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THE RESULTS OF COARCTATION OF THE AORTA WITH VENTRICULAR SEPTAL DEFECT AND OTHER INTRACARDIAC LESIONS TWO-STAGE REPAIR

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The article refers to the results of coarctation repair with pulmonary artery banding from 2005 to 2010 in patients with complex coarctation. The analysis showed a high level of early postoperative mortality. In the period between the operations a significant number of patients was lost for follow-up, died or stayed nonoperated, which postpones total repair indefinitely. So it may be advisable to make a total correction of heart disease for patients with biventricular heart (especially for coarctation with ventricular septal defect) in order to improve the results of surgical correction.

Key words: *aortic coarctation, coarctation repair with pulmonary artery banding , two-stage repair.*

Coarctation of the aorta (CoA) - a congenital heart disease (CHD), which occurs in approximately 6 to 8 % of all CHD. There is a simple or a complex coarctation. Simple coarctation occurs in 52 % of cases, complex coarctation - in 48 % of cases, being combined with ventricular septal defect (16.6%), with aortic stenosis (14.8 %), atrioventricular communication (4, 2%), transposition of the great arteries (3.7 %), Taussig-Bing anomaly (2,8%) and others.

There are two approaches to the treatment of complex coarctation: one-stage and two-stage repair. One-stage repair consists in coarctation and all the

intracardiac defects repair. In a two-stage repair the first stage consists in coarctation repair with pulmonary artery banding, the second stage – in pulmonary artery debanding and intracardiac correction of all defects or Glenn operation and univentricular repair.

Purpose - the complex coarctation two-stage repair results analyses.

Material and methods. Coarctation repair with pulmonary artery banding was performed in in UCCC on 131 patients in the period from January 2005 to December 2010. The patients' average age at the time of the first operation was 78,3 ± 89,2 days (from 0 to 7.1 years), with 94.7 % (124 children) less than 6 months old. The patients' average weight was 3,6 ± 0,6 kg (1.8 to 16.0 kg). Coarctation of the aorta with ventricular septal defect had 88 patients (67.2 %), of them 21 (16.0 %) - with transposition of great arteries and Taussig-Bing anomaly, 16 (12.2 %) - with a single ventricle, 6 (4.6%) - with atrioventricular communication. In all the operations left-sided thoracotomy was performed. Coarctation repair was performed by end-to-end anastomosis, by extended end-to-end anastomosis, by extended end-to-end anastomosis with the plastic on Amato, by anastomosis end-to-side. Pulmonary artery banding was performed in accordance with Trusler recommendations [1].

Results and discussion. In the analyzed group of 131 patients who underwent the first stage of surgical repair (coarctation repair and pulmonary artery banding) the hospital mortality was 10.7 % (n = 14). Six of these patients (42.9%) were with coarctation of the aorta and ventricular septal defect , 5 (35.7%) with transposition of great arteries and Taussig-Bing anomaly, 3 (21.4 %) with a single ventricle. Four of them died due to cardiovascular failure, seven patients - from infectious complications, two patients died as a result of competitive extracardiac disease influence (congenital malformation of the gastrointestinal tract), one patient died because of neurological complications. Among the 117 patients discharged from the hospital after the first operation, the follow-up was received on 111 (94.9 %) patients. Nine of them (8.1%) died between the first and the

second stage of surgical correction, including 6 (66.7%) patients with coarctation of the aorta and ventricular septal defect. Five patients of this group died from cardiovascular failure, the other two patients – from extracardiac pathology (acute gastrointestinal obstruction and trauma). Information about two other patients' cause of death was unobtainable. The second stage surgical repair was performed on 89 (67.9 %) patients after an average of 577,2 ± 360,0 days (from 0 to 6.7 years). It should be noted that one patient with Taussig-Bing anomaly underwent a total repair less than a day after coarctation repair and pulmonary artery banding due to unstable hemodynamics. Another two patients with coarctation of the aorta and ventricular septal defect and transposition of the great arteries underwent total repair six days after the first stage of surgical repair. The average age of patients at the time of the second operation was 628,7 ± 376,0 days (from 18 days to 7.4 years). The total repair was performed on 82 (92.1 %) patients: 68 (82.9 %) - with coarctation of the aorta and ventricular septal defect, 12 (14.6%) - with transposition of great arteries and Taussig-Bing anomaly, 2 (2.4%) - with atrioventricular communication. Hospital mortality after the total repair made 2,3% (n = 2). One patient with coarctation of the aorta and Shone's anomaly died because of cardiovascular failure, the other with coarctation of the aorta and transposition of great arteries died because of neurological complications. Seven patients (7.9%) underwent Glenn shunt. 12 patients(9.6%) currently require the second stage of surgical correction, six of them (50 %) need total repair (five (41.7%) patients with coarctation of the aorta and one with ventricular septal defect), six patients (50%) need Glenn shunt. One patient (0.8%) was delayed total repair due to high pulmonary hypertension. The average age of patients who currently need the second stage of surgical correction is 6,8 ± 2,2 years (from 3.4 to 15.4 years).

