

# THE ECHOCARDIOGRAPHY IN PEDIATRIC CARDIOLOGY

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**Keywords:** *cardiology, pediatric echocardiography*

**Abstract:** *Cardiology is a medical specialty dealing with disorders of the heart and of blood vessels. Etymology: kardia – heart, logos – science. Pediatric cardiology represents a specialty embodied in another specialty, being less studied and too often ignored. However, the cardiac malformations are very frequent and many times curable when discovered and followed in optimum time. The echocardiography has become indispensable for all cardio-pediatric exams. It is interpreted on the spot. It represents a dialogue between the images that were obtained and the operator.*

**Cuvinte cheie:** *Cardiologie, echocardiografie pediatrică*

**Rezumat:** *Cardiologia este o specialitate medicală ce are ca subiect de studiu bolile inimii și ale vaselor de sânge. Etimologie: kardia – inimă, logos – știință. Cardiologia pediatrică este o specialitate cuprinsă în altă specialitate, puțin învățată și adesea chiar ignorată. Malformațiile cardiace sunt totuși frecvente și adesea curabile când descoperirea și urmărirea lor se face în timp optim. Echocardiografia a devenit indispensabilă la toate examenele cardiopediatrice. Interpretarea ei se face imediat. Este un dialog între imaginile obținute și operator.*

## Pediatric Cardiology

Pediatric cardiology represents a specialty embodied in another specialty, being less studied and too often ignored. However, the cardiac malformations are very frequent and many times curable when discovered and followed in optimum time.

The therapeutic progress allows children born with congenital cardiopathy to reach adult life, but with specific problems that can no longer be followed by the pediatrician or known by the cardiologist. The progress within the field of the pediatric cardiology can also be seen by means of the new noninvasive methods of investigation, such as: echocardiography, cardiac electro-stimulation, the pharmacology of cardiac insufficiency and antiarrhythmics, percutaneous interventional rhythmology.

In the United States the first pediatric cardiology clinic was established in 1931 within the Johns Hopkins University of Baltimore.

In Europe, the pediatric cardiology began to develop in the last 50 years, together with the evolution of pediatrics, cardiology and cardiovascular surgery. The first European countries to have founded pediatric cardiology clinics were France and Switzerland, and they were also the first to have physicians specialized in this field of medicine.

Pediatric cardiology deals with the structure and disorders of the heart functions of the newborn, infants and teenagers. The patients within the pediatric cardiology service, having cardiac malformations or acquired cardiac pathology, are submitted to evaluation and treatment tests and to monitoring, which lasts until surgery correction and then until their case is taken over by the cardiologist of adults.

In Sibiu, our clinic annually performs a number of approximately 1000 evaluations in pediatric cardiology.

The most frequent possibilities of diagnostic are still

the electrocardiogram and the echocardiography. Due to the informatics technology which has broken new ground in the past 20 years, the quality of the images received through echocardiography can be perfect. Thanks to this progress, many cardiac malformations do not request investigations through angiography, avoiding thus the invasive gestures and the hospitalization of these patients. Furthermore, the Rashkind procedure (balloon atrial septostomy) performed on newborn can more easily be used due to the echocardiographic visualization.

The echocardiography has become indispensable for all cardio-pediatric exams. It is interpreted on the spot. It represents a dialogue between the images that were obtained and the operator. The result of the echocardiography depends on the operator's quality. The integration of the information resulted from the echocardiographic examination within the clinical context helps us establish the best diagnostic.

A left-to-right shunt is when blood from the left side goes to the right side and affects the pulmonary circulation. The shunt is recognized by clinical pulmonary and cardiac signs, pulmonary hypervascularity and echocardiographic signs.

The study aimed at settling the value of the echocardiography in analyzing the hemodynamic of cardiac malformations with a left-to-right shunt. The evaluation of the systolic function of the left ventricle is of paramount importance for the taking under observation of the patients with malformative cardiac disorder with shunt, and their echocardiographic monitoring.

The echocardiography holds an essential role in analyzing the importance of the left-to-right shunt and the functional sound on the cardiac cavities and pulmonary circulation. If the shunt is located on an atrial level, it brings about a dilatation of the right ventricle. In case the shunt is located on a ventricular or arterial level, the left ventricle is also

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dilated.

In order to determine the function of the left ventricle, the echocardiography is the most common method of study, the most available and easy to use within the pediatric cardiology.

The new up-to-date devices have probes suited for the pediatric examination. Due to the fact that the thorax of newborns has a slight curve, the ultrasounds easily penetrate and allow high frequency emissions up to 12 MHz. The ergonomics of the probes enables the examination of children with low weight (born premature <1 kg). They are perfectly adapted to the suprasternal or subcostal notch, aboard openings, privileged at newborns.

In the case of infants there are used frequency emissions between 5 and 8 MHz. For the older children the frequency of emission may reach adult values (between 2 and 5 MHz). The contrast echocardiography or the tissue Doppler has not been of interest for the pediatric cardiology up to this moment. The streets-ahead echocardiographs, as that used in our clinic, have systems of storing the information.

**Echocardiography in children**

In order to reach the best results we must know that the echocardiography is always the same, and the value of the results responds to three dimensions:

1) The instrument

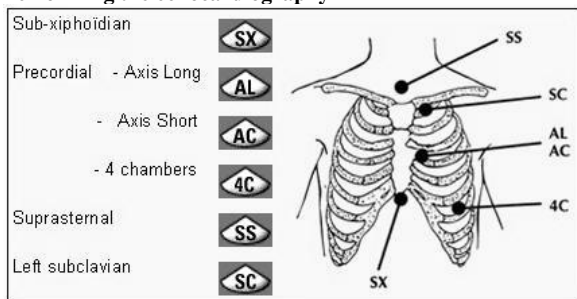
The echochardiographic equipment is the same as that used for adults, but the probe used is a special one, suited for newborns and infants.

2) The patient

It is important to get close to the child. At the beginning of the examination we need to take a few minutes to calm the infant, in this way the results will be of better quality:

- Let's not forget that the parents are often present and they can help us during the examination;
  - In order to calm the baby, sometimes we need to administer a sedative. There are different medicines that are used (Chloral Hydrate -50mg/kg/dose,po.)
- 3) The physician that performs the echocardiography is the person having the main role in getting the best results:
- He must know what he is looking for and how to do it echocardiographically, guided by the cardiologic clinic consult;
  - If an anomaly is seen, the possibility of another one associated with the first, will be taken into consideration;
  - The physiology of the newborn must be kept into mind (the different stages of the fetal circulation and the transition to maturity);
  - It is necessary to have tact and patience.

**Performing the echocardiography**



The description on segments of how to perform an echocardiography is in fact the way of approaching the heart and its different structures.

Each segment is defined by certain characteristics that can be echocardiographically studied through different axes.

The 2D echocardiography has become usefull and

indispensable in getting the diagnostic of cardiac malformations. The 2D ecocardiography together with the TM model, Doppler (pulsed, continuous and colour) allow a precise diagnostic of the cardiac architecture and hemodynamics.

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