



PHILIPS

Ultrasound

Quick guide

Introduction to transthoracic echo

Anne-Sophie Beraud, cardiologist
Clinique Pasteur, Toulouse, France

Toni Burkett
Philips Healthcare – Ultrasound

The more you see, the more you can do

The use of focused echo at the patient's bedside allows the physician to quickly assess chamber sizes, global LV and RV function, RV strain, hypovolemia, and fluid responsiveness. In addition, pericardial effusion, signs of tamponade, and significant valvular regurgitation can be identified. POC echo is a valuable tool that allows the treating physician to answer specific clinical questions that can guide the immediate care of patients.

Introduction to transthoracic echo

The basics

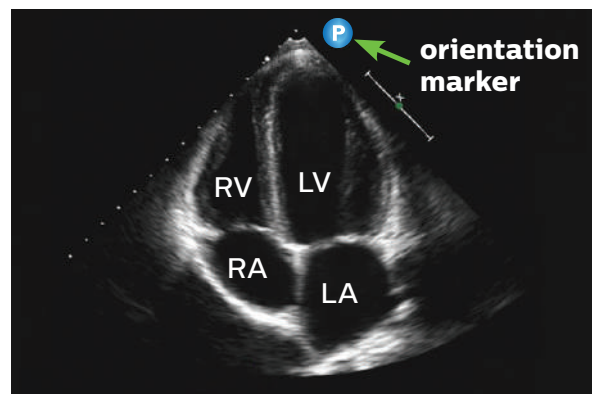
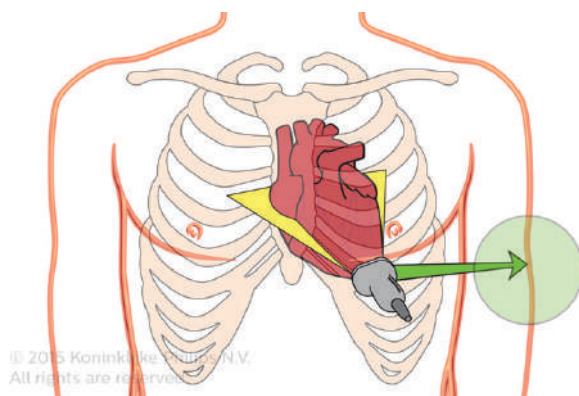
The transducer

- The optimal transducer for transthoracic echo is a low-frequency phased array.



Orientation of the ultrasound image for echo

- Every transducer has an orientation marker on one side (usually a notch, a groove or a ridge).
- The orientation marker on the transducer corresponds to the orientation marker on the ultrasound monitor.
- By convention, for echo, the orientation marker is located to the upper right of the ultrasound image.

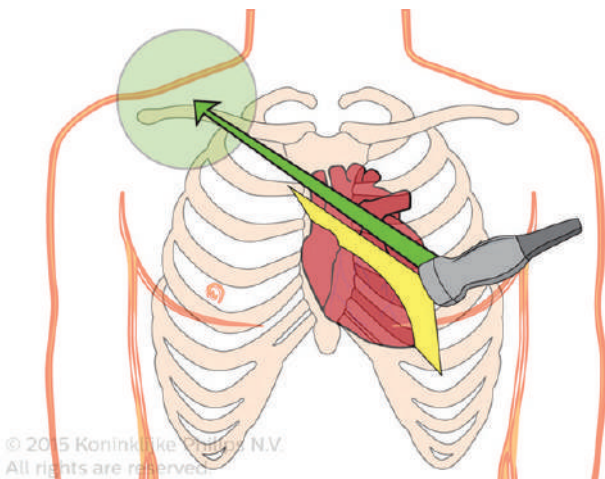


In this example, the transducer orientation marker is pointing to the patient's left, thus the patient's left will be on the right side of the ultrasound image.

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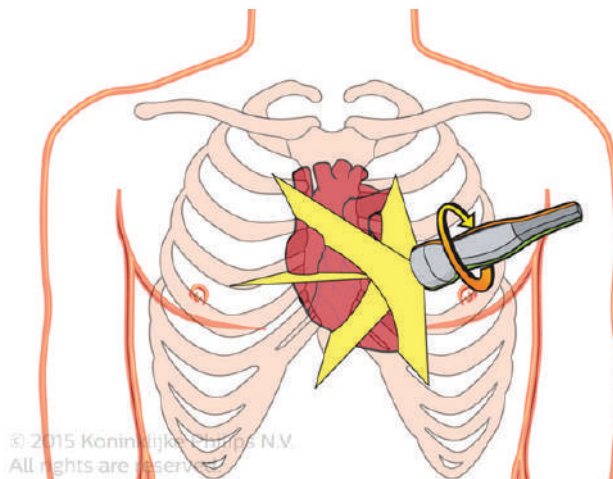
Techniques to adjust the transducer

Locate the ultrasound “window” on the patient’s chest. Adjust transducer manipulation step by step and with small movements.