If for patients with univentricular heart coarctation the repair and pulmonary artery banding is the only possible surgery at the first stage, for patients with biventricular repair it is just one of the options. Statistically the two-stage repair compared with the one-stage repair has higher mortality [2], it is unacceptable for

socially unfavorable families as postpones total repair indefinitely [3], and the one-stage repair is recommended even for complex coarctation for biventricular heart patients [4].

For comparison we analyzed 29 patients with complex coarctation which underwent one-stage repair in the period from January 2005 to December 2010. Postoperative mortality was 10,3% (n = 3), the first patient with coarctation and anomally origin of the right pulmonary artery from ascending aorta, the second - with coarctation and transposition of great arteries with ventricular septal defect, and the third - with coarctation and Taussig-Bing anomaly. It should be stressed that there was no mortality for the cases with coarctation and ventricular septal defect . In contrast to the one-stage correction, where all patients with biventricular heart underwent total repair, in the two-stage correction only 82 patients (74.5%) underwent total repair. It should be noted that the second stage surgical correction was not performed on 42 patients (32.1%), 28 (25.5%) of whom could have total repair, but at the stage between the operations they were lost to observation, died or due to other financial, social or organizational reasons did not come to the hospital. It is important that 17 patients (63%) of them had coarctation of the aorta with ventricular septal defect. We believe that for the patients with complex coarctation (especially coarctation of the aorta with ventricular septal defect) it is more advisable to make a total correction of heart disease for patients with biventricular heart to avoid losing patients in the period between the first and the second operation.

Conclusions. Correction of complex coarctation by coarctation and pulmonary artery banding has a high level of early postoperative mortality. In the period between the operations a significant number of patients is lost for follow-up, dies or stays nonoperated, that postpones total repair indefinitely. As a result, it is more advisable to make a total correction of heart disease for patients with biventricular heart (especially for coarctation with ventricular septal defect) in order to optimize the results of surgical correction.

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Результати двоетапної корекції коарктації аорти, поєднаної з іншими внутрішньосерцевими аномаліями

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У статті проаналізовано результати усунення коарктації аорти і звужування легеневої артерії за період з 2005 по 2010 рр. у пацієнтів з коарктацією аорти, поєднаною з іншими внутрішньосерцевими аномаліями. Результати аналізу показали, що усунення коарктації аорти і звужування легеневої артерії має високий рівень ранньої післяопераційної летальності. В періоді між операціями значна кількість пацієнтів втрачається для спостереження, помирає або залишається радикально не прооперованою. Внаслідок цього для пацієнтів із двошлуночковим серцем (особливо з коарктацією аорти і дефектом міжшлуночкової перегородки), можливо, більш доцільним є виконання одномоментної радикальної корекції вади серця для оптимізації результатів хірургічної корекції.

Ключові слова: *коарктація аорти, усунення коарктації аорти і звужування легеневої артерії, двоетапна корекція.*

Результаты двухэтапной коррекции коарктации аорты в комбинации с другими внутрисердечными аномалиями

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В статье проанализированы результаты устранения коарктации аорты и суживания легочной артерии за период с 2005 по 2010 гг. у пациентов с коарктацией аорты в комбинации с другими внутрисердечными аномалиями. Результаты анализа показали, что устранение коарктации аорты и суживание легочной артерии имеет высокий уровень ранней послеоперационной летальности. В периоде между операциями значительная часть пациентов теряется для наблюдения, умирает или остается радикально не прооперированной, что отдаляет проведение радикальной коррекции на неопределенный срок. Вследствие этого для пациентов с двухжелудочковым сердцем (особенно для коарктации аорты с дефектом межжелудочковой перегородки), возможно, более целесообразно проводить одномоментную радикальную коррекцию порока сердца для оптимизации результатов хирургической коррекции.

Ключевые слова: *коарктация аорты, устранение коарктации аорты и суживание легочной артерии, двухэтапная коррекция*