44 Interesting cases

DIRECT VISUALIZATION OF VERTEBRAL ARTERY DISSECTION BY COLOUR-CODED DUPLEX SONOGRAPHY

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Background: Dissection of a cervical artery (CAD) is an important cause of stroke in young patients. The pathogenesis is not completely understood, predisposing connective tissue abnormalities in combination with certain trigger and risk factors are discussed. The clinical spectrum includes headache, local neck pain, Horner’s syndrome, isolated cranial nerve deficits, and hemispheric or brainstem infarction. CAD is diagnosed noninvasively by duplex sonography (DS), magnetic resonance imaging (MRI), and magnetic resonance angiography (MRA).

Case report: A 38 year old male was admitted to the stroke unit with an acute posterior circulation syndrome of acute diplopia due to severe skew deviation and vertical gaze palsy, dysarthria, ataxia of gait and stance and psychomotor slowing. His girlfriend reported that he suffered from chronic back pain but had been complaining a new dorsal neck pain mainly on the left side in the last weeks. He had been treated with chiropraxis once. MRI of the brain showed infarctions in the left paramedian midbrain and the left thalamus. Time of flight (TOF)-MRA displayed normal flow signals of the intracranial arteries. DS showed normal flow velocities in the V2-segments of both vertebral arteries (VA), but detected a hypointense wall thickening of the left VA at the level of the posterior arch of the atlas (V3-Segment), suspicious of a hematoma. Another MRI of the neck with axial fat suppressed T1-weighted images showed the hyperintense wall hematoma and confirmed the diagnosis of a dissection. Contrast enhanced MRA revealed a slight narrowing of the lumen. Anticoagulant therapy was started.

Conclusion: If there is strong clinical suspicion of a dissection of a VA, one has to perform additional investigations like DS of the V3-Segment and MRI of the neck, especially fat suppressed T1-weighted images, despite of normal findings of routine TOF-MRA and DS.

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ESSENTIAL THROMBOCYTOSIS AS A CAUSE OF CEREBRAL VENOUS THROMBOSIS IN A YOUNG WOMAN

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A 37 year old. Italian woman presents to the accident and emergency department with several left sided, short lived (20 seconds) myoclonic seizures of the left upper limb with associated weakness over 24 hours. There was some mild left lower limb weakness. There was a preceding 3 day history of a headache with reduced fluid intake. There was no history of any sensory symptoms, speech or visual disturbances, any recent flu like illness, head/neck trauma or any illicit drug use. Her past medical history comprised of migranes, subclinical hypothyroidism, menorrhagia with secondary iron deficiency anaemia and thrombocytosis (that was under investigation). She was on iron supplements and the oral contraceptive pill. She was a non-smoker. Her initial investigations revealed a normal ECG, chest xray, electrolytes, Her platelets were elevated at 557 × 10⁹/L with the rest of the blood count within normal limits. She had an urgent MRI head and MRV that concluded a right cortical venous infarct with associative haemorrhage. She was commenced on IV heparin and warfarin and made good symptomatic recovery. Her seizures were controlled with oral sodium valproate. Her serial MRIs revealed good resolution of the thrombus in 4 months. Her thrombophilia screen revealed a JAK2V617F mutation allele by specific PCR. She was tested negative for Factor V Liedin and other thrombophilic tests. This is consistent with an underlying myeloproliferative disorder. A diagnosis of essential thrombocytosis was made and she was considered for myelosuppressive therapy. Essential thrombocytosis or primary thrombocythaemia is a myeloproliferative disorder characterised by a persistent elevation of the platelet count and a paradoxical predisposition to both thrombosis and haemorrhage. Other myeloproliferative disorders and reactive thrombocytosis have to be excluded before the diagnosis is made.

46 Interesting cases

TWO CASES OF SPONTANEOUS EPIDURAL HEMATOMA DEVELOPING HEMIPLEGIA; ANOTHER CONTRAINDICATION FOR RT-PA THERAPY FOR ACUTE ISCHEMIC STROKE

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Intravenous rt-PA treatment for acute ischemic stroke has been widespread use in Japan since 2005. Active hemorrhage must be ruled out before the injection of rt-PA. Two cases of spontaneous spinal epidural hematoma developing hemiplegia are presented. In one case, rt-PA therapy was considered.

Case 1: A 67-year-old hypertensive male suffered from mild neck pain followed by severe right hemiparesis on 8/30/2007. He was transferred to our emergency room one hour after the onset and the NIHSS was 10. A CT scan of his head and MRI, including diffusion weighted images, were both normal. Intravenous rt-PA therapy was initially considered, but not performed as MRA showed no causative abnormalities. Cervical MRI next day revealed C2-Th1 epidural hematoma. The hematoma evacuation operation was performed two days later, and he recovered almost completely.

Case 2: A 74-year-old female suffered from neck pain and severe left hemiparesis followed by severe right hemiparesis on 6/7/2003. She was referred to our hospital with a tentative diagnosis of cerebral infarction. Neurological signs were consistent with the Brown-Sequard syndrome. Cervical MRI revealed C4-C6 epidural hematoma, which was evacuated 4 days later. Only mild hemiparesis remained two months later. Because the occurrence of spontaneous spinal epidural hematoma is rare, it is not easy to diagnose it in the many patients presenting with sudden onset of hemiplegia. The presence of neck pain and the lack of facial paresis may be important signs in the discrimination of the cervical lesion from stroke.

47 Interesting cases

ISCHEMIC AND HEMORRHAGIC STROKE IN A PATIENT WITH ESSENTIAL THROMBOCYTHEMIA

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Background: Stroke is a well known complication of essential thrombocythemia (ET), which is an acquired myeloproliferative disorder. Overall, ET is responsible
for 0.4% of all ischemic strokes. In general, arterial events predominate over venous events (ischemic stroke 15.39% and cerebral vein thrombosis 1%).

Case report: Female, 37 years old, medical history of ET, with no treatment. Admitted to our hospital with severe headache, a parieto-occipital location, stabilizing in quality, that persisted during the previous 4 days, with nausea, vomiting and vertigo. Neurological examination revealed a right hemiparesis (grade 4) and hemihyposthesia, with fluctuation in symptoms severity. Brain CT and MRI revealed a multiple brain infarct pattern in the posterior circulation and subarachnoid hemorrhage at the right insula and high convexity. She started treatment with heparin and 48 hours later there was a clinical deterioration of the neurological status, with worsening of the right hemiparesis, a change in the sensitive pattern (right face impairment of pain sensation and contralateral impairment of all sensitive modalities), and appearance of new neurologic brainstem signs without new lesions in brain CT. Angio-MRI findings suggested vertebral artery dissection with no signs of aneurysms or venous thrombosis, confirmed by conventional angiography. No thrombophilic or autoimmune diseases were found. She was discharged with a modified Ranking scale (mRS) of 3, taking aspirin.

Conclusion: This patient presented simultaneously with ischemic and hemorrhagic stroke, which was never reported. This case demonstrates that besides elevated platelet number other factors might play a role (platelet and endothelium dysfunction) in the pathogenesis of stroke in ET.

48 Interesting cases

MEDIAL MEDULLARY INFARCTION PRESENTING WITH DECREASED PAIN, TEMPERATURE SENSATION
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The classical clinical Triad of Dejerin’s syndrome, that includes ipsilateral hypoglossal palsy, contralateral hemiparesis, and hemihyposthesia is usually decreased. Pain sensation to be occasionally decreased in isolated MMI often with preserved temperature sensation. We report a rare case of decreased both pain and temperature sensation in MMI.

Case: A 71-year-old man came to out-patient department because of left extremity weakness, sensory abnormality which had started 2 days ago. On neurological examination, there was weakness of left upper & lower extremity (4+/5). Sensory examination showed hypoesthesia of left extremity. Pain and Temperature was decreased about 7/10 degree from normal sense but vibration, position and touch sense was preserved. There was no sensory change in face and trunk. In magnetic resonance imaging (MRI), typical MMI signal change was presented. From symptom onset 7 days later Sensory change was normalization.

Conclusions or comments: There are some theories about this sensory change that dismutation of ascending pain modulating influences at the level of the medial lemniscus and involvement in the adjacent medial medullary reticular formation in nociception.

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THROMBOTIC-THROMBOZYTOPENIC PURPURA ASSOCIATED WITH POSTERIOR REVERSIBLE ENCEPHALOPATHY SYNDROME
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Background: Thrombotic-Thrombocytopenic Purpura (TTP) is a rare disorder presenting with neurologic symptoms resembling a vasculitis. Often neurologists are in the frontline of making the diagnosis, which has to be achieved fast and accurately in order to avoid severe consequences and even lethal outcome. Manyfold neurological complications may arise, some supposedly due to hypertensive dysregulation. The latter has been associated with Posterior Reversible Encephalopathy Syndrome which is still being poorly understood.

Methods: We present here a case of a young woman developing TTP, with the diagnosis work-up focusing on MR-findings typical for Posterior Reversible Encephalopathy Syndrome posing additional diagnostic problems in the beginning. With a further focus on background and differential diagnosis of TTP as one disease entity amongst other haemolytic anemias the case presentation closes with specific aspects of treatment and its caveats.

Results: A 29-year old woman with a history of migraine presents with intensifying headaches, nausea and vomiting without further neurologic deficits. MRI shows diffuse brain stem lesions in T2-weighted imaging, CSF is normal. Massive hypertensive RR-values lead to specific laboratory check-up that reveals haemolytic anaemia, with further diagnosis and treatment aiming in that direction.

Conclusion: TTP is associated with Posterior Reversible Encephalopathy Syndrome. In spite of being rare it is a life-threatening disorder so that quick diagnosis by neurologists is crucial for commencing efficient therapy.

50 Interesting cases

ISCHEMIC STROKE IN YOUNG ADULTS: A PROPOSAL OF 3 CASES IN MALES AGED 18, 19 AND 30 YEARS
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Background: Ischemic stroke in young adults (< 45) is a relatively uncommon event with incidence rate rising with age. Exploring the causes, underlying diseases and risk factors of a similar event presents major challenges. The aim of this study is to report and analyze the cases of 3 young males (18, 19 and 30 years old) who were admitted with an ischemic stroke in vertebralbasil vessel (case 1) and spinal cord (case 2, 3) artery system.

Methods: The records of the 3 aforementioned patients were retrospectively reviewed.

Results: Case 1: The patient was an 18 old male diagnosed with an ischemic stroke in vertebralbasil vessel artery system. Immunological/virological tests as well as thrombophilia test were negative. Transoesophageal echocardiography (TEE) show tendency for thrombogenesis. The toxicology screen (urine) was positive for benzodiazepine. Excessive alcohol consumption before the onset of the event was reported.

Case 2: The patient was a 19 old male diagnosed with an ischemic stroke in anterior spinal cord artery system, after a laborious work with the arms extended over the head. Immunological/virological and thrombophilic tests as well as magnetic resonance arteriography of vertebral arteries were negative. It was not possible to associate etiologically any factor with the event.

Case 3: The patient was a 30 old male diagnosed with an ischemic stroke in anterior spinal cord artery system. The patient was reported to be a drug addict and the event triggered by an infusion of a mixture of heroin and lemon into the right jugular vein.

Family history of stroke was not reported in any of the cases.

Conclusion: In 2 out of the 3 cases studied stroke was associated with substance intake. In young patients with cerebral vascular accident it is highly probable that the event can be associated with the use of toxic or other substances.

51 Interesting cases

RECURRENT EPISODES OF CEREBRAL AND VISCERAL INFARCTION WITH ARTERIAL INTIMAL HYPERPLASIA ASSOCIATED WITH CANNABIS USE IN A YOUNG WOMAN
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Introduction: Cannabis use has been previously reported associated with multiple cerebral infarctions in susceptible subjects.

Case: A 35 year old woman was admitted following an episode of collapse, ataxia and left hemiplegia. MR of brain showed areas of acute infarction multiple arterial territories. On history, the only risk factors for stroke were regular tobacco and recreational drugs use. Comprehensive investigations including MR angiography, coagulopathy screen, autoantibody screen and vascular risk factors. Toxicology was positive for cannabis and cocaine. Transoesophageal echocardiogram was normal except for a non-significant PFO. During her admission she developed an acute psychosis related to her cannabis use and cerebral injury. She was discharged on Clopidogrel but was readmitted 6 months later with a new left hemiplegia. Rescanning confirmed further areas of acute infarction in both cerebral hemispheres especially in her right frontal lobe. All investigations were repeated, including cerebral angiogram and were normal except for a toxicology screen positive for cannabis. CT of Abdomen showed additional infarctions in her spleen and both kidneys. She was rehabilitated and anticogulated but was non-compliant with therapy and was readmitted 4 months later with further infarctions of her right frontal lobe and an occlusion of her popliteal artery. Investigations were again found to be unremarkable. A temporal artery biopsy showed gross hyperplasia and thickening of the intima, but was normal in all other respects. Ultrasound survey revealed areas of intimal thickening throughout her arterial tree. She has had no further episodes of infarction for more than 12 months on daily supervised anticoagulation therapy and abstinence from drugs.

Conclusion: In the absence of other causes we conclude that the infarctions are most likely due to this intimal pathology and this in turn is likely to be associated with longitudinal cannabis use.
Interesting cases

CORTICAL HAND SYNDROME DUE TO “HAND KNOB” INFARCTION
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Background: Isolated hand weakness due to stroke is infrequently observed, and often misdiagnosed as peripheral lesions.

Case report: A 52-year-old, right handed, woman noticed a sudden weakness in her left hand, and transient ipsilateral peribucal paresthesia. Neurological examination few hours later revealed severe palsy (Medical Research Council Scale grade 1) of her left hand, with no sensory functions (algesia, stereognosia and pallaesthesia) abnormalities and no other neurological findings. Cranial CT scan was normal, but MRI, two days latter, showed a single distinct infarction involving the “hand-knob” area of the right primary motor cortex (T1WI, FLAIR, T2WI and diffusion-weighted images). Vascular investigations were negative (except transesophageal echocardiography, not performed). Patient recovered hand function after 3 months.

