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EXPERIENCE OF MITRAL VALVE REPLACEMENT IN CHILDREN UNDER 2 YEARS

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In the case of severe mitral valve pathology and the impossibility of plastic in the younger children there is a vital need for a mechanical mitral valve prosthesis. During the period from 2007 to 2013 in the UCCC mitral valve replacements with mechanical prosthesis were fulfilled in 8 children under 2 years. Immediate and long-term results are evaluated. All the children are doing well clinically. Early postoperative mortality was 12.5%, one child died , the youngest in the group, with severe preoperative condition. Currently one patient is being prepared for reoperation. In a small group of children is shown satisfactory results of mitral valve replacement in young children.

Key words: **mitral valve, replacement , plastic, mitral valve dysplasia.**

Treatment of children with congenital mitral valve (MV) pathology is one of the urgent problems of cardiac surgery, especially in young children. These patients represent a contingent of complex patients due to the fast development of heart failure that is refractory to medical therapy. A special category of patients are young children with mitral valve insufficiency, which leads to rapidly progressive overload of the left heart with subsequent formation of a secondary symptom of pulmonary hypertension. Congenital mitral insufficiency occurs with a frequency of 0,2-9 % and often combined with congenital heart defects as the membranes of the heart , an open ductus arteriosus, coarctation of the aorta, fibroelastosis and endomyocardial fibrosis in

different severity [1,2]. A large number of surgical correction of mitral insufficiency indicates the complexity of the restoration of normal function of the valve [2]. Some cardiac clinic abides by the preservation and restoration of the structure of the valve with a variety of plastic techniques. However, despite the attractiveness of the concept of preservation of own MV and good results of reconstructive techniques, there is a large contingent of children in need of MV replacement [3,4].

When choosing method of correction of MV pathology in young children in is necessary to remember about the hard enough initial clinical status of these patients. Characteristic features of this age contingent are: 1) the small size of the annulus fibrosus of MV; 2) a variety of lesions of anatomical structures of the valve; 3) high frequency of associated congenital heart diseases that complicate the postoperative course , and 4) the complexity of the selection and administration of anticoagulant therapy [5,6].

In the case of relatively preserved valvular apparatus in children as in adult patients, the preferred method is different types of reconstructive operation. A large number of studies proved that valve preservation with proper selection of patients gives a good immediate and long-term results and less amount of complications, than the replacement[7].

However, an anatomical features disease, the high frequency of rough valve disease, concomitant CHD, and addition of infection often make reconstructive operations ineffective or technically impossible. In such cases, there is a need to replace valve by mechanical or biological prosthesis.

Objective: To analyze the immediate and long-term results of mitral valve replacement in patients younger than 2 years .

Material and methods: During the period from 2007 to 2013 in the Centre were performed mitral valve replacement with mechanical prosthesis in 8 patients with severe mitral insufficiency in age from 8 days to 17 month (average 8,9±6,4 months), weighing from 3.6 kg to 8.8 kg (average 6,2±3,7 kg). There were 5 boys and 3 girls in the group. Remote follow-up period ranged from 2 to 6 years (average 3,3±2,8 years).

The main indications to the mitral valve was severe congenital mitral insufficiency associated with pathology of chordal apparatus and valve dysplasia,

which was noted in 6 (75%) patients that do not allow to fulfill a successful plastic valve correction, in 2 (25 %) mitral insufficiency was associated with a failed previous correction of atrioventricular communication.

Mitral insufficiency was combined with other congenital heart defects (CHD) in 5 (62,5%) patients, on which was held the previous operative intervention and plastic of mitra valve (see tab.1).

Table 1. Characteristics of patients with mitral insufficiency and concomitant cardiac pathology required previous surgical interventions

Concomitant pathology	**Number of patients (n=5)**	**Surgical interventions**
Crit.AoSt	1	1)BAV 2)AV plasty+MV plasty
SubAoSt+AoSt	1	1)BAV 2 times 2)AV+SubAoSt+MV repair
	1	1)SubAoSt repair+MV plasty
AVSD+CoAo	1	1)CoAo repair+PAB 2)AVSD repair 3)MV repair
AVSD+PAPVC	1	1)AVSD+PAPVC repair 2)MV+TV plasty

Patients underwent previous surgery on concomitant cardiac pathology and plastic of MV required mitral valve replacement within a period of 20 days to 11 months after the last operation (average 82,8±57,6 days).

After unsuccessful reconstructive correction mitral valve replacement performed

primary 3 (37.5 %) patients with severe mitral insufficiency associated with mitral valve dysplasia.

For valve replacement the following valve prosthesis were used : «St. Jude Medical »-Ø19mm- in 3 (37,5 %) patients, Ø17mm- in 2 (25 %), Ø21mm- in 1 (12,5 %), «Carbomedics»-Ø16mm - in 1 (12,5 %) patient, «Links»-Ø17mm - 1(12,5 %) patients.

