

Gender differences in Aortic Wall Thickness Regression by Magnetic Resonance Imaging (MRI) and its Association to HDL Profile: The Plaque Follow up Study by the National Institute of Aging (NIA)

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Background:

Aortic atherosclerotic plaques are associated with the risk of further cardiovascular events. Magnetic resonance imaging (MRI) allows for monitoring plaque regression and is a precise non-invasive tool for accurate measurements of aortic wall thickness in clinical trials, in patients with advanced atherosclerosis. The purpose of our study was to assess the relationship between changes in aortic wall thickness measured by MRI with lipid profile and gender, of participants enrolled in the Plaque Study by National Institute of Aging, a randomized clinical trial using lipid-lowering drugs (Fluvastatin + Niacin).

Methods:

114 participants (95 males) >65 years of age in the Plaque Study underwent baseline MRI, and after starting the lipid-lowering therapy, MRI measurements of thoracic aortic wall thickness were repeated every 6 months for two years, using a 1.5-Tesla MRI system. Axial images of 3 segments of the thoracic aorta (ascending, arch and descending segments) were obtained using a double inversion recovery black blood fast spin-echo sequence with ECG-gating and T1-weighted (post 0.1 mmol/kg of intravenous injection of gadodiamide) was used to evaluate the changes in vessel wall thickness and lumen diameter compared to baseline variables at study entry. Robust generalized estimation equations were used for the data analysis.

Results:

We found a significant lower rate reduction of aortic wall thickness in men when compared to women during the 2 years follow up. The reduction was statistically significant for ascending (<0.01) and descending aorta (p<0.01), and marginally significant for the aortic arch (p=0.06). After adjusting for age, gender, aortic lumen diameter, LDL, triglycerides, and Lipoprotein A (LPA), higher values of serum high-density lipoprotein (HDL) was associated with a significant reduction in the ascending aorta wall thickness (p<0.05). Changes in the serum LDL and triglyceride levels had no significant effect on the changes in aortic wall thickness. The lumen diameter was related to aortic wall thickness in all aortic segments and this relationship remained significant even after adjustments (p<0.05). The results of the analyses are shown in Table 1.

Conclusion:

Women demonstrate higher reduction in aortic wall thickness following lipid-lowering therapy than men. Greater HDL levels were related to a decrease in ascending aortic wall thickness, after adjustments for variables. These results indicate the importance of MRI aortic thickness measurements as an index of regression atherosclerotic plaque burden and vulnerability, and may provide important information regarding risk stratification and treatment selection, which may have therapeutic implications and improve the prognosis of cardiovascular disease patients. Ongoing studies will investigate its role in monitoring lipid lowering therapy in patients with advanced cardiovascular disease.

Table 1. Relationship of Aortic Wall thickness and Adjusted and unadjusted results of the generalized estimation equations.

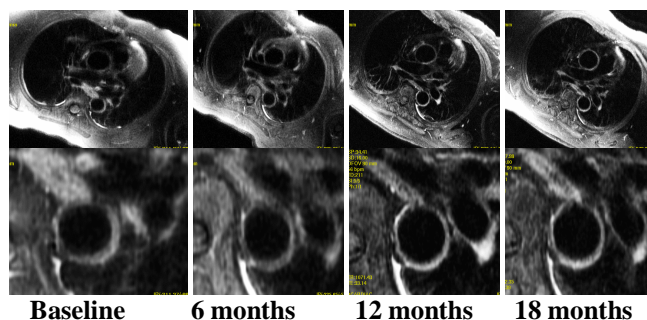
	Generalized Estimation Equations Coefficients for vessel wall thickness (mm)					
	Ascending Aorta		Aortic Arch		Descending Aorta	
	Unadjusted	Adjusted*	Unadjusted	Adjusted*	Unadjusted	Adjusted*
Age ≥ 75 years	-0.4	-0.25	-0.5	-0.10	0.3	0.16
Male gender	0.9 †	0.03	0.6	-0.05	0.6 †	-0.17
HDL	-0.01	-0.02 †	-0.003	-0.01	0.004	0.004
LDL	0.004	0.003	0.001	-0.002	-0.002	-0.004
Triglyceride	0.001	0.0001	-0.001	-0.001	0.0005	0.0003
LPA	-0.03	0.02	-0.03	0.0002	-0.06	-0.03
Aortic lumen diameter	0.19 †	0.17 †	0.18 †	0.17 †	0.35 †	0.38 †

Abbreviations: HDL=High-density lipoprotein, LDL=Low-density lipoprotein, LPA=Lipoprotein(a).

*Adjusted for age, gender, aortic lumen diameter and serum levels of HDL, LDL, Triglycerides and LPA.

†p<0.05, || p≤0.06

Figure 1. Serial Axial T1-Weighted post-gadolinium images of the descending thoracic aorta from the same patient during the follow-up showing the aortic wall thickness regression.



References:

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