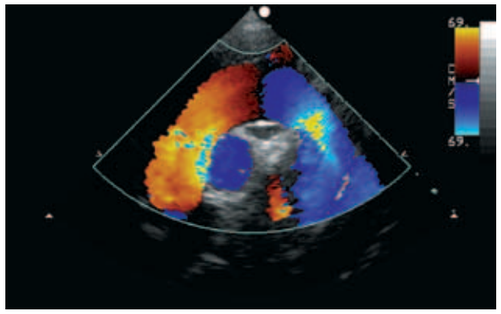
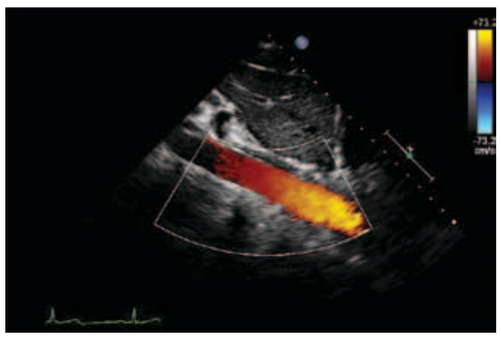
During early diastole, low velocity retrograde flow can be identified within the ascending and descending aorta due to the elastic recoil of the vessel. When present, early diastolic flow reversal within the ascending aorta is directed away from the transducer and, therefore, is colour-encoded blue while flow reversal within the descending aorta is directed toward the transducer and, therefore, is colour-encoded red. Note that this normal reversal of flow occurs only during early diastole and does not occupy the entire vessel lumen.

From the subcostal window, the abdominal aorta can be demonstrated in its long axis. Recall that from the subcostal view, the sector orientation is such that the top of the image represents the inferior aspect of the body while the bottom of the sector depicts the superior aspect of the body. Therefore, from this view, systolic blood flow within the abdominal aorta is directed toward the transducer. As flow is toward the transducer, it is colour-encoded red (Fig. 8.8).



▶**Figure 8.7** This systolic frame was acquired from the suprasternal notch view. Observe that flow within the ascending aorta is directed toward the transducer during systole and is, therefore, colour-encoded red. Blood flow within the descending aorta is directed away from the transducer and, therefore, is colour-encoded blue. Also observe at the top of the aortic arch, a region devoid of colour. This region indicates a zero Doppler shift because blood flow is aligned perpendicular to the ultrasound beam (not because there is no flow within this region). Note that in the routine examination, the ascending aorta and descending aorta should be interrogated separately in order to maintain a high frame rate.



▶**Figure 8.8** This systolic frame demonstrates the normal colour flow Doppler pattern of flow within the abdominal aorta as viewed from the subcostal window. From this view, blood flow is directed towards the transducer and is, therefore, colour-encoded red.

Colour Flow Doppler Examination of RA Inflow

Examination Windows

Blood flow into the right atrium (RA) occurs via the inferior vena cava (IVC), superior vena cava (SVC), and the coronary sinus (CS). This flow is continuous throughout the entire cardiac cycle.

In the routine examination, CFI of IVC flow into the RA is assessed from the subcostal views. IVC flow can also be evaluated from the PLAX view of the right ventricular (RV) inflow tract, the PSAX view, and the apical 4-chamber view.

Colour Doppler interrogation of SVC flow into the RA can be achieved from the subcostal short axis or bicaval views, and from the right supraclavicular fossa.

Normal CS flow into the RA is not usually assessed in the routine CFI examination. In particular, CS flow is not easily identified by CFI due to the relatively small volume and low velocity of flow. However, CS flow may occasionally be seen from the PLAX view of the RV inflow. Other views for assessing CS flow include the apical 4-chamber view with posterior tilting.

Normal Flow Pattern

Vena caval and CS flow into the RA is continuous throughout the cardiac cycle; that is, flow occurs during systole and diastole. This flow is low velocity and therefore, when the colour Nyquist limit is set too high, the colour box may appear empty or under-filled. In this case, the colour velocity scale (colour Nyquist limit) should be decreased to enhance the detection of this low velocity flow.

From the parasternal and apical views, blood flow from the IVC into the RA is directed toward the transducer and is, therefore, colour-encoded red. From the PLAX of RV inflow view the coronary sinus runs almost parallel to the IVC. Therefore, from this view, flow from the coronary sinus into the RA may be seen and as flow is directed toward the transducer, it is also colour-encoded red.

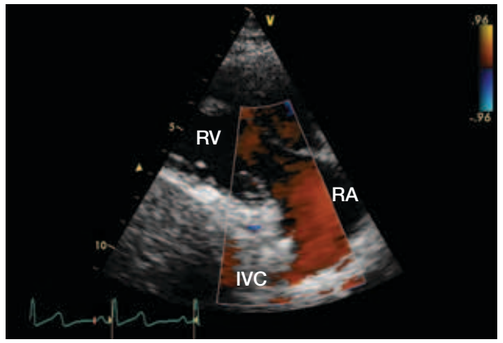
From the subcostal views, blood flow from the IVC into the RA is predominantly directed away from the transducer and, therefore, is colour-encoded blue. A brief phase of colour flow reversal within the proximal portion of the IVC can be observed with atrial contraction. When seen, this flow appears red as flow is directed toward the transducer.

