Immediate and midterm results of balloon angioplasty for recurrent aortic coarctation in children less than one year

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Objective: Several publications have considered results of percutaneous angioplasty of aortic recoarctation, but none of them focused on procedures performed in children before one year of age. We aimed to describe the immediate and midterm results of balloon angioplasty of recoarctation before the age of one year, and to define factors that may influence the outcome.

Method: We retrospectively reviewed data from 20 consecutive children undergoing percutaneous dilatation of aortic recoarctation before one year of age in University Hospitals of Tours and Nantes.

Results: In all patients except one, dilatation improved the median recoarctation diameter Z score (from -5.5 (range -10.6 to -2.5) to -2.8 (range -4.3 to 0.7); p<0.001), and reduced the median peak systolic gradient (from 33mmHg (range 20 to 60) to 21mmHg (range 6 to 50); p<0.001). There was no procedure-induced mortality and no acute intimal flap or long term aneurysm. Three patients experienced a transient femoral artery thrombosis with a transient ischemic stroke in one of them.
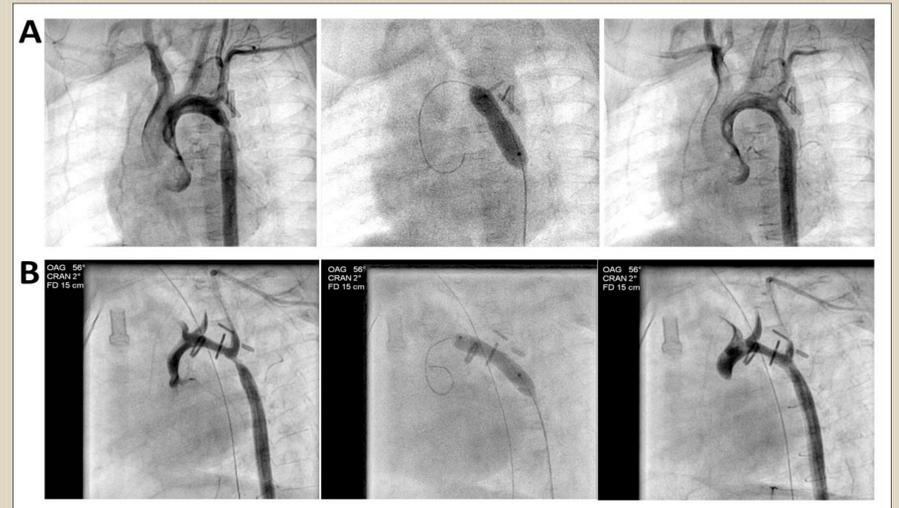

Fig 1: Two representative illustrations (A and B) of percutaneous balloon angioplasty of recoarctation.