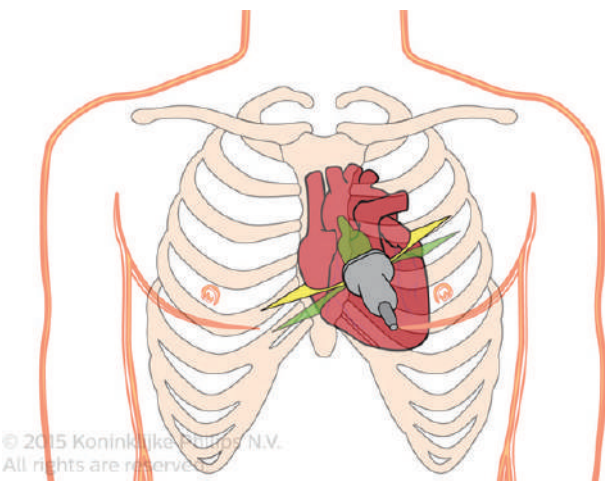
Align

Place the transducer so the ultrasound beam is aligned with the anatomy



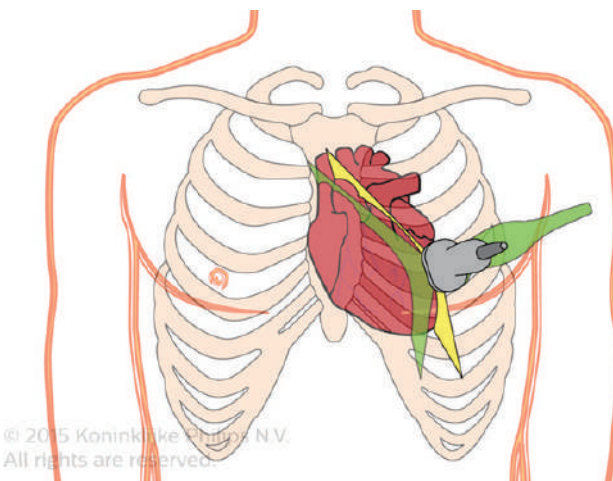
Rotation

Clockwise or counterclockwise rotation of the transducer is required to change views and to optimize the image.



Tilt

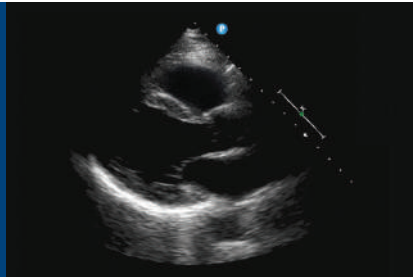
Tilt the transducer to identify and optimize the anatomy of interest.



Tilt may be up/down or side-to-side depending on the ultrasound view.

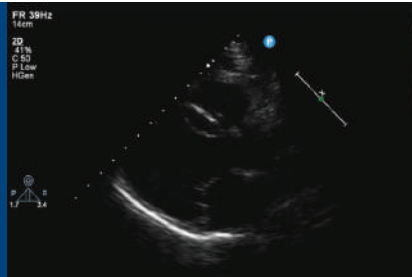
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Using gain



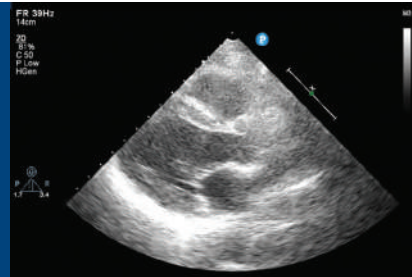
Optimal gain

The **gain** controls the amplification of the displayed images. With an **optimal gain** setting, the cardiac structures will be shades of gray and the blood will be almost black.



Under gained

An image that is **under gained** will result in an image that is too black and some of the anatomical information will be missing.



Over gained

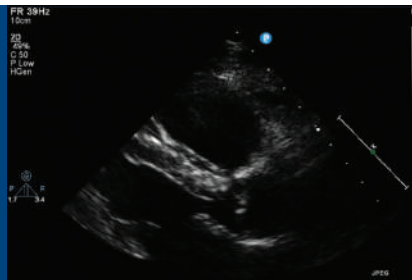
An image that is **over gained** will result in an image that is too white and some of the anatomical detail will be lost.

Using depth



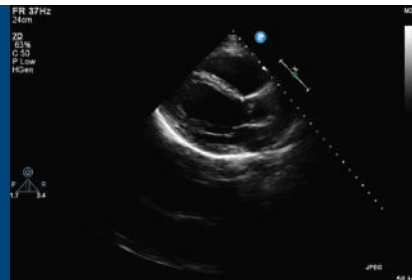
Optimal depth

The **depth** control increases or decreases the field of view. It is very important to have the appropriate depth setting for each view.



Insufficient depth

Insufficient depth will not display all of the anatomy that is of interest.



