THE PEDIATRIC ECHOCARDIOGRAPHY AND THE FUNCTION OF THE LEFT VENTRICLE

VIORELA COTÂRLĂ [1]

PhD candidate, "Lucian Blaga" University of Sibiu

Keywords: *pediatric echocardiography, left-to-right shunt, cardiology*

Abstract: *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. 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 great advantage of the echocardiography is its availability and possibility of usage by all cardiologists even if the patient is in bed.*

Cuvinte cheie: *Echocardiografiegrafie pediatrică, shunt stânga – dreapata, cardiologie*

Rezumat: *Un shunt stânga-dreapta este o cantitate de sânge saturat ce trece de la stânga la dreapta şi încarcă circulaţia pulmonară. Shuntul este recunoscut prin semne clinice pulmonare şi cardiace, o hipervascularizaţie pulmonară şi semne echocardiografice. Pentru determinarea funcţiei ventriculului stâng echocardiografia este cea mai practicată metodă de studiu, cea mai disponibilă şi simplu de realizat în cardiologia pediatrică. Avantajul major al echocardiografiei este disponibilitatea sa şi posibilitatea utilizării sale de către toţi cardiologii dacă este necesar şi la patul bolnavului.*

SCIENTIFICAL ARTICLE OF BIBLIOGRAPHIC SYNTHESIS

Left ventricular insufficiency

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

a) Abdominal situs: or the position of abdominal organs;
b) Position of heart in the thorax: to the left, to the right, centered;
c) Atrial situs (auricular): or the position of the left and right atriums;
d) Atrio-ventricular relationship;
e) Ventricular-arterial relationship.

The evaluation of the systolic function of the left ventricle (LV) is of paramount importance, crucial for taking under observation and monitoring patients that present congenital cardiopathy with left-to-right shunt. The function of the left ventricle, seen by measuring the fractional shortening (FS) of the LV, represents a major prognostic factor for cardiopathies with left-to-right shunt. The limit value of FS of LV is proposed in different recommendations, in cardiac insufficiency, for the most efficient current therapeutic indications (medical treatment). Thus, the determination of the fractional shortening has to be specified and the echocardiography represents the most common method.

The children subject to the study presented cardiac malformations with left-to-right shunt: clinical pulmonary and cardiac signs, namely pulmonary hypervascularity and echocardiographic signs.

Unlike the adult, the child offers an excellent transthoracic echogenity, the problem is given by its compliance during the examination.

The TM (fractional shortening, ejection fraction, ventricle wall thickness) allows an evaluation of the LV function. The bidimensional echocardiography (2D) has become the most frequently used echocardiographic technique. It uses pulsed ultrasounds in order to immediately supply correct images in space of the cord. In addition to this, the 2D echocardiography allows the numerous heart sections and major vessels to be visualized.

The Doppler echocardiography uses ultrasound technology to measure the velocity, direction and type of blood flow within the cardiovascular system. The color Doppler echocardiography represents a bidimensional Doppler echocardiography in which the signal is encrypted in color in order to point the direction of the blood flow (red is the color that approaches the transductor and blue is moving away).

From a clinical point a view, the cardiac insufficiency is stressed by a tachycardia induced by effort, or in what the newborns are concerned, while being fed, and associated with weight stagnation and respiratory distress.

With the help of the echocardiography we can see the hyporkinetic of the left ventricle, its dilution, the septal curve becomes flat (rectilinear), the fractional shortening measured in the TM mode begins to drop towards the minimum value or below it (30-45%).

The left ventricular function is usually studied in the TM mode. The bidimensional study of the left ventricle is not indispensible unless it has a diskinetic contractility.

The population subject to this study was represented by 110 children having cardiac malformations with left-to-right shunt, from the moment of birth until the age of 18. These children were selected out of the total number of approximately 2906 children with cardiac symptomatology: cardiac soufflé, loss of weight or weight stagnation, cyanosis, precordial pains, dyspnoea at effort or repose, examined in our clinic in this period of 6 years.

