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PSYCHOMOTOR DEVELOPMENT OF INFANTS AFTER THE NEONATAL ARTERIAL SWITCH OPERATION WITH AUTOLOGOUS PLACENTAL-UMBILICAL CORD BLOOD USE

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The study describes development of 92 infants of 1 to 2,5 years of age that underwent arterial switch operation using the autologous placental umbilical cord blood (APUCB) and donor blood.We used the Bayley Scales of Infant Development. The average mental 94,5 ±15,8 and psychomotor 91,4 ±15,3 indices were within normal age limits. Taking into consideration follow-up of infants development the APUCB use in congenital cardiac surgery is a perspective method of neonates treatment.

Key words: *children, arterial switch operation, psychomotor development indices, autologous placental-umbilical cord blood.*

Over the past decade arterial switch operation (ASO) for transposition of great arteries (TGA) has become a standard operation. Surgical mortality of these defects has decreased and now is less than 5% in many centers [1-3]. Our Center was the first in the world since 2009 to begin the use of components of autologous placental-umbilical cord blood (APUCB) instead of donor blood for the ASO in order to avoid the risk of infection and immunological reactions [4]. From the time of the first long-term studies it has become clear that even with excellent surgical and postoperative results a significant proportion of patients show development delay of cognitive functions after ASO. The objective of this study was to compare

the follow-up psychomotor development of children who underwent ASO with APUCB and donor blood use.

Methods. The study involved 92 children of 1 to 2.5 years of age with TGA. All the children were divided into two groups: the first group included 30 children who underwent radical surgical correction during their first hours of life with APUCB use; the second group included 62 children who underwent radical surgery on the 3rd to 6th day after birth with donor blood use. We used the Bayley Scales of Infant Development (BSID-II) to study the psychomotor development. We considered mental developmental index (MDI) and psychomotor development index (PDI) of 84 points and below to be the psychomotor development delay. Scores of 85 to 114 points were considered to be within the average age norms.

Results. The aggregate MDI 94,5±15,8 and PDI 91,4±15,3 study group were higher compared with MDI 90,3 ±13,4 and PDI 86,3 ±14,5 conventional group. In the two groups percentage of low MDI and PDI points revealed a statistically significant difference using Fisher criterion, ($p < 0,03$). It means that the vast majority of children who have normal psychomotor development were in the study group with APUCB use. The results are presented in table 1.

Table 1.

Psychomotor development of children with congenital heart disease after surgical correction with APUCB and donor blood use

Groups of children	Norm*		Delay **	
	The absolute number	%	The absolute number	%
The study group with APUCB use	23	76,7	7	23,3
The conventional group with donor blood use	34	54,8	28	45,2

Norm* - means MDI and PDI 85 points and higher; Delay** - means MDI and PDI 84 points and lower

The results of this small study demonstrated a new potential link between the time of surgery and the use of APUCB and patients psychomotor development in follow-up period. The children of preschool and school age require further randomized psychophysical studies with detailed factor analysis of operative parameters. Mental and physical assessment of children with congenital heart disease should be standard practice to identify children with impaired neurological and psychomotor development delay and to identify risk factors and develop strategies to optimize long-term results, improve the quality of life, provide psychosocial support to pregnant women and families.

Conclusion. 40% of children identified low performance indices of mental and motor development. "Bayley Scales of Infant Development" can be effective measure in early detection of psychomotor development delay in children after surgical correction of CHD. The number of children with normal indices of mental and psychomotor development is greater in the group of patients with APUCB use than in the group of children who underwent surgery with the donor blood use. Therefore, we can assume the APUCB use during cardiac correction does not only promote overall physical recovery through useful stem cells but also enhances the cognitive development of the child.

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ПСИХОМОТОРНИЙ РОЗВИТОК ДІТЕЙ ПІСЛЯ ОПЕРАЦІЙ АРТЕРІАЛЬНОГО ПЕРЕКЛЮЧЕННЯ ІЗ ЗАСТОСУВАННЯМ АУТОЛОГІЧНОЇ ПЛАЦЕНТАРНО-ПУПОВИННОЇ КРОВІ

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В роботі вивчено розвиток 92 дітей віком 1–2,5 років після операції артеріального переключення залежно від застосування аутологічної плацентарно-пуповинної крові (АППК) та донорської. В дослідженні використана методика "Шкала розвитку малюків N. Bayley". Середні показники індексів ментального розвитку (94,5±15,8) та індексів психомоторного розвитку (91,4±15,3) в межах вікової норми. Використання АППК під час хірургічної корекції вроджених вад серця є перспективним методом лікування новонароджених з огляду на віддалені результати.

Ключові слова: *діти, операція артеріального переключення, індекси психомоторного розвитку, аутологічна плацентарно-пуповинна кров.*

ПСИХОМОТОРНОЕ РАЗВИТИЕ ДЕТЕЙ ПОСЛЕ ОПЕРАЦИЙ АРТЕРИАЛЬНОГО ПЕРЕКЛЮЧЕНИЯ С ИСПОЛЬЗОВАНИЕМ АУТОЛОГИЧЕСКОЙ ПЛАЦЕНТАРНО-ПУПОВИННОЙ КРОВИ

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В работе изучено развитие детей в возрасте 1–2,5 года после операции артериального переключения в зависимости от использования аутологической плацентарно-пуповинной крови (АППК) и донорской. В исследовании использована методика "Шкала развития детей N. Bayley". Средние показатели индексов ментального развития (94,5±15,8) и индекс психомоторного развития (91,4±15,3) в рамках возрастной нормы. Использование АППК во время хирургической коррекции врожденных пороков сердца является перспективным методом лечения новорожденных, исходя из отдаленных результатов.

Ключевые слова: *дети, операция артериального переключения, индексы психомоторного развития, аутологическая плацентарно-пуповинная кровь*