

follow-up brain CT scan was done within 72 hours after stroke.

Results and Discussion: Forty-four acute stroke patients were investigated within three hours between January and December 2005. Thirty-two patients (M/F: 1.9) had an adequate insonation condition for UPI analysis (72.7%). No adverse events related to the US investigation were observed. The pixel-by-pixel analysis converted the gray-scale loop in a colour map, and a 3D-visualization was possible. In the group of patients with a complete MCA infarct it was possible to identify the perfusion deficit on the parameter images. The area of hypoperfusion corresponded to the area of infarction in follow-up brain CT scan. TIC parameters calculated for each investigation were: Peak Intensity (PI), Time-To-Peak (TTP), and Area Under the Curve (AUC). In conclusion Ultrasound Perfusion Imaging might be of help in the early identification of ischemic areas in acute stroke patients within the therapeutic window, allowing to a more selective and safe identification of stroke patients eligible for thrombolysis.

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Improvement of Cerebrovascular Reserve (CVR) on middle cerebral artery (MCA) after carotid revascularization, evaluated by Transcranial Color-Coded Duplex sonography (TCCD)

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It is known that cerebral haemodynamic impairment is a risk factor for ipsilateral ischemic stroke and TIA in patients with carotid stenosis and occlusion. In these patients haemodynamic and embolic factor contribute to stroke risk, but it is not quite studied how cerebral hemodynamics changes after carotid surgery or stenting in both symptomatic and asymptomatic subgroup. The aim of this study is to identify the direction and the time of short term changes in CVR on MCA after carotid revascularization, either surgical or endovascular. For this purpose we have used TCCD with Diamox test (administration of acetazolamide 1 g i.v.). Twenty-one patients (2 female, 19 male, 14 symptomatic and 7 asymptomatic, mean age 69,48 years, standard deviation 7,93 years) with unilateral or bilateral carotid artery stenosis (>60% on NASCET criteria) underwent TCCD using a commercially available ultrasound machine (Toshiba Aplio). All the patients had at least 3 cerebrovascular risk factors. Vasomotor reactivity of the main cerebral vessels was determined using the Diamox test before surgery and at 10, 30, 60-80, 160-180 days and one year after. The data were compared using the Wilcoxon rank test for paired data and t test. In the subgroup with unilateral symptomatic carotid stenosis CVR on ipsilateral MCA shows a statistical significant improvement in the early days after revascularization (Wilcoxon rank test, p 0,0234) and at 6 months (t di Student, p 0,02). CVR on ipsilateral MCA shows a statistical significant improvement in the early days after revascularization (Wilcoxon rank test, p 0,0336) in the subgroup with

bilateral symptomatic carotid stenosis too. In asymptomatic patients with unilateral and bilateral carotid disease CVR on ipsilateral MCA does not significantly improve during follow-up. Instead in the subgroup with asymptomatic bilateral carotid disease there is a statistical significant improvement in CVR on contralateral MCA (Wilcoxon rank test, p 0,0339) in the early days after surgery. In patients with unilateral stenosis and subclavian-vertebral disease there is a statistical significant improvement in CVR on ipsilateral MCA both early (Wilcoxon rank test, p 0,0391) and late (Wilcoxon rank test, p 0,0232). Evaluation of cerebral haemodynamics using TCCD and Diamox test may help to select the asymptomatic patients for carotid surgical or endovascular procedure. In this higher risk subgroup there are at the moment patients with bilateral significant carotid disease and patients with unilateral carotid stenosis plus subclavian-vertebral disease, although we need larger sample of patients in order to confirm this view.

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A subclavian steal syndrome with bulbar TIAs on hemodynamic ground, investigated by Transcranial Color-Coded Duplex sonography (TCCD) and Diamox test

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C.S., female, 51 years old, came to our out-patients' department in November 2005 because of repeated occurrence of a sensory disturbance with sudden onset and spontaneous relief. Since at least 5 months she was having at a daily rate a right hemifacial loss of sensation and formicolar paresthesias with a spatial course from ear to mouth like an onion's bulb. These symptoms were triggered by standing up and sitting and relieved by lying down. Neurological exam was normal unless right hemifacial hypoesthesia on sitting position. Physical exam shown a clear asymmetry in humeral and radial pulses with right side hypospagyria. The past history was only notable for mild hypercholesterolemia, mild obesity and past smoking. Clinical suspect of bulbar TIAs on hemodynamic ground was made and then the patient underwent to MRI of brain with gadolinium, that was normal, and ultrasound examination of supraaortic trunks, that shown a tight right subclavian artery (SA) stenosis in the prevertebral segment with fully inverted flow direction in ipsilateral vertebral artery (VA). A TCCD was performed in order to investigate cerebral hemodynamics. The main results were the identification of a large anastomotic loop between left and right VA, the inverted flow direction on right VA proximal to this loop with normal flow direction in the segment distal to it in lying down position and the inverted flow direction in the precommunicant right posterior cerebral artery (PCA P1). Instead in sitting position flow direction was inverted in the full course of right VA and there was a partial steal on basilar artery too. Then Diamox test (administration of acetazolamide 1 g i.v.) was performed and it shown

