Cerebral Aneurysms
AB-14245-98

The pathogenesis of aneurysms formation and rupture is not clearly understood and is undoubtedly a multifactorial event. It is generally accepted that the aneurysm arises from an interaction between structural weakness of arterial wall and hemodynamic factors. Previous studies suggested the possible role of collagenolytic and elastolytic activities in aneurysm development, leading to extracellular matrix alteration. The content of collagen 3-hydroxypiridinium cross-links and elastase and collagenase activities were measured in 12 samples of intracranial aneurysms and in control specimens obtained from temporal superficial arteries and from autopic samples of Willis Circle. Collagen content is significantly lower in aneurysm than in autopic control samples (p<0.01). The total amount of cross-links is significantly lower in ruptured aneurysms than in unruptured and autopic controls (p<0.01). Collagenase and elastase activities are significantly increased in ruptured cerebral aneurysms versus unruptured aneurysms (p<0.01). Linear regression shows that an inverse relationship exists between cross-links content and both elastolytic (p=0.0032) and collagenolytic (p=0.0001) activities in aneurysmal samples. Multiple regression shows that collagenase has a more important statistic impact (p=0.027) than elastase (p=0.08). The results of the study supports the hypothesis that an imbalance of protease-antiprotease homeostasis with elevated collagenolytic and elastolytic activities may represent the predisposing condition leading to aneurysms rupture through collagen depaupehization and reduced cross-linkage of collagen fibres.

AB-14246-98
Endovascular Embolization of 150 Basilar Tip Aneurysms With Guglielmi Detachable Coils: Results of the Food and Drug Administration Multicenter Clinical Trial—Esbride JM (Dept of Neurological Surgery, Box 356470, Univ of California, San Francisco, 505 Parnassus St, San Francisco, CA 94143-0114), Colford JM, Gress DR—J Neurosurg. 1998;89:81–86.

Object. To assess the safety and efficacy of aneurysm embolization performed using Guglielmi detachable coils (GDCs), the authors reviewed the results of a cohort of 150 patients with either ruptured (83 patients) or unruptured (67 patients) basilar tip aneurysms treated with these detachable platinum coil devices in the early part of the United States multicenter GDC clinical trial that led to Food and Drug Administration approval for the device.

Methods. The most common presentation in this cohort of patients was headache (53%). All patients were entered into the trial after neurosurgical assessment excluded them as candidates for surgical clipping of their aneurysms. Greater than 90% coil packing was achieved in 75% of the patients. For those patients in whom follow-up information was available, the mean angiographic and clinical evaluation follow-up time for 61 patients with ruptured aneurysms was 13.7 months (range 0–43 months) and that for the 49 patients with unruptured aneurysms was 9.8 (range 0–40 months). Conservative mortality rates included up to 23% for the ruptured aneurysm group and up to 12% for the unruptured aneurysm group; the rebleeding rate for treated ruptured aneurysms was up to 3.3% and the bleeding rate for unruptured aneurysms up to 4.1%. Permanent deficits due to stroke in patients with ruptured or unruptured aneurysms occurred in up to 5% and 9%, respectively. Vasospasm occurred in 8% of the patients; it was associated with two deaths. Periprocedural mortality was 2.7% (four patients with ruptured aneurysms).

Conclusions. Detachable platinum coil embolization is a promising treatment for ruptured basilar tip aneurysms that are not surgically clipable: in selected patients it offers lower incidences of morbidity and mortality compared with conservative medical management. The role of this procedure in unruptured basilar tip aneurysms is unclear with less supportive results. More long-term follow-up evaluation is necessary and results are expected to improve.

