Predictors of re-intervention after aortic coarctation repair in childhood - a population based study

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Introduction: Recurrent coarctation of the aorta (reCoA) may occur regardless of primary treatment modality including surgery or balloon angioplasty/stent. Residual CoA and small transverse arch have been proposed as etiological factors. The aim of the present study was to evaluate the incidence of reCoA and to explore risk factors predicting the need for re-intervention.

Methods: 294 patients with isolated CoA were treated (surgery n=251, angioplasty n=43) in Helsinki Children's Hospital between years 2000 and 2012 with a follow-up until 2014 (median 8.0 years). Pre- and post-procedure baseline characteristics were retrospectively collected from clinical records.

Results: In all, 51/294(17.3%) of the patients developed reCoA after the initial procedure, 40/251(15.9%) after surgery and 11/43(25.6%) after angioplasty. The median time to second procedure was 3.4 and 16.8 months, respectively. In the surgery group, younger age, smaller weight and small pre-procedure transverse arch were associated with reCoA(Table). There were no need for re-interventions if aortic arch reconstruction was used as a primary technique (n=15). In the angioplasty group, bicuspid aortic valve was more common and post-procedure arm-leg blood pressure gradient (BPGr) was higher among reCoAs(Table), all but one reCoAs had post-procedure BPGr at least 10 mmHg. The best cut off post-procedure BPGr value was 7,6 mmHg based on ROC-analysis, and predicted reCoA with a sensitivity and specificity of 60%. The best cut off for pre-procedure transverse arch Z-score was -2.8 SD with a sensitivity of 38% and specificity of 79%. In logistic regression, post-procedure BPGr and small transverse arch were independent predictors of reCoA when arch reconstructions were removed from the analyses.

Conclusions: The need for re-intervention after CoA repair in childhood is common and the associated risk factors differ between the primary treatment modalities. Both residual CoA and small aortic arch were independent predictors of development of reCoA.

Baseline characteristics	Surgery		Angioplasty	
	No ReCoA n=211	ReCoA n=40	No ReCoA n=32	ReCoA n=11
Age, surgery in days, angioplasty in years, median (range)	23 (1-6378)	10 (1-250)*	3,1 (0,7-14,3)	5,7 (0,9-15,5)
Weight (kg) at primary procedure, median (range)	4,1 (1,1-98,5)	3,8 * (2,3-7,2)	14,2 (6,8-72,5)	20,0 (9,1-63,9)
Sex (male, %)	146 (69%)	26 (65%)	22 (69%)	9 (82%)
Bicuspid aortic valve (%)	97 (46%)	19 (48%)	4 (13%)	6 (55%)*
Pre-procedure transverse arch diameter, Z-score, mean (SD)	-1,5 (2,0)	-2,2 (1,2)*	-0,1 (1,0)	-0,8 (1,4)
Pre-procedure systolic arm-leg gradient, mmHg, mean(SD)	35,1 (18,6)	34,6 (18,8)	27,3(19,1)	31,7 (20,6)
Post-procedure systolic arm-leg gradient, mmHg mean(SD)	3,7 (11,3)	5,3 (10,0)	9,6(12,9)	27,6(15,1)*

* p<0,05, Fisher`s exact test / Mann-Whitney U-test / Independent sample T-test