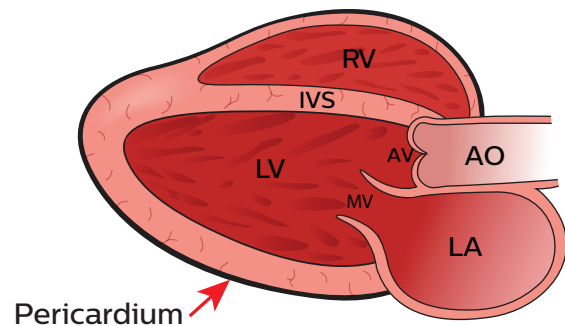
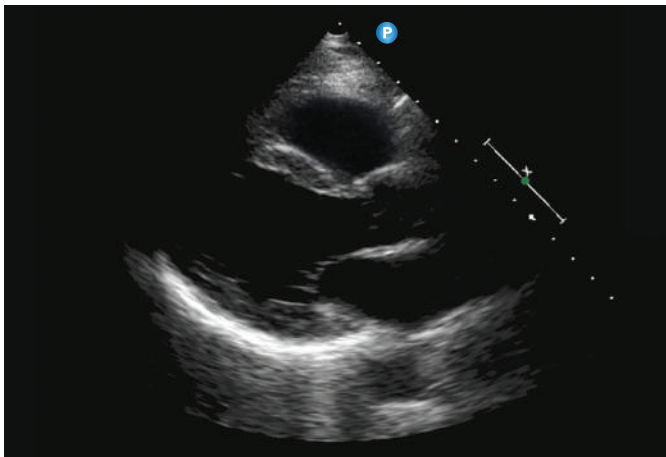
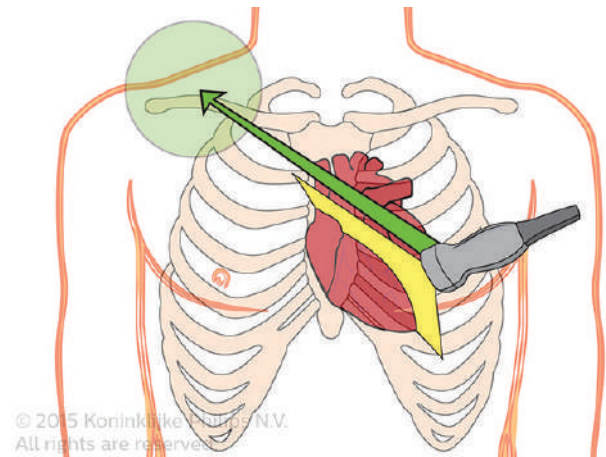
Excess depth

Excess depth may not allow the visualization of details needed.

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Parasternal long-axis

- Transducer is placed in 3rd-4th intercostal space.
- Transducer orientation marker is pointing toward the patient's right shoulder (~10 o'clock).
- Depth 12-16 cm.
- For assessment of a pericardial and pleural effusion use a depth of 20-24 cm.



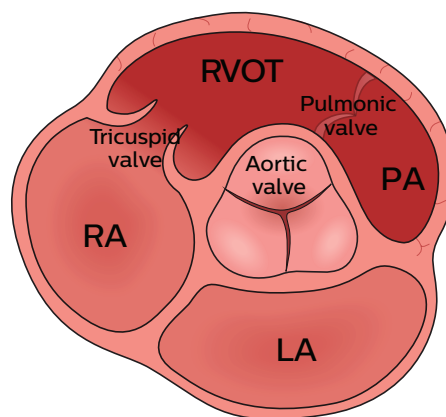
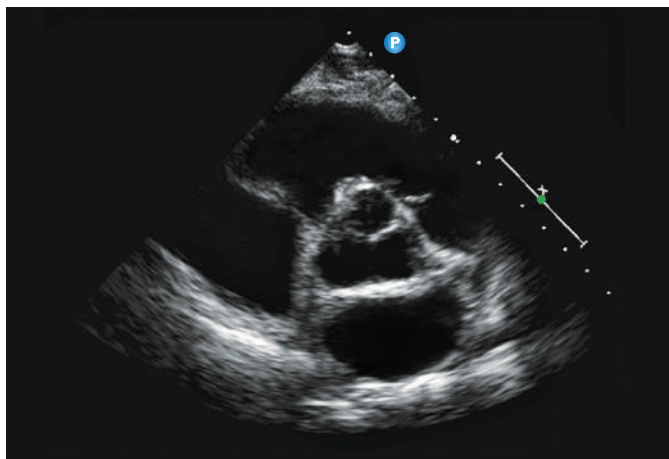
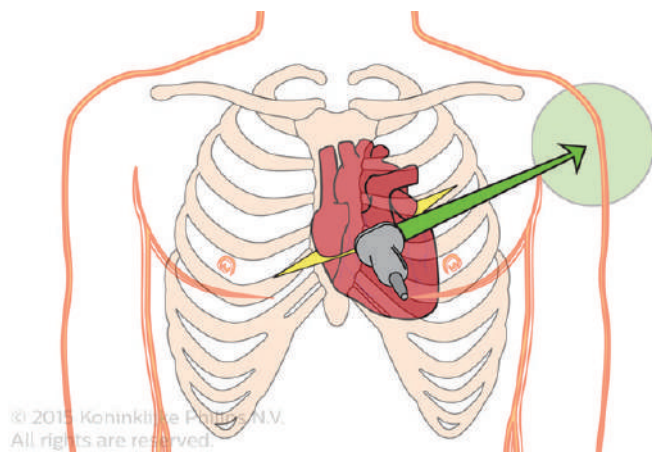
Parasternal long-axis view.

Right side of the image is cephalad.
The pericardium is a strong echo reflector and appears as a bright white echo.

Introduction to transthoracic echo

Parasternal short-axis aortic valve level

- From the parasternal long-axis view, rotate the transducer 90 degrees clockwise.
- Transducer orientation marker is pointing toward the patient's left shoulder (~2 o'clock).
- Tilt the transducer face slightly upward toward the patient's right shoulder.
- Depth 12-16 cm.

