


Balloon atrial septostomy through azygos vein in two cases of D-TGA with left atrial isomerism

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Brief Report

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Abstract

Balloon atrial septostomy is a palliative procedure that is performed in D-transposition of great arteries when surgery is not immediately available. Although D-TGA and left isomerism association are rare, it is an important condition as the BAS procedure approach is unique. In this case report, we present two cases of D-TGA with left isomerism where BAS was performed due to restrictive atrial septal defect and lack of immediate availability of the paediatric cardiac surgeon.

Balloon atrial septostomy was described by Rashkind and Miller in 1966 as a palliative procedure for D-transposition of great arteries.¹ The procedure is still commonly performed in developing countries, where complete repair during the neonatal period is not widely available. For a successful BAS, a thin septum primum is essential. Therefore, it must be performed no later than 3 weeks postnatally in order to have the best result. D-transposition of great arteries with left isomerism rate is 1.3% according to the literature.² In this case, the femoral veins or the umbilical vein, whenever available, are used for the procedure. Once either one is not available like a thrombosed vein due to previous use, or interrupted inferior caval vein, a different approach can be considered, such as transhepatic or azygos–hemiazygos.

We report two cases in order to emphasise how to manage the rare cases of the d-transposition of great arteries with left atrial isomerism.

Cases report

Case 1

An 18-day-old child was referred to our newborn ICU with severe cyanosis. After paediatric cardiology evaluation, the echocardiographic study revealed D-TGA, intact ventricular septum, mild dynamic left ventricular obstruction, restrictive 3 mm atrial septal defect with left-to-right flow, and patent ductus arteriosus with left-to-right flow. Furthermore, the inferior caval vein was not connected directly to the right atrium. Because our hospital's paediatric cardiovascular surgeons were not available and restrictive ASD was present, we decided that BAS could be attempted for this case. The patient was taken for BAS after intubation and mechanical ventilation. After settling a 5 F sheath in the right femoral vein, we accessed the right atrium through the azygos vein. Septostomy was performed by NuMED 1 cc balloon septostomy catheter. Subsequent to septostomy, Thysak 8 × 2 cc balloon catheter was used to observe the disappearance of the indentation in the atrial septum. Blood oxygen saturation increased from about 55% to 75–80%. There was no complication to report.

Case 2

A 35-day-old child was referred to the paediatric cardiology clinic with murmur. Echocardiography examination revealed D-TGA with ventricular septal defect, restrictive 4 mm atrial septal defect, and mild pulmonary stenosis. There was no patent ductus arteriosus. Similar to the previous case, inferior caval vein was not connected directly to the right atrium. Because of the restrictive pattern of the ASD, high blood lactate level, and severe hypoxemia, BAS was performed like the former case. There were no complications noticed after the procedure.

Both patients were successfully operated in our hospital at a later time and they have been under our observation ever since. No additional complications or problems have arisen.

Angiography images are shown in the Figures 1–3.

Discussion

One of the main causes of early mortality in cases of D-TGA is hypoxia secondary to restrictive ASD. BAS is one of the life-saving palliative procedures that can be performed in a catheterisation laboratory or even ICU through transthoracic echocardiography. In case of restrictive

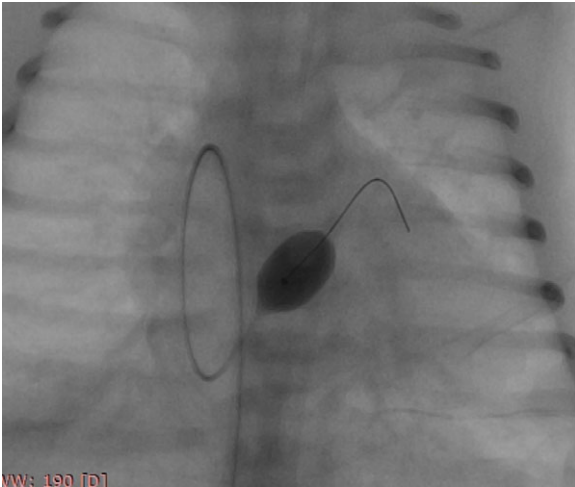


Figure 1.

