

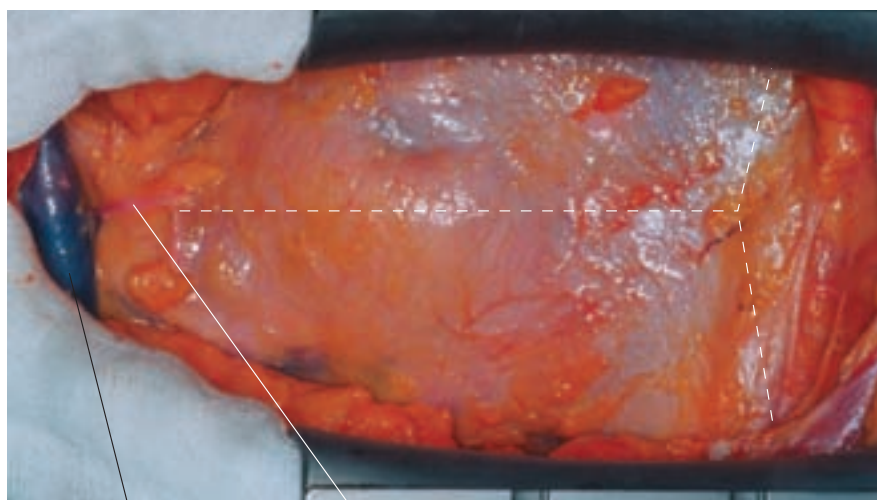
8.2 Surgical Anatomy of the Tricuspid Valve

8.2.1 Median Sternotomy for the Tricuspid Valve

The incision and technique for median sternotomy is performed as described in Chap. 2. After completion of the skin incision cut down of the sternum, the anterior mediastinum is exposed (**Fig. 8.13**). The fat tissue lying behind the sternum is dissected down to the pericardial sheath. Inferior thymic vein is dissected and subsequently ligated. Prior to the pericardial incision, the left brachiocephalic vein is identified. The pericardium is

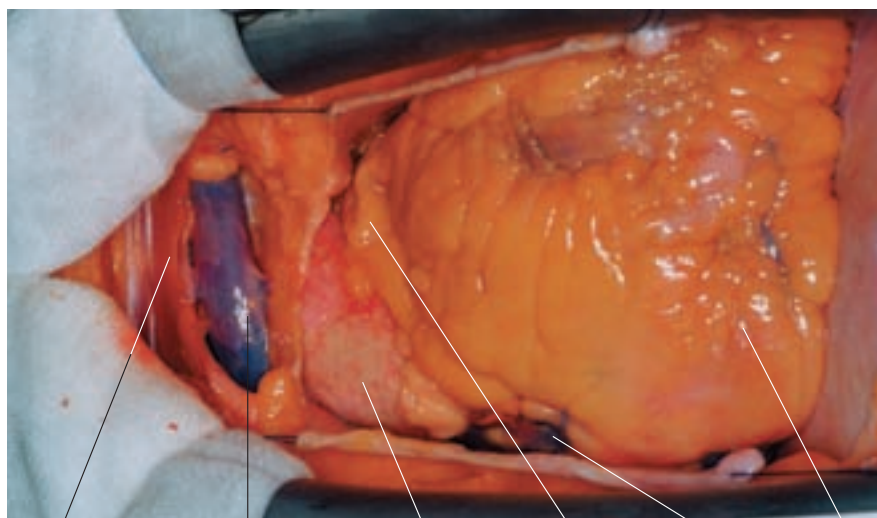
incised using the inversed “T” method. The edges are then lifted by using purse-string sutures to facilitate exposure of the heart, as presented in (**Fig. 8.14**). In this exposure, the ascending aorta is positioned in front of the superior vena cava. Note that the right ventricle is located relatively deeply and to the right (**Fig. 8.14**). This special placement of the right lateral surface of the right ventricle covers the whole appendage of the right atrium.

