Results

Follow-up cohort

A total of 32 patients had more than one scan, 30 patients had two scans, 2 patients three scans, respectively. The mean time between those exams was 488±448 days (range: 0–1,433 days). The overall matched mean difference between first and second scan was 2.5±4.8 mm for the DL and 2.6±4.4 mm for the reports. A size increase of >5 mm between two scans was found in 4 cases (DL: 2 cases, reports: 2 cases). After detailed review, true dilatation was found in none of those cases. For the two DL cases, the measurement planes at the aortic root were tilted causing the measurement discrepancy. For measurements from the reports, one case was probably caused by a tilt in measurement planes, the other case was likely a typing error in the report.
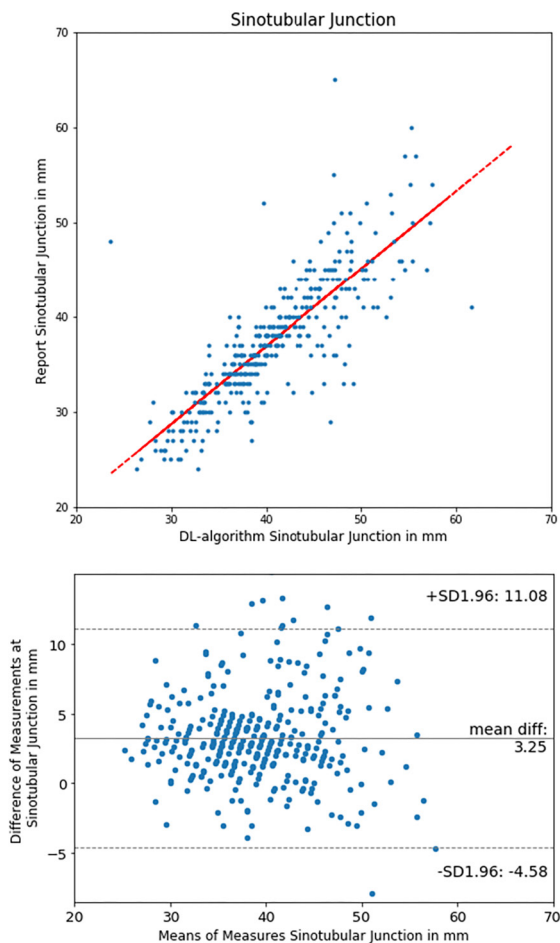

Figure S1 Scatter and Bland-Altman plots of measurements (in mm) at Sinotubular junction.
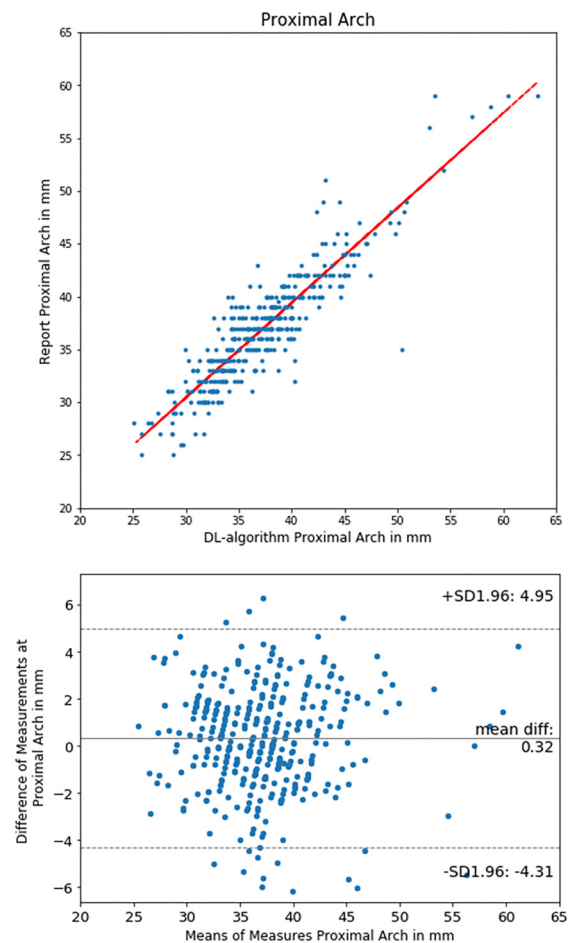