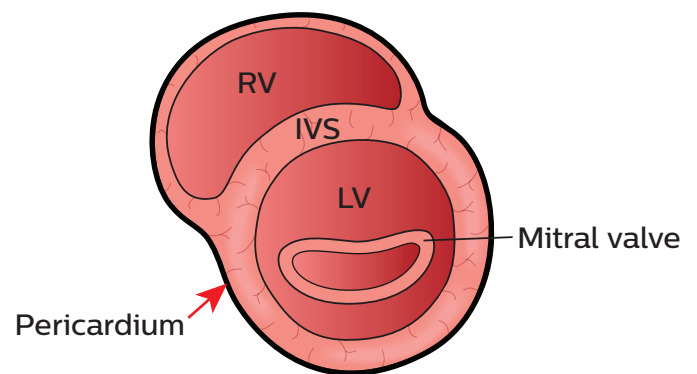
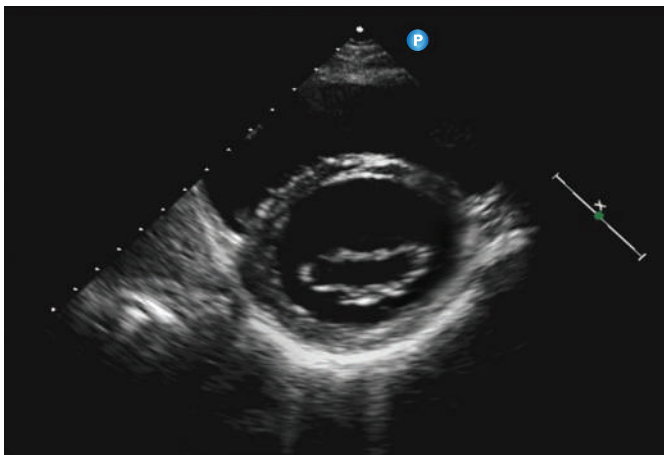
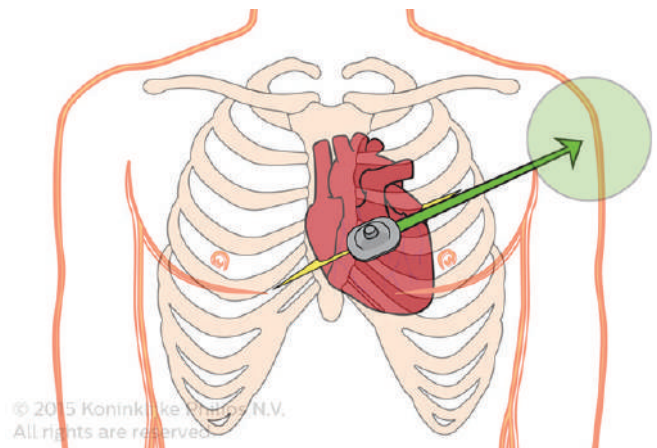


Parasternal short-axis view aortic valve level.

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Parasternal short-axis mitral valve level

- From the parasternal long-axis view, rotate the transducer 90 degrees clockwise.
- Transducer orientation marker is pointing toward the patient's left shoulder (~2 o'clock).
- Transducer is perpendicular to the chest wall.
- Depth 12-16 cm.

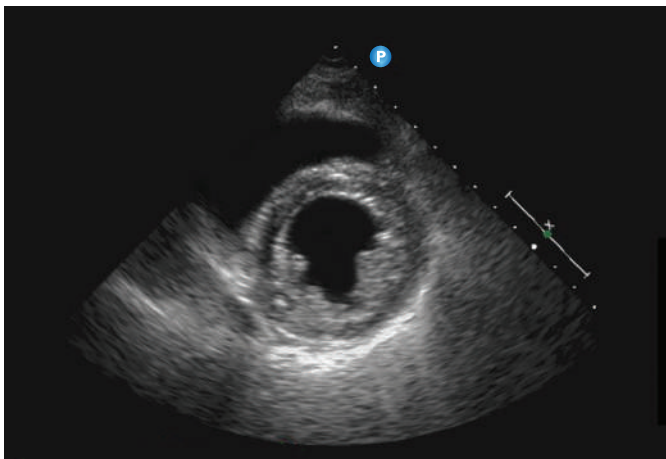
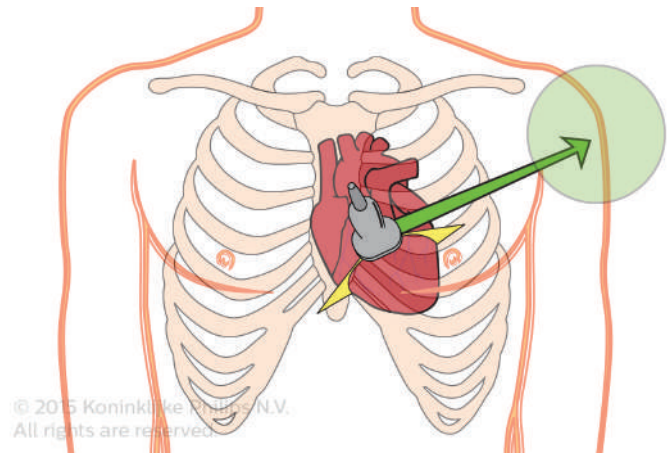


Parasternal short-axis view mitral valve level.

