Modern repair of aneurysmal disease

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Each blood vessel carrying oxygenated blood under high pressure from the heart to organs and tissues, is called artery. If the artery becomes permanently dilated, more than 50 % of the anticipated diameter, due to structural deterioration of the vessel wall, it is defined as ***arterial aneurysm***. One of the most frequent locations of aneurysmal development is the abdominal aorta, where the diameter of the artery should exceed the 3 cm limit to be defined as aneurysm. Other less frequent sites of arterial aneurysms are thoracic aorta, cerebral arteries, iliac, femoral, popliteal, splachnic and subclavian arteries. The aneurysmal wall becomes thinner and fragile leading to the devastating complication of rupture and blood exsanguination.

Many studies have proved that most aneurysms are degenerative in origin. Genetic, enzymatic, metabolic, hemodynamic such as hypertension, structural and inflammatory factors interact and contribute to their formation. In some locations aneurysms might be infectious, congenital, post-traumatic or post-operative in origin.

Aneurysms located deep in closed cavities (aorta, cerebral arteries, visceral arteries) usually evolve silently until they acquire enormous dimensions pressing adjacent organs and causing symptoms. In case of abdominal aortic aneurysm, patients may complain of abdominal pain with radial reflection, or may palpate a pulsating mass in their abdomen. More rarely, the abdominal aneurysm can present with nausea, anorexia, constipation, diarrhea, blood in stool, back pain. Aneurysms of the arteries in the extremities are more easily detected because of their superficial location. Diagnosis is confirmed by ultrasound, computed tomography and selectively intra-arterial angiography or magnetic resonance angiography. Because many aneurysm progress asymptomatic until they acquire enormous dimensions, they eventually become apparent by one of their complications (rupture, embolism, thrombosis). The most important and dramatic complication is rupture accompanied by very high mortality due to tearing of the vessel wall and blood exsanguination. The risk of rupture becomes higher as the diameter of the aneurysm increases.

The ultimate treatment of aneurysmal disease remains the exclusion of the pathology from the blood flow. This can be achieved either by open surgical reconstruction which involves aneurysmal sack resection and prosthetic graft interposition, or by endoluminal repair including minimal invasive intra-arterial sack exclusion utilizing endografts. During the latest years an innovative multi-layer stent has been invented and used to treat anatomically difficult aneurysms, based on classical hemodynamic principles.