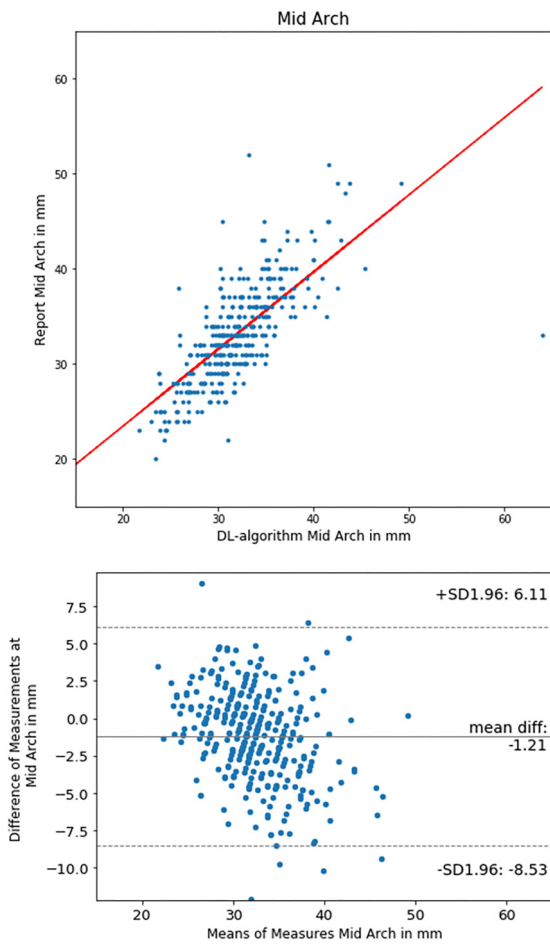**Figure S2** Scatter and Bland-Altman plots of measurements (in mm) at Proximal arch.

Figure S3 Scatter and Bland-Altman plots of measurements (in mm) at Mid arch.
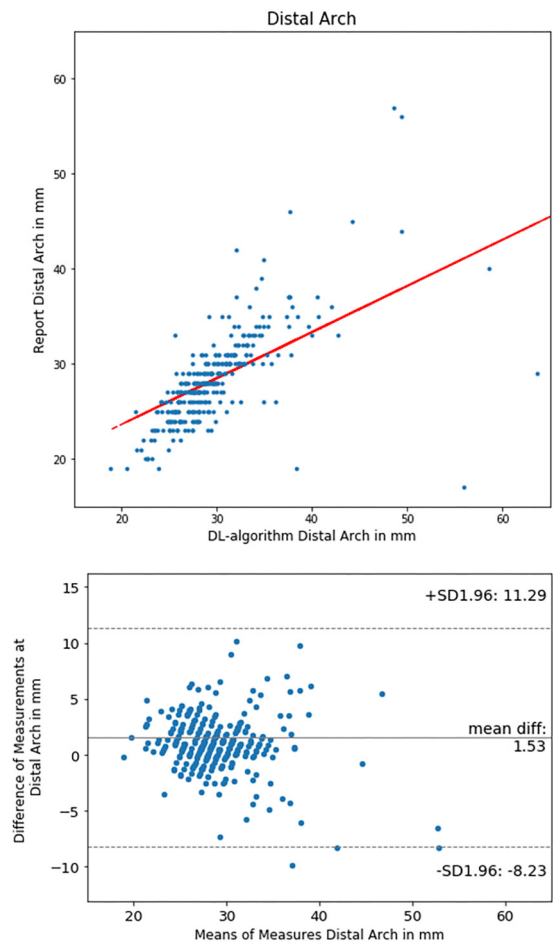

Figure S4 Scatter and Bland-Altman plots of measurements (in mm) at Distal arch.

