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ECHOCARDIOGRAPHY IN CHILDREN AND SUPRASTERNAL NOTCH IMAGING WINDOW

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Annotation

Echocardiography has been used to noninvasively image the moving structures of the heart. This has proven particularly beneficial in pediatrics as echocardiography is a safe and portable imaging modality that can detect structural and functional abnormalities of the heart in real time. As ultrasound technology has improved, echocardiography has become the primary mode of diagnosing most pediatric heart disease, both congenital and acquired. The performance of a high-quality echocardiogram requires familiarity with the ultrasound principles involved in obtaining diagnostic images as well as a clear understanding of cardiac anatomy and imaging planes.

Keywords: Echocardiography serves as a primary clinical tool in the assessment of congenital and acquired heart disease in children. It is a noninvasive and portable imaging modality that provides vast anatomic and physiologic information with good spatial and temporal resolution. It is less expensive than cross-sectional imaging modalities, avoids exposure to ionizing radiation, and can often be performed without sedation. Some limitations to echocardiography exist and anatomy that is not well visualized by echocardiography such as extracardiac vessels and the airway can be obtained with cross-sectional imaging. Cross-sectional imaging is often used in conjunction with echocardiography to make clinical decisions.

The suprasternal notch is in close proximity to the aortic arch and upper body systemic veins and is therefore a useful location from which to image these



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structures. Imaging from the notch can provide a transverse cut through the distal ascending aorta with the indicator at 3 o'clock. From this view, the position of the right pulmonary artery traveling caudal to the transverse arch is noted. Deep to the right pulmonary artery, the left atrium and pulmonary veins are also seen. The image demonstrating four pulmonary veins into the left atrium is commonly referred to as the "crab view." The left innominate vein can be seen coursing cranial to the transverse arch and draining into the superior caval vein. From this reference image, a sweep is performed to determine aortic arch branching. The transducer is swept cranially and to the patient's right to follow the first head and neck vessel until it branches into the right common carotid and right subclavian artery in patients with normal aortic arch branching. Absence of branching should raise suspicion for an aberrant right subclavian artery. In the setting of a first aortic arch branch that courses to the left, the sweep should be performed cranially and to the patient's left shoulder. Sweeping the transducer toward the patient's left shoulder also allows for visualization of the left innominate vein and can detect either a left superior caval vein arising from the innominate vein or an anomalously draining pulmonary vein entering the innominate vein. The use of color Doppler interrogation discussed next increases the information obtained from these sweeps. The long axis of the aortic arch can also be imaged from the suprasternal notch with the transducer positioned in a more sagittal plane with the indicator at 1 o'clock. Imaging in this plane allows visualization of the ascending aorta, transverse aorta with head and neck branches, and the descending aorta. Aortic dimensions including the proximal transverse arch, the distal transverse arch, and the aortic isthmus are important measurements in the assessment of the aortic arch heart provides additional anatomic information while adding important information regarding cardiac hemodynamics.

All in all, an echocardiogram is a test that uses sound waves to create pictures of the heart. It is used with children to help diagnose defects of the heart that are present at birth (congenital). The picture is more detailed than a regular x-ray image. An echocardiogram also does not expose children to radiation.



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