Cardiology in the Young

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An unusual case of tetralogy of Fallot with an absent pulmonary valve associated with a retro-aortic innominate vein in a patient with a 16p12.2 microdeletion

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Brief Report

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Abstract

16p12.2 microdeletion has been associated with congenital heart defects and developmental delay. In this case, we describe the rare association between tetralogy of Fallot with an absent pulmonary valve a right-sided aortic arch and a retro-aortic innominate vein associated with a 16p12.2 microdeletion and epilepsy.

Tetralogy of Fallot with an absent pulmonary valve is a rare variant of tetralogy of Fallot and is associated with severe pulmonary regurgitation and aneurysmal dilatation of the pulmonary arteries.[1] This defect can be associated with abnormalities of the pulmonary veins and the aortic arch.[2] While 16p12.2 microdeletion has been associated with congenital heart defects, we report a specific defect in a patient with epilepsy and minimal developmental delay.

Case report

We report a case of a patient with an antenatal diagnosis of tetralogy of Fallot with an absent pulmonary valve associated with a right-sided aortic arch, a retro-aortic innominate vein, and 16p12.2 microdeletion.

He was born by spontaneous vaginal delivery in a tertiary maternity hospital at a gestation of 39 + 5 and a weight of 3.6 kg with normal APGAR scores and no resuscitation required at birth. He was transferred to the regional cardiology centre and his echocardiogram confirmed a diagnosis of tetralogy of Fallot with an absent pulmonary valve and also demonstrated a right-sided aortic arch and a retro-aortic innominate vein (Figs 1 and 2).

On examination, he is non-dysmorphic, he had a systolic and a diastolic murmur and was well. He remained well and was discharged home on day 4 of life. He was followed in the outpatient department, his oxygen saturations remained greater than 97% and he continuously gained weight.

At four and half months and a weight of 5.79 kg, he had a tetralogy of Fallot repair, reduction plasty of his left and right pulmonary arteries, and a monocusp repair of his pulmonary valve.

He had a cardiac magnetic resonance imaging at 20 months old which showed mild right ventricular outflow tract obstruction, moderate pulmonary regurgitation, and normal right ventricular size and function. His right ventricle ejection fraction was 58% with a right ventricle end diastolic volume indexed to body surface area of 70 ml.

He is followed in his local hospital from a general paediatric stand point and was diagnosed with myoclonic epilepsy at 19 months having presented with generalised jerky movements and subsequently had an abnormal electroencephalogram. He is currently on sodium valproate for management of this.

His 60 K chromosome microarray showed a significant 16p12.2 5780 kb microdeletion (16: 21837492–22407931 x1 UCSC Hg19) which was also present in his mother. He also inherited two benign copy number duplications from his father of 680 kb on chromosome 8 (8: 99137339–99816900 x3 UCSC Hg19) and 455 kb on chromosome 10 (10: 58572992–59028303 x3 USCS hg19) (Supplementary Figure 1).

He was seen in his local hospital at 3 years and 10 months old from a developmental point of view and apart from mild language concerns, he has no developmental issues. His epilepsy is controlled.

Discussion

16p12.2 microdeletion has been reported in association with congenital heart disease. As is seen in this case, there is incomplete penetrance and variable expression; his mother carries the same

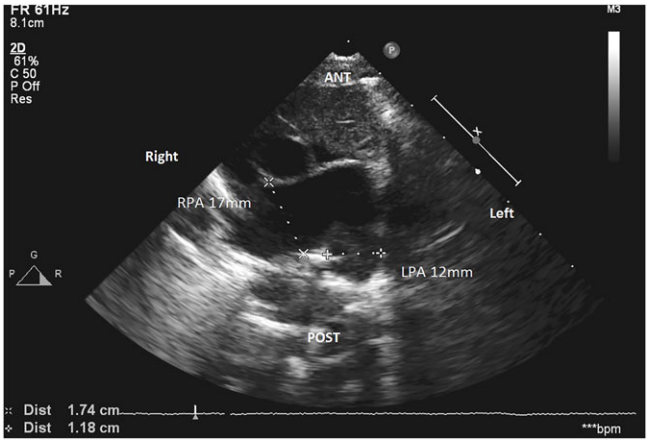

Figure 1. Parasternal short axis echocardiographic view demonstrating dilated branch pulmonary arteries.

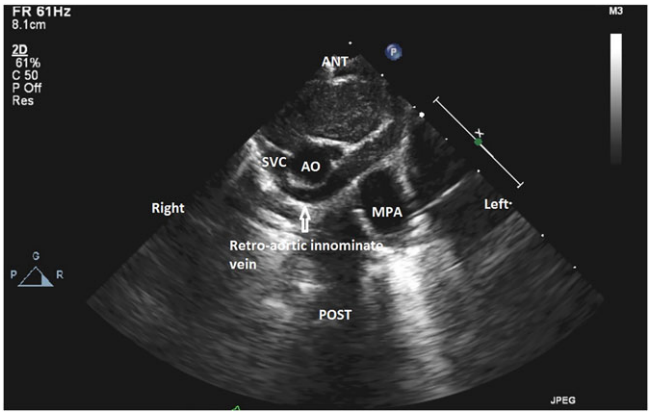

Figure 2. High parasternal short axis echocardiographic view demonstrating retro-aortic in nominate vein.

microdeletion and is unaffected. Girirajan et al. have reported previously that patients with the microdeletion present on both chromosome 16 s have a more severe phenotype and this may explain why from a developmental delay point of view, at least, our patient's phenotype is mild.[3]

Congenital heart disease is described in 33% patients with the microdeletion in one study, with the predominant lesion being hypoplastic left heart syndrome.[3] No patients in that study had tetralogy of Fallot; however, one patient had a double outlet right ventricle with a right-sided aortic arch.[3] However, a further review highlighted that tetralogy of fallot has been described but not when associated with an absent pulmonary valve and a retro-aortic innominate vein.[4]

Interestingly in our patient, despite his myoclonic epilepsy which is well controlled, his development has been relatively normal to date. However, he has a severe form of congenital heart disease which will require life-long treatment.

Conclusion

The case highlights an unusual combination of severe congenital heart disease associated with a mild phenotype of neurodevelopmental problems caused by a 16p12.2 microdeletion.

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Conflicts of interest. None.

Ethical standards. Not applicable.

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