

Cardiac Examination

Learnpediatrics.com Narration

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Introduction

Welcome to the LearnPediatrics examination of the cardiovascular system. A standardized approach to the physical exam will be presented here but as with all pediatric exams, it is important to be flexible and to take advantage of the opportunity to perform different parts of the exam as they present themselves. As you go through your exam be sure to keep in mind the child's age, development and disposition and to interpret findings accordingly.

Acute Assessment

Your evaluation begins with the acute assessment of the child. This information allows you to dictate the pace and thoroughness of the exam. Begin with an assessment of the ABC's. If the child is unwell it may be necessary to address acute problems prior to obtaining a history and physical.

Observe the child for any signs of distress. These may include pallor, sweating, cyanosis or increased work of breathing. Observe the level of activity in the patient. Do they appear comfortable? Are they interacting in an appropriate manner with you and their parent?

History

A well taken pediatric history is an essential beginning to a cardiovascular assessment. Begin with the general health of the child including feeding difficulties, growth delay and decreased exercise tolerance. In the older child, asking the parent to compare the child to peers of the same age can help in this assessment.

Specific symptoms that can indicate cardiovascular disease can include periods of cyanosis, sweating, shortness of breath, palpitations and edema. Chest pain and syncope, while relatively rare in the pediatric population may indicate underlying cardiac pathology. Squatting after exercise can indicate congenital cardiac defect such as Tetralogy of Fallot. Be sure to enquire about the prenatal period. Exposure to medication or drugs such as lithium, phenytoin and alcohol can be associated with cardiac lesions. History of maternal illnesses such as Systemic Lupus Erythematosus, Diabetes or primary rubella should be elicited. Children that were born prematurely are at an increased risk of having a patent ductus arteriosus.

Don't forget the family history. This often reveals the presence of other family members with congenital heart defects or early onset cardiovascular disease. This

should include parents, grandparents, aunts, uncles and cousins. Always ask this question of the parents: Are you related to each other?

In pediatrics you will encounter children of different ages and different stages of development. Be cognizant of every individual child's need for privacy and provide them with adequate covering during the exam.

General exam

Before starting any physical exam ensure that your hands are properly washed.

Observe the body habitus, noting any dysmorphic features that may indicate a syndrome associated with congenital heart disease. Common examples would include Trisomy 21, Di George and Turner's syndrome.

You should take a complete set of vital signs including heart rate, respiratory rate, blood pressure, height, weight, and for children under 5 years of age, head circumference. If the heart rate is regular, count the beats over 15 seconds and multiply by 4. Ideally, the blood pressure should be taken in all four limbs. Choosing the proper cuff size is extremely important but even more so is the size of the cuff bladder. Use of a cuff that is too small will provide a falsely high blood pressure reading. The cuff bladder should be wide enough to cover between 40 and 75% of the upper arm and should be long enough to completely encircle the arm and be properly closed. Be sure to plot the growth on an age appropriate chart. What can be of particular help is having growth measurements at several ages plotted on the same chart.

Inspection

Examine the hands and feet. Note the presence of clubbing, splinter hemorrhages or any other abnormalities of the nails. Assess for clubbing by asking the child to hold the two index fingers together and looking at Lovibond's angle. Check the capillary refill. A normal refill is less than 2 seconds.

Cardiac abnormalities normally manifests as respiratory distress. Look for signs of increased work of breathing such as tachypnea, intercostal indrawing, tracheal tug, head bobbing and nasal flaring. Abdominal breathing is normal in the neonate but not in the older child.

Turn your attention to the child's face. Look at the eyes for scleral icterus or pallor. Next look inside the mouth for signs of central cyanosis. Examine the mucous membranes to assess the volume status of the patient.

Assessment of the jugular venous pressure is not routinely performed in the pediatric patient under 8 years of age. Although, it is applicable to older adolescent and young adult patients.