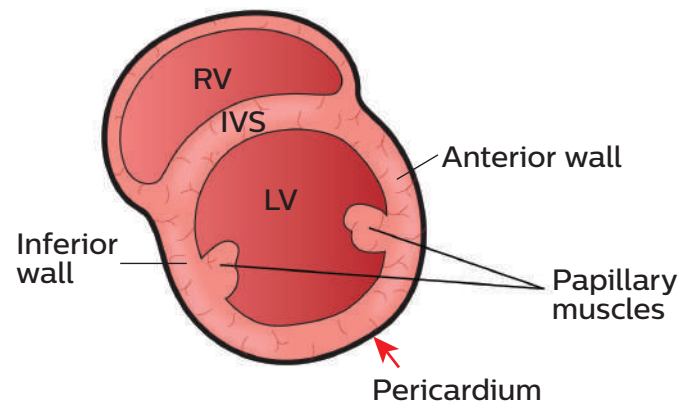
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Parasternal short-axis papillary muscle level

- From the parasternal long-axis view, rotate the transducer 90 degrees clockwise.
- Transducer orientation marker is pointing toward the patient's left shoulder (~2 o'clock).
- Tilt the transducer face slightly downward toward the patient's left flank.
- Depth 12-16 cm.



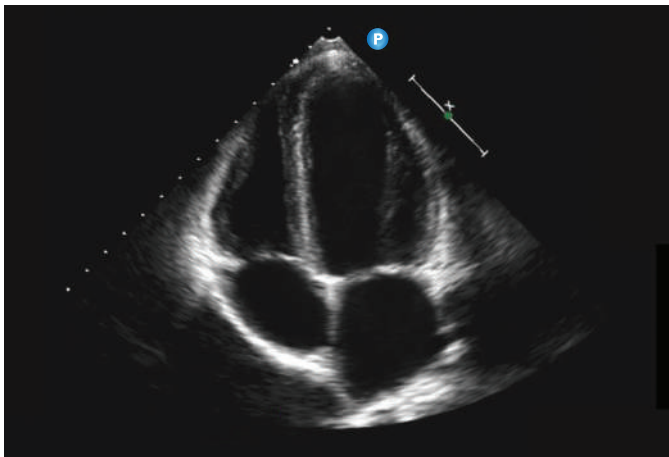
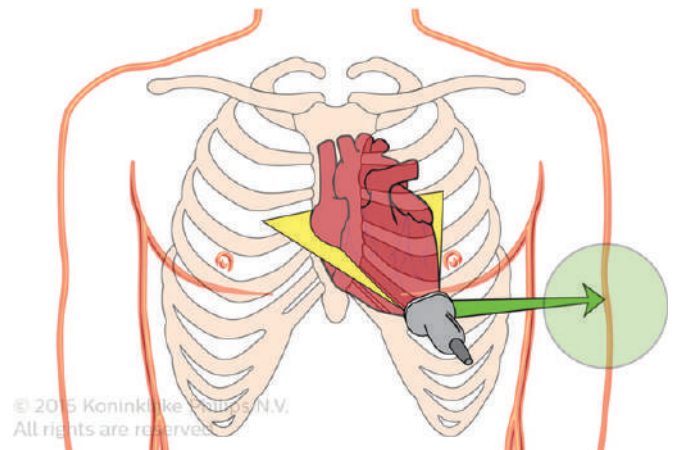
Parasternal short-axis view papillary muscle level.



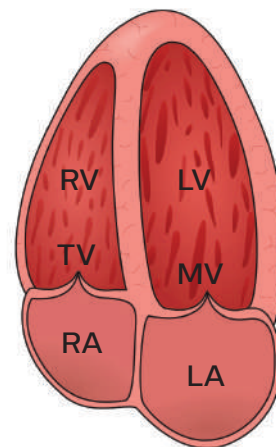
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Apical four-chamber (A4C)

- The transducer is placed on the apical impulse.
- Tilt the face of the transducer up until the ultrasound beam cuts through the long axis of the heart and all four chambers are visualized.
- Transducer orientation marker is at ~3 o'clock.
- Depth: 14-18 cm.



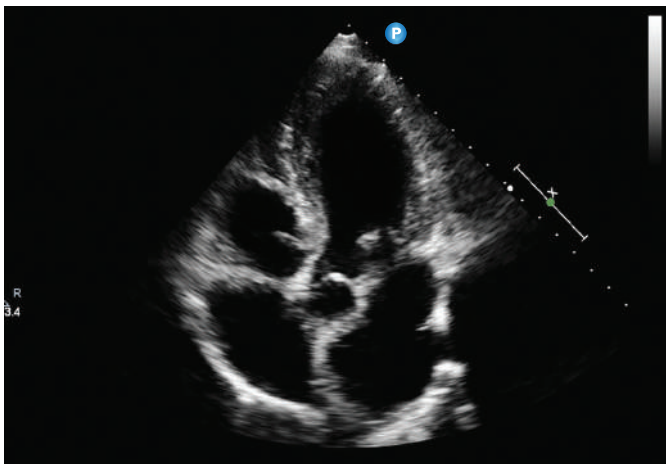
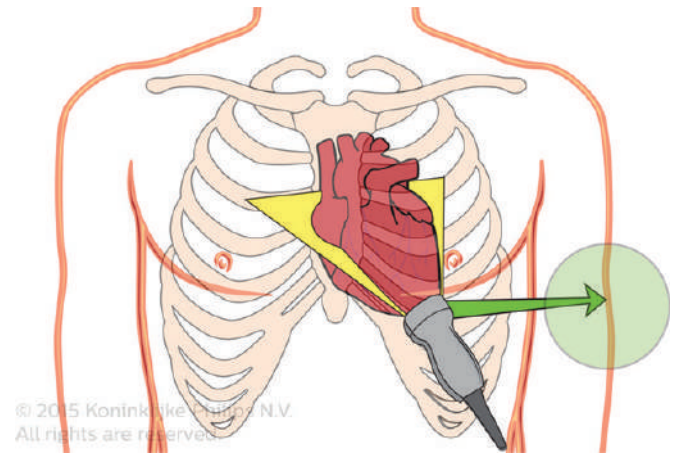
Apical four-chamber view.



