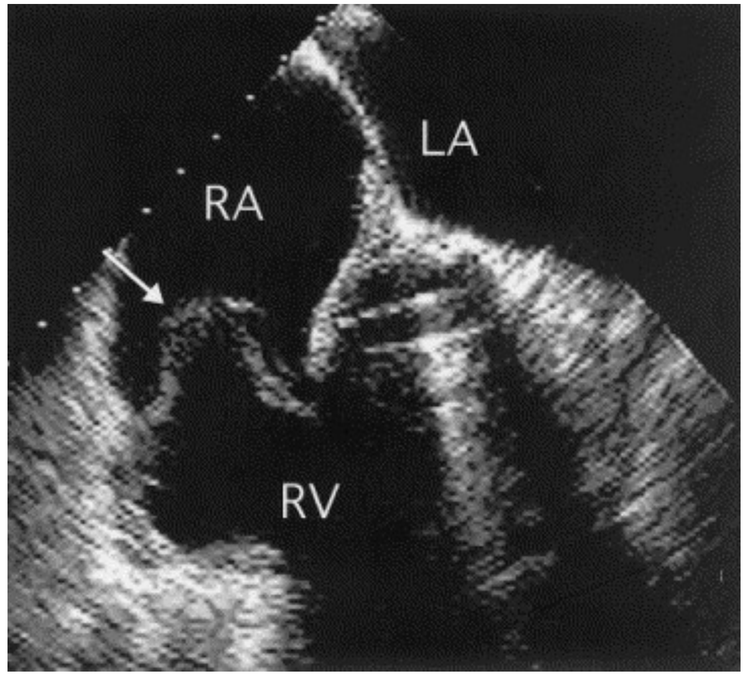
- **Infections**
  - Rheumatic Fever
    - approx 8% of rheumatic heart disease
  - Endocarditis
    - TVIE - up to 90% of right heart endocarditis
    - Associated with IV drug use



Primary TR

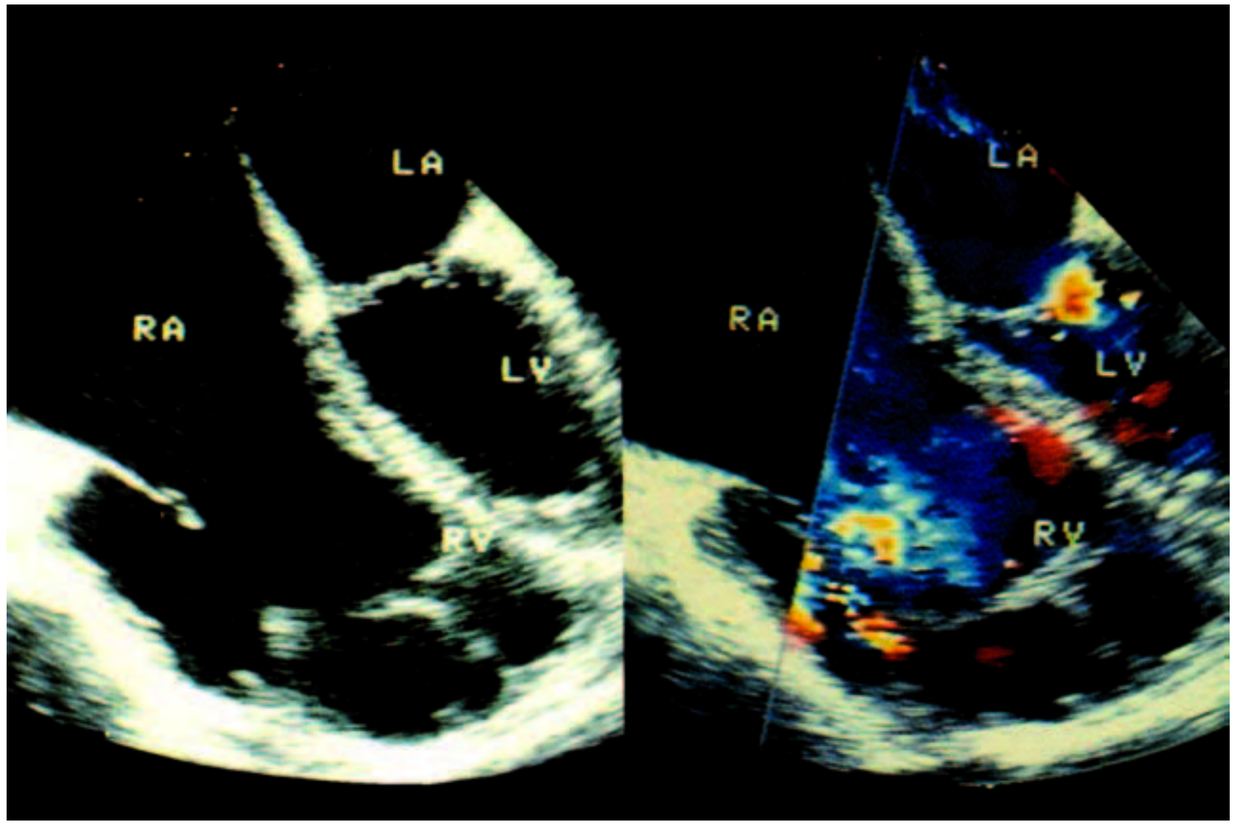
- **Trauma**
  - TR = most common valvular injury associated with motor vehicle collision
  - Papillary muscle rupture → TVL flail