preserved cerebrovascular reserve (CVR) on distal right VA and steal (-83.67%) on the proximal one, and reduced CVR on the inverted right PCA P1 in lying down position. Instead in sitting position Diamox test shown reduced steal in proximal right VA (-29.76%) and right PCA P1 steal from middle cerebral artery by right posterior communicating artery (CoP). Three days after the patient underwent to PTCA + stenting of right SA stenosis with residual, non significant stenosis and normalized flow direction on ipsilateral VA. Since endovascular treatment the patient's complaint disappeared and any positional trigger was not reproducible. At three days from revascularization another TCCD + Diamox test was performed showing normalized flow direction on right VA with partial distal steal in lying down position and partial steal in proximal and distal segments in sitting position. Right VA CVR improved in the proximal segment, albeit still stealing (-9.75%), in lying down position; instead in sitting position right VA CVR was normalized by stealing from PCA P1. In our known this is the first report of subclavian steal syndrome symptomatic for bulbar TIAs on positional ground and TCCD + Diamox test was able to show the complex hemodynamics of the posterior circulation and to follow the change and identify the timing of its normalization after SA revascularization. In our opinion any other tool could not give us the same data.

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Improvement of Cerebrovascular Reserve in Type II Diabetes Mellitus on Atorvastatin therapy

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The vasodilatory ability of cerebral vessels is impaired in long-standing diabetes mellitus. Vasodilatory ability is also improved by pravastatin therapy in patients with cerebral small vessel disease and in healthy subjects. The present study investigates the effects of atorvastatin therapy on vasomotor reactivity and reserve (CVR) in a subset of patients with type II diabetes mellitus (NIDDM) using Transcranial ColorCoded Duplex sonography (TCCD) and Diamox test. In six patients (age 60.33 ± 4.24 years, 3 males and 3 females) with recent diagnosis (less than two year) of NIDDM and clinical indications for statin therapy, CVR was tested by injection of acetazolamide 1 g iv and TCCD insonating middle cerebral artery (MCA M1 and M2), anterior cerebral artery (ACA A1 and A2), posterior cerebral artery (PCA P1, P2 and P3) and vertebral artery (VA V4) on both sides. Blood flow velocity measurement was made on these vessels before and 30 days after onset of atorvastatin therapy (10 mg daily). No significant differences have been found in CVR on PCA, ACA, VA and MCA M1. But there is a significant difference in CVR on MCA M2 ($p = 0.0388$; Wilcoxon rank test for paired data). Correlation testing was significant for total cholesterol and MCA M2 CVR at 30 days ($r = 0.0101$, CI 95% -0.92 0.92; $p = 0.020$). This is the first study using Diamox test with TCCD

and therefore calculating CVR on all basal cerebral vessels. It is the first performed on NIDDM patients only. Furthermore it is the first using atorvastatin. In this small sample atorvastatin improves CVR on MCA in M2 segment only. A non significant trend toward CVR improvement was also evidenced in ACA A2 and PCA P2 and P3, like a peripheralization of cerebral circulation. This result may help to elucidate the pathophysiology of small vessel disease associated with diabetes mellitus and the protective effect of statin therapy on vessel wall.

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Survey of M.E.S. during the procedures of application of stent for stenosis of the extracranial internal carotid artery.

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The spread of procedures of neuroradiology, in alternative to the surgery of cerebro-afferent vessels, places the necessity to monitor the microembolic events (MES) that are come true. In the application of stent we have isolated various stages: 1) the introduction of the catheter with direct puncture of the right-sided femoral artery, 2) the introduction of contrast medium, 3) the passage of the device for the treatment of the stenosis, 4) the passage of the protection's filter in order to inhibit the arrival of microembolus in to the intracranial circle, 5) the distension of the stent, 6) the liberation of the catheter. We recorded, in neuroradiological room, n°10 pz, 5 females and 5 male, with age comprised 65 ± 5 , with DWL MultiDop X2 equipment, MARK 600 of the Spencer Technologies with 2 probes of 2 MHz, bilaterally, positioned on the Middle Cerebral Artery. The radiological procedures was 35-50 min long, the recording Doppler 45-60 min. The survey program on-line by DWL, has been executed with acquisition's threshold and maximum of the instrumentation's sensibility of 9 dB. The analysis off-line has been tested about sensibility and possibility of being reproduced, with threshold's values to 9 dB, 15 dB, 20 dB, for every phase of the indicated procedure-on. We noted that the maximum number of MES on the MCA have been determined from the introduction, by manual pressure, of the contrast medium, with values of 200 ± 400 recorded events. The introduction of the catheter/guida in femoral has shown 2 ± 6 events that have not been estimated like microemboli. The passage of the stent, of the protection filter, the filter's opening and the stent's expansion has shown, altogether, from 4 to 40 events, that have been estimated like compatible with microembolic signals.

References:

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