

Conference Abstract

P.53 Ascending Aorta Diameter and Pulse Wave Velocity are Increased and Local Hemodynamic is Disrupted in Patients with Blunt Traumatic Thoracic Aortic Injury Treated by TEVAR

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Keywords

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stiffness
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MRI

ABSTRACT

Background: Thoracic endovascular aortic repair (TEVAR) is becoming the preferred treatment option to repair the proximal descending aorta after rupture following blunt traumatic injury. However, hemodynamic and mechanic implications of this intervention are poorly understood. Exploiting the possibilities of 4D flow magnetic resonance imaging, hemodynamics, stiffness and local dilation in the ascending aorta in patients following aortic repair by TEVAR are studied.

Methods: Fifteen apparently healthy individuals who underwent TEVAR implantation after traumatic descending aortic injury and 44 healthy volunteers (HV) underwent 4D flow-MRI. Ascending aorta pulse wave velocity was computed [1]. Moreover, at eight planes equally distributed in the ascending aorta systolic flow reversal ratio, i.e. relative amount of backward flow during systole, and in-plane rotational flow, measuring the strength of helical flow, were computed [2,3].

Results: TEVAR patients and HV did not differ in terms of age, sex, BSA and blood pressure (Table). However, compared to HV, TEVAR patients showed reduced in-plane rotational flow in the distal ascending aorta in patients with TEVAR and increased backward systolic flow in the whole ascending aorta (Figure). Patients with TEVAR had a stiffer ascending aorta, with pulse wave velocity higher compared control (7.8 ± 4.2 vs 5.3 ± 1.9 , $p = 0.004$). Finally, aortic root and ascending aorta diameters were larger in TEVAR patients compared to HV (Table).

Conclusions: The implantation of TEVAR in apparently healthy individuals after traumatic rupture of the proximal descending aorta is associated with altered hemodynamics, higher stiffness and larger aortic diameter in the region proximal to the TEVAR.

Table

	Healthy volunteers	TEVAR patients	<i>p</i>
N	44	15	
Age [years]	40 ± 12	43 ± 10	0.392
Sex [% male]	66	80	0.075
Years from intervention [years]	N/A	10.3 ± 6.4	N/A
Body surface area [m ²]	1.87 ± 0.15	1.96 ± 0.23	0.088
Systolic blood pressure [mmHg]	127 ± 19	131 ± 15	0.389
Diastolic blood pressure [mmHg]	70 ± 11	74 ± 9	0.198
Aortic root diameter [mm]	31 ± 4	34 ± 4	0.026
Ascending aorta diameter [mm]	28 ± 4	32 ± 3	0.003
Ascending aorta PWV [m/s]	5.3 ± 1.9	7.8 ± 4.2	0.004

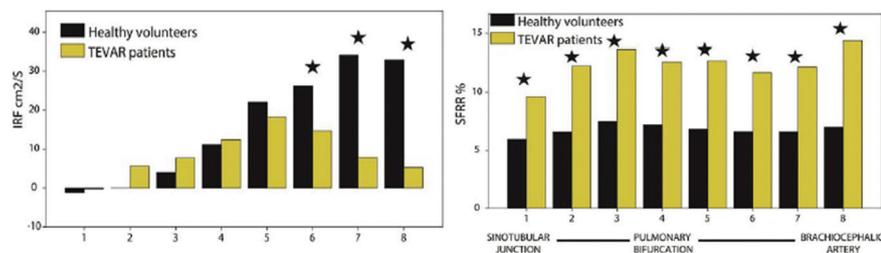


Figure In-plane rotational flow (IRF, left) and systolic flow reversal ratio (SFRR, right) in healthy volunteers (black) and TEVAR patients (yellow) in the proximal (planes 1 to 4) and distal (planes 5 to 8) ascending aorta. Stars show statistically-significant differences ($p < 0.05$).

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