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# Transhepatic vascular access - a feasible and safe alternative for cardiac catheterization in children with congenital heart disease?

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## Introduction

Cardiac catheterization in children with congenital heart disease is performed via femoral vascular access. In case this access isn't available due to vessel thrombosis, indwelling central lines or patient's small size, transhepatic approach seems a "viable" and safe alternative.

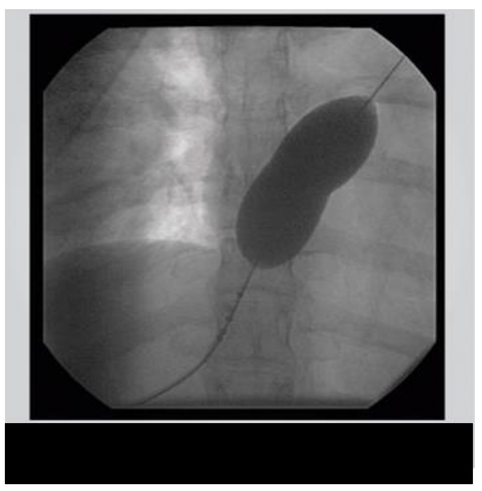
## Methods

Retrospective single center analysis 2005 to 2016.
Regarding feasibility, safety and complications of transhepatic access in children with congenital heart disease.

## Conclusion

- Broad spectrum of interventional cardiac catheter is possible via transhepatic vascular access.
- Transhepatic vascular access is feasible and safe alternative for cardiac catheterization, if routine femoral or jugular access is not possible.
- CAVE: active liver disease, abnormal hepatic drainage.

Catheter in right atrium via A.hepatica



Balloon-sizing for ASD-closure

## Results

| Patient | Nr. of Catheters | Body Weight | Congenital heart disease | Interventions | Sheath size | V. hepatica closed |
|---|---|---|---|---|---|---|
| 1 | 2 | A) 4.6kg<br>B) 10.9kg | Right isomerism double inlet left ventricle with total anomalous pulmonary venous return | A) Closure of pulmonary artery (amplatzer vascular plug 10mm)<br>B) Stenting superior caval vein (palmaz genesis 8x18mm) | 4 french | yes (cook coil) |
| 2 | 1 | 6.6kg | Pulmonary atresia ventricular septal defect | Stenting left and right pulmonary artery (palmaz blue stent 6x15mm and 7x15mm) | 4 french | yes (cook coil) |
| 3 | 2 | A) 9.8kg<br>B) 10kg | Ebstein's anomaly, pulmonary valve stenosis | A) Coiling venovenous collateral (amplatzer vascular plug 6/8), ASD closure (ASO)<br>B) Transseptal puncture, balloon dilatation left upper pulmonary vein | 6 french | no |
| 4 | 1 | 10kg | Double outlet right ventricle, hypoplastic left ventricle, obstruction right ventricular outflow tract | Diagnostic (no intervention) | 4 french | no |
| 5 | 1 | 18kg | Complete atrioventricular septal defect, pulmonary stenosis | Stenting distal pulmonary artery (CP Stent 16mm) | 11 french | yes (amplatzer vascular plug) |
| 6 | 1 | 32kg | Atrial septal defect, secundum type | ASD-Closure (amplatzer septal occluder 12mm) | 7 french | no |

- Eight cardiac catheterizations in 6 children during 11 year period.
- Median age 18.5months (range 2-174months), median weight 10kg (range 4.6-18kg).
- Sheath size ranged 4-11Fr.
- Transhepatic puncture was ultrasound guided.
- After 3 interventions the punctured hepatic vein was closed with a device.
- In all patients post interventional abdominal ultrasound, transthoracic echocardiography and ECG didn't reveal any complications, especially no intra abdominal bleeding.

Coiling hepatic vein after intervention

Literature
- Shim D et al. Transhepatic Therapeutic Cardiac Catheterization: A new Option for the Pediatric Interventionalist. Cathet and Cardiovasc Diagn. 1999; 47:41-45
- Mc Leod KA et al. Transhepatic approach for cardiac catheterization in children: initial experience. Heart. 1999; 82: 694-96
- Pulver A et al. Transhepatic Transseptal, Anterograde Balloon Angioplasty for Recurrent Neonatal Coarctation. Congenit Heart Dis. 2007; 2:438-41
- Jolly N et al. Transhepatic Closure of Patent Foramen Ovale. Catheterization and Cardiovascular Interventions. 2010; 75: 56-59
- Al Senaidi K et al. Percutaneous Transhepatic Stenting of a Restrictive Atrial Septal Communication in Hypoplastic Left Heart Syndrom. Cath and Cardiovasc Interventions. 2014; 83: 269-71
- Boe BA et al. Transhepatic Central Venous Catheters in Pediatrics Patients With Congenital Heart Disease. Pediatr. Crit Care Med. 2015; 16; 726-32