Pediatrics and Neonatology (2019) 60, 485–486

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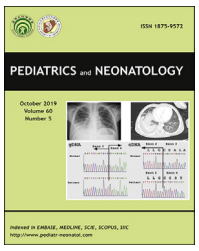

Editorial

Cesarean section and ventricular function in neonatal transitional period—An unnoticed question

The transition of the circulatory system after birth is a critical time for the neonate to adapt to the external environment. After birth, the systemic vascular resistance (SVR) increases as a result of the loss of low-resistance placental circulation and surge of catecholamine levels after delivery. During this period, the pulmonary vascular resistance (PVR) decreases in association with pulmonary vasodilatation due to an increase in the oxygen concentration, accompanied with lung aeration. As a result, the increased SVR and decreased PVR causes redirection of patent ductus arteriosus (PDA) in a left-to-right pattern, which signifies adequate pulmonary venous return and increased left ventricle (LV) preload. Furthermore, with increased partial oxygen tension, the PDA functionally closes, which further increases the LV stroke volume and cardiac output.[1] The LV and right ventricle (RV) should be responsive to the continually changing demands of preload and afterload and adapt accordingly.

Several studies have analyzed the serial change of LV and RV function after birth.[2–4] These studies found the LV E/e' was high during the first 24 h, which correlated with the redirection of PDA flow and increase of LV filling. The LV E/e' then decreased gradually, which was caused by both LV adaptation and PDA closure.[2,4] For the RV function, RV E/e' was significantly lower than the LV and was relatively stable after birth during the early neonatal period. This suggests that the preload and afterload change after birth is more dramatic in systemic ventricles than in pulmonary ventricles.

During normal vaginal delivery, the surge in catecholamine levels during labor and thoracic compression increases fluid resorption of the lung epithelium. In contrast, after cesarean section (CS), because of the lack of labor pain-induced catecholamine release and thoracic compression, the infant has an increased risk of transient tachypnea of the newborn.[1] Although it is widely known that the delivery mode may affect lung function, their effect on the cardiac function has not been reported in the literature.

In the present study, Tao K et al. conducted a prospective observational study on the effect of CS on the cardiac function in the newborn.[5] The authors used echocardiography and tissue Doppler imaging to evaluate the cardiac function. Using serial echocardiography data at days 0, 1, 2, and 5, they found that the function of both ventricles increased after birth, as demonstrated by decreased LV and RV Tei index. In addition, for the diastolic function, the LV E/e' gradually decreases after birth, which suggested the adaptation of the LV to the increase in preload. In contrast, the RV E/e' marginally increased during the first 2 days and then decreased. This suggested a delayed adaptation of RV in comparison with the LV when facing preload increase and afterload decrease. Compared with vaginal delivery, the E/e' of both ventricles was significantly higher in the CS group and mitral annular plane systolic excursion was significantly lower in the CS group. Moreover, the RV E/e' was significantly higher in the CS group at day 1. This implied that the LV and RV function was lower and that RV maladaptation is more prominent during the early neonatal period in the CS group compared with that in the vaginal delivery group. Additionally, the authors performed regression analysis. After adjusting for the birth weight, gestational age, and oxygen administration, they found that the RV E/e' was still significantly higher, which implied that the RV diastolic function was lower in the CS group. Hence, the delivery mode does have an effect on the cardiac function during the early neonatal period.

Presently, it is established that the RV and LV diastolic function is lower during CS delivery compared with that during vaginal delivery. What is the meaning of this finding, and how can it apply the clinical situation? In the present study, the authors focused on the healthy term baby to examine the cardiac function adaptation without disease status. The LV and RV can adapt well to the postnatal transitional change of the circulatory system in both vaginal delivery and CS. However, it is still uncertain if this is still

https://doi.org/10.1016/j.pedneo.2019.09.002

true when facing a condition such as meconium aspiration syndrome with persistent pulmonary hypertension of newborn, persistent ductus arteriosus opening, prematurity with respiratory distress syndrome, or even congenital heart disease[6]? Whether the delayed adaptation of RV during CS causes hemodynamic deterioration when facing a disease situation such as pulmonary hypertension remains to be seen. Therefore, further studies are necessary to examine the cardiac function adaptation in the disease status.

Conflict of interest

I have no conflict of interest.

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Aug 28, 2019

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