

Introduction

Today, young patients with native CoA are treated surgically. However, surgery for re-CoA is associated with increased morbidity and even mortality. Some children with native CoA present relative contraindications for surgery. CoA-stenting may be an alternative treatment option in these patients. We present the short- to mid-term results after CoA-stenting in small children.

Material and Methods

Between January 1999 and November 2015, 218 patients with CoA were treated with stents. Fifteen of these (female – 9, male – 6, median age 8 months [3-34]; median weight 5,8 kg [4,6-14,7] were included into the study (age<3 years; weight <15 kg).

Diagnoses

Re-CoA post-surgery was found in 14 patients (in 8 patients after Norwood procedure, in 3 patients who underwent CoA-end-to-end anastomosis and in 3 patients after complex arch reconstruction). In one patient with relative contraindications for surgery (ALL on chemotherapy) native CoA was stented.

Patient number	Age [months]	Weight [kg]	Diagnoses	CoA category	Access	Type of the stent	Gradient before stenting [mmHg]	Gradient after stenting [mmHg]	Left subclavian artery overstenting
1	3	4,6	HLHS	re-CoA	Femoral vein	Cook formula 8x12 mm	14	-5	No
2	4	4,7	HLHS	re-CoA	Femoral vein	Cook formula 6x12 mm	37	-7	Yes
3	8	5,2	HLHS	re-CoA	Femoral vein	Cook formula 6x12 mm	14	0	No
4	4	5,3	Hypoplastic aortic arch	re-CoA	Femoral artery	Osypka baby stent	118	32	No
5	6	5,6	Isolated CoA	re-CoA	Femoral artery	Cook formula 6x12 mm	48	9	No
6	5	5,7	HLHS	re-CoA	Femoral artery	Cook formula 6x12 mm	10	0	No
7	5	5,8	Hypoplastic aortic arch	re-CoA	Femoral artery	Osypka baby stent	40	0	No
8	9	5,8	HLHS	re-CoA	Femoral artery	Cook formula 6x12 mm	10	0	No
9	5	6,7	Criss-cross univentricular heart, CoA	re-CoA	Femoral artery	Osypka baby stent	23	5	Yes
10	8	7,1	CoA, MS	re-CoA	Femoral artery	Osypka baby stent	40	13	No
11	32	12,2	CoA	re-CoA	Femoral artery	Cook formula 8x12 mm	50	5	Yes (re-opened)
12	34	13,2	CoA, ALL	Native CoA	Femoral artery	Cook formula 8x12 mm	107	21	No
13	28	14,7	HLHS	re-CoA	Femoral vein	Cook formula 8x12 mm	24	-1	No
14	10	6,5	Dextrocardia, Hypoplastic aortic arch	re-CoA	Femoral artery	Cook formula 8x12 mm	4	-2	Yes
15	19	10,5	HLHS	re-CoA	Femoral artery	2x Cook formula 8x12 mm	20	9	No

Tab. 1. HLHS- hypoplastic left heart syndrome; CoA- coarctation of aorta; MS- mitral stenosis; ALL- acute lymphoblastic leukemia

Results

Procedural success was obtained in all patients. The mean systolic gradient declined from 37 ± 34 mmHg to 6 ± 11 mmHg ($p=0,003$). The stenosed aortic diameter increased from a mean value of $3,1 \pm 1,5$ mm to $6,5 \pm 1,8$ mm ($p=0,001$). In four patients the intervention was performed by venous access. In three patients the left subclavian artery was covered by the stent (re-opened by balloon angioplasty in one patient).