AB-14247-98

The objective of this study is to estimate the risk of subarachnoid hemorrhage produced by oral contraceptive use. Methods: Studies published since 1960 were identified using MEDLINE, Cumulated Index Medicus, Dissertation Abstracts On-line, and bibliographies of pertinent articles. Two independent reviewers screened published cohort and case-control studies that evaluated the risk of subarachnoid hemorrhage associated with oral contraceptives. Eleven of 21 pertinent studies met predefined quality criteria for inclusion in the meta-analysis. Relative risk (RR) estimations evaluating subarachnoid hemorrhage risk in oral contraceptive users compared with nonusers were extracted from each study by two independent reviewers. Study heterogeneity was assessed by design type, outcome measure (mortality versus incidence), exposure measure (current versus ever use), prevailing estrogen dose used, and control for smoking and hypertension. Results: The overall summary RR of subarachnoid hemorrhage due to oral contraceptive use was 1.42 (95% CI, 1.12 to 1.80; p=0.004). When the two study results failing to control for smoking were excluded from the analysis, a slightly greater effect was seen, with an RR of 1.55 (95% CI, 1.26 to 1.91; p=0.0001). In the six studies controlling for smoking and hypertension the RR was 1.49 (95% CI, 1.20 to 1.85; p=0.0003). High-estrogen oral contraceptives appeared to impart a greater risk than low-dose preparations in studies controlling for smoking, but the difference was not significant (high-dose RR, 1.94; 95% CI, 1.06 to 3.56; low-dose RR, 1.51; 95% CI, 1.18 to 1.92). Conclusions: This meta-analysis of observational studies suggests that oral contraceptive use produces a small increase in the risk of subarachnoid hemorrhage.

AB-14248-98

OBJECTIVE: Risk factors that predispose to the formation of multiple intracranial aneurysms, which are present in up to 34% of patients with intracranial aneurysms, are not well defined. In this study, we examined the association between known risk factors for cerebrovascular disease and presence of multiple intracranial aneurysms.

METHODS: We reviewed the medical records and results of conventional angiography in all patients with a diagnosis of intracranial aneurysms admitted to the Johns Hopkins University hospital between January 1990 and June 1997. We determined the independent association

The abstracts in this section have been typeset for consistency with journal format but otherwise appear as in the original articles.
between various cerebrovascular risk factors and the presence of multiple aneurysms using logistic regression analysis.

**RESULTS:** Of 419 patients admitted with intracranial aneurysms (298 ruptured and 121 unruptured), 127 (30%) had multiple intracranial aneurysms. In univariate analysis, female gender (odds ratio [OR] = 1.9; 95% confidence interval [CI], 1.1–3.3) and cigarette smoking at any time (OR = 1.8; 95% CI, 1.1–3.0) were significantly associated with presence of multiple aneurysms. In the multivariate analysis, cigarette smoking at any time (OR = 1.7; 95% CI, 1.1–2.8) and female gender (OR = 2.1; 95% CI 1.2–3.5) remained significantly associated with multiple aneurysms. Hypertension, diabetes mellitus, and alcohol and illicit drug use were not significantly associated with presence of multiple aneurysms.

**CONCLUSION:** Cigarette smoking and female gender seem to increase the risk for multiple aneurysms in patients predisposed to intracranial aneurysm formation. Further studies are required to investigate the mechanism underlying the association between cigarette smoking and intracranial aneurysm formation.

**Clinical**

**AB-14249-98**


**Background:** Clinical features that consistently predict ischemic stroke in patients with nonvalvular atrial fibrillation have been identified, while echocardiographic risk factors are less well defined.

**Objective:** To determine whether the results of transthoracic echocardiography add independent information to the clinical risk factors for stroke in patients with atrial fibrillation.

**Methods:** Transthoracic echocardiographic findings and clinical features from 1066 patients with atrial fibrillation assigned to placebo or control in 3 randomized trials (Boston Area Anticoagulation Trial for Atrial Fibrillation, Stroke Prevention in Atrial Fibrillation I Study, and Veterans Affairs Prevention in Atrial Fibrillation Study) were correlated with subsequent ischemic stroke by multivariate analysis.