Hepatic venous flow into the IVC can also be seen from the subcostal views. Blood flow is continuous and directed away from the transducer and, therefore, is colour-encoded blue.

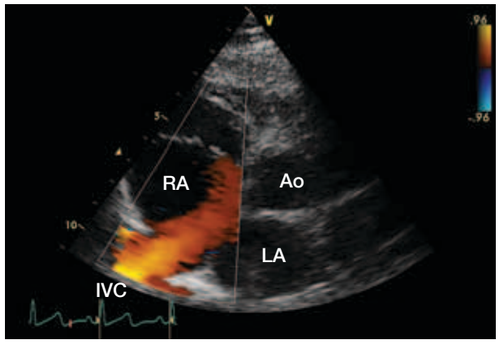
From the subcostal bicaval view, blood flow from the SVC into the RA is directed toward the transducer and, therefore, is colour-encoded red. From the right supraclavicular fossa, blood flow within the SVC is directed away from the transducer and, therefore, is colour-encoded blue.

Figure 8.9 demonstrates the normal colour flow Doppler pattern seen in the IVC and SVC from various views.

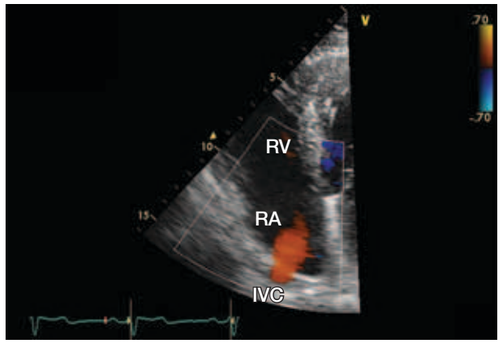
PLAX RV Inflow: IVC Flow



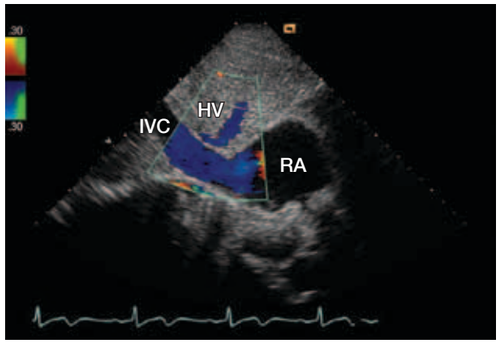
PSAX: IVC Flow



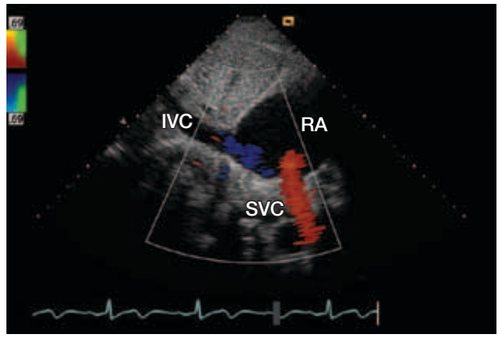
Apical 4-chamber: IVC Flow



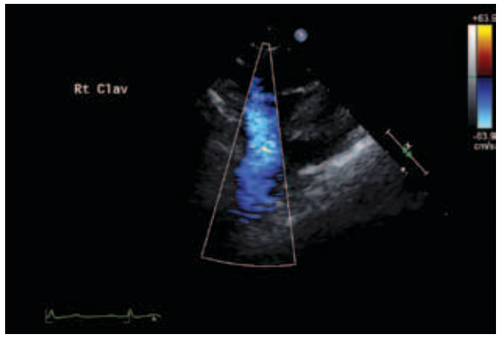
Subcostal (LAX IVC): IVC & HV Flow



Subcostal SAX: SVC Flow



Right Supraclavicular Fossa: SVC Flow



▶**Figure 8.9** These images demonstrate the normal colour flow Doppler pattern seen in the inferior vena cava (IVC), hepatic vein (HV) and superior vena cava (SVC) from various views. Images were acquired from different patients. See text for details. Ao = aorta; LA = left atrium; RA = right atrium, Rt Clav = right supraclavicular fossa; RV = right ventricle.

Colour Flow Doppler Examination of RV Inflow

Examination Windows

Normal blood flow into the RV occurs during diastole as blood flows from the RA, through the open tricuspid valve, into the RV.

RV inflow, or transtricuspid inflow, is assessed from all views that image the tricuspid valve. In the routine examination, CFI of RV inflow is assessed from the PLAX, PSAX, and apical 4-chamber views. Tricuspid inflow can also be assessed from the subcostal views and from an apical long axis view with lateral angulation of the probe face. Colour Doppler interrogation of RV inflow is best evaluated from the apical 4-chamber view where blood flow across the tricuspid valve into the RV is the most parallel to the ultrasound beam.