

Aortic tortuosity index as a predictor of type A aortic dissection

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**Introduction:** The risk of type A aortic dissection (AAD) depends on the degree of aortic wall's alteration, which can result in dilatation or tortuosity. The estimate of this risk relies solely on the evaluation of the diameter of the ascending aorta.

**Purpose:** The purpose of this study is to evaluate the presence and importance of aortic tortuosity in patients with type A aortic dissection.

**Method:** Postoperative CT scans of patients with type A aortic dissection were compared with CT scans from controls matched for gender and age. After 3D reconstruction, total length (actual distance along aortic center line = Ltot) and geometric length (length of a straight line between start and end of the aortic segment = Lgeo) were measured to calculate the tortuosity index (TI = Ltot / Lgeo).

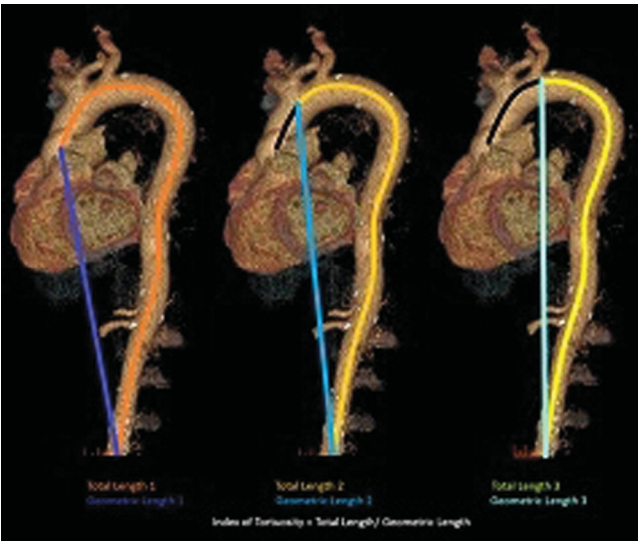
**Results:** Ltot, Lgeo and TI from different aortic segments of the AAD group were higher than in the control group. Ltot and TI of the whole aorta (from aortic valve to bifurcation) were greater in patients with type A aortic dissection (527.7±46.1 mm vs. 475.8±39.7, p<0.0001; and 2.05±0.24 vs. 1.98±0.21, p=0.002 respectively). Total length and TI were greater after exclusion of the ascending part, and a value of this TI >1.3 identifies AAD patients with an accuracy of 74.8% (AUC = 0.792, p<0.0001). TI is altered by risk factors for aortic dissection: it increases with hypertension and age but not by tobacco use, and TI decreases in diabetes.

**Conclusions:** Type A aortic dissection is associated with longer aorta and increased aortic tortuosity. This index may help recognize patients at risk for type A aortic dissection.

Main results

	Dissection group (n=109)	Control group (n=109)	Mean difference between each pairs (%)	P value
Ltot 1 – mm (mean ± SD)	527.7±46.1	475.8±39.7	9.36	<0.0001
Lgeo1 – mm (mean ± SD)	259.0±28.4	242.6±26.5	5.51	<0.0001
TI 1 – mm (mean ± SD)	2.05±0.238	1.98±0.211	2.95	0.002
Ltot 2 – mm (mean ± SD)	446.3±39.1	390.6±33.3	12.00	<0.0001
Lgeo2 – mm (mean ± SD)	326.3±30.0	312.8±27.0	3.52	<0.0001
TI 2 – mm (mean ± SD)	1.37±0.13	1.25±0.08	8.29	<0.0001
Ltot 3 – mm (mean ± SD)	410.9±36.6	363.7±30.9	11.00	<0.0001
Lgeo 3 – mm (mean ± SD)	343.8±28.8	322.2±27.2	5.80	<0.0001
TI 3 – mm (mean ± SD)	1.20±0.10	1.13±0.06	5.18	<0.0001
Ltot 2-3 – mm (mean ± SD)	102.5±32.0	27.0±6.4	71.41	<0.0001

Total lengths (Ltot), geometric lengths (Lgeo) and tortuosity indexes (TI) in patients with type A aortic dissection and controls.



Calculation of tortuosity indexes