**Results:** The mean ± SD age of patients was 67 ± 10 years, 78% were men, 55% had a history of hypertension, 19% had a history of diabetes, 7% had a previous transient ischemic attack or stroke, and 27% had a history of heart failure. During a mean follow-up of 1.6 years, 78 ischemic strokes occurred (annual rate, 4.7%). Moderate to severe left ventricular systolic dysfunction shown via 2-dimensional echocardiography was a strong independent predictor of stroke (relative risk, 2.5; P < .001) in the 1010 patients in whom echocardiographic values for left ventricular function were available. Left atrial diameter by M-mode echocardiography did not predict stroke (relative risk, 1.02/mm; P = .10).

Of 163 patients categorized as low risk based on clinical features (annual stroke rate, 0.8%; 95% confidence interval, 0.2%–3.0%), 10 had moderate to severe left ventricular dysfunction shown via 2-dimensional echocardiography and a 9.3% per year risk of stroke (95% confidence interval, 1.3%–66%). Conversely, 728 of the 847 patients at high risk for stroke based on clinical criteria had normal or mildly abnormal left ventricular function; their stroke rate was 4.4% (95% confidence interval, 3.4%–5.8%).

**Conclusions:** Left ventricular systolic dysfunction shown via 2-dimensional transthoracic echocardiography independently predicts risk of stroke in patients with atrial fibrillation. Echocardiography may prove most useful in a small group of patients who have a low risk of stroke according to clinical factors.

**AB-14250-98**


Thrombogenesis in the left atrial appendage (LAA) has been related to the special morphology of this cavity and to its size and degree of dysfunction. However, no study has focused on LAA function in conjunction with left atrial (LA) function in both sinus rhythm (SR) and nonrheumatic idiopathic atrial fibrillation (AF) in relation to clinical status (cardioembolic stroke). Forty-three patients in SR (14 patients with stroke, 29 control subjects) and 45 patients in AF (27 patients with stroke, 18 control subjects) were examined by transthoracic and transesophageal echocardiography. Baseline clinical characteristics and standard transthoracic and transesophageal measurements of the LA and LAA (size, fractional area change, flow measurements, spontaneous echo contrast, and thrombus) were recorded and compared in relation to cardiac rhythm. Patients in the stroke-SR group showed a significant decrease of fractional area change in the LA (32% ± 15%) and LAA (34% ± 15%) in relation to control subjects (43% ± 10%, P = .035, 49% ± 13%, P = .006, respectively). Patients in the stroke-AF group showed significant reduction of appendage flow measurements (outward velocity = 22 ± 13 vs 33 ± 19 cm/sec, p = .036), whereas no differences were detected in the center of the LA. In multiple regression analysis, the presence of cardioembolic stroke was positively associated with the presence of spontaneous echo contrast (p = .0025) and spontaneous echo contrast negatively associated with appendage inward flow velocity (p < .001).

Cardioembolic stroke in patients in SR is associated with a global decrease of shortening in both cavities and in patients with AF, with a reduction of LAA flow parameters. Patients with spontaneous echo contrast, thrombus, or both showed further reduction of shortening and flow velocities in both cavities, indicating a more advanced stage of dysfunction.

**AB-14251-98**


This study was designed to measure recurrent stroke rates and identify their determinants in a mixed ethnic population. A cohort of 299 patients (110 black, 57 Hispanic and 132 white) admitted to a large urban hospital with an acute stroke between November 1, 1991, and July 1, 1993, was followed for a mean of 17.6 months. Demographic and historical data and stroke subtype and severity were recorded at the time of the index stroke. The main outcome measure was stroke recurrence. The unadjusted relative risk of stroke recurrence for blacks, relative to whites, was 2.0 (95% CI: 0.9–4.4) and for Hispanics, relative to whites, it was 2.6 (95% CI: 1.0–6.0). Ethnicity appeared to be associated with recurrence risk only among first-ever strokes: the risk for blacks, relative to whites, was 2.4 (95% CI: 1.02–5.5) and for Hispanics, it was 2.9 (95% CI: 1.2–7.4). None of the other putative risk factors for stroke recurrence identified at the time of initial hospitalization were associated with risk of recurrence.