Only a small part of the right appendage is seen in this position. Note also that the pulmonary infundibulum is in front of the ascending aorta. Due to the round and posterior course of the pulmonary artery, this large vessel is finally positioned posterior and to the left relative to the ascending aorta (**Fig. 8.14**). Finally, in this extreme right lateral rotation of the heart, the wall of the right atrium must be exposed to enter the cavity of the atrium and to reveal the tricuspid valve. For this purpose, the patient and the operating table may be rotated to the left, and the right appendage subsequently grasped using a smooth lung forceps, and pulled superiorly and to the left (**Fig. 8.15**). By using these two very helpful maneuvers, the posteriorly positioned right atrium may be brought almost into the anterior aspect (**Fig. 8.15**). Note that now the course of the superior vena cava may be seen, along with its connection to the right atrium. The sinoatrial node (SN) is located at the junction of the two structures. Furthermore, the lateral wall of the right atrium is exposed. Condensation of the subepicardial fat tissue is observed at the transition of the superior vena cava and right atrium (**Fig. 8.15**). This fat tissue marks the initial part of the terminal sulcus, the superior edge of the terminal sulcus indicates the junction be-



Left brachiocephalic vein Thymic vein

Fig. 8.13. Pericardial incision



Sternohyoid muscle Left brachiocephalic vein Ascending aorta Infundibulum Right auricle Right ventricle

Fig. 8.14. Sternocostal surface of the heart

tween the superior vena cava and the right atrium. It begins at the right lateral edges of the superior vena cava and of right atrium. From this position, the terminal sulcus runs in a posterior and diagonal direction toward the posterior surface of the right atrium. It ends posteriorly, at the level of the coronary sulcus. The position of the terminal sulcus is equivalent with the border between the right appendage and the sinus venosus of the right atrium (**Fig. 8.15**). One very important detail should be considered at this point: the position of the sinus node (SN). The SN is located at the initial part of the terminal sulcus, at the right lateral edge of the superior vena cava. Further details of the SN anatomy will be described in Sect 10.1.

Considering all of the aforementioned morphological relationships, the direction of the right atrial incision may now be considered. The opening cut of the right lateral wall of the right atrium may be seen on the schematic drawing presented in **Fig. 8.16**, which is a copy of the presented in situ specimen. The opening incision of the right atrium is performed in a diagonal direction on the right lateral surface of wall of the right atrium. The initial segment of opening cut is performed inferior to the superior end of the terminal sulcus (**Fig. 8.16**); the surgeon must be careful to avoid injury to the SN. From here on, the incision is extended down in a diagonal manner toward the inferior vena cava. This incision is positioned over the terminal sulcus and as such, actually opens the right appendage. This diagonal positioning of the incision is very important because of the following morphological facts: (1) the SN is positioned in the initial part of the terminal sulcus, and the incision