Table S1 Measurements by the DL-algorithm sorted by sex and age groups

Sex	Age group [years]	Total cases	AS Mean	AS Std	STJ Mean	STJ Std	AA Mean	AA Std	PA Mean	PA Std	MA Mean	MA Std	DA Mean	DA Std	MDA Mean	MDA Std	DDA Mean	DDA Std
Female	0–54	20	36.8	5.1	36.6	6.3	39.1	8.0	32.2	5.1	28.6	4.9	24.8	3.1	22.8	2.9	22.4	2.9
	54–59	9	34.6	4.0	34.4	4.1	47.0	8.7	36.8	7.5	29.8	6.2	27.9	4.5	25.0	6.6	25.8	5.7
	59–64	10	36.1	2.8	35.4	3.5	43.5	6.9	34.1	3.9	28.8	3.1	29.6	2.2	27.1	3.4	26.5	4.0
	64–69	26	35.2	5.1	35.2	4.8	41.9	5.9	36.7	4.7	30.9	3.3	28.2	4.2	26.1	3.4	25.9	3.8
	69–74	10	39.5	8.0	39.2	7.0	48.2	14.0	40.9	10.2	32.1	4.1	30.0	3.4	27.7	5.0	26.2	4.4
	74–79	17	39.7	8.4	38.7	7.6	47.0	11.7	41.0	7.3	33.2	4.3	29.7	4.5	28.5	5.4	27.8	6.3
	79–84	13	39.7	8.9	38.9	9.1	45.0	10.7	39.8	9.1	31.8	3.2	32.5	13.2	27.9	4.7	27.6	5.1
	84–99	3	30.3	2.4	30.5	1.6	37.6	3.7	35.8	3.1	31.6	4.6	31.7	3.4	31.1	4.4	28.7	4.0
Male	0–54	63	41.6	5.6	42.2	6.4	41.8	7.0	35.7	5.5	30.1	5.1	29.6	8.1	26.2	3.5	25.3	2.8
	54–59	37	43.7	4.3	43.5	5.9	42.7	5.5	36.0	3.6	31.1	2.8	28.6	2.7	27.1	2.1	26.5	1.9
	59–64	49	43.1	4.5	42.9	5.3	43.1	4.8	37.4	4.6	32.0	3.9	29.4	4.2	27.5	3.5	26.7	3.1
	64–69	70	43.4	5.6	43.0	5.9	42.2	4.7	37.4	4.2	32.4	4.0	30.7	5.9	29.0	4.1	28.2	3.5
	69–74	44	43.7	5.9	43.1	6.5	42.7	5.7	37.9	4.4	33.9	5.7	31.8	7.6	29.6	3.4	28.3	3.8
	74–79	37	40.3	6.4	39.4	7.3	41.6	5.2	38.0	5.5	32.6	3.9	30.6	4.9	28.3	3.9	27.8	4.2
	79–84	17	40.9	8.6	39.9	8.5	43.3	7.2	38.0	5.9	33.3	5.0	33.0	11.6	28.8	5.3	28.6	6.0
	84–99	7	43.7	5.3	41.7	3.6	44.3	3.5	40.6	4.1	35.8	4.1	36.8	8.2	33.9	5.9	29.9	3.0

AS, aortic sinus; STJ, sinotubular Junction; AA, Ascending aorta; PA, proximal arch; MA, mid arch; DA, distal arch; MDA, mid descending aorta; DDA, distal descending aorta; STD, standard deviation.

Table S2 Intraclass correlations (ICC) for inter-rater agreement

Dataset B (n=21) inter-rater subset location	ICC for intra-reader agreement Reader 1	ICC for intra-reader agreement Reader 2	ICC for intra-reader agreement Reader 3	ICC for inter-reader agreement (R1-R3)
AS	0.91	0.98	0.98	0.95
STJ	0.76	0.96	0.70	0.85
AA	0.98	0.99	0.97	0.98
PA	0.87	0.98	0.97	0.93
MA	0.89	0.98	0.99	0.97
DA	0.94	0.97	0.95	0.95
MDA	0.91	0.94	0.94	0.93
DDA	0.95	0.96	0.98	0.97
Average	0.90	0.97	0.93	0.94

AS, aortic sinus; STJ, sinotubular Junction; AA, ascending aorta; PA, proximal arch; MA, mid arch; DA, distal arch; MDA, mid descending aorta; DDA, distal descending aorta; ICC, intraclass correlation; R, reader.

Table S3 Measurement times

Dataset B (n=21) inter-rater subset	Reader 1		Reader 2		Reader 3		Duration DL measurements	
Reading session	1st read	2nd read	1st read	2nd read	1st read	2nd read	1st read	2nd read
Average reading time ± SD (min)	6:54±2:32	6:08±1:46	3:41±0:53	3:26±1:04	4:39±0:53	4:03±0:42	2:21±0:24	2:17±0:19
Overall average reading time ± SD (min)	4:48±1:55						2:19±0:22	

Comparison of reading times. Overall, the DL-algorithm performed measurements significantly faster than human readers. DL, deep learning; SD, standard deviation.