**AB-14252-98**


Among patients with systemic lupus erythematosus (SLE), the presence of antiphospholipid antibodies (APA), notably the lupus anticoagulant, and anticardiolipin antibodies (aCL) characterizes a subset of patients with a thrombotic tendency. During the regular follow-up care of patients with SLE, we noticed that many described transient visual disturbances. Because a hypercoagulable state may cause transient
monocular blindness (TMB), we determined the frequency of TMB and studied its relation to the presence of APA in patients with SLE. 

Methods: We asked 175 unselected patients with SLE whether they had transient visual disturbances and reviewed their medical charts. All patients were examined with specific attention to the presence of livedo reticularis. Blood was examined for APA. 

Results: Visual disturbances were recorded for 136 (78%) patients. According to predefined criteria, the symptoms were diagnosed as TMB for 10 (6%) patients and as visual disturbances associated with migraine for 18 (10%) patients. Five of the 10 patients with TMB had attacks in either eye. The 175 patients with SLE accrued a maximum total of 6,349 patient years in their lifetime. From this, the incidence of TMB can be calculated to be at least 158 per 100,000 per year. Lupus anti-coagulant was detected in 3 of 10 patients with TMB and 41 of 165 patients without TMB (odds ratio, 1.3; 95% CI, 0.2 to 6.0). ALCs were found in 5 of 10 patients with TMB and 91 of 165 patients without TMB (odds ratio, 0.8; 95% CI, 0.2 to 3.7). 

Conclusions: 

The frequency of TMB among patients with SLE is at least 158 per 100,000 compared with the normal population (14 per 100,000 per year). However, among patients with SLE, no significant relation could be shown between TMB and the presence of APA or livedo reticularis.

Epidemiology

AB-14253-98 

To assess the influence of oral contraceptives (OC) on the risk of cerebral thrombosis and transient cerebral ischemic attacks, a 5-year case-control study including all Danish hospitals was conducted. All women 15–44 years old who suffered a cerebral thromboembolic attack (CTA) during the period 1994–95 and 1200 age matched control subjects were included. 

Of 309 patients and 1200 control subjects questionnaires sent out, 271 patients (87.7%) and 1074 control subjects (89.5%) responded and agreed to participate. After exclusion of women with nonvalid diagnoses, previous thromboembolic diseases, or current pregnancy, 219 patients without TMB (odds ratio, 0.8; 95% CI, 0.2 to 3.7). ALCs were found in 5 of 10 patients with TMB and 91 of 165 patients without TMB (odds ratio, 0.8; 95% CI, 0.2 to 3.7). 

Conclusions: 

The frequency of TMB among patients with SLE is at least 158 per 100,000 compared with the normal population (14 per 100,000 per year). However, among patients with SLE, no significant relation could be shown between TMB and the presence of APA or livedo reticularis.

Epidemiology

AB-14254-98 

In 1994, stroke was responsible for the death of 4,994 men and 7,601 women in the Netherlands, corresponding to 7.5% of all deaths in men and 11.4% in women. Age-adjusted stroke mortality declined by 39% for men and by 45% for women between 1972 and 1994. However, the decline in mortality leveled off after 1987. In contrast to mortality, age-adjusted discharge rates increased by 47% for men and by 28% for women during the study period. The decline in mortality was equally distributed over the age groups, while the increase in the number of hospital admissions was more pronounced in the older age groups. The analyses by diagnostic subgroups of stroke showed the importance of increasing diagnostic capabilities in the hospital setting. The use of diagnostic subgroups in national mortality data was of limited value, illustrated by the fact that 70% of all stroke deaths in 1994 belonged to the ill-defined type of stroke.

