J. Fetal Med. (March 2019) 6:45–46
https://doi.org/10.1007/s40556-019-00197-8

BRIEF COMMUNICATION

Premature Ductal Constriction and Reversible Early Isolated Right Ventricular Cardiomyopathy in a Neonate at Birth

Vernika Tyagi[1] · Abhishek Chopra[2] · Ashish Jain[2]

Received: 16 September 2018 / Accepted: 23 February 2019 / Published online: 27 March 2019

Abstract Cardiomyopathies are a group of diseases of the myocardium associated with mechanical and/or electrical dysfunction that usually exhibit inappropriate ventricular hypertrophy or dilatation. Neonatal CMs account for about 1% of childhood cardiac disease, with an estimated incidence of 10:100,000 live births, and are responsible for 10% of all paediatric cardiac deaths [1]. Among this, transient right ventricular hypertrophy (RVH) is a rare anomaly that is seen during the neonatal period. The various causes associated with right ventricular hypertrophy are maternal diabetes, metabolic causes, NSAID use and premature constriction of ductus. Present case is interesting as no cause could be found in this case of transient RVH.

Keywords Neonatal cardiomyopathy · Transient right ventricular hypertrophy · Non compaction cardiomyopathy

Case Report

A term female baby was delivered to a 28 year old fourth gravida mother vaginally through clear liquor through a non-consanguineous marriage. The antenatal period was uneventful except for 37 week ultrasonography that revealed a narrow hypoplastic fetal left ventricle with deviation of interventricular septum to the left side. Mother had absence of any other medical or surgical illness and no history of intake of NSAID during entire antenatal period. Oral glucose challenge test performed at 28 weeks was normal.

The newborn weighed 3400 g at birth and needed only routine care at birth with APGAR score of 9 and 9 at 1 min and 5 min respectively. Immediately after birth the infant had tachypnea with a resting respiratory rate of 90 per minute with absence of any retractions or grunting. The apex was located in the 4th intercostal space, heart rate was 150 beats/min with short systolic murmur of grade 3 localized at apex. The infant had pulse oximetry readings of 75–80% in room air which improved to 93% on oxygen by hood (FiO_2—50%). There was no difference between pre and post ductal oxygen saturation. The liver was palpable 2 cm below costal margin. Arterial blood gas done showed PaO_2—94.3, $PaCO_2$—35 and HCO_3^-—22.

Intravenous fluids were initiated and the neonate was continued under oxygen by hood at a FiO_2 of 50%. The chest X-ray at 10 h of life suggested a cardiomegaly (Cardiothoracic ratio of 75%) with essentially clear lung fields. A dedicated echocardiography by a senior pediatric cardiologist at 48 h of life confirmed the findings of in-house ECHO done at 12 h of life. The ECHO revealed a non coapting tricuspid valve with tricuspid regurgitation with possibility of noncompacted right ventricle with moderate dysfunction and absent ductus arteriosus. The neonate was weaned off oxygen within 12 h of birth and initiated on full breast feeds. Oral furosemide at a dose of 2 mg/kg/day was initiated on 2nd day of life after echocardiography. A dynamic cardiac MRI was planned on the 3rd day of life to reconfirm the presence of the non-compacted right ventricle, as this was rarely reported in neonates and on the right side. The MRI reported the heart to have normal orientation with grossly dilated right atrium and ventricle (Fig. 1). There was mild trabeculation of wall

✉ Abhishek Chopra
abhishekmamc2006@yahoo.co.in

[1] Department of Pediatrics, Maulana Azad Medical College, New Delhi, India

[2] Department of Neonatology, Lok Nayak Hospital, Maulana Azad Medical College, New Delhi, India

of right ventricle with associated tricuspid regurgitation, however the ratio of non compacted to compacted myocardium was less than 2, hence a non-compaction cardiomyopathy was ruled out. The baby was discharged on 6th day of life on oral furosemide at a dose of 2 mg/kg/day, with a advice to follow up at 3 weeks of life. On follow up at 3rd week of life, a repeat Echo was normal. There was weight gain and no active issues, oral furosemide was discontinued and the baby was advised to come for routine immunization.