Conclusion: Isolated hand weakness caused by central lesions is most commonly caused by embolic strokes or large-artery atherosclerotic infarctions involving the “hand-knob” area. Most patients with isolated hand weakness after ischemic infarctions experience good recovery. Its importance to differentiate central from peripheral lesions in similar cases because different treatment modalities is required.

AN UNFAMILIAR TRIAD: HYPERGLYCEMIA, STRIATAL PETECHIAL HEMORRHAGE AND HEMICHOREA. CASE REPORT AND REVIEW OF LITERATURE
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The combination of hemichorea caused by striatal petechial hemorrhage under the influence of hyperglycemia is relatively unfamiliar. An 81-year-old man presented with uncontrolled movements of right arm and leg. He had recently been diagnosed with diabetes mellitus and used oral antidiabetic medication. Neuro-imaging revealed striatal petechial hemorrhage on the left side; HbA1c was significantly raised. The patient was treated with warfarin and underwent follow-up imaging showing resolution of the vasoespasm.

RESULTS: The presentation with subarachnoid and ischaemic stroke is unusual. It usually has a benign outcome resolving spontaneously in 1 to 3 months although complications like ischaemic or haemorrhagic stroke can occur. The presentation with subarachnoid haemorrhage and ischaemic stroke is unusual and has been scarcely reported.

Methods: We present a clinical case and neuroimaging of a RVCS syndrome associated with subarachnoid haemorrhage and ischaemic stroke after a physical effort.

Results: A 58 year-old female with a past history of migraine and hypothyroidism began suffering explosive recurrent headache after a physical effort, after one week she developed visual loss. Neurological exploration detected right homonymous hemianopia. A CT head scan showed bilateral cortical subarachnoid haemorrhage. Brain MRI showed a recent infarct with restricted diffusion in the left occipital cortex and bilateral cortical subarachnoid haemorrhage. The MRI angiography showed multiple segmental vasocstructions of the intracranial arteries. A cerebral angiography ruled out vascular malformations showing the same results. Nimodipine perfusion was initiated with fast recovery. After 2 months a new MRI was made showing resolution of the vasospasm.

Conclusions: RVCS is uncommon but is probably underdiagnosed.

Although it has good prognosis it’s not so infrequent to be complicated with stroke or subarachnoid haemorrhage, occurring in 25% of reported cases. The association of subarachnoid haemorrhage and ischaemic stroke is quite unusual occurring in 6% of the reported cases. RVCS should be considered in patients with thunderclap headache with cortical subarachnoid haemorrhage and cryptogenic stroke.

Interesting cases

CRANIAL PACHYMENINGITIS: A RARE NEUROLOGICAL SYNDROME WITH HETEROGENEOUS ETIOLOGY
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Background: Cranial pachymeningitis is a poorly understood syndrome defined by leptomeningeal thickening and typical Gadolinium-enhanced magnetic resonance imaging (MRI). We present the heterogeneous clinical and etiological features of five patients with both focal and diffuse pachymeningitis.

Results: The initial symptoms included headache (n=3), sensory Jackson seizures (n=1), hemiparesis (n=1), episodes of short-lasting hemiatxia (n=1), hemiparesis-thesia (n=1), aphasia (n=1) and confusion (n=2). MRI scans revealed focal (n=3) or diffuse (n=2) leptomeningeal Gadolinium enhancement and cortical swelling (n=4). One case each presented additionally with subarachnoidal and intracerebral hemorrhage, respectively. CSF findings were variable and showed clear lymphomonocytic pleocytosis in 3/5 cases. Infectious diseases were extensively excluded in all cases. Leptomeningeal biopsies of the two cases with hemorrhage revealed perivascular inflammation indicating central nervous system vasculitis. In the cases presented, pachymeningitis was caused by primary central nervous system vasculitis (n = 2) and rheumatoid arthritis (n = 2). In one case, the cause remained unclear.

Conclusions: Cranial pachymeningitis is typically associated with various disorders and presents with diverse neurological symptoms and CSF findings. Pachymeningitis should be therefore considered a neurological syndrome with heterogeneous etiology attributed to one of the following causative groups: (a) PCNSV (b) secondary CNS vasculitis (c) general systemic inflammation, especially tuberculosis (d) neoplastic disorders and (e) idiopathic causes. Treatment and outcome depends on the underlying disease.
as asymmetrical weight-bearing pattern, participation in loading activities, and vascular health in the affected leg may be contributing factors.

57 Interesting cases

A FATAL COMPLICATION OF ATRIAL FIBRILLATION RADIOFREQUENCY ABLATION

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A 64-year-old woman was admitted to our hospital for an acute lung infection. She had undergone a radiofrequency ablation for drug-refractory atrial fibrillation three weeks earlier. During the first two days, the patient received a prophylactic antibiotherapy and the symptoms disappeared. On the third day she suddenly developed a subtle generalized convulsive status epilepticus. The cerebral magnetic resonance imaging exposed multifocal septic embolic events. Polymicrobial sepsis suggested a digestive etiology. A CT scan and a transoesophageal echocardiography showed an atrio-oesophageal fistula with a necroted left atrium. The patient died from cardiac arrest just before undergoing surgery.

58 Interesting cases

SPONTANEOUS INTERNAL CAROTID ARTERY DISSECTION: AN UNCOMMON CAUSE OF RECURRENT POST-PARTUM HEADACHE

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Background: Post-partum headache is a common complaint during the first two weeks following pregnancy. The differential diagnosis is broad including both anesthesis and non-anesthesia related causes. Post-partum spontaneous cervicocerebral artery dissection (CAD) is an uncommon, poorly understood condition following pregnancy that with the advent of non-invasive neuromaging studies (MRI and MRA) has recently emerged as a potentially under-diagnosed and potentially serious cause of post-partum headache.

Case presentation: We report a case of a 32-year-old woman with no history of trauma, chiropractic manipulation, connective tissue disorder and previous headache who developed a mild, unilateral headache 7 days after the uneventful delivery of her third child (no general or neuraxial anesthesia was delivered). Seven days latter she presented to our emergency department complaining of recurrent episodes of right-sided headache coupled with a transient episode of sensory deficits in her left lower limb. Brain MRI disclosed small infarctions in the internal watershed distribution of right internal carotid artery (ICA). Axial T1 Fat/Sat sequences revealed the presence of an intramural hematoma in the cervical portion of the right internal carotid artery (ICA), a neuromaging finding that was highly suggestive of CAD. The diagnosis was confirmed using standard Digital Subtraction Angiography that showed a segment of smooth tapering of the proximal right ICA at approximately 1 cm beyond the bulb. The patient was placed under oral anticoagulation and remained asymptomatic during a follow-up period of 6 months.

Discussion: The present case report highlights that CAD is a condition that should not be overlooked in women with persisting or remitting unilateral headache following childbirth.

59 Interesting cases

DOUBLE TRAUMATIC INTRACRANIAL AND EXTRA CRANIAL CAROTID ARTERY DISSECTION: A CASE REPORT

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Background: Cervicocephalic artery dissection of two or more segments occurs preferentially in women, is rare, moreover in the same patient. The classical triad of pain and parzial Horner's syndrome; intracranial ICA dissection is rarer, occurs in young age group (mean age of 25 years) and a less favourable clinical outcome with a mortality rate of 75%; it is also less common, almost exclusively spontaneous and symptoms are associated with a subarachnoid haemorrhage (SAH).

Methods: We report a case of traumatic double carotid artery dissection (CAD) in a previously healthy 35-year-old man who, 3 days after a car accident, had had a gradual onset of chest pain and incomplete Horner's syndrome.

Results: Brain Computed Tomography showed no abnormality. Carotid duplex ultrasonography showed significantly decreased flow in the right ICA without evidence of plaquing. Brain and cervical area magnetic resonance imaging (angiography/MRI/MRA) showed loss of flow in the intrapetrous segment of right ICA without infarcts and the diagnosis was dissection. He started anticoagulant oral therapy (TAO). One month later, he performed a clinical follow-up; he didn't complain about any new symptoms or trauma. He presented a progressive neurological recovery and INR ratio was in range. He underwent a new MRI/MRA that showed a partial resolution of right ICA dissection (70% stenosis) and the new occlusion of the cervical(C1-C2)segment of left ICA as a dissection consequence.

Conclusion: This case confirms that multiple CAD are preceded by a minor trauma and can have a favourable clinical outcome in most patients but, on the contrast, shows a different clinical presentation way for intra and extra cranial ICA dissection; moreover, this report shows neurological resolution in an intrapetrous ICA dissection.

Discussion: This case is important because confirms that multiple CAD are not so rare, can be asymptomatic and well detected by MRI/MRA, on the other hand TAO seems to be suboptimal in this case.

60 Interesting cases

THE IMPORTANCE OF PRESERVED BLOOD FLOW OF THE ROSTRAL END OF THE BASILAR ARTERY ON THE OUTCOME IN PATIENTS WITH THE BASILAR ARTERY OCCLUSIVE DISEASE

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Background: The basilar artery arises from the confluence of the two vertebral arteries and bifurcates at the level of the midbrain to form the posterior cerebral arteries. At the base of the brain, the carotid and vertebo-basilar arteries form a circle of communicating arteries known as the circle of Willis. Basilar artery occlusion is associated with a poor prognosis, but the outcome mainly depends on the site of stenosis.

Methods: We report the mid-basilar artery occlusion in two middle aged male patients, with preserved blood flow in the distal segment, in which the clinical outcomes have been good.

Results: The patients presented with similar symptoms and signs such as dizziness, severe occipital headache, dysmetria and broad-based gait. Both had poorly controlled hypertension, hyperlipidemia and history of previous vascular disease (one had cardiac disease and other minor hemorrhagic stroke). Color duplex ultrasonography of the vertebral arteries showed reduction in the measured flow velocities with amplified resistance which implied stenosis of distal arterial tree. They had occlusion of the middle basilar artery segment detected by transcranial Doppler ultrasonography (TCD). In one patient there was demonstrable retrograde flow in the distal basilar artery and in the other the observed blood flow in rostral part of the artery was in normal direction but greatly accelerated. In both cases pan-anangiography confirmed preserved flow in distal segment of the basilar artery with retrograde flow down the rostral basilar artery from the carotid-posterior communicating artery system in one case. After one year, repeated TCD examinations have showed retrograde flow in distal segments of the basilar arteries in both patients.

Conclusion: Preserved retrograde flow down the distal basilar artery from the circle of Willis is very important prognostic factors for good outcome in the patients with the mid-basilar artery occlusion.
characteristic of an embolic infarct rather than watershed hypoperfusion. 12 lead ECG showed first degree heart block. Carotid ultrasound, trans-thoracic echocardiogram and routine blood tests were normal. Subsequent 24 hour cardiac recording showed episodes of ventricular standstill with a maximum-asymmetric pause of 6.7 seconds. The patient underwent emergency permanent pacemaker insertion.

Discussion: Ventricular standstill is the absence of ventricular activity in presence of atrial activity. It is commonly seen in context of acute myocardial infarction and in chronic atrial fibrillation. Patients are usually symptomatic due to cerebral hypoperfusion. Very rarely it can predispose to formation of ventricular thrombus. Occipital lobe infarction is more likely to be embolic in origin. In our case, MRI scanning was highly suggestive of an embolic infarct rather than hypoperfusion. This emphasizes the need to look extensively for sources of embolisation in younger patients despite the presence of conventional risk factors. Otherwise potentially life threatening conditions can be missed.

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BODY LATERALISATION DUE TO LATERAL MEDULLAR STROKE

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Background: Body lateralisation is a well-known feature of the lateral medullar infarction, however other lesions in different topographies along the diencephalos-brainstem axis and cerebellum may also result in this clinical manifestation.

Case report: A 53-year-old man noticed sudden unsteadiness of stance and gait, becoming unable to stand or walk, complaining of falling to the left side. His medical record was remarkable only for a past history of excessive alcohol intake. First neurological evaluation, 3 months after the this event, revealed axial lateropulsion to the left in upright, parallelism of left palate on phonation, and position sense impairment at the right foot, without ophthalmoparesis, limb weakness or other pyramidal dysfunction signs, no pain or temperature loss, neither limb ataxia on finger-to-nose and heel-to-shin testing. Onstological evaluation disclosed signs of vestibular central dysfunction. Brain MRI revealed two small areas of sub-acute infarction localized at the left lateral medullar and ipsilateral parietal lobe. No intracranial or cervical vascular abnormalities were found. Patient started functional rehabilitation and, six months latter, he returned to deambulate, help by unilateral assistance, showing only mild unsteadiness of gait.

Conclusion: Only a few cases of body lateralisation as a key feature of brainstem infarction were reported. It seems that it relays on vestibular dysfunction in most cases. In this case we allocate the lateralisation to lateral medullar stroke and the proprioceptive impairment to the parietal infarction. Correlation between clinical and anatomical data is discussed in this regard.

Challenging cases

1 Challenging cases

ENDOVASCULAR TREATMENTS FOR UNCOMMON CAROTID LESIONS: DISSECTIONS, CHRONIC TOTAL OCCLUSION AND CAROTID WEB

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Background: Various carotid pathologies are encountered in the management of stroke patients, and some of them are refractory to medical therapy. We show cases with uncommon carotid lesions which were successfully treated with endovascular treatments.

Methods: In 403 cases with acute ischemic strokes admitted to our stroke unit, four patients participated: two with spontaneous dissection, one with chronic total occlusion, and another with carotid web. Written informed consent was taken from the subject before the procedure.

