

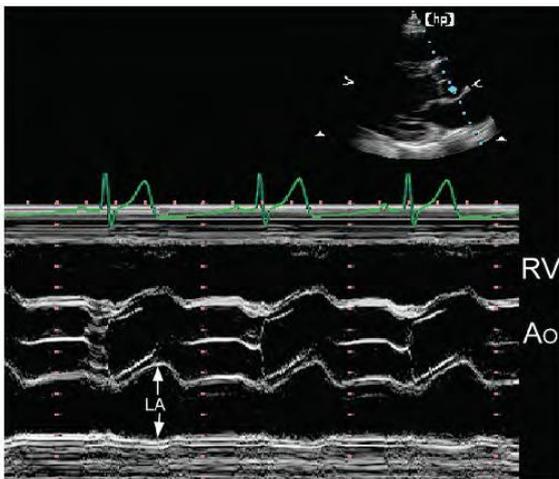
## LEFT ATRIUM

### LA SIZE

LA diameter is measured at **end-systole** (before the MV opening) in the **PLAX**, using either 2-D or M-mode imaging. This measures only the AP diameter of the LA and may underestimate the size of the LA. Therefore the recommended parameter is LA volume measured by the area length method from apical view. 3D imaging is shown to be more accurate.

LA volume is measured using modified Simpson's rule method in 4C & 2C apical views

	Normal	Mild	Moderate	Severe
LA diameter (cm) ♂	Up to 4.0	Up to 4.6		5.3 or above
LA diameter (cm) ♀	Up to 3.8	Up to 4.2		4.7 or above
LA diameter index (cm/m <sup>2</sup> )	Up to 2.3	Up to 2.6		3 or above
LA volume (ml) ♂	≤ 58	Up to 68		79 or above
LA volume (ml) ♀	Up to 52	Up to 62		73 or above
LA volume index (ml/m <sup>2</sup> )	Up to 28	Up to 33		40 or above



**Measuring left atrial size.** By convention, the measurement is performed at **end-systole when left atrial volume is greatest**

**Causes of biatrial enlargement** include restrictive cardiomyopathy, rheumatic heart disease, isolated mitral insufficiency and constrictive pericarditis.

**Biatrial dilatation** is common in chronic atrial fibrillation, and is associated with impaired left ventricular function.

**Persistent LSVC** may cause a dilated **coronary sinus** and possibly **RA** but not biatrial enlargement

**Cor-triatriatum-** is a rare congenital abnormality in which the LA is partitioned into two chambers by a membrane, best seen in the apical 4-chamber view. The membrane contains one or more perforations allowing blood to flow between the two chambers, but nonetheless there is a degree of obstruction to LV inflow which can be assessed using PW Doppler. Cor triatriatum dexter is the name given to this condition when it occurs in the right atrium.

### Anatomic variants related to the RA mimicking pathology on echocardiography

- **Lipomatous hypertrophy of interatrial septum (RA/LA)**
- **Pectinate muscles (RA/LA)**
- Suture line following transplant
- Fossa ovalis
- Calcified mitral annulus
- Coronary sinus
- Ridge between LUPV and LAA
- Transverse sinus