Finally, inspection of the chest - is it normally shaped? Is there a precordial bulge (which may signify right-sided cardiac enlargement)? Note any skeletal deformity such as pectus carinatum or excavatum. Note any scars. Look for the visible cardiac impulse. This is often seen in the normal child, especially one who is thin or in higher output states such as fever.

Peripheral Palpation

Before beginning, think about rapport. For children who are old enough to understand, explain to them exactly what you are going to do before you begin. Younger children may need to be examined while being held by their parent and your approach may have to be more flexible.

The radial, brachial and femoral pulses should be assessed for rate, rhythm, volume and contour. Assessment of the femoral pulse is extremely important and shouldn't be overlooked. In the younger patient, line your finger parallel with the femur and place the pad lightly in the inguinal triangle. Once the femoral pulse is found, use your other hand to palpate the brachial pulse and assess for brachial femoral delay, which may indicate coarctation of the aorta. Check peripheral circulation by feeling the dorsalis pedis and posterior tibial pulses.

As you assess the heart's rhythm, be aware that a children's pulses can vary significantly with respiration. Usually the rate slows during expiration and speeds up during inspiration.

Precordium Palpation

Use the pads of your fingers to feel for the apex beat. In children older than 7, this is usually found in the 5th intercostal space in the mid clavicular line. Deviation away from this may indicate right, left or generalized ventricular enlargement. If the apical beat is difficult to ascertain, ask the child to roll over onto their left side and breathe out. The cardiac impulse should be felt as a tap while a heave is felt as a forceful lift. Thrills, caused by turbulent flow, are best palpated through bone. Use the ball of your hand and press firmly down in the older child and the tips of your fingers in younger children. Palpate all four auscultatory areas.

Palpation of the liver can give an indication of right-sided heart function. Back up of flow on the right side can quickly cause engorgement of the liver. In general the normal liver may be felt up to 2 cm below the costal margin. Percuss the liver span and if hepatomegaly is present splenic enlargement should be determined. It's not always abnormal to be able to feel the spleen tip in children. However, a spleen tip that is more than 2 cm below the rib margin is indicative of an enlarged spleen.

Assess for dependent edema in the limbs and sacral area. Often the best assessment of whether edema is present is by asking the child's parent whether they think the child appears edematous or puffy.

Auscultation

Before beginning, let's review the areas of cardiac auscultation. Each of these spaces has a traditional valvular name but it is important to remember that murmurs of more than one origin may be heard in a given area. The first area is the 2nd right interspace next to the sternum - this is the aortic area. The 2nd intercostal space to the left of the sternum is described as the pulmonic area. The lower left sternal border is known as the tricuspid area, and the apex is described as the mitral area. Be sure to listen to the back. The murmur of aortic coarctation is sometimes only found here and will be missed if not specifically listened for.

Listen at each of these spaces with both the bell and the diaphragm of the stethoscope. The diaphragm picks up high pitched sounds such as pericardial rubs, S1 and S2, as well as most murmurs. The bell placed lightly on the chest works best for hearing low pitched sounds such as a gallop or for best hearing the S2 split. The S2 should be widest split at the end of inspiration. Hearing and interpreting all of these sounds takes significant time and practice in pediatrics. Go slowly and listen carefully.

If a murmur is heard, listen for the timing in the cardiac cycle, volume (configuration) and radiation. Determine at which area the murmur is loudest and then listen for radiation at all of the other areas, including both the axilla and the back.

Remember that more than 50% of children will have a murmur at some point while congenital heart disease is present in less than 1%. Learning to distinguish pathologic from benign murmurs is extremely important and takes practice.

Lastly, listen to the lungs. If there are crepitations this may be a late sign of pulmonary congestion secondary to congestive heart failure.

Conclusion

This concludes the cardiac examination in the pediatric patient. Remember that like with all physical exams, becoming competent at the cardiac evaluation takes time.

Be sure to do a systemic exam in all patients with a good focus on the general health status of the child.

If you think there is cardiac pathology refer to a cardiologist for further evaluation.