There is accordance between the clinic and the

[1]Autor Corespondent: Viorela Cotârlă, Spitalul Clinic de Pediatrie Sibiu, str. Pompeiu Onofreiu nr 2-4, Sibiu, România; e-mail: vcotarla@yahoo.com; tel +40-0744598766

Articol intrat în redacţie în 21.04.2010 şi acceptat spre publicare în 10.05.2010
ACTA MEDICA TRANSILVANICA September 2010; 2(3)230-231

echocardiographic study in what concerns the left ventricular insufficiency, and this fact is outlined by the results of the study on the correlation between the weight curve and the fractional shortening. When the body weight is growing, the fractional shortening values are within normal limits, whereas in the presence of a loss or stagnation of weight the fractional shortening is below the normal values (p=0,001).

Tabele no. 1. Study on the correlation between weight and FS

		greutate (curba ponderala)	FS%
greutate (curba ponderala)	Pearson Correlation	1.000	-.308**
	Sig. (2-tailed)	.	.001
	N	110	110
FS%	Pearson Correlation	-.308**	1.000
	Sig. (2-tailed)	.001	.
	N	110	110

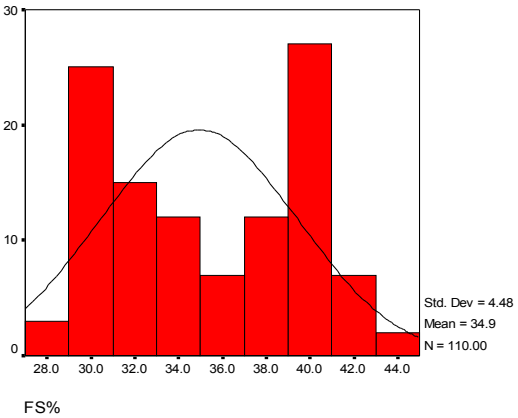
The fractional shortening measured in the TM mode goes below the minimum value (30%) in 13,6% of the cases, in the rest of 86,4%, its value remains within the normal values (30-45%), thus it does not present left ventricular insufficiency. The aforementioned results are drawn from the next table of frequency and the histogram graphic, the latter mentioning also the fractional shortening values within the lot of study, this being of 34,9% (SD=4,48).

Table no. 2. Tabel de frecvenţa FS

FS%

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	28	3	2.7	2.7	2.7
	29	12	10.9	10.9	13.6
	30	13	11.8	11.8	25.5
	31	5	4.5	4.5	30.0
	32	10	9.1	9.1	39.1
	33	5	4.5	4.5	43.6
	34	7	6.4	6.4	50.0
	35	5	4.5	4.5	54.5
	36	2	1.8	1.8	56.4
	37	5	4.5	4.5	60.9
	38	7	6.4	6.4	67.3
	39	11	10.0	10.0	77.3
	40	16	14.5	14.5	91.8
	41	5	4.5	4.5	96.4
	42	2	1.8	1.8	98.2
	43	1	.9	.9	99.1
	44	1	.9	.9	100.0
	Total	110	100.0	100.0	

Figure no. 1. Histograma FS



BIBLIOGRAPHY

1. Alain Batisse, Cardiologie Pediatrique Pratique, Ed. Dion – Paris 2008.
2. Simoneau G et Coll. Clinical classification of pulmonary hypertension. J Am Coll Cardiol 2004 ; 43 : S5-12.
3. European Society of Cardiology. Guidelines on diagnosis and treatment of pulmonary arterial hypertension. Eur Heart J 2004; 25: 2243-2279.
4. Chaouat A. Kraemer J.P. Canuet M. Kadaoui N. Ducolone A. Kessler R. Weitzenblum E. Hypertension pulmonaire des affections respiratoires chroniques. Press Med 2005; 34: 1465-74.
5. Sithon O et coll. Long-term response to calcium channel blockers in idiopathic pulmonary arterial hypertension. Circ 2005; 111: 3105-3111.
6. Ionela Mocan, SPSS Introducere in analiza datelor, Ed. Univ. Lucian Blaga Sibiu, 2005, 20-95.