AB-14255-98 

There are no previous reports of the incidence rate of intracranial saccular aneurysms in a defined population. Methods: Medical records of all residents of Olmsted County, MN, with a possible intracranial saccular aneurysm (IA) were reviewed. Incidence rates and prevalence of symptomatic and asymptomatic IAs, aneurysmal intracranial hemorrhage (ICH), and frequency of IA detection based on size and site were determined. Results: A total of 348 IAs were detected among 270 persons during the 31-year period from 1965 to 1995, including 188 symptomatic patients at presentation (166 with ICH). The age- and sex-adjusted incidence rate for IAs excluding asymptomatic autopsy cases was 9.0/100,000 person-years (P-Y; 95% CI, 7.8 to 10.2). The rate of detection in women (10.7/100,000 P-Y; 95% CI, 8.9 to 12.4) was higher than in men. The highest incidence of IA was among those age 55 to 64 years in men, and 65 to 74 years in women. The incidence rate of aneurysmal ICH was 6.9/100,000 P-Y (95% CI, 5.9 to 8.0). Aneurysms were seven times more likely to be detected in the anterior circulation, and this ratio was not altered significantly by age or gender. On January 1, 1990, the age- and sex-adjusted prevalence rate of identified IAs was 83.4/100,000 population (95% CI, 64.1 to 102.7). Conclusions: This study provides unique data on the population-based incidence and prevalence rates of IAs.

Experimental Pathology

AB-14256-98 

Both dizocilpine (MK-801) and isoflurane antagonize glutamatergic neurotransmission. In this study, we examined the relative neuroprotective effects of these drugs administered in equianesthetic doses before the onset of focal cerebral ischemia. Rats were anesthetized with 1.0%–1.5% isoflurane and prepared for focal ischemia in the middle cerebral artery (MCAO). After preparation, one group (n=22) remained anesthetized with 0.7% isoflurane. Another group (n=18) was given dizocilpine (1 mg/kg intraperitoneally), and isoflurane was discontinued. The third group (n=18) was allowed to awaken immediately after the onset of ischemia. MCAO persisted for 75 min. Epidural temperature was determined.

In conclusion, use of OC with 50, 30–40, or 20 μg EE had OR of 2.65 (1.11–6.34), 1.60 (1.05–2.43), and 1.59 (0.57–4.58), respectively. Odds ratios for specific progestin types were as follows: estrons 1.37 (0.60–3.13), levonorgestrel 2.43 (1.40–4.21), norgestimate 7.09 (1.87–26.8), desogestrel 1.62 (0.72–3.63), and gestodene 1.24 (0.67–2.30). Duration of use was without significant influence on the risk and the OR were constant across the age bands. Compared with women who had never used OC, former users had an OR of CTA of 0.95 (0.66–1.51).

In conclusion, use of OC with 50 μg of EE and OC with second generation progestins increased the risk of CTA significantly. OC with third generation progestins did not have any significant influence on the risk of CTA. The risk of CTA among former users of OC was not increased.
dizocilpine (P=0.11) or the awake group (P=0.15). Isoflurane was examined at doses used clinically but smaller than those found to reduce N-methyl-D-aspartate (NMDA)-mediated injury in vivo. This study supports the hypothesis that NMDA receptor activation is injurious during focal ischemia and that amelioration of focal ischemic brain damage by NMDA receptor antagonists persists under normothermic conditions. **Implications:** Rats underwent focal cerebral ischemia with rigid maintenance of brain normothermia. The glutamate receptor antagonist dizocilpine was effective in reducing cerebral infarction size during damage by NMDA receptor antagonists persists under normothermic conditions during focal ischemia and that amelioration of focal ischemic brain damage by N-methyl-D-aspartate receptor antagonists persists under normothermic conditions.

**AB-14257-98**

**Reduced Endothelial Nitric Oxide Synthase Expression and Production in Human Atherosclerosis—**Oemer BS, Tschudi MR, Godoy N, Brovkovich V, Malinski T, Lüscher TF (Professor and Head of Cardiology, Univ Hospital Zürich, CH-8091 Zürich, Switzerland)—Circulation, 1998;97:2494–2498. © 1998 American Heart Association, Inc.