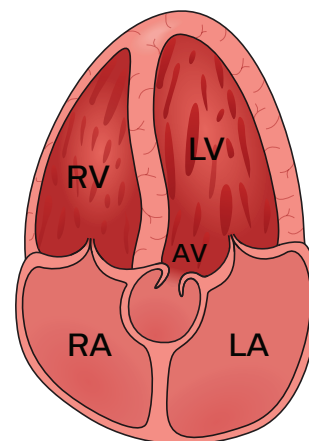
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Apical five-chamber (A5C)

- From the apical four-chamber view, tilt the face of the transducer slightly upward until the aortic valve appears.
- Transducer orientation marker is at ~3 o'clock.
- Depth 14-18 cm.
- Note: The LV and RV will be foreshortened in this view.



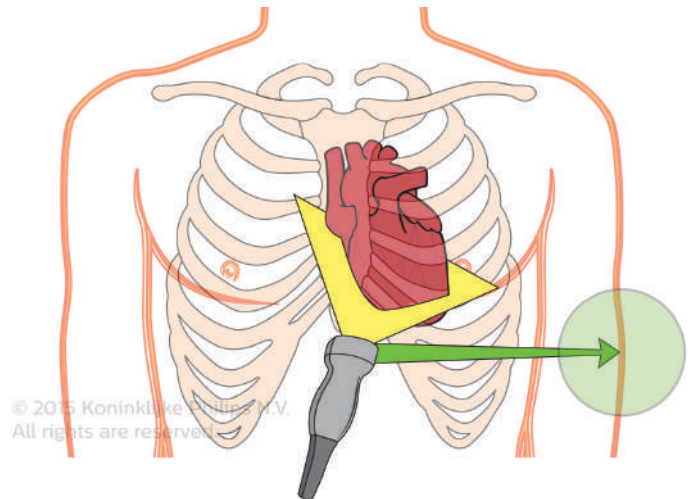
Apical five-chamber view.



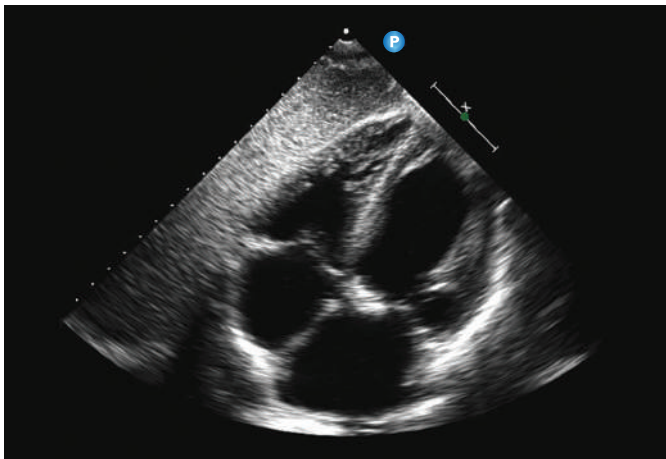
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Subcostal four-chamber

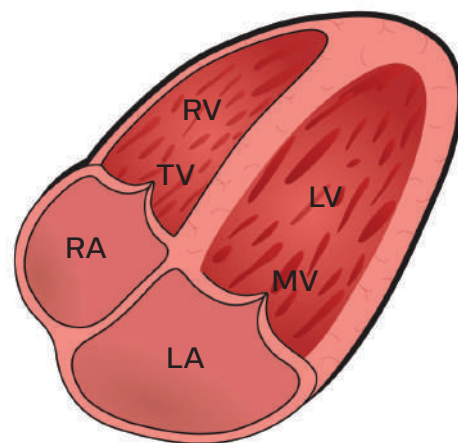
- Patient is supine.
- Transducer is placed 2-3 cm below the xyphoid process.
- Direct the transducer toward the patient's chin/left shoulder.
- Transducer orientation marker is at ~3 o'clock.
- Hold the transducer palm down to facilitate cephalad angulation of the ultrasound beam.
- Depth 16-24 cm.



- Tip: Directing the ultrasound beam too posterior is a common mistake in the subcostal view.



