ESC European Society of Cardiology

European Heart Journal - Case Reports (2021) **5**(8), 1–2
doi:10.1093/ehjcr/ytab238

EDITORIAL

Late presentation of shunt lesions in Down syndrome patients: the importance of multidisciplinary assessment and lifelong follow-up

Inga Voges [1]* and Evangelia Nyktari[2]

[1]Department of Congenital Heart Disease and Paediatric Cardiology, University Hospital Schleswig-Holstein, Arnold-Heller-Str. 3, 24105 Kiel, Germany; and [2]Cardiovascular MRI Unit, BIOATRIKI SA (Biomedicine Group of Companies), Athens, Greece

Received 24 April 2021; first decision 25 May 2021; accepted 27 May 2021

This editorial refers to 'Against all odds—late repair of multiple shunt lesions in a patient with Down syndrome: a case report', by A. Arvanitaki *et al.* doi:10.1093/ehjcr/ytab234.

Patients with Down's syndrome and shunt lesions have an increased risk (10 times)[1,2] for developing pulmonary artery hypertension (PAH). Underlying pathogenesis is often multifactorial (altered pulmonary vascular structure, unfavourable anatomic characteristics of both upper and lower airway, respiratory comorbidity, angiogenic genetic factors related to chromosome 21) leading to the high risk for PAH during infancy.[3,4] Typically, early repair of the particular lesion in the first 4–6 months is necessary to prevent patients from severe pulmonary vascular disease with persisting PAH.

The case described by Arvanitaki *et al.*[5] reports a 3-year-old patient with Down syndrome and an unrepaired large perimembranous ventricular septal defect, a large persistent ductus arteriosus, and an atrial septal defect. Interestingly, haemodynamic assessment with acute vasodilator testing suggested operability and after thorough multidisciplinary team discussion, the patient underwent successful surgical repair.[5]

As pointed out by the authors,[5] with the rising immigration from developing countries, more patients with unrepaired or a late diagnosis of congenital heart lesions are presented to our hospitals and clinics. Their treatment is often difficult and in particular large shunt lesions are a therapeutic challenge. The decision for permanent closure of the shunt lesion is often not easy and should be made with caution. A standardized and thorough preoperative and multidisciplinary workup is a key factor[6] which is nicely presented by the authors.[5]

It is remarkable that the presented patient did not show clinical signs of PAH after surgical repair. However, it is known that even those who undergo successful repair of congenital heart disease can develop PAH later in life with poorer outcome than patients with Eisenmenger syndrome.[7,8] Latus *et al.* have even shown a worse response to acute vasodilator testing in PAH patients with operated congenital heart disease compared to patients with idiopathic PAH. They speculated that the significantly impaired pulmonary vasoreactivity in operated congenital heart disease patients might negatively impact on the long-term outcome and suggested that these patients should be treated with a targeted drug therapy similar to patients with idiopathic PAH.[9] The authors of the present case report discussed this nicely and recommended a regular long-term follow-up[5] which we believe should be lifelong.

As acknowledged by the authors, assessment of the reversibility of PAH plays a major role for the management of patients with congenital heart disease and large shunt lesions.[5] The current decision process is largely based on the clinical findings and haemodynamic results from heart catheterization and leaves a grey zone in some patients.[5] However, beside data from cardiac catheterization and vasodilator testing, other indices such as biomarkers, genetic variants, and vascular stiffness markers (distensibility, compliance) could be important for the detection of irreversible pulmonary vascular disease.[5,10–12] Although they are typically not part of the routine investigations at this stage, they might help improve the decision-making process in future.

In summary, Arvanitaki *et al.* deserve credit for their report which not only present a rare case but also excellently demonstrates and discusses the decision-making and treatment process in patients with a late presentation of large shunt lesions.