**Background**—NO regulates vascular tone and structure, platelets, and monocytes. NO is synthesized by endothelial NO synthase (eNOS). Endothelial dysfunction occurs in atherosclerosis.

**Methods and Results**—With a prophyrinic microsensos, NO release was measured in atherosclerotic human carotid arteries and normal mammary arteries obtained during surgery. eNOS protein expression was analyzed by immunohistochemistry. In normal arteries, the initial rate of NO release after stimulation with calcium ionophore A23187 (10 μM/L) was 0.42±0.05 (μM/L)/s (n=10). In contrast, the initial rate of NO release was markedly reduced in atherosclerotic segments, to 0.08±0.04 (μM/L)/s (n=10, P<0.0001). NO peak concentration in normal arteries was 0.9±0.09 μM/L (n=10) and in atherosclerotic segments, 0.1±0.03 μM/L (n=10, P<0.0001). Reduced NO release in atherosclerotic segments was accompanied by marked reduction of immunoreactive eNOS in luminal endothelial cells, although specific endothelial cell markers (CD31) were present (n=13). Endothelial cells of vasa vasmorum of atherosclerotic segments, however, remained positive for eNOS, as was the endothelium of normal arteries.

**Conclusions**—In clinically relevant human atherosclerosis, eNOS protein expression and NO release are markedly reduced. This may be involved in the progression of atherosclerosis.

**AB-14258-98**


Strategies directed against activated neutrophils have reduced ischemia-induced brain injury. However, therapies targeted specifically against the neutrophil adhesion protein L-selectin have not yet been examined in stroke. This study therefore examined the effects of a monoclonal antibody directed against L-selectin in a rabbit model of thromboembolic stroke both with (n=16) or without (n=10) concomitant t-PA therapy. Rabbits received either the humanized monoclonal antibody DREG200 directed against the L-selectin receptor or humanized control monoclonal antibody HuDREG55 which does not bind to rabbit L-selectin in addition to t-PA therapy (n=8, each group). HuDREG200 (2 mg kg⁻¹ i.v.) was given as a bolus 3 h following clot embolization, followed immediately by a 2 h intravenous infusion of t-PA (6.3 mg kg⁻¹). Without t-PA therapy rabbits received HuDREG200 (2 mg kg⁻¹, i.v.; n=5) or HuDREG55 (n=5) 1 h following clot embolization. The group receiving HuDREG200 in addition to t-PA demonstrated a moderate improvement in brain infarct size (8.4±2.4 vs. 13.5±3.5, %hemisphere, mean±sem), ICP (final reading 10.0±1.6 vs. 12.4±3.0 torr) and restoration in regional cerebral blood flow (30.2±7.8 vs. 21.6±10.9 cc 100 g⁻¹ min⁻¹) when compared to t-PA therapy alone although statistical significance was not achieved. No efficacy was demonstrated in the group receiving HuDREG200 without concomitant t-PA therapy. The results suggest that the addition of a humanized anti-L-selectin monoclonal antibody HuDREG200 in combination with t-PA may further improve outcome in acute thromboembolic stroke, although future studies are necessary to support these findings.

**AB-14259-98**


We studied the effect of YM-39558, orotic acid ethylster, in a focal cerebral ischemia model in anesthetized cats. YM-39558 has good permeability across the blood brain barrier, and in the brain is hydrolyzed to orotic acid, the main active substance. Cats were subjected to permanent occlusion of the middle cerebral artery (MCA) for 6 h, then killed and examined histologically. Treatment with YM-39558 (intravenous infusion of 11.8 mg (10 mg as orotic acid)/6 ml per kg per h) starting 15 min after MCA occlusion markedly reduced the volume of ischemic damage (from 2450±82 mm³ of the cerebral hemisphere in the saline-treated cats to 1644±123 mm³ in the YM-39558-treated cats, P<0.01). In contrast, YM-39558 (2.26 and 1.18 mg/0.8 ml per kg per h) showed no significant protective effect on ischemic damage. No significant differences were observed between saline- and YM-39558-treated cats concerning physiological variables including brain temperature. This evidence for the neuroprotective efficacy of YM-39558 in gyrencephalic species suggests its therapeutic potential in the treatment of stroke in humans.