Results: Case 1: A 45yo male with dissecting pseudoaneurysm in the left extracranial internal carotid artery (ICA) that led to the cortical embolisms. Rapid expansion of the lesion was ceased by stent deployment. Case 2: A 51yo female with occlusive dissection in the left ICA. A balloon catheter with guide wire attached to the stump successfully recanalized the artery. Case 3: A 78yo male with the right ICA occlusion. The occluded portion was penetrated by the microwire, and the following angioplasty restored the normal flow. He became ambulatory, and the dementia disappeared. Case 4: A 58yo female was suffered from transient faintness following angioplasty restored the normal flow. He became ambulatory, and the occlusive dissection in the left ICA. A balloon catheter with guide wire attached to tracranial internal carotid artery (ICA) that led to the cortical embolisms. Rapid

Conclusion: Although the management of the atherosclerotic stenoses in ICA had been repeatedly studied, the treatment of uncommon lesions such as carotid dissections leaves much to be discussed. We assumed that the surgical intervention is justified only when the conservative treatment failed to control the problems. Intensive imaging evaluation of the lesions by means of multimodal imaging techniques is a fundamental process to best individualize the therapy to each case. Most of the actual procedures were the assortment of the routine techniques in IVR, and safely performed.

2 Challenging cases

LONG-TERM ANGIOGRAPHIC AND CLINICAL OUTCOMES FOLLOWING STENTING UNDER FLOW REVERSAL BY PROXIMAL FLOW CONTROL TECHNIQUE FOR CHRONIC TOTAL OCCLUSIONS OF THE CERVICAL VERTEBRAL AND CAROTID ARTERIES

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Background: Because there may be large amount of thrombi in chronic total occlusions (CTOs) of the cervical arteries, an expected risk associated with endovascular recanalization is high. The aim of the retrospective study was to investigate the feasibility, safety and effectiveness of stenting under flow reversal by proximal flow control for CTOs of the cervical vertebral and carotid arteries.

Methods: Included for analysis were patients (1) who were admitted to our institution from March 2005 to May 2007, (2) with recurrent TIAs, (3) modified Rankin scale of <2, (4) with angiographic total occlusion of the cervical vertebral or carotid arteries, (5) with estimated occlusion length of 150 mm or shorter in the affected arteries and (6) who underwent stenting for CTOs of the cervical arteries under flow reversal by proximal flow control technique. Procedural success, complications, one-year angiographic and clinical outcomes were investigated.

Results: During the study period, seven patients underwent stenting for cervical CTOs: carotid arteries in five cases and vertebral arteries in two cases. The median real occlusion length was approximately 26 mm (range from 10 mm to 38 mm). In all seven cases, CTOs were penetrated successfully with hard-type guidewires and dilated sufficiently with stents. No complications occurred during the peri-procedural period, no TIAs have recurred for one year after stenting, and no restenosis occurred at one-year angiographic investigation.

Conclusion: Long-term angiographic and clinical outcomes were favorable. Stenting under flow reversal by proximal flow control for CTOs of the cervical vertebral and carotid arteries may be feasible, safe and effective in improving hemodynamic symptoms.

Challenging cases

SUCCESSFUL THROMBOLYSIS IN THE SETTING OF ACTIVE GASTROINTESTINAL BLEEDING

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Background: Acute thrombolysis has been shown to be effective to reduce the burden of stroke sequelae in the acute setting. An absolute contraindication for its use includes the presence of active bleeding within the previous 21 days. There is no evidence in the literature describing the use of thrombolysis in cases with acute systemic bleeding presenting with stroke.

Methods: To report two cases of acute arterial stroke presenting with active rectal bleeding and underwent thrombolysis with recombinant Tissue Plasminogen Activator (rPA).

Results: Case 1: 70 year old man with active post-radiation proctitis presented with left sided weakness and dysarthria. NIHSS was 13. Active rectal bleeding was documented.CT-Head ASPECTS score 10. He received 70 mg of rPA intravenously. Increased rectal bleeding required one unit of blood transfusion. NIHSS was 4 one hour post rPA. Repeat CT-Head showed a right temporal ischemic stroke without secondary bleeding. Discharged home 12 days after admission without deficits.

Case 2: 29 year old woman with a recent flare-up of Ulcerative Colitis (UC) presented with sudden dense left-sided weakness and drowsiness. NIHSS was 18. Rectal bleeding was noted. CT-Head ASPECTS score was 9. She received initial dose of 36 mg of intravenous rPA. Cerebral angiogram showed a complete occlusion of the right middle cerebral artery. Additional 10mg of intratrarial rPA were given over 6 hours. Significant recanalization was achieved with residual lumen defect. MRI Brain showed an area of ischemia in the right lenticular nucleus. Abdominal CT-Venogram excluded thrombus but showed areas of embolic infarcts in the kidneys. Marked rectal bleeding was noted requiring two units of blood transfusion. One month later she was discharged home with NIHSS of 1 on oral anticoagulat. UC was under control with steroids.

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**4 Challenging cases**


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**Background:** cerebrovascular disease as the first manifestation of cancer is a rare and challenging entity with often limited therapeutic possibilities. Although squamous cell cancer of the cervix is worldwide the third most common cancer, cerebrovascular complication of this tumour are exceptional.

**Methods:** we described a patient with an ischemic stroke revealing a late left heart metastasis of a previously treated cervix cancer. A literature review on the subject is presented and discussed.

**Results:** a 55 years old woman was diagnosed to have squamous cell carcinoma of the uterine cervix and underwent extended hysterectomy followed by chemotherapy (Cisplatin) and local radiotherapy (54 Gy). 12 years after the patient presented a left opercular stroke with non-fluent aphasia and mild facio-brachial paresis (NIHSS score of 6). The brain MRI confirmed the embolic stroke lesion. A transoesophageal echocardiography revealed a mass in the left atrium originating from neoplastic invasion of the superior pulmonary vein and of the pulmonary artery. A cardiac CT confirmed the diagnosis and biopsy by minimal invasive toracotomy confirmed the histology of the previous primary treated cancer. A screening for coagulopathy was negative, the stroke was considered of cardioembolic origin. The patient refused any surgical approach and was put under oral anticoagulation (INR target: 2-3). The follow-up of 21 months showed a good stroke recovery (mRankin of 1) with no further vascular event.

**Conclusion:** first-ever stroke may be an initial presentation of an underlying left heart metastasis of a primary treated cervix cancer. This exceptional diagnosis must be considered in a patient with embolic stroke and past cancer history. In this rare setting, transoesophageal echocardiography is mandatory to establish the correct diagnosis and anticoagulation seems to be a safe secondary prevention strategy.

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**5 Challenging cases**

**USE OF AN INDIRECT BYPASS PROCEDURE FOR INTERNAL CAROTID ARTERY (ICA) OCCLUSION ASSOCIATED WITH HAEMODYNAMIC COMPROMISE**

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**Background:** Stenosis or occlusion of the major arteries of the head or neck may cause haemodynamic impairment of the distal cerebral circulation and play an important role in the pathogenesis of ischaemic stroke.

**Methods:** We report on a 52 year-old right-handed man with hypertension and smoking who presented with recurrent stereotyped episodes of speech and language difficulty associated with right-sided sensorimotor dysfunction lasting up to 30 minutes.

**Results:** Neurological examination showed nonfuent aphasia and right-sided facial and limb weakness and sensory deficit of varying severity during typical episodes. MRI brain showed multiple acute small infarcts in watershed territories of the left hemisphere while MRA demonstrated occlusion of the left ICA and vertebral artery (VA). He was treated with antiplatelet and statin therapy and antihypertensive therapy and antihypertensives were stopped. The frequency of his episodes increased, however, and he became bed-bound unable to tolerate upright posture. Repeat MRI showed further acute infarction in left middle cerebral artery (MCA) territory. Four-vessel angiography showed limited filling of left MCA territory via left external carotid artery-ophtalmic collaterals and left anterior cerebral artery territory via anterior communicating artery. Cerebral SPECT showed decreased perfusion in left hemisphere with a further marked decrease post acetazolamide. An indirect bypass procedure was performed with multiple burr-holes drilled over left posterior frontal and temporal areas. He made good progress in rehabilitation and was discharged home. When last seen six months post surgery, he reported no further episodes and repeat SPECT showed improved hemispherical perfusion without marked decrease post acetazolamide.

**Conclusion:** Our case highlights the benefit of careful haemodynamic assessment in situations of perfusion failure to guide clinical management. Indirect bypass procedures may offer a rescue therapy in critical haemodynamic compromise.

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**6 Challenging cases**

**CEREBRAL AMYLOID ANGIOPATHY-RELATED INFLAMMATION CAN BE MISSED BY OPEN-BRAIN BIOPSIIES**

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**Background:** Subacute dementia, headaches, seizures, lobar T2-hyperintensities (LH) on brain MRI, and response to immunosuppressive therapy characterize the inflammatory form of cerebral amyloid angiopathy (I-CAA). We sought to highlight diagnostic challenges in I-CAA.

**Methods:** Case report.

**Results:** A 53-year-old woman with unremarkable past medical history reported progressive headaches since 1 year and mentalation slowness since 3 months. Her mother had late-onset Alzheimer disease. Physical and neuropsychological exams were unremarkable. Brain MRI showed a few small LH with no diffusion restriction or mass effect. Results of echocardiography, Holter monitoring, cerebral angiography, prothrombotic and vasculitis work-up, and other blood tests were normal. The absolute contraindication a successful outcome occurred with minimal untoward effects. To our knowledge this is the first report of such an intervention with the achievement of excellent outcomes. These cases highlight the challenges of balancing risks and benefits in circumstances beyond the accepted criteria.

Despite the absolute contraindication a successful outcome occurred with minimal untoward effects. To our knowledge this is the first report of such an intervention with the achievement of excellent outcomes. These cases highlight the challenges of balancing risks and benefits in circumstances beyond the accepted criteria.
normal. Cerebrospinal fluid (CSF) analysis revealed oligoclonal bands. She was clinically stable over the next 5 months. Sequential brain MRI revealed new LH and progressive enlargement of previous ones with mass effect, and several microbleeds on gradient echo sequences. She underwent open biopsies of a recent temporal LH and a frontal hypermetabolic spot identified by positron emission tomography (PET). Leptomeningeal fibrosis, cortical and subcortical gliosis, focal of neuron loss, a few senile plaques but no neurofibrillary tangles, arterial hyalinosis, frequent intimal dissections and a recent cortical microhemorrhage were found, but no inflammatory infiltrate. Brain vessels contained extensive beta-amyloid deposits and intact myocontractile structures. Apolipoprotein-E genotype was e4/e4. Repeat brain MRI documented important regression of LH after 11 weeks of prednisone therapy.

Conclusion: Clinical presentation, progressive LH on brain MRI, oligoclonal bands in the CSF, hypermetabolism on brain PET, and response to prednisone in this case are consistent with a diagnosis of LCAA. Brain and leptomeningeal biopsies can fail to confirm CAA-related inflammation, even when recent and hypermetabolic lesions are targeted.

7 Challenging cases

THUNDERCLAP HEADACHE, SUBARACHNOID HEMORRHAGE AND CEREBRAL VASOSPASM: RUPTURED INTRACRANIAL ANEURISM, CNS VASCULITIS, OR IDIOPATHIC REVERSIBLE CEREBRAL VASOCONSTRUCTION SYNDROMES?

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Objective: We sought to distinguish reversible cerebral vasoconstriction syn-
dromes (RCVS) from ruptured aneurism and CNS vasculitis in cases presenting
with subarachnoid hemorrhage (SAH).

Method: Case report.

Results: A 39-year-old woman without migraines, using oral contraceptives had a thunderclap headache during yoga exercises. Physical exam was normal. Brain MRI showed a left superior frontal sulcus hypersignal on FLAIR and normal angiogram. Cerebrospinal fluid (CSF) analysis confirmed SAH. She developed left-sided seizures and stroke on day 4. Repeat brain MRI revealed additional subarachnoid hypersignals on FLAIR, a large right frontoparietal hematoma, a right occipital infarct and meningeval enlargement. Digital subtraction angiography (DSA) showed stenoses with beading in most cerebral arteries and their branches. Blood test results were normal, including prothrombin and vasculitis work-up. EEG confirmed right-sided epileptic activity. Phenytion, high-dose corticosteroids and calcium channel blockers were started. In 2 weeks, she had multiple focal neurological deficits reflecting variable vascular territories and episodes of angina or T-wave inversion on EKG. Repeat brain MRI showed two more infarcts. Repeat cerebral DSA revealed progression of stenoses, which responded to intra-arterial milrinone. She stabilized clinically and radiologically by adding mannitol, pravas-
tatin and perfusions of levophed, milrinone and magnesium. Stenosis regression was documented. She is now off medication and asymptomatic since 2 years. Conclusion: Thunderclap headache, and the combination of normal cognition, absence of blood or CSF inflammation and severe vasculitic changes in large cerebral arteries are consistent with RCVS but not with CNS vasculitis. Although DSA shows many intracranial aneurisms, vasospasm typically correlates with the site and severity of aneurismal SAH. Vasospasm typically is above the cortex surface in RCVS, but usually present at symptom onset.

8 Challenging cases

CONSENT AND THROMBOLYSIS IN STROKE PATIENTS WITH INTELECTUAL DISABILITY – INITIAL EXPERIENCE

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Introduction: Stroke Thrombolyis improves functional outcome but can cause serious haemorrhage. Informed consent is difficult and a particular challenge in intellectual disability/ID/patients with stroke.

Case 1: 50 y.o. man with ID and bipolar affective disorder presented at 60min with right-sided facial and upper limb weakness, severe dyseresthesia/dysphagia. NIHSS score = 8. Premorbid modRankin 1. CT brain no haemorrhage. Risks/benefits explained. Consent by proxy obtained from parents. Thrombolysis administered at 160 mins. NIHSS=6 after 24 hours. Day 14 discharge; Modified Rankin 3; walking with frame; minor assistance with ADLs; speech/cognition at baseline.