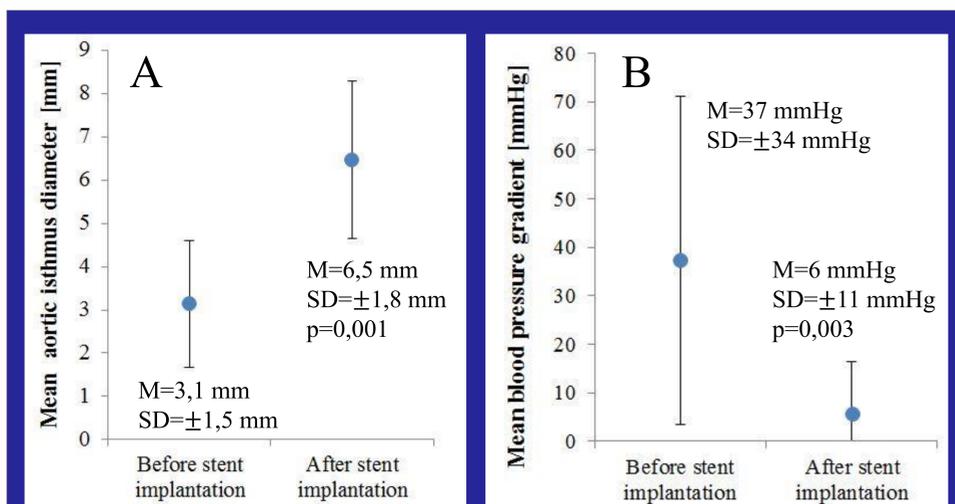


Fig. 1. Figures showing procedural success. A – Mean aortic isthmus diameter before and after stent implantation. B – Mean blood pressure gradient before and after stent implantation.

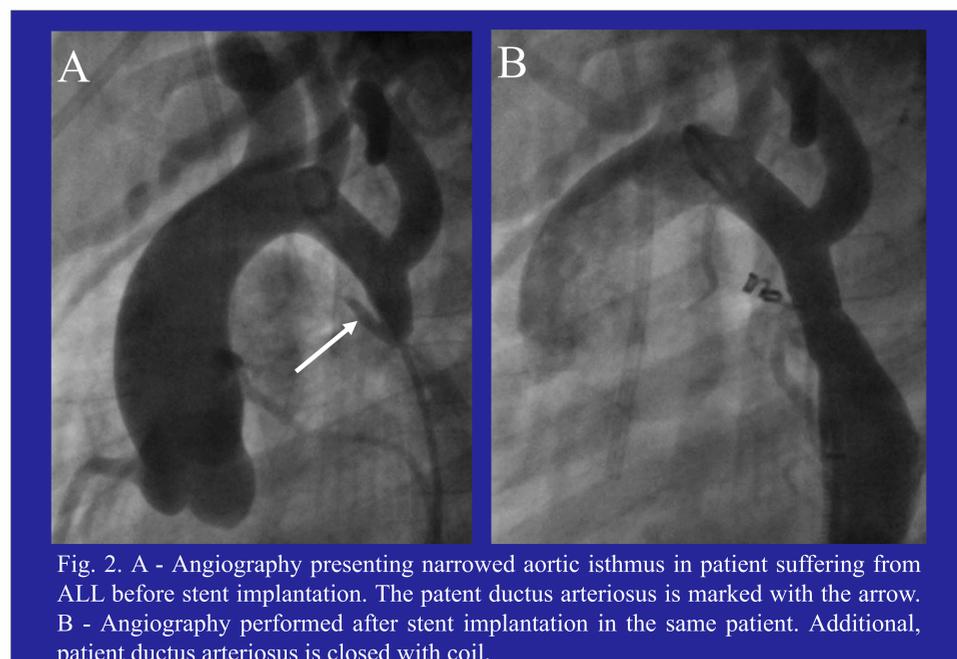


Fig. 2. A - Angiography presenting narrowed aortic isthmus in patient suffering from ALL before stent implantation. The patent ductus arteriosus is marked with the arrow. B - Angiography performed after stent implantation in the same patient. Additional, patent ductus arteriosus is closed with coil.

Complications

After the procedure in one patient right femoral artery and in another patient right femoral vein were occluded. There were no other complications.

Follow-up

The mean follow-up time is $4,8 \pm 6,4$ months, during this time 7 patients required re-dilatation, two of them underwent re-stenting. The mean time of re-intervention was $5,1 \pm 4,0$ months. All patients are alive.

Conclusion

Percutaneous stent implantation for Re-CoA and in selected patients with native CoA can be performed successfully in very young patients. However, repeated stent angioplasties and further on interventional 'opening' of the stent with a larger stent shall be necessary to augment the aorta to adult size.