**Imaging**

**AB-14260-98**


**PURPOSE:** Our purpose was to determine whether topographic patterns of ischemic damage seen on brain imaging studies are useful for evaluating different mechanisms of infarction and for distinguishing embolic from hemodynamic disorders.

**METHODS:** Early CT scans were reviewed to identify brain infarctions in the middle cerebral artery territory in 800 patients with either significant obstructive lesions of the internal carotid artery (70% stenosis, n=17; occlusion, n=85) or nonvalvular atrial fibrillation (n=186) as the only identified source of stroke. Ninety-nine CT studies were considered suitable for entry into the final analysis. The scans were digitized and superimposed on postmortem brain sections by matching algorithms to display the variability of the cerebrovascular territories.

**RESULTS:** Cortical borderzone-type infarctions were rare and evenly distributed among patients with cardiac sources of embolism (3.2%) and severe carotid obstructions (3.6%). In contrast, subcortical borderzone infarcts occurred significantly more often in patients with carotid obstructive disease (36% versus 16%). However, on computer-aided segmentation analysis, the topography of infarction was the same in both groups.

**CONCLUSION:** The current concept that stroke mechanisms can be inferred from interpretation of stroke patterns on brain scans is heavily confounded by the variability in intracranial arterial territory distributions. Since individual arterial territories cannot be identified in vivo,
interpretation of stroke topography is invalid. In particular, the cortical wedge-type of borderzone infarction, said to result from hemodynamic compromise in low-flow perfusion territories, is an ambiguous observation and may be seen in patients with cerebral embolism and hemodynamic compromise due to severe carotid disease.

AB-14261-98  

PURPOSE: Our purpose was to evaluate the clinical efficacy, sensitivity, and specificity of echo-planar diffusion-weighted MR imaging in patients with acute infarction.

METHODS: We retrospectively analyzed 94 cases of acute ischemic stroke diagnosed clinically within 24 hours of onset and studied with echo-planar diffusion-weighted MR imaging. Examinations were considered to be positive for infarction when an increase in signal was noted on images acquired at a high b value but absent on images with a low b value. A final clinical diagnosis of acute stroke was used as the standard of reference. A subset of 48 patients scanned within 6 hours was also analyzed.

RESULTS: Diffusion-weighted MR imaging studies were positive in 133 of 151 cases of infarction (88% sensitivity) and negative in 41 of 43 cases with no infarction (95% specificity). Two cases identified as positive on diffusion-weighted images had nonspecific diagnoses (1.5% false-positive rate). Diffusion-weighted imaging had a positive predictive value of 98.5% and a negative predictive value of 69.5%. Use of T2-weighted sequences as well as diffusion-weighted imaging produced no false-positive findings. Of the negative scans, 69.5% corresponded to transient ischemic attacks or infarcts (mostly small brain stem infarcts). When only cases scanned within 6 hours of onset were considered, the sensitivity rose to 94% and the specificity to 100%.

CONCLUSION: Despite bias due to dependence between diffusion-weighted imaging and the final diagnosis, this analysis suggests high sensitivity and specificity for echo-planar diffusion-weighted imaging in the diagnosis of acute cerebral infarction, although negative scans did not rule out an ischemic pathogenesis.

AB-14262-98  

We examined the utility of echoplanar magnetic resonance perfusion imaging and diffusion-weighted imaging (DWI) in predicting stroke evolution and outcome in 18 patients with acute hemispheric infarction.

