Physiopathological aspects in the stenosis of the renal arteries.

The renal arteries stenosis is relatively frequent, (up to 5% of the etiology of systemic hypertension) and due to it’s high evolutivity and “malignant” potential upon renal function it requires an early diagnosis, because it has a good therapeutic response (medical and/or surgical). Renovascular Hypertension is the high blood pressure secondary to a partial or complete obstruction of the renal and is potentially curable. The atherosclerotic stenosis of the renal arteries is the main cause of Renovascular Hypertension by decreasing the renal perfusion. The atherosclerotic stenosis of the renal artery is frequently associated with 2 major clinical syndromes: ischemic renal disease and renovascular hypertension.

With the aid of the duplex scan Doppler ultrasonography, we have attempted to diagnose hemodynamically significant renal artery stenoses (with over 60% decrease of arterial diameter). The results were compared, to renal arteriography, considered “the gold standard” in the diagnosis of the renal artery stenosis.

Material and the method: The study included 122 hypertensive patients, admitted to hospital and with subsequent follow-up in the period January 2000 -June 2006 in Clinica Medicala III Târgu Mures and Policlinica Atlas Târgu Mures.

This group included patients with suspicion of renal artery stenosis, all of them with hypertension and presenting one or more of the following (hypertension debut under 35 of years and over 55 years of age; sudden rise in blood pressure; acceleration of a hypertension previously under control; high blood pressure not responsive to a treatment with at least 3 drugs; fast evolution of the retinopathy (stage III and IV); malignant hypertension; sistolo-diastolic abdominal murmur; sudden development of acute pulmonary edema in a patient with hypertension, without a clear cause, or the development, under the same conditions, of left ventricular failure; acute renal failure after treatment, with ACE inhibitors (a three fold increase of the initial value after treatment) or after the administration of ARB; inexplicable hypokalemia; inexplicable increase of blood urea in a patient with hypertension; single kidney (75% of which is associated with renal artery stenosis).

Results: Significant renal artery stenosis (over 60% stenosis) has been diagnosed
in 38 patients by ultrasonography, and they were referred to digital subtraction renal angiography for diagnostic confirmation. 36 patients were confirmed by renal angiography. We have measured by Doppler ultrasonography (duplex scan) series of parameters (the top systolic velocity, pulsatility and resistivity indexes) in the renal artery, in hilum, as well as at the level of the main arterial branches of the 2 lobes and in the middle area of the kidney. The angiographic examination has certified the presence of the stenosis as well as its degree of severity. Out of the 36 patients, 30 had one-sided stenosis of the renal artery and 6 had bilateral stenosis or stenosis on single functional kidney. Regarding the etiology 35 patients had atherosclerotic renal artery stenosis and only one had fibrous dysplasia.

Conclusions: High levels of serum creatinine and urea in one-sided renal artery stenosis are explained by the accelerated nephro-angio sclerosis that affects the opposite kidney due to the high blood pressure as demonstrated by increased Doppler resistivity indexes. These results have implications in the control of the hypertension and its response after renal revascularisation.

Levels of systolic and diastolic blood pressure are higher in patients with renovascular hypertension than in the control group with primary hypertension. There is also a significantly higher proportion of treatments that need over 3 drugs. The etiology of the stenosis of the renal artery is mostly represented by arteriosclerosis, the fibrous dysplasia is a rare occurrence. It has a bad prognosis over a relatively short period of time especially in severe stenosis with important hemodynamic impact. It was revealed that duplex scan Doppler ultrasonography (color + pulsated) can be considered a successful initial screening test for the diagnosis of renal artery stenosis with the best cost/efficiency ratio.

The top systolic speed, the maximum systolic speeds ratio and the resistivity index are predictor factors in the diagnosis of renal artery stenosis. These indexes, beside the diagnostic importance, offer information about the prognosis of renal revascularisation strategy (the resistivity index). The “tardus et parvus” pulse in the diagnosis of the renal artery stenosis is subjected to the, influence of intra-renal microvascularisation whose resistance is hypertension linked. We used it as an indirect sign, as it requires the visualization of the stenosis, with the narrowing of the lumen.
The cardiovascular risk factors are superposed over the risk factors for renovascular atherosclerotic disease. Although diabetes mellitus, smoking, dislipidemia, obesity, uric acid, taken individually did not prove to be factors of statistical importance in the studied group, when all of these risk factors are considered together there is a significant relationship, which becomes more evident as the number of the risk factors increases.

The renal artery stenosis is accompanied by a high cardiovascular morbidity. It has been found a tight connection with the presence of the left ventricle hypertrophy and the left ventricle failure. Also the association of acute pulmonary edema with the renal artery stenosis is greater than we might have expected especially regarding the bilateral renal artery stenosis or on single functioning kidney. The cardiogenic acute pulmonary edema is predictor of renovascular hypertension evolution.

Atherosclerosis is the main etiology of renal artery stenosis, and the association with the coronary disease, with the cerebrovascular disease (strok and carotid stenosis) as well as peripheral vascular disease is statistically significant.