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Vascular Disease

Vascular Disease and Erectile Dysfunction

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[*Rev Cardiovasc Med.* 2005;6(2):127-128]

Impaired Brachial Artery Endothelium-Dependent and -Independent Vasodilation in Men with Erectile Dysfunction and No Other Clinical Cardiovascular Disease.

Kaiser D, Billups K, Mason C, et al.
J Am Coll Cardiol. 2004;43:179-184.

Erectile Dysfunction: The Earliest Sign of Generalized Vascular Disease?

Cheitlin M.
J Am Coll Cardiol. 2004;43:185-186.

It is quite common during the course of taking a thorough cardiovascular history that male patients will describe symptoms consistent with erectile dysfunction (ED). Often these symptoms are attributed to either adverse effects of medication, particularly antihypertensive treatments, or life stresses. ED is present in approximately 30 million American men, with vascular causes, particularly endothelial dysfunction, responsible for the vast majority of cases. Penile erection occurs through neural stimulation of the endothelial lining of penile vessels and the lacunae of the corpus cavernosum. This stimulation results in the release of nitric oxide (NO), which activates guanylate cyclase, leading to the conversion of guanosine triphosphate into cyclic guanosine monophosphate (cGMP), resulting in smooth muscle relaxation, arteriolar vasodilation, relaxation of the corpus cavernosum lacunae, filling of the lacunae with arterial blood under arterial pressure, and swelling of the penis. The erection resolves as a result of the cGMP's hydrolysis to GMP by the enzyme phosphodiesterase-5 (PDE-5). Compounds such as sildenafil (Viagra®; Pfizer, Inc., New York, NY), a PDE-5 inhibitor, prolong the action of cGMP, resulting in maintenance of smooth muscle relaxation and an erection.

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Kaiser and colleagues studied vascular structure and function in 30 patients with ED with no other cardiovascular disease compared with 27 age-matched controls. They measured a variety of vascular parameters, including carotid and brachial artery diameters, intima-media thickness, compliance and distensibility, aortic pulse wave velocity, coronary calcification, and brachial artery endothelium-dependent and -independent vasodilation. In comparing these two populations, there were no differences in baseline laboratory studies including lipids, glucose, and homocysteine levels, nor in coronary calcium scores, carotid and brachial artery diameters, intima-media thickness, brachial and carotid artery compliance and distensibility, and aortic pulse wave velocity. Brachial artery endothelium-dependent flow-mediated vasodilation and endothelium-independent vasodilation were reduced in patients with ED compared with normal subjects. ED patients did have lower than normal penile Doppler peak systolic velocities. Most patients with ED had abnormalities in the penile NO-cGMP system, as sildenafil treatment resulted in significant symptomatic improvement.

The investigators conclude that despite the similarity in coronary risk score, measures of vascular compliance and distensibility, and coronary calcium score, "abnormalities in the peripheral vascular NO-cGMP vasodilation system may result in ED as the first clinical manifestation of cardiovascular disease." The next step will be to show whether patients with ED, no manifestations of cardiovascular disease, and abnormal NO-cGMP–mediated vasodilation will go on to develop cardiovascular events.

In the editorial by Cheitlin, the author describes data showing a correlation of severity of ED and the number of vessels involved in patients with cardiovascular disease and the association of ED with hypertension, smoking, diabetes, and hyperlipidemia, all known risk factors for cardiovascular disease. He emphasizes the need to include an assessment of ED in a full cardiovascular history and that "its presence should alert the clinician to the possible presence or future development of vascular disease."

The investigators conclude that despite the similarity in coronary risk score, measures of vascular compliance and distensibility, and coronary calcium score, "abnormalities in the peripheral vascular NO-cGMP vasodilation system may result in ED as the first clinical manifestation of cardiovascular disease."

Just as we cardiologists have incorporated the ankle-brachial index to determine the presence of obstructive peripheral vascular disease into a comprehensive cardiovascular assessment, so too should we consider a more comprehensive assessment of vascular function in patients with ED, to perhaps enable us to identify and intervene in these patients prior to the development of cardiovascular events such as myocardial infarction and stroke. ■