Discussion: Many authorities advocate explicit consent procedure in stroke thrombolysis [1]. We provide prompt verbal, written/diagrammatic explanation of risk/benefit and assess capacity in thrombolysis patients. Patient consent/assent or consent by “proxy” is obtained where possible. Full informed consent requires provision of information, capacity to decide and voluntary choice. Capacity can be difficult to establish in acute stroke patients but is more challenging in assessing and upholding “voluntary choice” in ID patients. Our experience shows acute stroke treatment can be delivered effectively to ID patients with due ethical consideration of consent.


9 Challenging cases

DELAYED DEVELOPMENT OF PSEUDOANEURYSM POST UNDIAGNOSED INTRACRANIAL DISSECTION OF THE VERTEBRAL ARTERY MANIFESTING AS ISOLATED HORNER’S SYNDROME: REPORT OF AN ENDOVASCULARLY TREATED CASE

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Background: Intracranial vertebral artery (VA) dissections are uncommon and are manifested more often with subarachnoid hemorrhage. The late development of pseudoaneurysms, though common in the extracranial VA, is extremely rare – if not unknown – in the intracranial VA. We present a very rare case of postarterial mediullary infarction caused by V4 segment dissection that was undiagnosed due to the normal initial MRA evaluation, with subsequent development of a pseudoaneurysm.

Case report: A 50 year-old man without known risk factors was admitted for dizziness. He presented gaze-evoked nystagmus, left Horner’s syndrome, alter-
ating thermoanalgiesia, dysarthria and dysphagia. CT was normal and he was treated conservatively with a presumed diagnosis of left postarterial mediullary infarction that was confirmed by MRI. MRA of the posterior circulation was unremarkable. During hospitalization he had mild hypertension, LDL: 160 mg/dl and homocysteine: 22 mg/dl. The patient was discharged with a modest right leg sensory deficit and a mild left Horner’s syndrome under clopidogrel, eprosartan, atorvastatin and folate with a presumed etiology of microatheromatosis. He pur-
sued an uneventful course over the following 20 months until he complained for aggravation of his slight residual left lid ptosis. A repeat MRI/MRA disclosed a dissecting pseudoaneurysm of the left VA just proximal to the PICA origin, that was treated successfully endovascularly.

Discussion: The presence of an aneurysm 20 months after the medullary infarction, strongly argues in favor of an initial dissection of the V4 segment with subsequent development of a pseudoaneurysm. The recurrence of Horner’s syndrome could possibly be attributed to pressure on the lateral medulla. The natural course of intracranial VA pseudoaneurysms is unknown and the decision of whether and how to treat represents a major challenge.

10 Challenging cases

STROKE IN THE Puerperium TREATED WITH INTRA-ARTERIAL RTPA

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Introduction: The safety of thrombolysis in acute stroke in the early puerperium is not proven. Recent obstetrical delivery is considered a contraindication for thrombolysis. This paper reports a case of intra-arterial thrombolysis with rTPA in acute ischemic stroke in the puerperium.

Case report: A 29 year old primigravid developed signs of peripartum cardiomy-
opathy with severe left ventricular dysfunction three days after delivery. Eight days postpartum she had an acute ischemic stroke due to occlusion of the M2 segment of the middle cerebral artery (MCA). She had a number of relative contraindications for administration of systemic rTPA: Puerperium, on anticoagulation therapy and chest drain for pleural effusion. She received intra arterial thrombolysis with rTPA. Shortly after treatment she had a substantial improvement. Angiograms showed recanalisation of the MCA.
Discussion: This is the first patient reported treated with rtPA in the puerperium. There are a few case reports that show a beneficial effect of systemic rtPA in acute ischemic stroke late in pregnancy. Only one case of thrombolysis in stroke in the puerperium is reported. In that particular case the patient received urinokase. Catheter-based treatment should be considered in the puerperum especially in large branch occlusions and when systemic thrombolysis may be contraindicated.

Stroke and metabolic syndrome

1 Stroke and metabolic syndrome

**METABOLIC SYNDROME AND RESISTANCE TO EARLY MIDDLE CEREBRAL ARTERY (MCA) RECANALIZATION AFTER THROMBOLYSIS IN ACUTE ISCHEMIC STROKE**

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Background: The metabolic syndrome (MetS) has been associated with a higher resistance to clot lysis at 24 hours after ICA administration in patients with ischemic stroke. However, whether MetS-related resistance to iv thrombolysis is also present at earlier time-points, when rescue neurointerventional procedures may be still indicated to achieve arterial recanalization, remains unknown.

Methods: Of a total of 159 consecutive ischemic stroke patients treated with iv ICA at our Stroke Centre from July’06 to November’08 we prospectively selected those treated within 3 hours from symptoms onset and who showed MCA occlusion on prebolus transcranial Duplex (TCDx) examination. TCDx was repeated at 2, 6 and 24 hours after ICA. TIBI grades were recorded. MetS was diagnosed following AHA/NHLBI-2005 criteria. Resistance to thrombolysis was defined as the absence of TCDx-assessed complete MCA recanalization 2, 6 and 24 hours after ICA infusion.

Results: 80 patients were included. 32 (40%) fulfilled MetS criteria. Median prebolus NIH Score Scale was 13 [9-19]. Resistance to clot lysis was observed in 45/74 patients (60.8%) at 2 hours, in 42/72 patients (58.3%) at 6 hours and in 23/77 patients (29.9%) at 24 hours. MetS was associated with resistance to clot lysis at 2 hours (53.3 vs 20.7%, p=0.005), 6 hours (54.8 vs 20%, p=0.003) and 24 hours (56.5 vs 31.5%, p=0.039). MetS remained as an independent predictor of resistance to thrombolysis at 2 hours (OR: 4.8, 95% CI 1.5-14.8, P=0.006) and at 6 hours (OR: 6.4, 95% CI 1.9-20.7, p=0.002), but not at 24 hours (OR: 2.6, 95% CI 0.9-7.4, p=0.064), after adjustment for age, gender and baseline stroke severity. Accordingly, good recovery (NIHSS score 0, or improvement ≥ 8) at 2h, 6h and 24h was less frequent in MetS (26% vs 50%, p=0.021 at 24h).

Conclusion: The effect of MetS on the resistance to MCA recanalization after ICA appears to be more pronounced at earlier than at late time-points and is associated with a poorer neurologic outcome.

2 Stroke and metabolic syndrome

**ACUTE POST-STROKE ADIPOPOIN CTIN IN RELATION TO DISEASE SEVERITY AND 6-MONTH OUTCOME**

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Background: The metabolic syndrome (MetS) has been associated with a higher resistance to clot lysis at 24 hours after ICA administration in patients with ischemic stroke. However, whether MetS-related resistance to iv thrombolysis is also present at earlier time-points, when rescue neurointerventional procedures may be still indicated to achieve arterial recanalization, remains unknown.

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Conclusion: The effect of MetS on the resistance to MCA recanalization after ICA appears to be more pronounced at earlier than at late time-points and is associated with a poorer neurologic outcome.

3 Stroke and metabolic syndrome

**LOW SERUM ADIPOPOIN CTIN A CULTY AND SIX MONTHS AFTER AN ISCHEMIC STROKE**

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Background: Low circulating adiponectin (ADPN), a recognized anti-inflammatory and anti-atherosclerotic agent, has been associated with incidence and severity of coronary artery disease. The association between ADPN and acute ischemic stroke (IS) is, however, controversial. Furthermore, it remains unclear whether suppressed ADPN levels, measured shortly after an IS, may simply reflect the inhibitory effect of the acute-phase inflammatory reaction.

Objective: To study the association of acute post-stroke ADPN with IS, and re-evaluate serum ADPN 6 months later, during the chronic, stable phase of the disease.

Methods: We measured serum ADPN in eighty-two acute IS patients, and thirty stroke-free subjects of the same age and sex distribution. At 6 months, measurements were repeated in forty-six stroke survivors. For all participants, conventional risk factors, treatments, lipid profiles, body-mass index and high-sensitivity C-reactive protein were recorded at inclusion.

Results: Patients had significantly lower ADPN levels than controls (11.15±8.50 versus 15.86±7.84 μg/ml, p=0.009). Increasing age, male sex and low HDL were independently associated with decreased ADPN levels. Higher ADPN was associated with reduced risk for IS (Odds ratio 0.92. (95% CI 0.85-0.992) accounting for age, sex and HDL. The association was strengthened after further adjustments for known confounders. Serum ADPN levels 6 months after stroke did not differ from baseline values (10.25±7.47 versus 9.76±8.29 μg/ml, p=0.36).

Conclusion: Decreased post-stroke ADPN is associated with IS, independently of conventional risk factors. The marked stability of ADPN levels by month 6 implies that ADPN could not have been transiently suppressed by the acute ischemic inflammatory reaction. Rather, we propose that it is an independent anti-atherogenic agent, and therefore, an interesting candidate for atherosclerosis prevention therapies.

4 Stroke and metabolic syndrome

**LEPTIN – AN IMPORTANT LINK FOR DEVELOPMENT CEREBROVASCULAR DISEASE IN THE OBSESE PEOPLE**

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Background: Leptin, an important hormone for body weight regulation - primary involved in the regulation of food intake and energy expenditure - may be involved in the pathogenesis of cerebrovascular manifestations of obesity. Its concentration is proportional to body adiposity. The Metabolic Syndrome is a cluster of highly interrelated risk factors that together increase the risk of cerebrovascular disease.

Methods: To this study were qualified patients with early ischemic stroke and referents without cerebrovascular diseases, matched with age and gender. We examined lipid pattern (cholesterol, HDL, cholesterol, triglycerides, LDL cholesterol), blood glucose level, blood pressure, body mass index and central fat - measured by waist circumference (WC) and waist to hip ratio (W/H) - in every patient. On the basis of these parameters we diagnosed the presence of Metabolic Syndrome (MetS) and the association of MetS with plasma leptin concentration. The MetS was defined according to the American Heart Association 2005. Plasma leptin level was measured by an enzyme linked immunosorbent assay.

Results: To this time we have examined 34 participants: 21 with stroke and 13 without vascular diseases. In stroke group there was more often presence of markers of abdominal obesity, like W/H Ratio and WC and presence of Metabolic Syndrome. Leptin concentration was higher (but not statistically important) in the stroke group. Leptin was positively correlated with WC (p<0.01) and W/H ratio (p<0.01) in both groups and positively associated with presence of MetS (p=0.05)
in the stroke group. Leptin level was significantly negatively correlated with HDL concentration too.

**Conclusion:** Plasma leptin concentration was positively associated with presence of abdominal obesity and Metabolic Syndrome. Adipose tissue (or leptin per se) may have an influence on the development of cerebrovascular disease in obese people.

## 5 Stroke and metabolic syndrome

**METABOLIC SYNDROME (MS) AS A RISK FACTOR (RF) FOR ISCHEMIC STROKE (CI): HOW INDIVIDUAL RISK FACTORS INTERACT IN THIS SYNDROME**

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**Introduction:** No consensus exists how individual parameters of MS influence the clinical course of this syndrome

**Aim:** To analyse every MS component individually, multiplicatively and by summation in relation to CI.

**Methods:** Material consists of 1968 pts with first-ever stroke (CI), data from Medline, Cochrane Library, EMBASE, ISI (1995-2008).

All five MS components were precisely characterized according to special protocol.

**Results:** 1. AH increases CI risk 3-4 times in symptomatic and asymptomatic AH. Both sBP and dBP are important predictors, but sBP was more significant than dBP. Although higher BP predicts higher RR, there is an additional factor, which contributes to the CI risk. Recent evidence points to Ang. II 2. Glucose tolerance. By using of oGTT and double loaded oGTT, ivGTT, analysing of immunoreactive insulin (IRI), glycosylated Hb and fructoseamino, it was found out significant correlation between impaired GT and the onset and time-course of CI. By analysing of regulatory metabolic centers in diencephalon, it was found out that this was not influenced by disorders of these centers. Insulin production was not changed and it was not found the failure of intestinal resorption. 3. Obesity (BMI), mainly abdominal, was found as an important RF. 4. Total cholesterol didn’t correlate with increased RR - CI, but LDL-C, VLDL-C, apoprotein AI, AII, AIII, TGs showed significant correlation to increased RR. Promised results showed analysis of completely new original LDL subtraction fractions analysis of LDL 1-7.

**Conclusions:** 1. Individual components of MS significantly contribute to incidence, severity, time-course, and prognosis of CI. 2. They interact multiplicatively rather than by summation. The risk of CI, poor prognosis and death increases, even when these RFs are individually of less significance. 3. The largest multicenter study concerning this topic Supported by the Governemental grants LPP 0180-06, APVV 0586-06, KEGA 5034-07 and Intern. grant INTERREG IIIA 141-42-032

## 6 Stroke and metabolic syndrome

**APOLIPOPROTEIN B/A-I RATIO IS RELATED WITH METABOLIC SYNDROME IN ISCHEMIC STROKE PATIENTS**

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**Background and objective:** Apolipoprotein-B (apoB)/apolipoprotein-AI (apoA) ratio is a strong predictor of cardiovascular risk. Metabolic syndrome (MetS) is associated with an increased risk of stroke and myocardial infarction. The aim was to examine whether apoB/apoA1 was associated with the MetS in ischemic stroke patients.

**Methods:** We investigated demographic features and risk factors in 216 patients (mean age 67.8±11.9 years; 123 men) who underwent brain MRI and MRA between December 2007 and December 2008 were evaluated. The stroke subtypes were categorized as large artery atherosclerotic (LAA), small artery occlusion (SAO), cardioembolism (CE), and stroke of undetermined etiology (SUE). MetS was diagnosed following the criteria by the American Heart Association/National Heart, Lung, and Blood Institute. We examined associations between full syndrome (at least 3 of the 5 components) as well as its components and apoB/apoA1 quartiles by controlling possible confounders.