Primary TR

- **Congenital**
  - Ebstein's anomaly
  - Tricuspid valve prolapse
  - TV dysplasia
    - More common in dogs
  - Wide anatomical variation



Primary TR

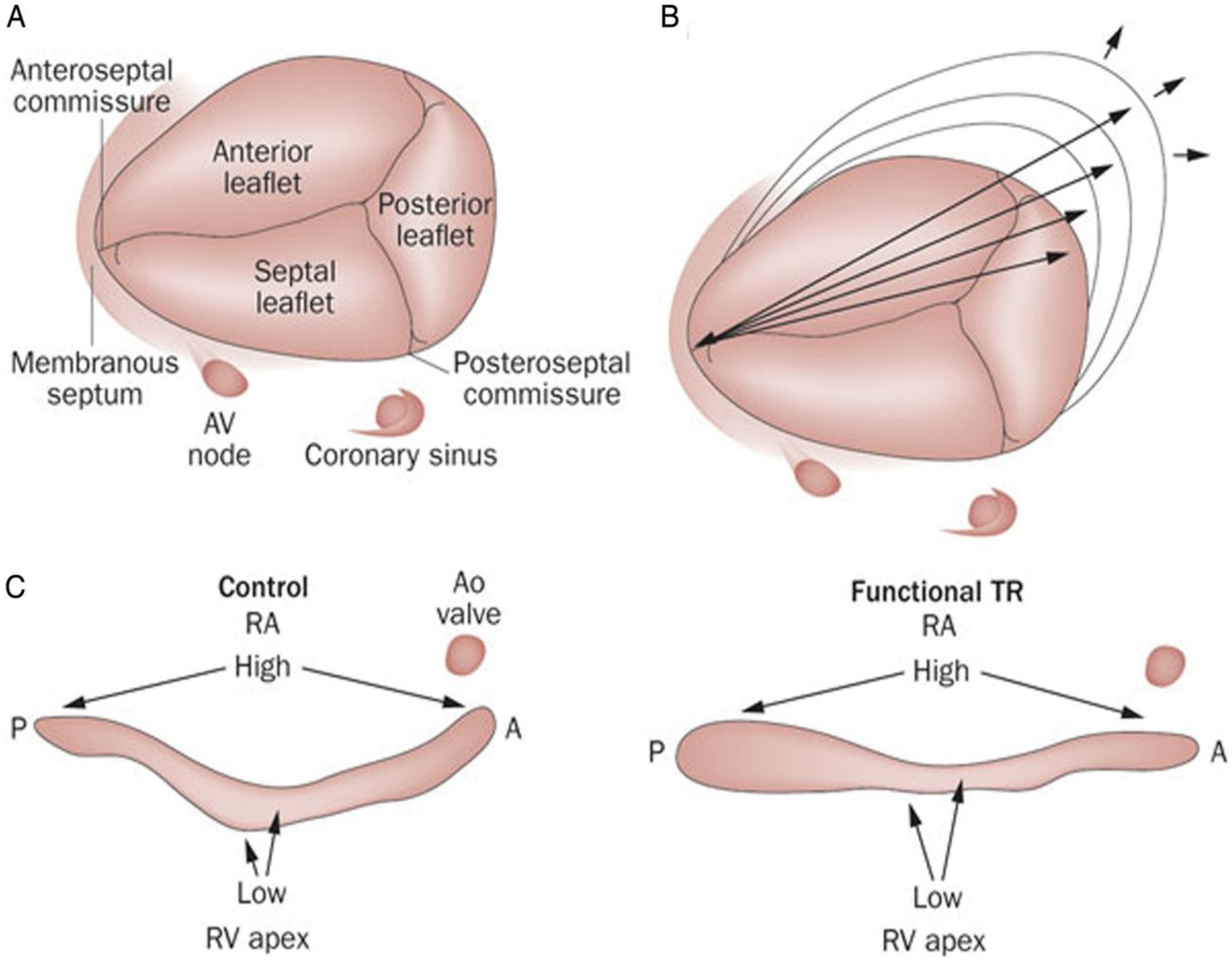
Uncommon 8-10% of TR

Due to TV pathology

- **Acquired**
  - Infections
  - Tumours - Carcinoid, Myxoma
  - Systemic disease
  - Trauma
- **Iatrogenic**
  - Device leads
  - Central catheters
  - Endomyocadial biopsy
  - Drug-induced
  - Radiotherapy
- **Congenital**
  - Ebstein’s anomaly
  - TV dysplasia

Secondary TR - >90%

- **Normal TV complex anatomy**
  - RV dilatation & dysfunction
    - leaflet tethering
    - papillary muscle displacement
    - annular dilatation
      - septo-lateral direction
    - coaptation defect