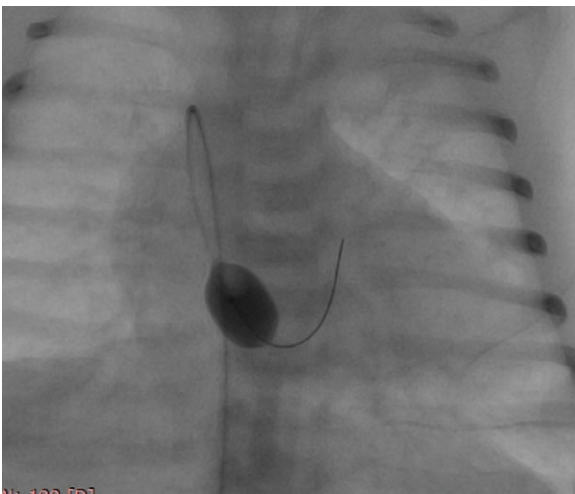


Figure 2.

interatrial communication and severe hypoxemia, urgent intervention with balloon atrial septostomy is needed prior to surgery for medical stabilisation.³ The femoral vein or umbilical vein, whenever available, is used to provide the access for the procedure. In cases when these access routes are not available because of thrombosed veins due to previous use, or in case of IVC interruption, BAS can be performed through transhepatic or transfemoral (azygos or hemiazygos) veins. Access through the internal jugular vein is not considered due to difficulties.⁴ A transfemoral approach in the case of IVC interruption with azygos continuity is preferred due to its safety for paediatric interventional angiography. Performing BAS procedure in left isomerism cases is hard due to the difficulty of steering the catheter from the top into the left atrium as shown in the figures. Therefore, using conventional approaches and methods is not effective and different manoeuvres are needed.⁵ Although BAS is known as a safe method, a recent study showed that prevalence of the diagnosis of stroke was higher in the group who underwent BAS before the operation. However, there was no significant statistical difference in mortality of BAS versus no-BAS patients.³

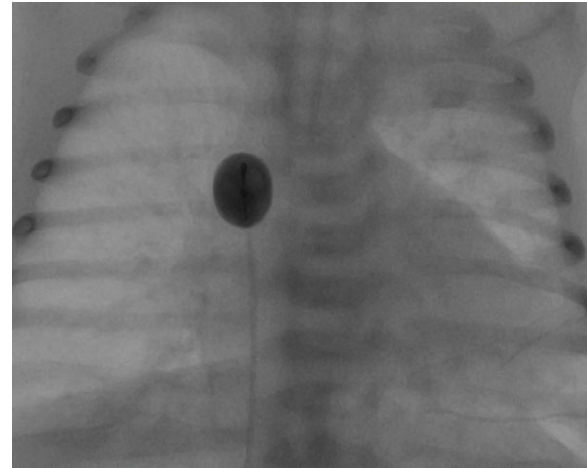


Figure 3.

In our case, IVC was interrupted due to left atrial isomerism. We entered the left atrium successfully with a NuMED balloon with the technique described above and the procedure could be done without any complications.

The aim of reporting these cases is to emphasise that in difficult situations where femoral vein or umbilical vein is not accessible or in case of IVC interruption, successful BAS could be done through the azygos or hemiazygos veins by balloon septostomy catheter.

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Conflicts of interest. None.

Ethical standards. The authors assert that all procedures contributing to this work comply with the ethical standards of the relevant national guidelines on human experimentation (Meryem Beyazal) and with the Helsinki Declaration of 1975, as revised in 2008, and has been approved by the institutional committees (Meryem Beyazal).

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