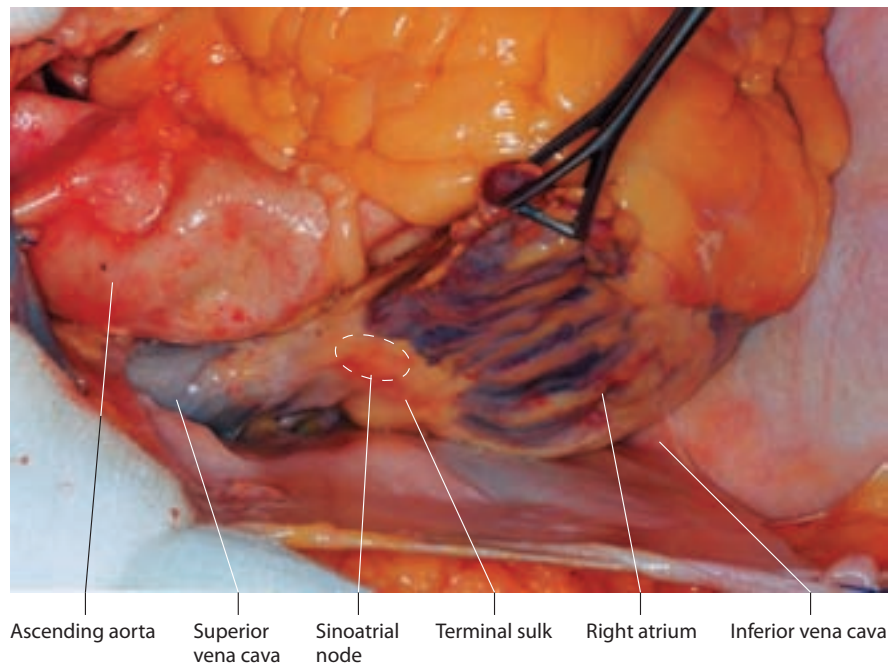


Fig. 8.15. Exposure of the lateral wall of the right atrium

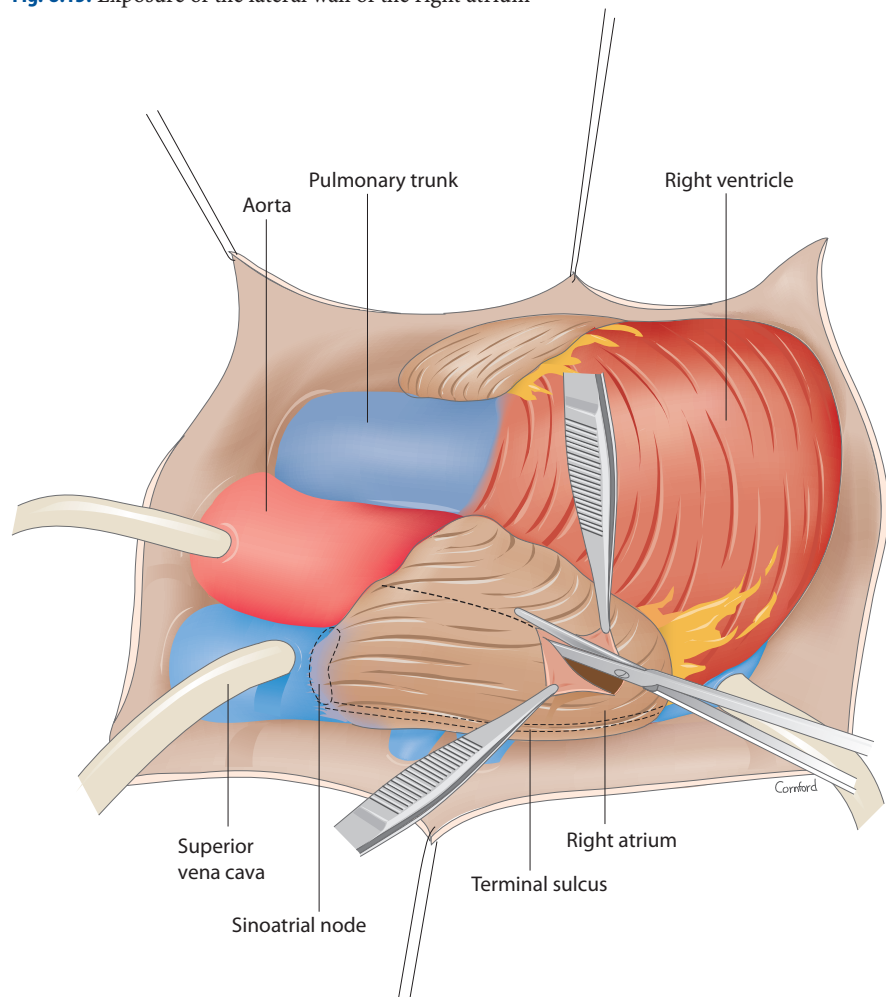


Fig. 8.16. Incision on the lateral wall of the right atrium

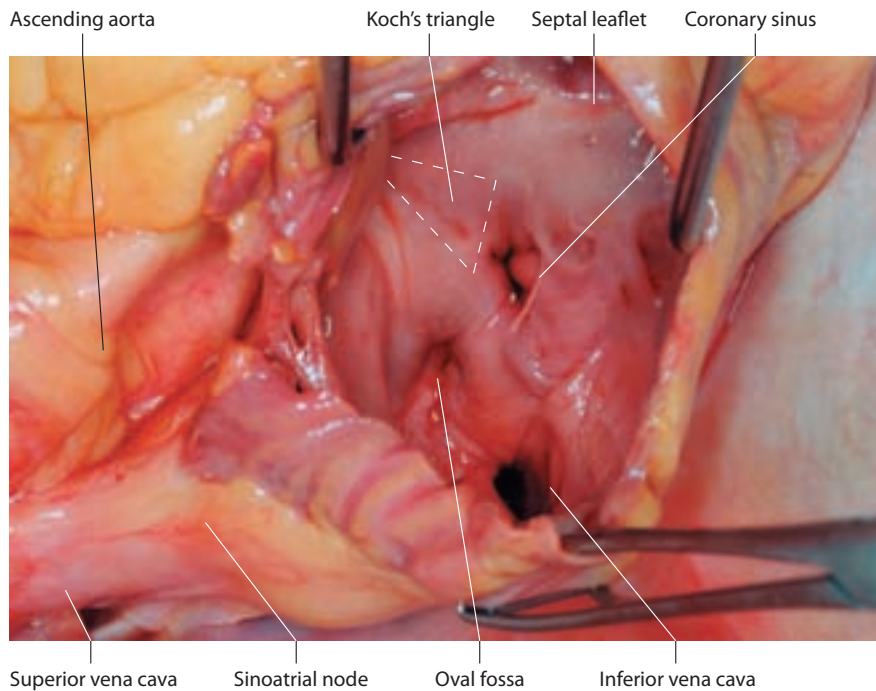


Fig. 8.17. Exposure of the right atrial cavity

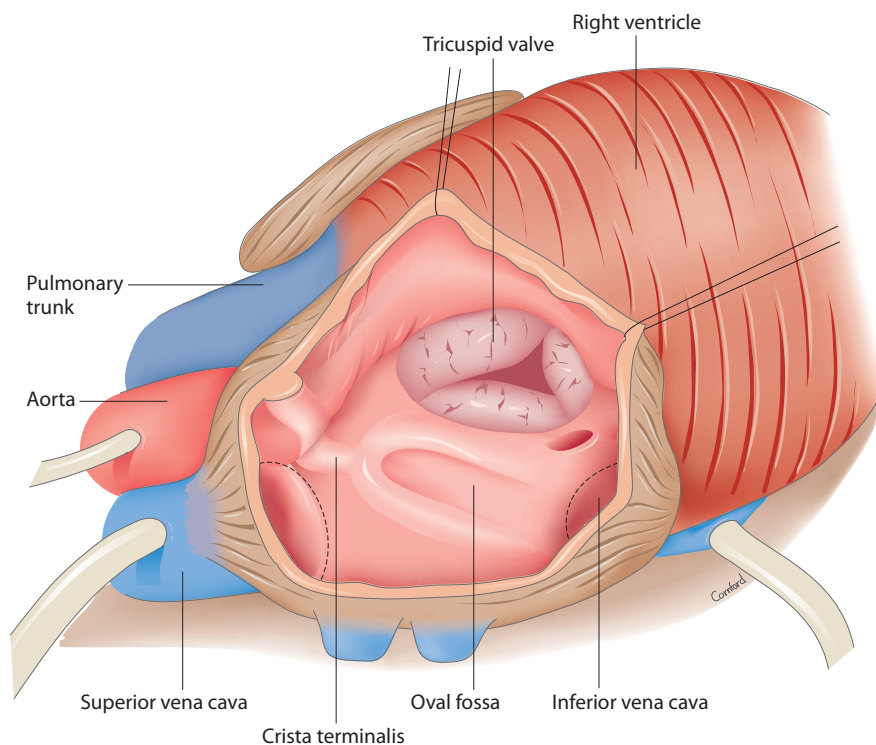


Fig. 8.18. Exposure of the right atrial cavity, schematic drawing

should not cross the terminal sulcus, thus reducing to a minimum any potential to damage the SN; (2) the artery to the SNA runs, in very rare cases, on the free wall of the right atrium, and so the positioning of the incision on the lateral wall of the right ventricle also reduces the chances of damaging the blood supply of the SN.

After completion of the incision into the right atrium, the area of the interatrial septum is inspected. In the presented exposure (**Fig. 8.17**), the interatrial septum is found to be positioned almost in a coronal plane. The oval fossa is located in the middle of the septum; in the present case, it is a small structure. The opening of the inferior vena cava may be seen inferior and posterior to the oval fossa. Note that the axis of the inferior vena cava is directed toward the superior anterior area of the oval fossa, and that there is no limb surrounding the oval fossa. In addition, there is no valve positioned at the opening of the inferior vena cava. The same situation is also seen on the schematic drawing in **Fig. 8.18**, although the tricuspid valve is depicted, being positioned at the anterior inferior area of the oval fossa. In the dissected specimen (**Fig. 8.17**), the tricuspid valve is not seen clearly, perhaps as a result of the special position of the right atrium or the natural rotation of the heart to the left hand side.

The ostium of the coronary sinus is found in front of the opening of the inferior vena cava. Note the presence of the valve at the ostium of the coronary sinus. The opening of the superior vena cava is found behind the crista terminalis, which is the counterpart of the terminal sulcus. Note that the crista runs from the roof of the right atrium toward the interatrial septum.

Superior to the oval fossa, the crista divides into the superior and anterior limbs of the oval fossa (Figs. 8.17 and 8.18). The septal leaflet of the tricuspid valve is found in front and inferior to the inferior limb of the oval fossa (Fig. 8.18).

In the presented cases, the tricuspid valve is open, the leaflets being positioned as in diastole. The aim of this exposure was to show the position of the posterior and anterior papillary muscles.

Lifting of the posterolateral leaflet reveals the inferior papillary muscle (see Figs. 8.19 and 8.20). The inferior papillary muscle gives rise to the chordae tendineae that run to the septal and posterolateral leaflets, and appears to have two heads: septal and anterior. The septal part gives rise to the chordae tendineae that anchor the posterior part of the septal leaflet (Figs. 8.19 and 8.20), while the anterior head gives rise to the chordae that are attached to the posterolateral leaflet (Figs. 8.19 and 8.20).