**Results:** There were 132 (61.1%) patients with MetS. Females with MetS were prevalent (53.8% vs. 26.2%, P<0.001). Hba1c (P<0.001), total cholesterol (P=0.049), low density lipoprotein (LDL) (P=0.008), apoB (P=0.003), apoB/apoA1 ratio (P<0.001), high sensitivity C-reactive protein (hs-CRP) (P=0.078), and uric acid (P=0.027) showed higher levels in patients with MetS, whilst apoA1 and high density lipoprotein (HDL) levels were lower in those with MetS (all P<0.001). The quartiles of the apoB/apoA1 ratio showed increased tendency as the number of MetS components increased (P<0.001), especially in LAA (P=0.001) and SAO (P=0.015). After adjusting for age, gender, and smoking, patients with the MetS were more likely to be in the upper 1st quartile of the apoB/apoA1 ratio (OR, 2.34, P=0.020). Of individual components of the MetS, only low HDL showed significant association with upper 1st quartile of the apoB/apoA1 ratio (OR 2.93, P=0.006).

**Conclusions:** Elevated apoB/apoA1 ratio was strongly associated with MetS in ischemic stroke. Our study provides that the atherogenic lipid constitute an important feature of the MetS.

## 7 Stroke and metabolic syndrome

**HEAT STROKE IN DIABETES EXACERBATES BLOOD-BRAIN BARRIER BREAKDOWN, BRAIN EDema FORMATION AND BRAIN PATHOLOGY. NEUROPROTECTIVE EFFECTS OF CEREBROLYSIN**

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**Heat stroke is a serious clinical situation during summer months in European populations for which no suitable medical therapy is still available. It is still unclear whether persons suffering from cardiovascular or metabolic syndromes, e.g., diabetes are more prone to heat stroke induced brain damage. Furthermore, no protective agents given in standard doses for routine stroke cases may equally be effective in heat stroke cases in patients suffering from diabetes or related disorders. Therefore, in present investigation, we examined brain pathophysiology following hyperthermia in experimental diabetic rat model and evaluated the effects of cerebrolysin in these animals for its possible neuroprotective effects.**

Rats were made diabetic by administering streptozotocine once daily for 3 days (50 mg/kg, i.p.) that resulted in elevated blood glucose level (>18 and 20 mEq/L), compared to controls (blood glucose 4-6 mEq/L). Both control and diabetic rats were subjected to 4 h heat stress at 38°C in a biological oxygen demand incubator (BOD). This exposure results in massive BBB disruption to Evans blue and radiodine and induced brain edema and cell injury. The diabetic rats also showed and exacerbation of hyperthermia (~41°C), cognitive dysfunction and other behavioral thermal stress symptoms, e.g., salivation and prostration. Pretreatment with cerebrolysin, a mixture of various growth factors [5 mKg] 30 minutes before hyperthermia in normal animals significantly attenuated brain damage. However, in diabetic rats about 2 to 3 times higher dose of cerebrolysin [10 to 15 mKg] is needed to induce considerable neuroprotection. These observations suggest diabetes aggravates heat stroke induced brain pathology and in these situations, therapeutic doses of neuroprotective agents, e.g., cerebrolysin require certain adjustments to achieve neuroprotection.

## 8 Stroke and metabolic syndrome

**PREVALENCE OF THE METABOLIC SYNDROME IN ISCHAEMIC STROKE PATIENTS**

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**Background and purpose:** The metabolic syndrome (MetS) predisposes to cardiovascular disease or stroke development. We aimed at evaluating the prevalence of MetS in a population of acute ischaemic stroke (IS) and comparing it with patients suffering from other neurological disorders.

**Methods:** We analyzed 672 IS patients (387 women, 285 men) admitted to a Neurological Ward with Stroke Unit of Specialist Hospital in Koszkie (Poland) (1.01.2007-31.12.2008). 612 patients with other neurological disorders (low back pain, cephagalia, epilepsy, MS) established control group. MetS was diagnosed as linked to three from five disturbances (alimentary or simple obesity, increased blood pressure, increased triglycerides, low HDL cholesterol, fasting hyperglycaemia) according to the criteria of American Heart Association – National Heart, Lung and Blood Institute (AHA-NHLBI).

**Results:** According to criteria AHA-NHLBI MetS was diagnosed in 62.1% of IS patients vs 18.1% in those with other neurological disorders. Hypertension and hypertrigliceridemia were the most frequent disturbances in IS patients (87.2 and 68.2%). MetS was significantly more prevalent in women than men.

**Conclusions:** MetS occurs in more than half of ischaemic stroke patients and its...
frequency is statistically greater than in other neurological disorders. Metabolic syndrome may be a risk factor for ischemic stroke.

9 Stroke and metabolic syndrome

SERUM LEVELS OF METHYLMALONIC ACID AND VITAMIN B12 IN ACUTE ISCHEMIC STROKE

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Background: Mitochondrial toxins are produced during cerebral ischemia. It has been shown that a gene for methylmalonyl CoA mutase is expressed in ischemic region. Methylmalonyl CoA mutase, which is a vitamin B12 dependent enzyme, converts methylmalonyl CoA to succinyl CoA and has an important role both in electron transport chain and Krebs cycle. In case of vitamin B12 deficiency or methylmalonyl CoA mutation, methylmalonic acid (MMA) derived from methylmalonyl CoA, accumulates and interferes with mitochondrial functions. It's not known whether increased serum level of MMA has any affect on stroke severity. We measured serum levels of MMA and vitamin B12, and evaluated the correlation between stroke severity.

Methods: Fifty patients with acute ischemic stroke were included. Clinical status was assessed by National Institute of Health and Stroke Scale (NIHSS) and Modified Rankin Scale (mRS). Stroke subtype was classified according to TOAST criteria. Control group was 55 sex and age matched subjects without a history of stroke and other cardiovascular diseases. Serum MMA was measured by High-Performance Liquid Chromatography with fluorescence detection. Briefly, MMA was extracted from an acidified serum with ethyl acetate. The extract was dried and derivatized with monomethylcyclohexane and dichloromethane prior to injection on the HPLC. Ethylmalonic acid is used as an internal standard. Vitamin B12 tests were evaluated by the Immulite2500 Analyzer System. Principle of the procedure is a competitive immunoassay.

Results: The mean value of MMA in stroke cases was 0.40±0.05 mol/L, which is higher than the accepted normal range of 0.05-0.37 mol/L. Mean MMA value in control group was 0.37±0.04 mol/L. The difference was not found significant according to t-test. Mean value of vitamin B12 levels in cases was lower than control group (374.4±77.0 pg/mL and 461.4±54.9 pg/mL respectively) but the difference was not significant, either. T-test revealed no correlation between the stroke severity and serum levels of MMA and vitamin B12.

Conclusion: Despite the tendency of serum MMA levels to increase in acute ischemic stroke, the potential role in ischemic injury needs to be clarified before the routine use of the test.

Vascular surgery and neurosurgery/interventional neuroradiology

1 Vascular surgery and neurosurgery/interventional neuroradiology

ACUTE ISCHEMIC STROKE DUE TO MCA OCCLUSION: EFFECTIVENESS OF INTRACRANIAL PERCUTANEOUS TRANSLUMINAL ANGIOPLASTY IN PATIENTS WITHOUT IMPROVEMENT OF NEUROLOGICAL DEFICIT AFTER INTRAVENTRICES THROMBOLYSIS

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Background: The speed of brain artery recanalization is one of the most important prognostic factors in patients with acute ischemic stroke (IS). Intravenous thrombolysis (IVT) has only a limited effectiveness in the recanalization of the middle cerebral artery (MCA) occlusion. Emergent intracranial percutaneous transluminal angioplasty (PTA) may be used as an alternative experimental method in such cases. The aim was to assess the effectiveness of intracranial PTA in patients with acute IS caused by the MCA occlusion, in whom IVT was not effective in the improvement of neurological deficit.

Methods: The MCA (M1 and/or M2 segment) occlusion was found (using the sonography and/or angiography) in 73 patients treated with IVT from January 2003 to July 2008. Intracranial PTA was performed in 17 (10 males; age 24–81, average 64.8±16.2 years) out of these 73 patients, in whom no clinical improvement was observed after the IVT. Patients neurological state was assessed (using the NIHSS) before, 1 day and 7–10 days after the intracranial PTA. Mann-Whitney test and Wilcoxon signed ranks test were used for statistical evaluation.

Results: Using the intracranial PTA, total or partial MCA recanalization was achieved in 13 (76.5%) of patients (Subgroup 1) and no MCA recanalization or MCA recanalization with reclosure was found in 4 (23.5%) of patients (Subgroup 2). The following differences were found between Subgroup 1 and Subgroup 2: mean baseline neurological deficit 14.7±4.5 versus 15.0±4.5 points (p=0.099); mean improvement of the neurological deficit 1 day (2.5±4.9 versus 2.0±3.5 points; p=0.248) and 7–10 days (6.6±11.2 versus -0.7±3.8 points; p=0.041) after the intracranial PTA.

Conclusions: In the presented study, the use of intracranial PTA after ineffective IVT was associated with higher recanalization rate followed by the improvement of neurological state in acute IS patients with MCA occlusion. Supported by the Ministry of Education CR grant MSM6198950216.

2 Vascular surgery and neurosurgery/interventional neuroradiology

STENTING OF MIDDLE CEREBRAL ARTERY STENOSIS; CLINICAL AND ANGIOGRAPHIC RESULTS

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Objective: Intracranial artery stenosis is an important cause of ischemic stroke. Especially, patients with symptomatic M1 stenosis of middle cerebral artery (MCA) had the worse outcome. Recently, endovascular stent-assisted angioplasty has emerged as a potential therapeutic option. This study was aimed to assess the efficacy, safety and clinical outcome of stenting of symptomatic MCA stenosis.

Material and methods: From July 2002 to June 2006, we performed endovascular stent-assisted angioplasty in 20 patients with symptomatic M1 stenosis (>50%) of middle cerebral artery (MCA), who had either recurrent transient ischemic attack (TIAs) or cerebral infarction. Patient records were analyzed for cerebral angiography, pre- and post-procedure degree of stenosis, procedure-related complications, and clinical and radiologic outcome over 6 months.

Results: Endovascular stent-assisted angioplasty was successfully performed in 20 patients without any serious complications. Residual stenosis was less than 50% in all cases. The rate of complicating subarachnoid hemorrhage was 15%(3/20 patients) and the rate of death was 0%. Follow-up brain SPECT scan showed improved cerebral perfusion in 6 patients(6/17; 36%) after endovascular stent-assisted angioplasty. During follow-up period(mean 6 months), there were 2 recurrences of transient neurologic complications and 2 of permanent neurologic complications. Among 12 patients who underwent follow-up cerebral angiography, restenosis was noticed 2 patients(17%).

Conclusion: Endovascular stent-assisted angioplasty for symptomatic MCA stenosis was a relatively safe and effective procedure. Stent-assisted angioplasty can be used in preventing recurrent TIAs or strokes in M1 stenosis and improving cerebral blood flow.

3 Vascular surgery and neurosurgery/interventional neuroradiology

THE ANALYSIS OF EFFECTIVENESS AND SAFETY OF STENTS

IMPLANTATION IN PATIENTS WITH CAROTID SYNDROME

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Background: Carotid artery stenosis (CAS) is responsible for 15-20% of all
Ischaemic strokes. Carotid artery angioplasty and stenting is now used as an alternative to surgical endarterectomy in primary and secondary ischaemic stroke prevention.

**Material and Methods:** Between June 2007 and December 2008, 64 patients with 68 carotid artery stenoses were treated with angioplasty and stenting. In this group were 48,44% (n=31) men and 51,56% (n=33) women, with mean age 72,16 years, (range: 53-83). 37,51% (n=24) of patients had previous ischaemic stroke, 28,12% (n=18) transient ischaemic attack (TIA) and 34,37% (n=22) were asymptomatic. 92,19% (n=59) had contralateral carotid disease, in this group 29,69% (n=19) had carotid artery occlusion. 82,81% (n=53) had coronary arteries disease, 12,5% (n=8) had CABG, 9,37% (n=6) PCI. Mainly they were patients with high surgical risk.

**Results:** Baseline stenosis was 78,66% ±13,36%, mean peak systolic velocity measured with Doppler before the stenting was 224,14±93,2cm/sec. Procedural success was obtained in all patients. Distal protection devices and Cristallo stents (Invatec) were used in all cases. In-hospital complications occurred in 2 patients (2,9%), in 1 case-TIA, and 1 patient died because of acute circulatory insufficiency in the 3rd day after stenting. In 3 cases 2 stents were used in 1 lesion. Combined carotid angioplasty with stent implantation is safe and efficient method of treating occlusive carotid artery disease.

### 4 Vascular surgery and neurosurgery/interventional neuroradiology

**PREDICTORS OF HEMORRHAGIC TRANSFORMATION AFTER MULTIMODAL INTRA-ARTERIAL REPERFUSION THERAPY FOR ACUTE ISCHEMIC STROKE**

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**Background:** Although many studies have identified factors that may lead to HT after intravenous thrombolysis, factors relate to HT after multimodal IA therapy are still unclear. We investigated predictors of HT in patients treated with multimodal IA therapy.

**Methods:** We retrospectively reviewed patients with acute ischemic stroke who presented within 6 hours of symptom onset and was treated with thrombolytics infusion, mechanical thrombus disruption with a microcather, balloononing angioplasty, or/and stent deployment. We collected information about demographics, baseline National Institutes of Health Stroke Scale (NIHSS) scores, and treatment methods of these patients. HT was diagnosed using gradient echo MR imaging or CT at 12-24 hours after IA therapy and classified into hemorrhagic infarction (HI) type 1 and 2, parenchymal hemorrhage (PH) type 1 and 2. Also HT was classified into asymptomatic hemorrhage and symptomatic hemorrhage.