* Corresponding author. Tel: +49 431 500 25612, Fax: +49 431 500 25604, Email: inga-voges@t-online.de

Handling Editor: Amardeep Ghosh Dastidar

Lead author biography

Inga Voges is a consultant in paediatric and adult congenital heart disease at the University Hospital Schleswig-Holstein in Kiel (Germany) with exerpertise in cardiovascular MR and further special interest in paediatric cardiomyopathies. She is the secretary of the Association for European Paediatric and Congenital Cardiology imaging working group and a member of the pediatric and congenital heart disease executive committee of the SCMR. Dr Voges is highly involved in clinical research in the field of congenital heart disease and Cardiovascular MR imaging.

Conflict of interest: none declared.

References

1. Cua CL, Blankenship A, North AL, Hayes J, Nelin LD. Increased incidence of idiopathic persistent pulmonary hypertension in Down syndrome neonates. *Pediatr Cardiol* 2007;**28**:250–254.
2. Hawkins A, Langton-Hewer S, Henderson J, Tulloh RM. Management of pulmonary hypertension in Down syndrome. *Eur J Pediatr* 2011;**170**:915–921.
3. Pandit C, Fitzgerald DA. Respiratory problems in children with Down syndrome. *J Paediatr Child Health* 2012;**48**:E147–E152.
4. Galambos C, Minic AD, Bush D, Nguyen D, Dodson B, Seedorf G et al. Increased lung expression of anti-angiogenic factors in Down syndrome: potential role in abnormal lung vascular growth and the risk for pulmonary hypertension. *PLoS One* 2016;**11**:e0159005.
5. Arvanitaki A, Januszewska K, Malec E, Baumgartner H, Kehl H-G, Lammers AE. Against all odds—late repair of multiple shunt lesions in a patient with Down syndrome: a case report. *Eur Heart J Case Rep* 2021.
6. Lopes AA, Barst RJ, Haworth SG, Rabinovitch M, Al Dabbagh M, Del Cerro MJ et al. Repair of congenital heart disease with associated pulmonary hypertension in children: what are the minimal investigative procedures? Consensus statement from the Congenital Heart Disease and Pediatric Task Forces, Pulmonary Vascular Research Institute (PVRI). *Pulm Circ* 2014;**4**:330–341.
7. Haworth SG, Hislop AA. Treatment and survival in children with pulmonary arterial hypertension: the UK Pulmonary Hypertension Service for Children 2001-2006. *Heart* 2009;**95**:312–317.
8. Manes A, Palazzini M, Leci E, Bacchi Reggiani ML, Branzi A, Galiè N. Current era survival of patients with pulmonary arterial hypertension associated with congenital heart disease: a comparison between clinical subgroups. *Eur Heart J* 2014;**35**:716–724.
9. Latus H, Wagner I, Ostermayer S, Kerst G, Kreuder J, Schranz D et al. Hemodynamic evaluation of children with persistent or recurrent pulmonary arterial hypertension following complete repair of congenital heart disease. *Pediatr Cardiol* 2017;**38**:1342–1349.
10. Smadja DM, Gaussem P, Mauge L, Israël-Biet D, Dignat-George F, Peyrard S et al. Circulating endothelial cells: a new candidate biomarker of irreversible pulmonary hypertension secondary to congenital heart disease. *Circulation* 2009;**119**:374–381.
11. Liu D, Liu QQ, Guan LH, Jiang X, Zhou DX, Beghetti M et al. BMPR2 mutation is a potential predisposing genetic risk factor for congenital heart disease associated pulmonary vascular disease. *Int J Cardiol* 2016;**211**:132–136.
12. Ploegstra MJ, Brokelman JGM, Roos-Hesselink JW, Douwes JM, van Osch-Gevers LM, Hoendermis ES et al. Pulmonary arterial stiffness indices assessed by intravascular ultrasound in children with early pulmonary vascular disease: prediction of advanced disease and mortality during 20-year follow-up. *Eur Heart J Cardiovasc Imaging* 2018;**19**:216–224.