Discussion

Transient neonatal isolated right ventricular hypertrophy/cardiomyopathy at birth is an uncommon entity with increasing number of cases reported in the recent years. Maternal diabetes mellitus, use of drugs such as NSAIDs in the antenatal period leading to premature duct constriction and intake of food containing polyphenols [2] (herbal tea/orange/grape juice) have been implicated in its etiopathogenesis. Cardiomyopathy due to perinatal stress has also been described, is a relatively benign process and resolves spontaneously within 1–5 months [3].

Premature closure of duct results in sudden increased after load to immature right ventricle leading to right ventricular hypertrophy, dilatation, pulmonary artery hypertension and tricuspid regurgitation of variable severity. Recently Gelliwig et al. in 2017 described 27 neonates with fetal ductal dysfunction in which premature ductal closure and ductal constriction were the commonest anomalies. Nearly half of the infants had spontaneous resolution of their abnormalities [4]. Our baby also had dilated right atrium/ventricle along with closed ductus arteriosus immediately after birth suggesting possible role of antenatal ductal closure in its causation. This also had an early complete resolution comparable to most of the cases reported.

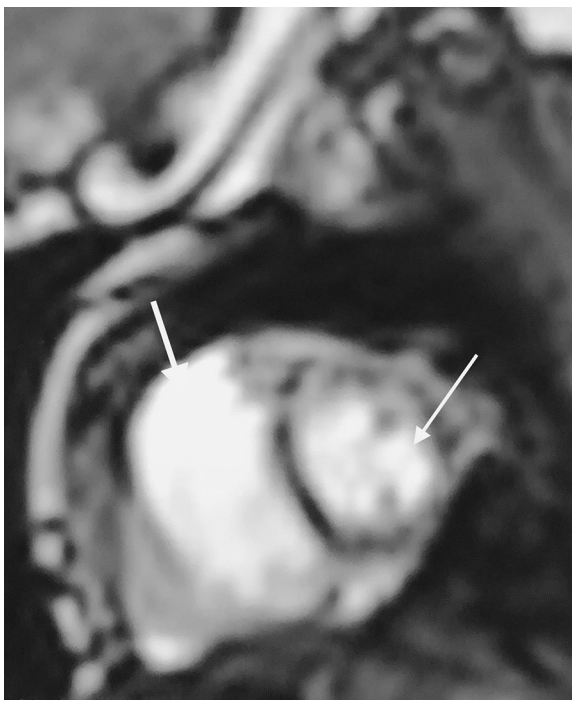

Fig. 1 Cardiac MRI showing dilated right ventricle and atrium indicated by thick and thin arrow respectively

In neonate with isolated right ventricular hypertrophy/dilatation, history of maternal diabetes, intake of NSAIDs and food rich in polyphenols should be enquired and echocardiography should focus on ductal constriction/closure and tricuspid valve abnormalities. The non-compaction may be a diagnostic dilemma that has to be resolved by cardiac MRI. Otherwise, these cases have a self-limiting course with very good outcome.

Compliance with ethical standards

Conflict of interest The authors have no conflict of interest.

Ethical approval Ethical approval is not needed for case report according to BMC medical ethics.

References

1. Bernstein D. Diseases of the myocardium. In: Kliegman RM, Stanton B, Geme JS, Schor NF, Behrman RE, editors. Nelson textbook of pediatrics. 19th ed. Philadelphia: Saunders; 2011. p. 1963–75.
2. Zielinsky P, Piccoli AL, Manica JL, Nicoloso LH. New insights on fetal ductal constriction: role of maternal ingestion of polyphenol rich foods. Expert Rev Cardiovasc Ther. 2010;8:291–8.
3. Tomar M, Radhakrishnan S, Shrivastava S. Transient severe isolated right ventricular hypertrophy in neonates. Cardiol Young. 2003;13(4):384–6.
4. Gewillig M, Brown SC, Roggen M, Eyskens B, Heying R, Givron P, et al. Dysfunction of the foetal arterial duct results in a wide spectrum of cardiovascular pathology. ActaCardiol. 2017;72(6):625–35.