## RIGHT ATRIUM

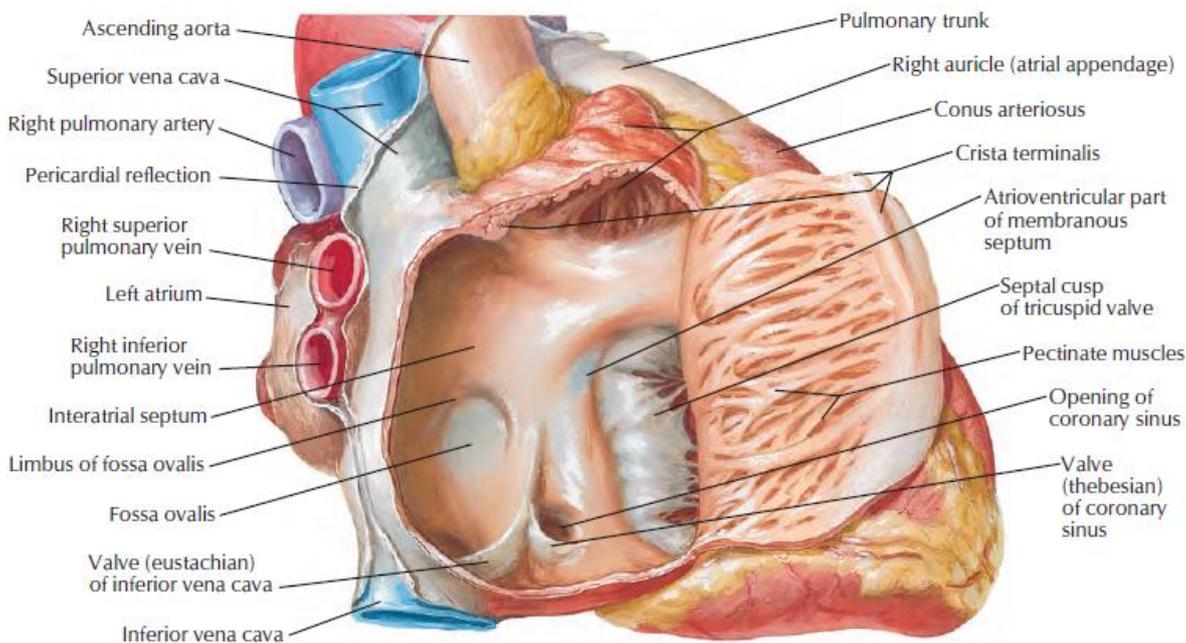
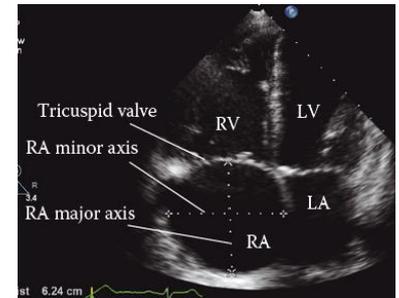
The right atrium (RA) receives venous blood returning from the upper body (via the SVC), the lower body (via the IVC) and also from the myocardium (via the coronary sinus). The IVC enters the RA inferior to the coronary sinus.

### Right atrial size

**Eyeballing-** in an apical 4C you can simply ‘eyeball’ the relative sizes of the left and right atria. The RA is normally no larger than the left – if it is larger, it is dilated.

**Minor & major axes-** in the modified apical 4C at end-diastole measure the RA minor axis from the lateral wall of the RA to the interatrial septum (perpendicular to the RA major axis). A RA minor axis  $>4.4$  cm or a RA major axis  $>5.3$  cm is indicative of RA dilatation.

**Planimetry-** perform planimetry of the RA in the modified apical 4C – a dilated RA is indicated by an area  $>18$  cm<sup>2</sup>.



Opened right atrium: right lateral view

### Anatomic variants related to the RA mimicking pathology on echocardiography

- **Eustachian Valve** is a residual **embryonic** attachment seen sometimes at the point of entry of the IVC into the RA. When this valve has a more extensive fenestration, it is termed the Chiari network. Both are considered normal variants, but can be mistaken for a mass, thrombus or vegetation.
- **Chiari Network** is a residual **embryonic** attachment seen as a multiple filamentous structures attached to the RA wall near the RA–IVC junction and extending into the RA cavity. It is thought to be a variant of Eustachian valve with more extensive fenestration. It is highly mobile with a random movement, not necessarily related to valvular movement. It is present in around 2% of the population as a normal variant and should be differentiated from free RA thrombus. The presence of a Chiari network is associated with an increased risk of ASD/PFO.
- **Lipomatous hypertrophy of interatrial septum (RA/LA)** is a Lipomatous thickening of the interatrial septum that creates a dumbbell-like appearance of the superior and inferior atrial septum, sparing the fossa ovalis. It is limited to the interatrial septum and does not protrude into the atrial cavity. It may mimic an infiltrative process.
- **Crista Terminalis** is a well-defined **fibromuscular** ridge separating a smooth sinus venarum and trabeculated RA. Externally, it corresponds to the sulcus terminalis, and internally, it extends from the SVC to IVC along the **lateral** RA wall. Prominent crista terminalis may be confused for RA tumour on TTE, but crista terminalis is differentiated by (1) its appearance as a nodular mass of similar echogenicity with adjacent myocardium, (2) its location at the posterolateral wall of the RA near the SVC, which corresponds to the course of crista terminalis connecting the SVC and IVC, and (3) the phasic change in its size becoming thicker or larger during atrial systole
- **Pectinate Muscles (RA/LA)** A series of parallel **ridges** known as pectinate muscles course across the anterior endocardial surfaces of the left and right atria, including both appendages
- Catheters/pacemaker leads
- Fatty material (surrounding the tricuspid annulus)