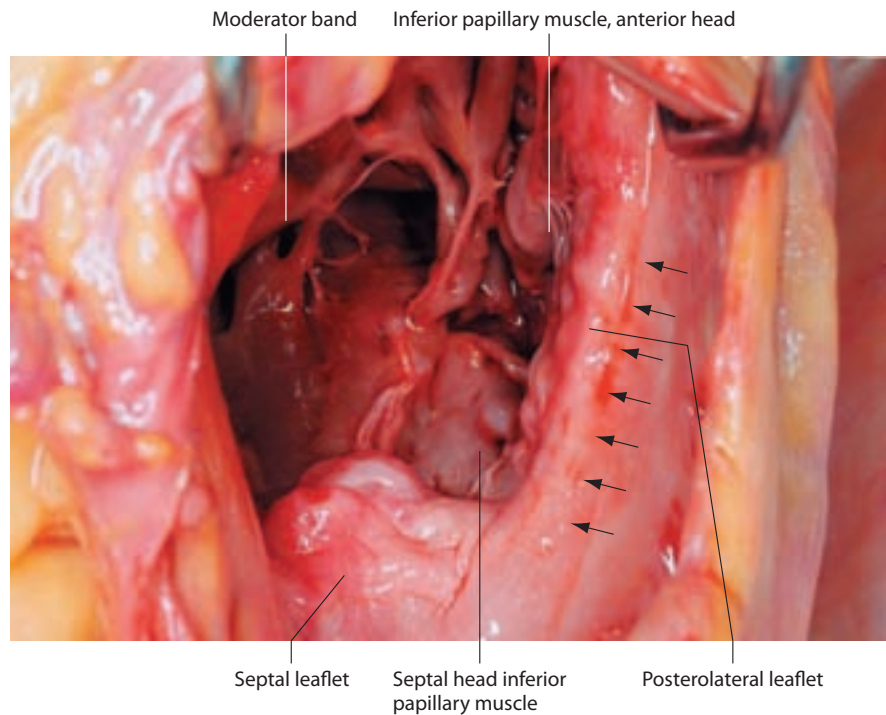


Fig. 8.19. Exposure of the inferior papillary muscle

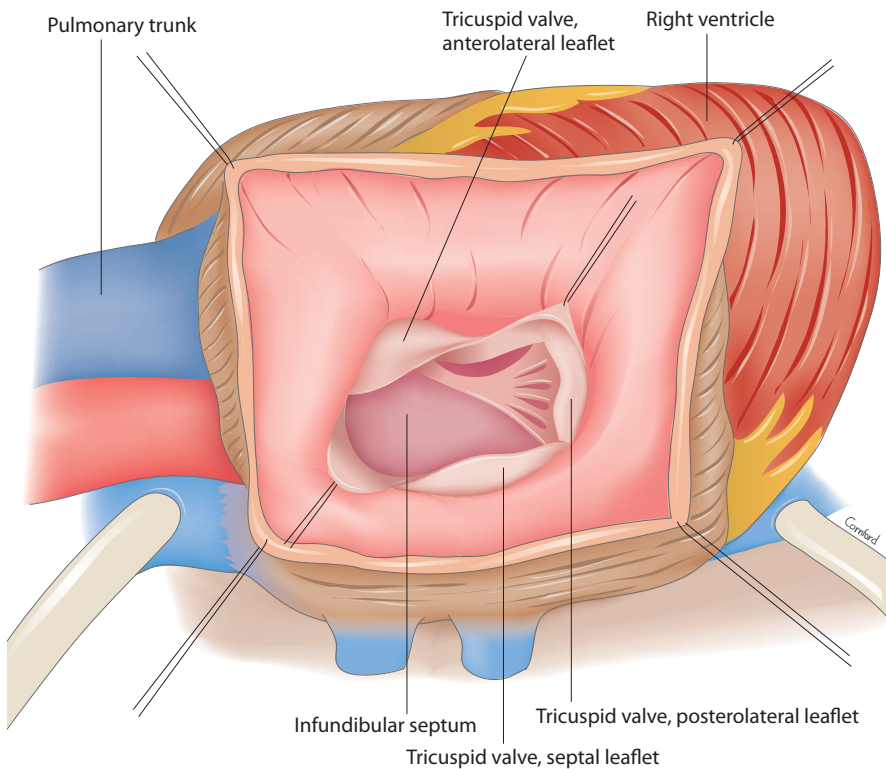


Fig. 8.20. Exposure of the inferior papillary muscle, schematic drawing



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