**Results:** We identified 157 patients with median NIHSS score of 14.3 (range, 4-30). Among 157 patients, 47 (29.9%) had HI, 42 (26.8%) had PH, and 20 (12.7%) had symptomatic hemorrhage. HI was significantly more frequent in patients who had low initial NIHSS score, IA urokinase alone, and combination therapy with intravenous rt-PA. Symptomatic hemorrhage was associated with high initial NIHSS score and occlusion of the distal internal carotid artery (dICA). In multiple logistic regression analysis, PH after multimodal IA therapy is significantly associated with initial NIHSS score OR 1.09; 95% CI 1.03-1.17; p=0.01) and glucose (OR 1.01; 95% CI 1.00-1.02; p=0.03). PH was significantly more frequent in patients who had low initial NIHSS score, IA urokinase alone, and combination therapy with intra-venous rt-PA. Symptomatic hemorrhage was associated with high initial NIHSS score and occlusion of the distal internal carotid artery (dICA). In multiple logistic regression analysis, PH after multimodal IA therapy is significantly associated with initial NIHSS score OR 1.09; 95% CI 1.03-1.17; p=0.01) and glucose (OR 1.01; 95% CI 1.00-1.02; p=0.03) and symptomatic hemorrhage is significantly associated with the occlusion of the dICA (OR 3.44; 95%; CI 1.08-3.34; p=0.04). Door to needle time, age, sex, tandem occlusion, recanalization, and platelet count were not related to PH and symptomatic hemorrhage.

**Conclusion:** Multimodal IA therapy in patients with acute ischemic stroke may increase the incidence of hemorrhage complication. Especially high initial NIHSS score, high glucose and occlusion of the dICA were associated with hemorrhagic transformation after multimodal IA therapy.

### 5 Vascular surgery and neurosurgery/interventional neuroradiology

**PERIOD BETWEEN STROKE AND CAROTID ARTERY STENTING IS NOT RELIEFABLE PREDICTOR OF PERIPROCEDURAL STROKE-EVENTS**

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**Background:** Carotid endarterectomy of symptomatic carotid artery stenosis is the most effective within the first 14 days after cerebrovascular event. Due to the need of dual antiplatelet therapy, carotid artery stenting (CAS) might be associated with an increased risk of reperfusion injury during this period. However, available data concerning this risk are contradictory. Furthermore there is only little knowledge about the optimal point in time for CAS after stroke onset.

**Methods:** We analyzed the data of 221 prospectively collected carotid artery stent procedures in patients with non-disabling (mRS <4) and stenosis-related symptoms within 180 days prior to CAS. We investigated the correlation between the time span “last cerebrovascular event – CAS” and the endpoint “rate of any stroke or death from procedure to day 30”.

**Results:** The overall complication rate was 9.5% (95% CI 5.9 to 14.5%); two patients (0.9%) suffered from an intracranial bleeding. There were no significant differences concerning baseline characteristics between patients with or without endpoint events. The median time interval between symptom onset and intervention was 11 days for patients with and 12.5 days for patients without endpoint events (p=0.77, Mann-Whitney U-test). Subdivision of time interval since symptom onset provided lowest complication rate for the period from day 8 to 14 days (7.9%; 95% CI 2.6 to 18.5%) with overlapping confidence intervals (Fig. 1) and thus no statistically significant difference (Fisher-Freeman-Halton exact test, p=0.97).

**Conclusion:** In the analyzed population we did not found a significant increased risk of CAS, if the patients are treated early after a non-disabling stroke. However, there was a hint for reduced complication rate in the second week after stroke onset.

### 6 Vascular surgery and neurosurgery/interventional neuroradiology

**FUNCTIONAL MRI IN THE ASSESSMENT OF CEREBRAL VASOMOTOR REACTIVITY AFTER EXTRACRANIAL-INTRACRANIAL BYPASS FOR INTERNAL CAROTID ARTERY OCCLUSION**

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**Background:** Extracranial-intracranial (EC-IC) bypass surgery may be useful in preventing stroke in patients with hemodynamic compromise. Functional magnetic resonance imaging (fMRI) can be used for the assessment of cerebral vasomotor reactivity (CVR) in patients with the internal carotid artery occlusion (ICAo) considered for EC-IC bypass surgery. However, post-operative changes in CVR assessed by fMRI have not been previously described. The aim was to describe the evolution of CVR assessed by fMRI after EC-IC bypass surgery for ICAo.

**Methods:** Out of 27 patients with unilateral ICAo studied with fMRI, 6 patients with signs of impaired CVR were considered for EC-IC bypass surgery. One patient refused the intervention and 2 were rejected for medical reasons. The remaining 3 underwent successful surgery and were studied with repeated fMRI at 3 and 6 months following surgery. fMRI employed a bimanual motor task within both a block paradigm and an event-related (ER) paradigm. CVR was studied using hemodynamic response properties in the ER paradigm.

**Results:** Follow-up fMRI showed several possible outcomes in the studied patient group. In one patient, postoperative fMRIs showed gradual improvement of CVR 6 months following surgery. fMRI employed a bimanual motor task within both a block paradigm and an event-related (ER) paradigm. CVR was studied using hemodynamic response properties in the ER paradigm.
damage of the motor cortex on the occluded/operated side, and the lesion did not allow placement of a region of interest. However, the pattern of activation of accessory motor cortical areas (initial relative overactivation of supplementary motor area and lateral premotor cortex) showed signs of restoration to normality over time.


7 Vascular surgery and neurosurgery/interventional neuroradiology

TREATMENT OF INTRACRANIAL STENOSES WITH SELF-EXPANDABLE MICROSTENTS. FIRST YEAR EXPERIENCE IN A NEWLY ESTABLISHED ENDOVASCULAR NEURORADIOLOGY UNIT

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Background: Intracranial stenoses are rare causes of cerebral infarction but pose a therapeutic challenge as recurrent strokes are common under medical treatment. With the advent of self-expandable intracranial stents there is a new option of treatment but there are still concerns of peri-procedural complications and in-stent restenosis. We present our data of intracranial stenting to shed light on these concerns.

Methods: 14 subsequent patients (9 m/5 f; av. age 64 yrs) treated by intracranial stenting were retrospectively evaluated. Indication was confirmed by a neurologist, also clinical examinations were carried out by the neurology. We evaluated treatment success, peri-procedural complications, and restenosis.

Results: Stenting was performed of the proximal MCA (n=5); distal ICA/proximal MCA (n=5); petrous ICA (n=3); caudal basilar artery (n=1). In one patient stenting of a MCA stenosis was not possible due to vessel elongation. In the postprocedural MRI new small infarctions were found in 3 patients, all of them having recent infarctions (1-9 days). One of them developed new neurologic deficits, one of them was not evaluable at that time. Infarction location in one of these patients was outside the territory of the catheterised vessels, so most probably due to cardiembolisation in the setting of absolute arrhythmia Restenoses occurred in two patients. One of them was retreated by a bare a metal due to stenosis proximal to the original stent and one with a drug eluting stent due to in stent restenosis. No new restenosis occurred.

Conclusion: Intracranial stenting is feasible in the vast majority of patients. Peri-procedural complications were only seen in patients in the subacute phase. Only in one patient new neurologic symptoms were detected. The rate of restenoses was under the range reported elsewhere.

8 Vascular surgery and neurosurgery/interventional neuroradiology

RECANALIZATION AND COMPLICATION RATES AFTER THE USE OF THE PENUMBRASYSTEM IN PATIENTS WITH ACUTE CEREBRAL ISCHEMIA: A SINGLE CENTER EXPERIENCE

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Background: The Penumbra system (PS) is a mechanical recanalization device under development for the treatment of acute stroke. In the United Kingdom, interventional neuroradiologists have pioneered its use.

Methods: Single centre observational study of consecutive patients treated with the PS between 2005 and 2008. The results are compared to data of the Penumbra trial (PT) [1].

Results: We treated 51 patients (PT: 125). Mean age was 70 years (49% female). Target vessels were internal carotid artery (37%, PT: 18%), middle cerebral artery (33%, PT: 70%), and basilar artery (29%, PT: 9%). The baseline TIMI-scores were 0 (82%, PT: 96%), 1 (4%, PT: 4%) and IIa (14%, PT: 0%). After a median recanalization time of 75 minutes (PT: 45 min), the TIMI scores were 0 (4%, PT: 10%), 1 (14%, PT: 9%), II (76%, PT: 54%) or III (4%, PT: 27%). Successful recanalization (TIMI II+III) was achieved in 82% (PT: 82%). Adjunctive therapies were abciximab (57%), rTPA (77%) and stenting (24%). We observed 3 procedure-related complications (5.9%) (1 dissection, 2 vessel perforations) (PT: 3.2%). Six patients (12%) experienced a parenchymal hemorrhage (all 6 had received rTPA). Mostly minor subarachnoid hemorrhages occurred in 8 patients, hemorrhagic infarctions in 12 patients (24%). There were no significant trends toward better recanalization and higher incidence of parenchymal hemorrhage after use of rTPA. The adjunctive use of abciximab led to better recanalization (p=0.025, Fisher's exact test) with identical rates of hemorrhage.

Conclusion: Our single center experience with the PS shows identical recanalization efficiency and complication rates compared to the PT [1]. The adjunctive use of abciximab was associated with higher recanalization efficiency without increase of hemorrhagic complications.

9 Vascular surgery and neurosurgery/interventional neuroradiology

REDUCTION IN TIME TO CAROTID ENDARTERECTOMY IS ACHIEVED BY STREAMLINING REFERRALS OF SYMPTOMATIC CAROTID STENOSIS TO VASCULAR SURGERY

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Background: Carotid endarterectomy (CEA) within two weeks of transient ischaemic attack (TIA) or ischaemic stroke significantly improves outcomes compared with later surgery. We audited our practice in 2006 and found major delays to CEA. Changes have since been made: carotid imaging is prioritised; referral of inpatients with surgical grade stenosis is expedited by same-day telephone referral to vascular surgery; and CEA patients are pre-booked on the next available operating list. This study evaluates the impact of these changes.

Methods: Data was collected retrospectively for new ischaemic stroke clinic and in-patients referred to stroke services at a single urban teaching hospital from 21/1/06 to 23/7/06 (n=360 post-intervention) and compared with a retrospective patient cohort from 4/1/06 to 28/06 (n=342 pre-intervention). Surgical grade stenosis was defined as extracranial internal/common carotid artery stenosis of 70%-99%. (European carotid surgery trialists criteria).

Results: In 2008, 268/360 (74%) patients had anterior circulation ischaemia. Carotid imaging was performed on 190 (70.9%) with 19 (10%) having surgical grade stenosis and 11 (5.8%) having CEA. In 2006, 234/342 (68%) patients had anterior circulation ischaemia. Carotid imaging was performed on 188 (80.3%) with 17 (9%) having surgical grade stenosis and 10 (5.3%) having CEA. Time from symptom onset to CEA was reduced from a median of 109 days pre-intervention to 15 days post-intervention (p=0.001, Mann Whitney U test). In 2006, 234/342 (68%) patients had anterior circulation ischaemia. Carotid imaging was performed on 188 (80.3%) with 17 (9%) having surgical grade stenosis and 10 (5.3%) having CEA. Time from symptom onset to CEA was reduced from a median of 109 days pre-intervention to 15 days post-intervention (p=0.001, Mann Whitney U test). In 2006, 234/342 (68%) patients had anterior circulation ischaemia. Carotid imaging was performed on 188 (80.3%) with 17 (9%) having surgical grade stenosis and 10 (5.3%) having CEA. Time from symptom onset to CEA was reduced from a median of 109 days pre-intervention to 15 days post-intervention (p=0.001, Mann Whitney U test). In 2006, 234/342 (68%) patients had anterior circulation ischaemia. Carotid imaging was performed on 188 (80.3%) with 17 (9%) having surgical grade stenosis and 10 (5.3%) having CEA. Time from symptom onset to CEA was reduced from a median of 109 days pre-intervention to 15 days post-intervention (p=0.001, Mann Whitney U test). In 2006, 234/342 (68%) patients had anterior circulation ischaemia. Carotid imaging was performed on 188 (80.3%) with 17 (9%) having surgical grade stenosis and 10 (5.3%) having CEA. Time from symptom onset to CEA was reduced from a median of 109 days pre-intervention to 15 days post-intervention (p=0.001, Mann Whitney U test).

Conclusions: A major reduction in time from ischaemic stroke or TIA to CEA in patients with symptomatic surgical-grade carotid stenosis was achieved by prioritising imaging and effecting simple changes in referral practice including same day telephone referral to vascular surgery and streamlined booking for operating theatre.

10 Vascular surgery and neurosurgery/interventional neuroradiology

2 YEAR AUDIT OF CAROTID ENDARTERECTOMY IN THE UK

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Background: As part of a stroke improvement programme an audit of carotid endarterectomy (CEA) in the UK was carried out in order to assess the speed of provision of CEA and the outcomes.

Methods: All surgeons in the UK performing CEA (396) were invited to contribute to the audit. Data entry was via a web-based system. Data was recorded in 2 phases; phase 1 included in-hospital data; phase 2 included follow up data. Cases performed between 1st December 2005 to 31st December 2007.

Results: 61% (240/396) eligible surgeons contributed 2513 cases. Hospital Episode Statistics recorded 9913 cases for the same time period. Follow up data was available for 4964 cases.

