

The ability of percutaneous closure of ventricle-pulmonary connections in the setting of cavopulmonary shunt or after the Fontan procedure: our experience

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Background

Low pulmonary pressure and resistance is crucial for the proper function of the Fontan circulation. Maintained anterograde pulmonary blood flow (through pulmonary artery banding (PAB) or recanalization of surgically sutured pulmonary trunk) can cause elevated mean pulmonary artery blood pressure (MPAP) and volume overload of systematic ventricle in the setting of cavopulmonary shunt or after the Fontan procedure.

Objective

To study the utility of occluder devices in ventricle-pulmonary connections.

Material and methods

5 patients (3pts after Glenn procedure, including 2pts with elevated MPAP, respectively 22 and 19 mmHg; 2pts after the Fontan operation, including 1pt with failing Fontan circulation), in the age group 2-19 yrs, were treated percutaneously with occluder devices for ventricle-pulmonary connections. We used different types of occluder devices: CP cover stent (n=1), Amplatzer Muscular VSD Occluder (MuscVSD) (n=1), Amplatzer Duct Occluder II (ADOII) (n=2), Amplatzer Septal Occluder (ASO) (n=1).

Results

Procedural success (with no residual shunt) was achieved in all patients. Although in one case there was a need for implantation of an additional stent and in another case we had to retrieve MuscVSD and deploy ADOII due to its unsatisfactory position. We observed improvement and resolution of pleural effusion in the patient with failing Fontan circulation. One patient with cavopulmonary shunt and elevated MPAP six months later was qualified and scheduled for completion of Fontan circulation due to normalisation of MPAP.

Complications

Two patients had thrombus formation in pulmonary trunk proximally to the device. In one case thrombus formation was detected immediately after the procedure and it resolved with warfarin therapy without complications. Second patient, who was lost in follow up for 10 months, was admitted to our institution with thrombus and cerebral stroke.

Summary

Percutaneous closure of ventricle-pulmonary connections is technically possible. This intervention should be considered in patients with cavopulmonary shunt or Fontan circulation with elevated MPAP and volume overload of systematic ventricle. The use of appropriate anticoagulation is crucial for success.