Results: In all patients was marked stable postoperative period. One child aged 8 days died, with severe preoperative condition, on the first day after surgery. The cause of death was acute cardiovascular failure. Early postoperative mortality was 12,5%. Complete atrioventricular block was observed in 2 (25%) patients after mitral valve replacement, which required the implantation of an artificial pacemaker. Duration of mechanical ventilation ranged from 55 to 180 hours (average 99,5±55,2 hours). The lenth of stay in the intensive care unit ranged from 8 to 25 days (average 14±6,6 days). The total period of stay in the hospital ranged from 14 to 74 days (mean 38,5±25,7 days).

All patients were discharged in good condition under the supervision of children's cardiologists and pediatricians in the community.

Remote follow-up period ranged from 2 to 6 years (average 3.3±2,8 years). During the observation period no late mortality was noted . There were no reoperations. Currently one patient is planned for replacement due to the increase in valve gradient and the need at this moment in the surgical correction of aortic valve due to severe aortic insufficiency. This is patient who underwent replacement at the age of 8 months 4 years ago.

In all cases, the evaluation of the mechanical valve was performed by echocardiography. Disturbances in function of the prosthesis was not found. In one patient was noted increase in average speed of blood flow through the prosthesis, which currently exceeds 2 m /s, which is likely due to the growth of the child, the so-called overgrowing of the size of the implanted valve. Patients is planned for mitral valve replacement. In the other 6 patients the average speed of blood flow through the mitral prosthesis is between 1m /s up to 1,8 m/s (in average ± 0,56 m/s), significant insufficiency in implanted valves were not found. All patients contractile function of the heart is saved, left ventricular volume characteristics were improved , the average

end-diastolic index was 70.1 ml/m² ± 38,9 ml/m² (50 to 105 ml/m²). According to X-ray in all cases there were no signs of venous congestion, pulmonary pattern normalized.

None of the patients was noted complications associated with taking anticoagulants. No patient needed reoperations associated with dysfunction of the prosthetic mitral valve, also did not reveal signs of thromboembolism or endocarditis.

Our results correlate with those of other cardiac clinics in the world. For example, in Research center of CVS Bakulyeva for 13 years were performed 104 MV replacement in young children, age of the patients ranged from 23 days to 4 years, the average weight from 3.2 to 19 kg. In the early postoperative mortality was 15,4% (n=16) , but as far as improving surgical techniques over the past two years, reached a reduction of hospital mortality in infants to 6,6 %. Six (5,7%) patients underwent reoperations [4]. In cardiac Institute in Japan were fulfilled MV replacement in 18 patients under the age of 3 years. Age at surgery ranged from 3 months to 3 years , weight from 3,4 kg to 13,2 kg. There were 4 (22,2 %) early and 2 (11,1%) late deaths. 3 (16,7%) patients required reoperation because of prosthesis dysfunction [6].

Conclusion:

1. MK Prosthetics in young children is vital method of correction after an unsuccessful reconstructive surgery or impossible MV plastic, associated with the presence of severe pathology in all its structures (dilatation of the annulus fibrosus with disturbances in formation of leaflets , chords and papillary muscles) , which results to total valve insufficiency. In a small group of children under the age of 2 years were marked satisfactory long-term results of MV replacement.
2. Question concerning time of valve replacement is decided individually, taking into account the data of clinical and instrumental methods of analysis, morphological features of the valve.

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ДОСВІД ПРОТЕЗУВАННЯ МІТРАЛЬНОГО КЛАПАНА У ДІТЕЙ ВІКОМ ДО ДВОХ РОКІВ

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За наявності вираженої патології мітрального клапана (МК) та неможливості його пластики у дітей молодшого віку виникає життєва необхідність у протезуванні клапана механічним протезом. За період з 2007 р.

по 2013 р. у НПМЦДКК було проведено протезування МК механічним протезом у 8-ми дітей віком до 2-х років. Проведено оцінку безпосередніх та віддалених результатів. Всі діти клінічно почувають себе добре. Рання післяопераційна летальність склала 12,5%, померла одна дитина, наймолодша в групі, з важким доопераційним станом. На даний момент одному пацієнту планується репротезування клапана. На невеликій групі дітей показано задовільні результати протезування МК у дітей раннього віку.
Ключові слова: *мітральний клапан, протезування, пластика, дисплазія стулок мітрального клапана.*

ОПЫТ ПРОТЕЗИРОВАНИЯ МИТРАЛЬНОГО КЛАПАНА У ДЕТЕЙ В ВОЗРАСТЕ ДО ДВУХ ЛЕТ

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При наличии выраженной патологии митрального клапана и невозможности его пластики у детей младшего возраста возникает жизненная необходимость в протезировании клапана механическим протезом. За период с 2007 по 2013 г. в НПМЦДКК было проведено протезирование МК механическим протезом у 8-ми детей в возрасте до 2-х лет. Проведена оценка непосредственных и отдалённых результатов. Все дети клинически чувствуют себя хорошо. Ранняя послеоперационная летальность составила 12,5%, умер один ребёнок, самый младший в группе, с тяжелым дооперационным состоянием. На данный момент одному пациенту планируется репротезирование клапана. На небольшой группе детей показаны удовлетворительные результаты МК у детей раннего возраста.
Ключевые слова: *митральный клапан, протезирование, пластика, дисплазия створок митрального клапана*