Conclusions: The median age of patients undergoing CEA was 71 (male) and 72 (female), 84% were symptomatic for carotid disease. The time between symptom and referral was greater than 2 weeks in 62% and between most recent symptom and surgery was...
greater than 2 weeks in 78%. The median time from referral to surgery was 40 days (IQR 17-84). Stroke physicians and neurologists were more efficient sources of referral than other professionals. Consultant anaesthetists were present in 97% of cases, while consultant surgeons were scrubbed in 97%. Median duration of operation was 1hr 56mins. Shunts were used in 43% and 68% were closed with a patch. The stroke rate by follow up appointment was 2.4% and the stroke and 30-day death rate was 2.5%. The rate of cranial nerve injury was 4.5%.

**Conclusions:** This is the largest audit of CEA performed in the UK. It is self reported data and not all surgeons contributed and so it has to interpreted in context. The audit has demonstrated a low complication rate. However there are unacceptable delays between the patient's symptom and surgery and public and professional awareness of what to do in the event of a TIA or stroke needs to be a key objective of primary care organisations and acute Trusts.

### 11 Vascular surgery and neurosurgery/interventional neuroradiology

**THE RACE TO PROTECT BRAINS**

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**Background:** Rapid Access Carotid Endarterectomy (RACE) is an evidence-based treatment for symptomatic carotid stenosis. Our vascular centre aims to provide this service within 48h of symptoms in appropriate patients. This study audits safety and efficacy of the first year of RACE.

**Method:** A clear trust protocol was published for the RACE pathway. A prospective database was established for all carotid endarterectomies (CE) performed. Outcomes were compared between elective (CEC) and rapid access operations.

**Results:** In one year 96 patients received CE; 20 were performed urgently. There were no significant differences in age or gender between CEC and RACE groups. 23 (30%) of CEC were for asymptomatic stenosis; no other significant differences in surgical indication were seen. 43% of symptomatic CE were for completed stroke vs 55% of RACE. Median delay between diagnosis and surgery was 113 days for elective and 2 days for RACE patients. There was a 1 death following CEC (1.3%) and 1 stroke after RACE (5%); 3 cranial nerve injuries after CEC (3.9%) vs 1 (5%) after RACE, 3 haematomas after CEC (3.9%) vs 1 after RACE (5%) (all n.s.). Anaesthetic method did not influence outcome. The main reasons for delaying surgery in RACE patients was optimisation of patient fitness and availability of theatre time.

**Conclusion:** The RACE pathway dramatically reduces delay without compromising patient safety. In the first year of service we have treated 50% of suitable patients within 48h. Further education of patients and colleagues should reduce delay and improve outcomes for symptomatic carotid disease.

### 12 Vascular surgery and neurosurgery/interventional neuroradiology

**ANEURYSMAL MALFORMATION OF THE VEIN OF GALEN (AMVG): REPORT OF 3 CASES MANAGED SUCCESSFULLY WITH ENDOVASCULAR TREATMENT**

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Vein of Galen malformations have generally been classified into 2 distinct categories based on the work of Lasjaunichs. The choroidal vein of Galen malformation is the more common of the 2 subtypes, with the arterial supply originating from the choroidal arteries, and the subependymal branches of the thalamoperforator vessels. The arteriovenous connection occurs at the anterior aspect of the persisting median vein of the prosencephalon and is the subtype most often associated with high output cardiac failure. The mural vein of Galen malformation is fed by collicular vessels or posterior choroidal branches with the fista located posteriorly in the median vein of the prosencephalon. This subtype of vein of Galen malformation is more often associated with macrocephaly or failure to thrive, with cardiac failure being much more mild or absent. This vascular anomaly is defined as: Arterio venous fistulas, located between the choroidal arteries and/or caudigeminal plate and with an unique venous sac located in the midline Rayboud and col. after reviewing 23 cases with aneurysm of the vein of Galen, concluded that the venous sac most probably represents the persistence of the median prosencephalic vein (embryonic) of Markowski and not the vein of Galen.

**Results:** The AMVG was corrected completely in patients 1 and 2, after the endovascular treatment. In patient No 2 the bilateral proptosis and the cardiac failure disappeared immediately after the second session of treatment and the patient remained asymptomatic. Patient No 3 showed approximately 90% decreased flow of the malformation. Intentionally a small proportion of the AMVG was left for a second session. Immediately after the second treatment the girl showed improvement in her blood pressure and the dopamine, digoxin and diuretics could be discontinued and the youngster gained weight gradually.

### 13 Vascular surgery and neurosurgery/interventional neuroradiology

**COILING OF PERIPHERAL INTRACRANIAL ANEURYSMS: CLINICAL AND ANGIOGRAPHIC OUTCOME**

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**Objective:** Periperal cerebral aneurysms are relatively rare and difficult to treat considering their locations and characteristics. We analyzed 26 aneurysms of distally located intracranial aneurysms treated by endovascular methods.

**Methods:** From January 2002 to June 2008, 26 aneurysms of 25 patients were treated by selective coil embolization and parent artery occlusion. They were composed of 14 aneurysms of distal ACA territories, 1 aneurysm of distal MCA territory, 8 aneurysms of distal PCA territories and 3 aneurysms of distal cerebellar artery territories.

**Results:** 22 aneurysms were treated by selective embolization with Guglielmi detachable coils and 4 aneurysms by parent artery occlusion. 7 cases of unexpected complication including thromboembolic event or rupture during procedure were occurred. One patient with ruptured Rt P1-P2 junctional aneurysm was dead due to rebleeding after partial occlusion, two aneurysms underwent additional endovascular treatment by the reason of recanalization and regrowth.

**Conclusion:** Careful attention must be paid to endovascular treatment in cases of distally located intracranial aneurysm considering their characteristic. PAO also provided favorable outcome in cases of difficult selective coil embolization inspite of potential ischemia.

### 14 Vascular surgery and neurosurgery/interventional neuroradiology

**DECOMPRESSIVE CRANIECTOMY AFTER INTRAARTERIAL THROMBOLYSIS**

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**Background:** Decompressive surgery in patients with malignant infarction of the middle cerebral artery (MCA) reduces mortality and increases the number of patients with a favourable functional outcome. Whether decompression is feasible and beneficial in stroke patients who underwent intra-arterial thrombolysis (IAT) and subsequently develop a life-threatening space-occupying oedema remains unclear.

**Methods:** We analysed clinical and radiological findings and functional outcome, measured with the modified Rankin Scale (mRS), in consecutive patients treated with IAT because of an acute occlusion of the internal carotid artery (ICA) or the M1 or M2 segment of the MCA.

**Results:** Ten of 224 patients (5 women, 5 men; mean age: 50 years) treated with IAT underwent decompressive surgery because of a life-threatening space-occupying oedema due to malignant MCA infarction (9 patients) or symptomatic intracranial haemorrhage (1 patient). Decompressive surgery was performed between 24 and 72 hours after symptom onset. Median baseline National Institutes of Health Stroke Scale score on admission was 17.5. Partial (TIMI 2) recanalization could be achieved in five and minimal (TIMI 1) in three patients. Recanalization failed
in two patients (TIMI 0) and no patient showed complete recanalization (TIMI grade 3). One patient under pre-treatment with dual antiplatelet therapy because of a cardiac stent developed severe intracranial bleeding during surgery and died. Three months after decompression surgery favourable outcome (mRS 0-1) could be achieved in four patients (40%), three had a poor outcome (mRS 4-5) and three patients died during the hospital stay. Conclusion: Decompressive surgery in patients after IAT is feasible and seems to improve outcome in patients, who develop a life-threatening space-occupying oedema. Our results are in line with the pooled data of 3 randomized controlled trials on early decompressive surgery in malignant MCA infarction.

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REAL TIME DOPPLER MONITORING OF INTRA-ARTERIAL RESCUE PROVIDES HELPFUL INFORMATION FOR INTRA-PROCEDURAL DECISION MAKING


Background: We’ve implemented transcranial Doppler(TCD) monitoring of flow changes during IA procedures and reported diagnostic criteria of findings. We aim to further describe TCD yield and impact on intra-procedural decision making. Subjects and methods: We studied consecutive acute strokes with intracranial occlusions/high grade stenosis who underwent IA rescue with TCD monitoring. Power motion Doppler(PDM) flow patterns and spectral gate waveforms of IA procedure stages and devices were analyzed. Results: 45 stroke patients underwent IA rescue: 10 TPA (22/49%), Penumbra 24(52%), balloon angioplasty 16(35%) and intracranial stenting 5(11%). TCD identified residual flow in 40(89%). Contrast injection produced high intensity transient signals(HITS) of 33±5db with mean flow velocity(MFV) increase of 12±8cm/s. MERCI signatures were high intensity(43±2db) short signals with transient MFV decrease of -11±11%. PENUMBRA produced lower intensity signals(19±3db, p<0.001) and greater MFV decrease(-38±34%, p<0.05). IA tPA increased MFV(+7±6%) with HITS due to air microbubbles from infused saline. TCD detected recollcusion in 7(16%) cases, 3 post-procedure. Embolization from intraluminal thrombus was observed in 2(7%) patients after procedure. PMD-TCD detected air embolization without catheter manipulation, immediately corrected by sheath connector reposition. Hyperperfusion post stenting or embolectomy was found in 13% (MFV increase 1.5 times normal homologous vessels) prompting blood pressure manipulation. PMD-TCD assessment of collaterals, residual flow, and persisting occlusion provided guidance for thrombus manipulation in terminal ICA in 3 patients(7%) and selection of multi-device strategies in 25/54%.

Conclusions: Our criteria for TCD monitoring of IA rescue yield detection of recollcusion, hyperperfusion, or embolisms in up to 1/3 of procedures. This early detection of potentially harmful changes can be particularly helpful in IA intubated patients.

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GAIT INSTABILITY RESOLVED BY STENTING

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Introduction: Optimal treatment for atherosclerotic intracranial arterial stenosis has not been established. Case report: A 76-year-old female with high blood pressure was admitted in another center because of episodes of gait instability with falls in the last few months. Cranial CT and cervical MRI were normal. No diagnosis was made. After some months, she was admitted in our center with worsening of symptomatology. Neurophysiological study showed a moderate sensitive-motor polynuropathy. Intracraniar angio-MRI showed right vertebral artery (VA) stenosis, hypoplastic left VA and basilar artery stenosis. Conventional angiography revealed bilateral VA occlusion, with high degree basilar artery stenosis. Reconstruction of right VA was carried out with 2 stents. The episodic instability disappeared.

Discussion: Patients with symptomatic intracranial stenosis are at high risk of subsequent stroke. Warfarin has not been shown to provide any benefit over aspirin. However, some patients do not respond to medical treatment because of hemodynamic factors. Our patient had recurrent episodes of verteobrobasilar ischaemia due to multiple intracranial stenosis. Stenting in right VA was done with clinical improvement.

Conclusion: Hemodynamic verteobrobasilar events must be borne in mind in a patient with recurrent instability. Angioplasty and stenting are reasonable options for these patients.

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SHOULD CLOPIDOGREL BE ADDED ON TOP OF ASPIRIN BEFORE CAROTID STENTING FOR PATIENTS WITH HIGH RISK OF HYPERPERFUSION SYNDROME?

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Introduction: Aspirin and clopidogrel were the usual treatment prior to carotid stenting. However, the cerebral hyper-perfusion and intracranial haemorrhage, as the complication, might be aggravated by the double anti-platelet therapy. This study would discuss whether double anti-platelet therapy should be used before stenting.

Method: A retrospective analysis of a series of patients with carotid stenting performed. The early complication and the practice of the peri-procedural anti-platelet regimen, was reviewed.

Results: Carotid stenting was performed in 66 high risk patients. 27 patients had post-radiotherapy extensive carotid diseases and 31 patients had contralateral carotid artery occlusion or severe stenosis. In the first 21 cases, aspirin and clopidogrel was initiated before stenting. There were only 1 minor ischaemic stroke immediately after a complicated procedure. But 2 cases of intracerebral haemorrhage occurred. In view of the predominant peri-procedural bleeding complications and devices were analyzed. Among the subsequent 38 patients, aspirin alone was used in 30 patients before and after the stenting. Among them, 1 patient developed hyper-perfusion syndrome without haemorrhage. But 1 patient developed early stent thrombosis and fatal massive cerebral infarction. After this event, Clopidogrel was added, three days after an uneventful stenting. The double anti-platelet therapy would then be continued for 4 weeks. One case of intracerebral haemorrhage developed prior the start of clopidogrel. Haemostasis was easily achieved during the operation. Conclusion: Our experience suggested that clopidogrel should not be started before stenting of high risk patients. But the optimal peri-stenting antiplatelet regimen is still controversial. Further studies are necessary to resolve this controversy.

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THE INVASIVE TREATMENT OF THE PATIENT WITH OCCLUSION OF BRACHIOCEPHALIC TRUNK, LEFT INTERNAL CAROTID ARTERY, RIGHT VERTEBRAL ARTERY AND CRITICAL STENOSIS OF LEFT VERTEBRAL ARTERY


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Background: atherosclerosis is a chronic inflammatory response in the walls of arteries, which lie in buildingup of fats and in artery walls (plaques), which conduct to restriction of blood flow. It can affect arteries anywhere in human body, so similar events occur in the arteries to the heart, brain, intestines, kidneys, legs, etc.

Methods: 61-years old man was admitted to our stroke unit because of vertigo and several events of fainting. There was no abnormality in his neurological status, but careful physical examination revealed a large difference of blood pressure, measured on left end right arm (more then 50mmHg). His laboratory tests were quite normal, except cholesterol level, which was: 6,77mmol/l. We performed doppler ultrasound examination which disclosed that right common carotid artery, left internal carotid artery and right vertebral artery were occluded, more ever left vertebral artery was critically stenosed also. We decided to perform angiography, which confirmed results of Doppler examination, but also revealed occlusion of brachiocephalic trunk, and critically stenosis of left coronary artery trunk. During coronarography sudden cardiac arrest occurs, successfully treated with immediate implantation of stent to the left coronary artery. Patient regained consciousness, with no neurological deficit. We decided to implant a stent to the left vertebral artery, so was done without any complications. At stroke unit the patient’s status was stable, we extended our examinations for any coagulation or metabolic...
abnormalities. There was no other deviation, than high level of toxoplasmosis antibodies. The patient was discharged from hospital without any neurological deficits or complaints.