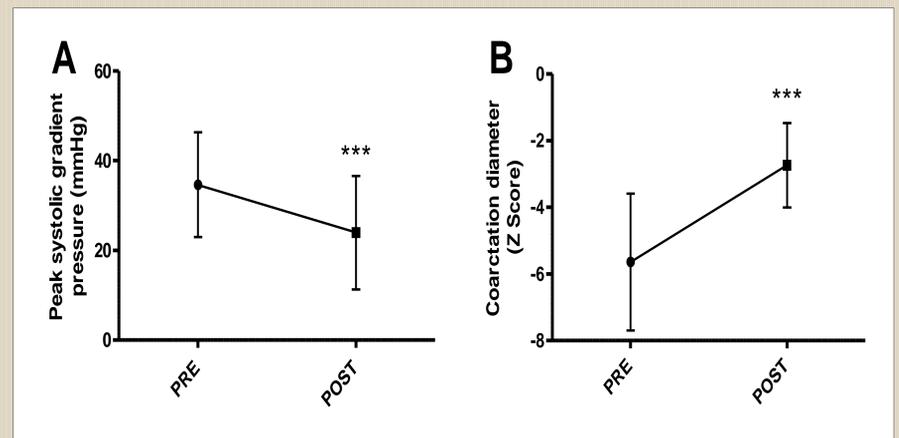|	Re-intervention (n=8)	No re-intervention (n=10)	p
Age at surgery (days)	10 (range 6;25)	11 (range 5;29)	NS
Age at dilatation (months)	3.2 (range 1.2;4.8)	2.9 (range 2.2;8.3)	NS
Weight at dilatation (g)	3.9 (range 2.7;5.0)	5.0 (range 3.0;8.0)	0.03
Interval between surgery and dilatation (months)	2.6 (range 0.9;4.2)	2.6 (range1.4;7.8)	NS
Peak systolic pressure before dilatation (mmHg)	36 (range 20;60)	31 (range 21;56)	NS
Peak systolic pressure after dilatation (mmHg)	25 (range 10;50)	21 (range 9;44)	NS
Peak systolic pressure after dilatation >20mmHg	4/8	5/10	NS
Recoarctation diameter before dilatation (Z score)	-4.3 (range -7.7;-2.5)	-5.8 (range -10.6;-2.7)	NS
Recoarctation diameter after dilatation (Z score)	-2.8 (range -4.1;-1.5)	-3.2 (range -4.3;0.7)	NS
Transverse arch diameter (Z score)	0.2 (range -2.6;1.7)	-2.0 (range -3.8;3.0)	NS
Transverse arch hypoplasia (Z score < -2)	2/8	5/10	NS
Transverse arch to LC-LS diameter ratio	0.7 (range 0.4;0.9)	0.7 (range 0.3;0.9)	NS
Descending aorta diameter (Z score)	0.0 (range -1.6;1.7)	-0.7 (range -2.6;1.5)	NS
Balloon to transverse arch diameter ratio	0.7 (range 0.4;1.0)	0.9 (range 0.6;1.2)	NS
Balloon to LC-LS diameter ratio	1.1 (range 0.7;1.4)	1.3 (range 0.9;2.1)	NS
Balloon to recoarctation diameter ratio	2.0 (range 1.3;3.3)	2.7 (range 2.1;4.5)	0.05
Balloon to descending aorta ratio	0.8 (range 0.7;1.2)	1.0 (range 0.9;1.3)	0.03

Fig 2: Immediate result of angioplasties. Change in peak systolic gradient pressure (A) and in coarctation diameter (B) obtained in the catheterisation lab before (PRE) and after (POST) balloon angioplasty. *** p<0.001.

Eight children (40%) needed re-intervention for further recoarctation (new surgery n=4 or new dilatation n=4). A smaller size of the balloon was significantly associated with the risk of re-intervention (balloon to recoarctation diameter ratio: 2.0 (range 1.3-3.3) vs 2.7 (range 2.1-4.5), p<0.05; balloon to descending aorta ratio: 0.8 (range 0.7-1.2) vs 1.0 (range 0.9-1.3), p<0.05).
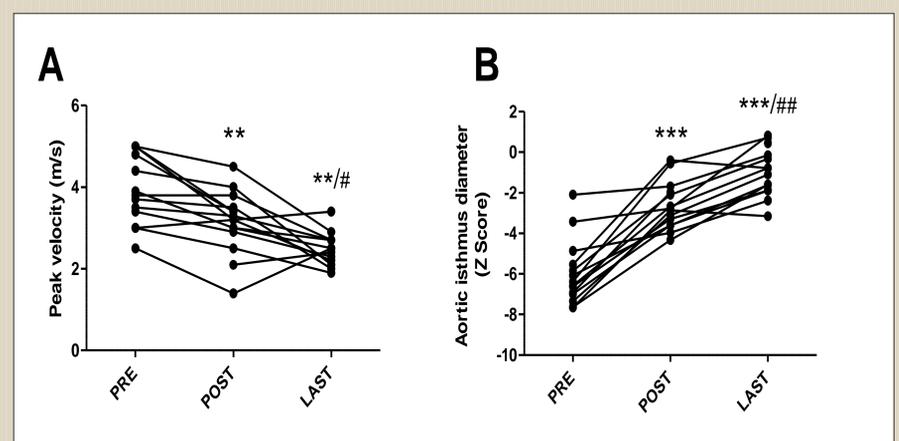

Fig 3: Change in peak velocity (A) and aortic isthmus diameter (B) before (PRE), after (POST) and during follow-up (LAST), assessed by echo Doppler ultrasound. *** p<0.001, ** p<0.01, POST vs PRE or LAST vs PRE; ## p<0.01, # p<0.05, LAST vs POST.

Conclusion: Percutaneous balloon angioplasty for recoarctation in young infant less than one year is safe and immediately effective. However, the rate for further intervention is high, and associated with a smaller size of the balloon.