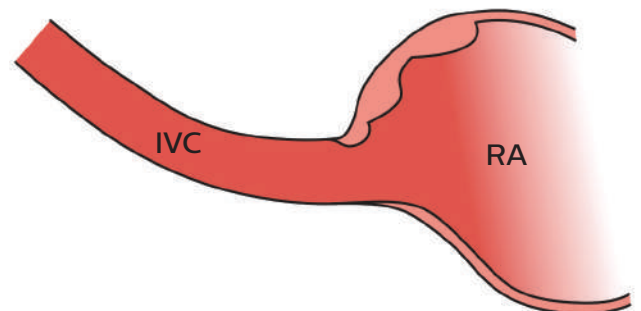
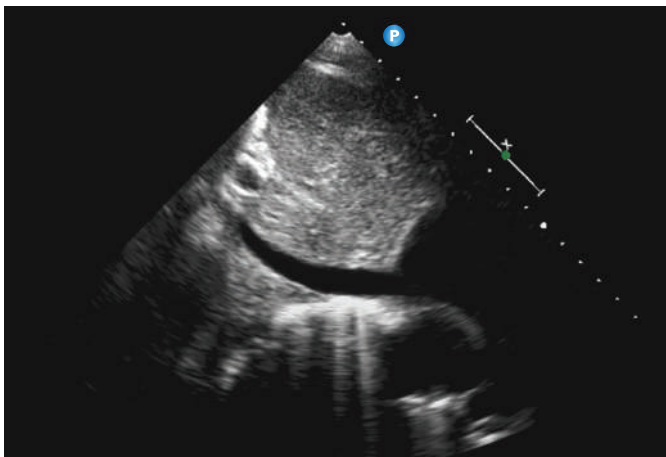
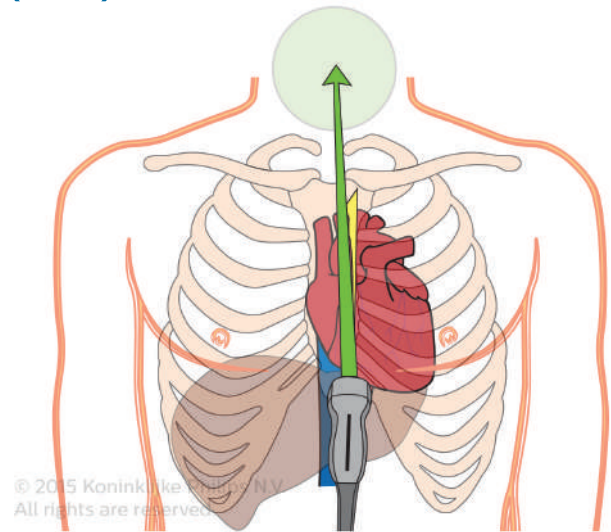
Subcostal four-chamber view.



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Subcostal inferior vena cava (IVC)

- From subcostal four-chamber view, rotate the transducer 90 degrees counter-clockwise, always keeping the right atrium on the screen.
- Transducer orientation marker at ~12 o'clock.
- Depth 16-24 cm.
- It is important to see the IVC merging into the RA. This will confirm that you are not visualizing the aorta.

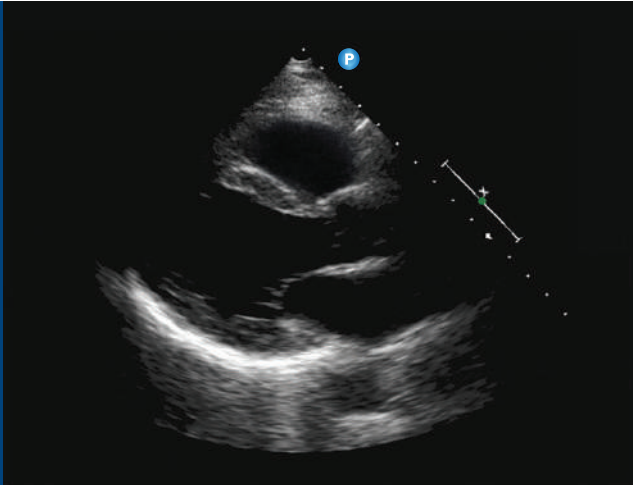


Subcostal inferior vena cava view.

The IVC should be seen merging into the RA.

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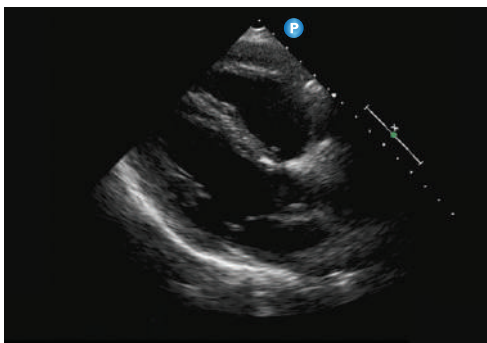
Tips for image optimization



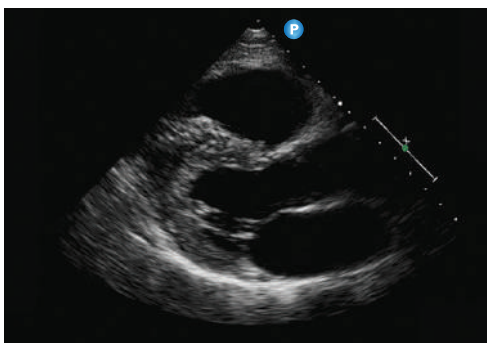
Optimal parasternal long-axis view

Interventricular septum and LV wall are parallel and as horizontal as possible. Aortic and mitral valves are in the center of the image.

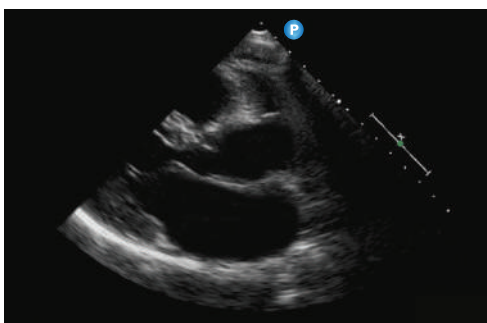
Caution: The septum and LV wall must be parallel in order to estimate LV function using the parasternal long-axis view. If the septum and LV wall are NOT parallel, LV function will be overestimated.



If the IVS and LV wall are vertical, try moving the transducer one intercostal space higher.



