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Genetic basis, pathogenesis, and hemodynamics aneurysm of the ascending aorta in patients with a bicuspid aortic valve

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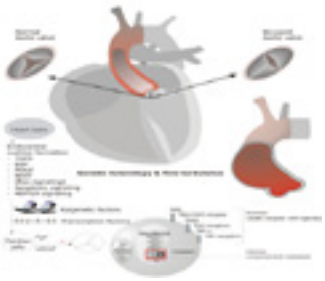
Statement of the Problem: The normal diameter of the aorta in adults is approximately 35 mm. A vessel bulge (aneurysm) is defined as permanent and exceeding of the standard value involving all layers of the vessel wall. Aneurysm of the ascending aorta is responsible for 1–2% of all deaths in industrialized countries. In approximately 50% of patients with a bicuspid aortic valve (BAV), the most common congenital heart disease, aneurysms of any or all segments of the aorta occurs. While aortic aneurysms are generally a benign condition, a consistent increase in the diameter of an aneurysm can give rise to catastrophic events such as acute aortic dissection (AAD) or aortic rupture.

Methodology & Research Orientation: Comprehensive genetic, molecular analysis and proteomic approaches to understand complex cellular processes and networks in the pathophysiology of aneurysms of the ascending aorta. To support two known kinds of hypotheses proposed to explain the causality in aneurysms formation, intrinsic factor is further investigated and analyzed in sense of vascular remodeling between congenital BAV and Marfan's patients (MFS). In MFS, mutations in the gene encoding for the extracellular matrix protein fibrillin-1 can be observed; this mutations lead to dysregulation of the transforming growth factor-beta signaling.

Findings: The interaction between mechanical forces and biological function is intimately coupled. In the subsequent molecular investigations of AAD, further genes were described, and their proteins were altered in patients with AAD.

Conclusion & Significance: The etiology of BAV and the thoracic aortic aneurysm appears to be multiple. At the onset of valvulogenesis a number of mechanisms [e.g., Genes, epigenetic factors, fluid forces (Fig)] may be involved, either alone or combined, in the pathogenesis.



Biography

Salah A Mohamed has his expertise in evaluation and passion in improving the health and wellbeing. Since 2002, he is working as Laboratory and Group Leader in the Department of Cardiac and Thoracic Vascular Surgery, Luebeck, Germany. He is an Associate Professor in Molecular Biology/Cardiac Surgery at the University of UKSH-Campus Luebeck, Germany. His research include: cardiovascular disease (e.g. genetic etiology and molecular), epidemiology of aortic and aortic valve disease, evaluation and validation of drugs and biomarkers and aging of the heart. His laboratory also focuses on understanding the causes of atrial fibrillation investigation.

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