Conclusion: Patient's assessment was one of the most important factors in daily practice, we cannot limit to our specialty, especially in vascular field. We should always be aware of any kind of surprise and experience of the operator is the key.

**Large clinical trials (RCTs)**

1. **EFFECT OF DYSPHASIA AND DYSPHAGIA ON IN-PATIENT MORTALITY AND END-OF-HOSPITAL LENGTH OF STAY: A DATABASE STUDY**
   
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   **Background:** Dysphasia and dysphagia after stroke have been shown to be associated with poor stroke outcomes. However, the relative and combined impacts of these disabling conditions are less well understood. We are interested to determine whether this effect is related just to stroke severity or results from problems related directly to dysphagia.

   **Methods:** We performed a retrospective database study in 2983 men and women with stroke admitted to hospital between 1997 and 2001. The relationship between dysphasia and dysphagia and in-patient mortality and likelihood of increased length of hospital stay defined as longer than median length of stay was examined.

   **Results:** A total of 2,983 patients, median age 78 years (range = 17 -105 years), were included. Of them 1,330 (44.6%) were men. 77.7% were ischaemic, 10.5% haemorrhagic and 1.8% were undetermined stroke types. Dysphasia was present in 41.2% (1,230), dysphagia in 50.5% (1,500) and 27.7% (827) had both conditions. Having either or both conditions was associated with increased mortality and length of stay (p<0.0001 for all). Using multiple logistic regression models controlling for age, sex, pre-morbid Rankin score, previous disabling stroke and stroke type (OCSP classification), corresponding odds ratios (95% CI) for death and increased length of stay were 2.2(1.8-2.7) and 1.4(1.2-1.6) for dysphasia; 12.5(9.173) and 3.9(3.4-3.6) for dysphagia. 5.5 (3.7-8.2) and 1.9 (1.6-2.3) if they had either or 13.0(9.4-20.4) and 3.7(1.4-4.6) if they had both conditions compared to having no dysphagia, no dysphagia or none of these conditions, respectively.

   **Conclusion:** Patients with dysphagia have worse outcome in terms of in-patient mortality and length of hospital stay than those with dysphagia. When both conditions are present, the likelihood of poor outcome appeared to be driven by presence of dysphagia. Whether this effect is related just to stroke severity or results from problems related directly to dysphagia is unclear.

2. **TRANSCRANIAL DIRECT CURRENT STIMULATION (TDCS) AND REPEETIVE ARM TRAINING TO ENHANCE MOTOR FUNCTION OF THE SEVERELY AFFECTED ARM AFTER STROKE: A DOUBLE BLIND PLACEBO RCT/TRAGAT – PRELIMINARY RESULTS**

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   **Purpose:** The purpose of this study is to evaluate the efficacy and safety of transcranial compared with aspirin in the secondary prevention of cerebrovascular and cardiovascular ischaemic events in patients with stroke or TIA.

   **Methods:** The PERFORM study is a randomised, double-blind clinical trial designed to evaluate the superiority of terutroban (30 mg o.d.) over aspirin (100 mg o.d.), over a 3-year period, in patients with a previous ischaemic stroke (randomisation >48 hours and <3 months after qualifying event) or a TIA (randomisation within 8 days after qualifying event). The primary efficacy endpoint is a composite endpoint of ischaemic stroke (fatal or not), myocardial infarction (fatal or not) or other vascular death (excluding haemorrhagic death of any origin).

   **Results:** A total of 19,126 patients have been randomised in 801 centres and 46 countries. At baseline, their mean age was 67 years, 20% were over 75 years old, 63% were male and 84% Caucasian. A history of hypertension, hypercholes- terolemia and diabetes existed for 82%, 47% and 27%, respectively. The qualifying event was an ischaemic stroke in 89% of the cases.

   **Conclusions:** The PERFORM study is a major ongoing trial that will test the efficacy and safety of terutroban compared with aspirin in the secondary prevention of cerebrovascular and cardiovascular ischaemic events in patients with recent ischaemic stroke or TIA.

3. **PATIENTS BASELINE CHARACTERISTICS OF THE PERFORM STUDY**

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   **Background:** Terutroban is a specific TP (thromboxane A2/prostaglandin d enoperoxide) receptor antagonist, orally active once daily with antiplatelet, antivasoconstrictive and antiatherosclerotic properties, which make it a promising drug for secondary prevention after ischaemic stroke or transient ischemic attack (TIA).

   **Objectives:** AND

   **Methods:** The PERFORM study is a randomised, double-blind clinical trial designed to evaluate the superiority of terutroban (30 mg o.d.) over aspirin (100 mg o.d.), over a 3-year period, in patients with an ischaemic stroke (randomisation >48 hours and <3 months after qualifying event) or a TIA (randomisation within 8 days after qualifying event). The primary efficacy endpoint is a composite endpoint of ischaemic stroke (fatal or not), myocardial infarction (fatal or not) or other vascular death (excluding haemorrhagic death of any origin).

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   **Conclusions:** The PERFORM study is a major ongoing trial that will test the efficacy and safety of terutroban compared with aspirin in the secondary prevention of cerebrovascular and cardiovascular ischaemic events in patients with stroke or TIA.
Large clinical trials (RCTs)

STROKE TEAM REMOTE EVALUATION USING A DIGITAL OBSERVATION CAMERA (THE DOC): RANDOMIZED, BLINDED, PROSPECTIVE TRIAL IN ARIZONA: THE INITIAL MAYO CLINIC EXPERIENCE (TIME)
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Background: There is a shortage of stroke specialist care in rural communities. To address the under-utilization of acute stroke therapies, telemedicine techniques can be employed. Efficacy of site-independent telemedicine was originally assessed in the STRoEe DOc trial in the state of California. Telemedicine consultations resulted in more accurate decision making compared with telephone consultations. The purpose of TIME was to determine the feasibility of establishing a single hub, multi-rural spoke hospital telestroke research trial in Arizona by replicating the STRoEe DOc trial and to determine whether telemedicine or telephone was superior for decision making in acute stroke consultations in a different state amongst different hospitals and providers.

Methods: The design was a prospective, single hub, two spoke, randomized, blinded, controlled trial of a 2-way, site-independent, audiovisual telemedicine system designed for remote examination of patients with acute stroke symptoms and signs versus telephone consultation to assess eligibility for treatment with intravenous thrombolysis. Subjects were adults who presented to a rural Arizona hospital stroke emergency department with an acute stroke syndrome. The sample size was 54 subjects, (27 in video camera/telemedicine intervention arm and 27 in the telephone arm). The interventions: Telemedicine (real-time, two-way audio and video, and digital imaging and communications in medicine [DICOM] interpretation versus telephone. Outcome Measures: The primary outcome measure was whether the decision to treat with intravenous thrombolysis was correct, as determined by central adjudication. Secondary outcomes were the rate of thrombolytic use, 90-day functional outcomes (Barthel index and modified Rankin scale), incidence of intracranial hemorrhages, and technical complications.

Results: Final results will be presented.

Conclusion: STRoEe DOc Arizona TIME trial (ClinicalTrials.gov NCT00623350) was completed.

Large clinical trials (RCTs)

PARAMEDEC PERSPECTIVES ON PARTICIPATION IN PRE-HOSPITAL ACUTE STROKE RESEARCH: A QUALITATIVE INTERVIEW STUDY IN A PHASE III CLINICAL TRIAL OF NEUROPROTECTIVE THERAPY
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Background: Pre-hospital stroke research has been identified as a priority area for Emergency Medical Services (EMS). As a medical emergency with significant mortalit and morbidity, stroke presents a major challenge to researchers. This study was conducted to determine the perspectives of paramedics about participation in a phase 3 placebo-controlled randomised clinical trial (The Field Administration of Stroke Therapy Magnesium Trial (FAST-MAG)).

Methods: Semi-structured interviews with paramedics participating in the Los Angeles based FAST-MAG trial. Purposive sampling of firefighter/paramedics with high (>4) and low (<4) patient enrolment to the trial. Analysis was conducted using a framework approach.

Results: Interviews were conducted with 30 paramedics. For paramedics, the perceived advantages of involvement in research included access to a treatment that would benefit patients and enhanced professional identity. Participants reported that involving paramedics in protocol-led research was feasible. Paramedic confidence in research was limited by lack of research experience, conflicts with institutionally set performance targets (especially time); limitations on autonomous practice; and concerns related to the lack of feedback about patient outcomes.

Conclusion: Training to promote evidence-based practice and support for cultural change may be valuable to increase paramedic confidence in research participation. The patient-centred paramedic culture and desire for autonomy should be recognised so that research can be conducted with sensitivity to existing practice.

Large clinical trials (RCTs)

RECRUITMENT TO CLUSTER RANDOMISED STROKE REHABILITATION TRIALS: EXPERIENCES FROM THE TRACS TRIAL
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Background: TRACS is a UK cluster randomised multicentre trial, investigating the effects of a competency based training programme for carers on physical and psychological wellbeing for patients and their carers after disablement stroke. This is one of the first multicentre stroke rehabilitation trials and the largest such study to be conducted in the UK. The aim of this paper is to report the factors that influence successful recruitment.

Methods: 900 patients (and carers) are to be recruited from 36 stroke units. Centres were randomised to either continue usual care or implement the training programme as a part of standard care. Patients are eligible if they are likely to return home with residual disability and have a carer willing and available to provide care. Patients and carers consent to complete a baseline questionnaire before discharge and follow-up questionnaires at 6 and 12 months post-recruitment.

Results: In the first 9 months of recruitment 418 (63%) out of a target of 666 patients were recruited into the trial. The main reasons for the lower recruitment were a lower than expected eligibility rate (22%) and a high refusal rate (60%). However, rates of eligibility and consent varied between centres (71% and 0-100% respectively), suggesting there are considerable differences in stroke unit patient populations. Other reasons for the difficulties in recruitment included delays in centre set-up; patients being discharged to intermediate care instead of home; difficulties in obtaining consent from an elderly population and from carers; and the need for researchers to be independent of clinical teams in a cluster trial.

Discussion: The TRACS trial demonstrates that it is possible to conduct large multicentre randomised trials in stroke rehabilitation involving patients and carers. Similar trials in the future should take into consideration differences in patient populations and local stroke rehabilitation services when predicting recruitment targets.

Large clinical trials (RCTs)

SELECTING INTERVENTIONALISTS AND SURGEONS FOR ACST-2 – A COMPARISON OF THEIR EXPERIENCE IN CAROTID STENTING AND SURGERY
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Background: Th ACST-2 is a new trial comparing outcomes of Stenting (CAS) and Surgery (CEA) in patients with asymptomatic carotid stenosis who are thought to require intervention. Previous surgery and stenting trials have shown wide variation in experience which has caused particular concern about expertise in stenting.

Methods: Potential collaborators are asked to submit a ‘track record’ of their experience, specifically including the last 2 years’ procedures, with indications (symptomatic/asymptomatic) and 30-day results (strokes, including fatal, and deaths from other causes). ‘Track records’ must also be verified by the local neurologist/stroke physician. The record are then anonymised and submitted for approval to the committee of 4 surgeons and interventional radiologists. Results must be comparable with large carotid trials (eg ECST and ACST) before approval.

Results: To date, 147 track records have been submitted from 80 operators in 47 centres in 20 countries. 27 were approved for both procedures, 34 for surgeons submitting CEA results only, and 19 for CAS only. 21 operators required further experience. The mean (total experience) number of CAS submitted was 135 (median 75), and from those doing both CEA and CAS was 168 (median 100). For CEA the mean was 279 (median 200) for those doing CEA only and 766 (median 207) for those submitting experience in both procedures.

Discussion: The total experience for 80 operators in these procedures was 33,754

Conclusion: Approval for collaboration in ACST-2 is conditional on good recent experience in CEA and CAS. Stentors, not surprisingly usually have less experience than surgeons, but usually have good recent experience of 75-100 procedures within 2 years. No collaborator was approved with less than 30 procedures within 2 years.

This new trial is open and new collaborators are welcome.
SANCHITONGSHU CAPSULE FOR ISCHEMIC STROKE: A RANDOMIZED CONTROLLED STUDY
Department of Neurology, West China Hospital of Sichuan University, Chengdu, China

Background: Agents of sanchi has been widely used as a complementary medicine for stroke in China. Sanchitongshu is a new Chinese patent medicine extracted from sanchi which has stronger anti-platelet activity than other agents of sanchi. Our aim was to investigate the synergistic action of low dose of aspirin combined with sanchitongshu capsule in the treatment of patients with light and moderate ischemic stroke in acute and subacute stages.

Methods: This was a multi-center, double-blinded, randomized controlled clinical trial conducted in four hospitals in China from July 2004 to 2006. 140 patients of ischemic stroke in anterior cerebral circulation within 30 days of onset were enrolled. Participants were assigned either to receive aspirin (50mg per day) and sanchitongshu capsule (200mg three times a day) or aspirin (50mg per day) and placebo capsule.

Results: Low dose of aspirin combined with sanchitongshu capsule significantly ameliorated neurological deficit (increased score of ESS: t=-5.02, p<0.0001) and activities of daily living (increased score of BI: t=-2.4, p=0.0178) after treatment compared with aspirin alone. Adverse reaction which occurred equally in both arms, was light to moderate and disappeared without special treatment.

Conclusion: Sanchitongshu capsule, as a complementary medicine to aspirin, was effective in improving outcomes after ischemic stroke. It was a safe drug in our trial.