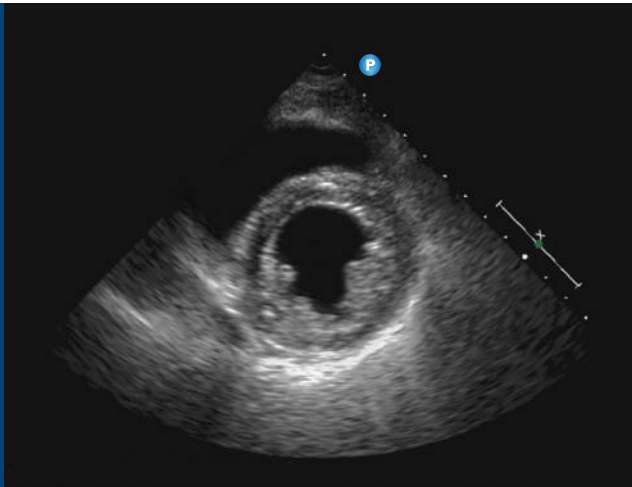
If the LV appears “closed,” rotate the transducer to open it.



If the valves are off-center, tilt the transducer away from the sternum.

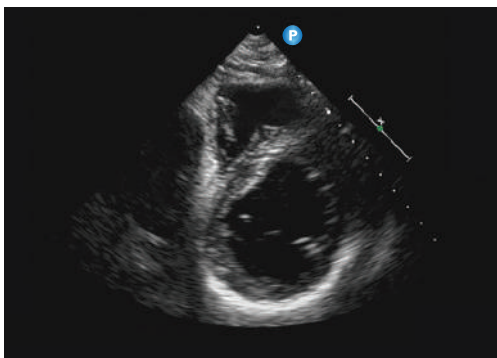
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Tips for image optimization

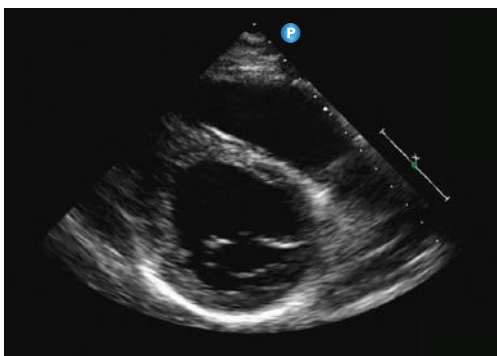


Optimal parasternal short-axis view

The LV should be round and in the center.



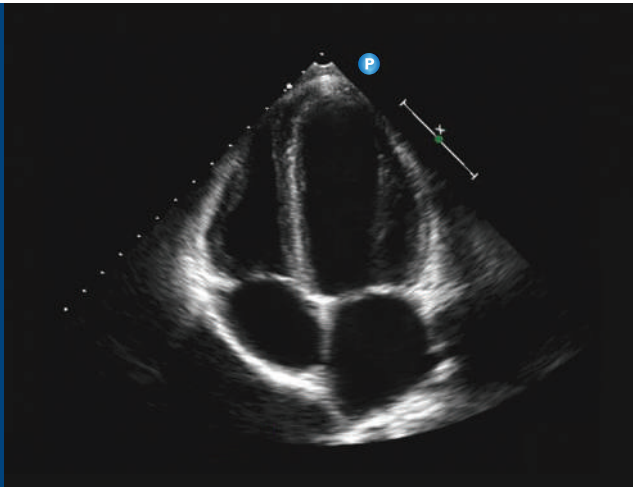
If the LV is pear-shaped, you are too low, try scanning one intercostal space higher.



If the LV is asymmetric, rotate the transducer clockwise or counter-clockwise.

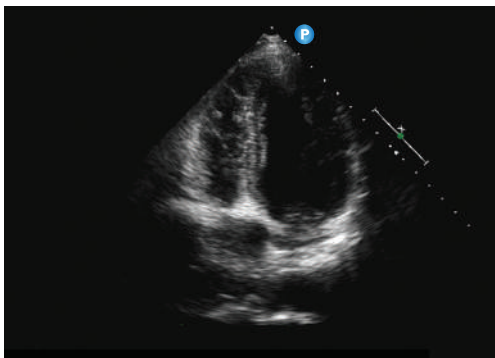
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Tips for image optimization

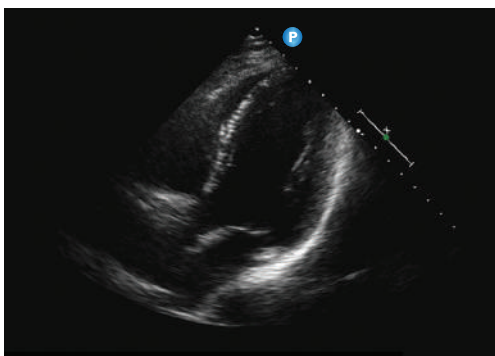


Optimal four-chamber view

All four chambers are visualized and the long-axis of the heart is vertical.



If you don't see the atria, the transducer may be aimed too posterior. Tilt the face of the transducer upwards.



If the heart appears tilted to the right, you are too medial. Move your transducer laterally.

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For information about **Philips Sparq ultrasound system** go to www.philips.com/sparq

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This Quick Guide is a companion tool to the **Introduction to transthoracic echo** tutorial. The tutorial provides more detailed information as well as many cardiac images and videos of normal anatomy and pathology.