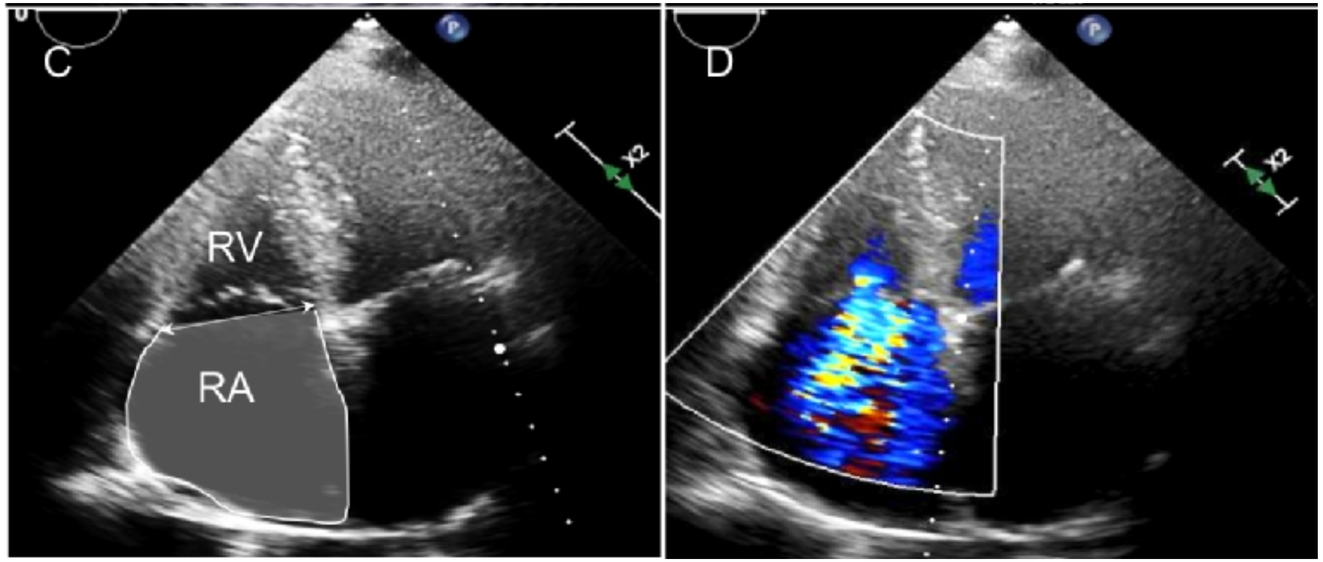
Secondary TR

Common >90% of TR
Normal TV morphology

- **Left-sided pathology with pulmonary hypertension**
  - MV pathology
  - AV pathology
  - LV pathology
- **Right-sided pathology with pulmonary hypertension**
  - Idiopathic PHT
  - Acute or chronic lung disease
  - Pulmonary embolism
- **Global or regional RV dysfunction**
  - RV ischaemia
  - ARVC
  - Sarcoidosis (without TV infiltrates)

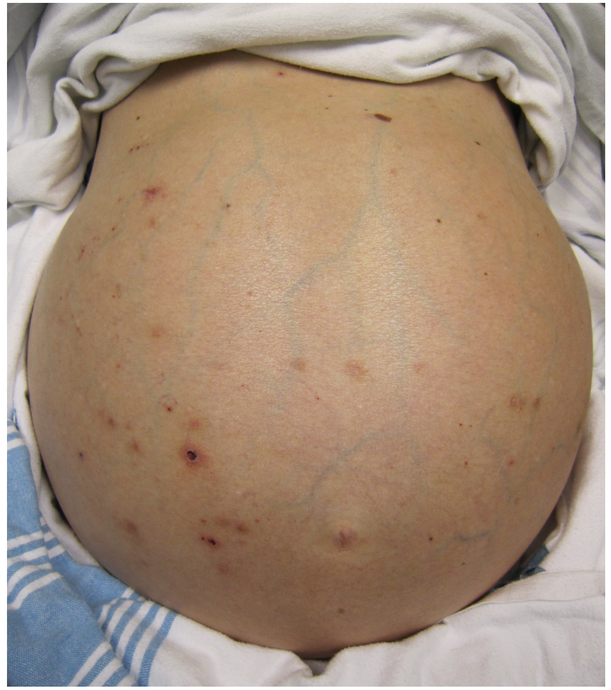
Isolated TR

- **Normal TV complex anatomy**
  - Normal RV – no PHT or LH disease
    - Pronounced RA dilatation
      - → annular dilatation
      - → leaflet malcoaptation
    - No pronounced RV remodelling



- Most often elderly patients with AF

TR - Consequences



- **Right heart failure**
  - ascites
  - Peripheral oedema
  - hepatic dysfunction

- Persistent moderate to severe TR impacts functional capacity and long term survival

TV Quiz

1. What substance is deposited in cardiac tissue in Fabry disease?

a. Gangliosides

b. Glycosaminoglycans

c. Mucolipids

d. Sphyngolipids

e. Oligosaccharides

TV Quiz

2. What % of RHD patients have clinically significant TS?

a. 1%

b. 5%

c. 15%

d. 40%

e. 75%

TV Quiz

3. Which enzyme prevents carcinoid (gut primary) affecting left sided valves?

a. Monamine oxidase

b. L-amino acid decarboxylase

c. Aminopeptidase

d. Diamine oxidase

e. Matrix metalloproteinase

TV Quiz

4. Which is not a recognised cause of mixed TV disease?

a. Carcinoid

b. ICD lead

c. SLE

d. RA Myxoma

e. Ergotamine