Methods: Patients were studied within 24 hours (mean, 12.2 hours), subacutely (mean, 4.7 days), and at outcome (mean, 84 days). Comparisons were made between infarction volumes as measured on perfusion imaging (PI) and isotropic DWI maps, clinical assessment scales (Canadian Neurological Scale, Barthel Index, and Rankin Scale), and final infarct volume (T2-weighted MRI). Results: Acute PI lesion volumes correlated with acute neurologic state, clinical outcome, and final infarct volume. Acute DWI lesions correlated less robustly with acute neurologic state, but correlated well with clinical outcome and final infarct volume. Three of six possible patterns of abnormalities were seen: PI lesion larger than DWI lesion (65%), PI lesion smaller than DWI lesion (12%), and DWI lesion but no PI lesion (23%). A pattern of a PI lesion larger than the DWI lesion predicted DWI expansion into surrounding hypoperfused tissue (P<0.05). In the other two patterns, DWI lesions did not enlarge, suggesting that no significant increase in ischemic lesion size occurs in the absence of a larger perfusion deficit. Conclusions: Combined early PI and DWI can define different acute infarct patterns, which may allow the selection of rational therapeutic strategies based on the presence or absence of potentially salvageable ischemic tissue.

AB-14263-98  

PURPOSE: To investigate whether unenhanced dual-helical computed tomography (CT) is useful in the rapid, noninvasive detection of protruding aortic atheromas.

MATERIALS AND METHODS: Thirty-two consecutive patients at least 50 years of age who had recent ischemic stroke, systemic emboli, or both, underwent transesophageal echocardiography (TEE) and unenhanced dual-helical CT with thin sections (section thickness, 3.2 mm; reconstruction increment, 1.5 mm).

RESULTS: TEE demonstrated protruding aortic atheromas in 15 patients (47%); dual-helical CT depicted protruding aortic atheromas in 13 of those 15 patients (87%). Of the 17 patients without a protruding atheroma at TEE, dual-helical CT helped confirm the absence in 14 (82%). Dual-helical CT yielded a sensitivity of 87%, a specificity of 82%, and an overall accuracy of 84%. Thirty-six protruding plaques were detected with TEE, of which 34 (94%) were correctly identified with dual-helical CT. Of those 34 plaques, 27 (79%) contained variable amounts of calcium and seven (21%) showed hypointensities suggestive of soft plaques and thrombi. In six patients, dual-helical CT depicted a protruding atheroma between the distal ascending aorta and the proximal arch; these plaques were not included in the comparative statistics and were analyzed separately.

CONCLUSION: Unenhanced dual-helical CT with thin sections appears to be useful for the rapid, noninvasive detection of a protruding aortic atheroma, especially in areas not clearly visualized with TEE.

Neurosonology

AB-14264-98  

Homocysteine is increasingly recognized as a risk factor for atherothrombotic arterial diseases. We investigated the relation between plasma concentrations of total homocysteine (tHcy) and common carotid artery intima-media wall thickness, measured by B-mode ultrasonography, in 513 asymptomatic men and women from eastern Finland aged 45–69 years. The subjects were examined in 1994–95 at the baseline of the Antioxidant Supplementation in Atherosclerosis Prevention (ASAP) study, a randomized double-blind placebo-controlled two by two factorial trial on the effect of vitamin E and C supplementation in the prevention of atherosclerotic progression. The subjects were assigned into two categories according to the plasma tHcy concentration; concentration over 11.5 μmol/L (highest quartile) or concentration below 11.5 μmol/L. In this study population the mean plasma tHcy concentration was 10.0 μmol/L, and the prevalence of plasma tHcy concentration exceeding 11.5 μmol/L was 33% in men and 18% in women. The adjusted mean intima-media thickness of the right and left common carotid arteries was 1.12 mm in men with elevated plasma tHcy concentration and 1.02 mm in men with a plasma tHcy concentration below 11.5 μmol/L (P=0.029). In women there was no significant difference. We conclude that elevated plasma tHcy concentrations are associated with early atherosclerosis, as manifested by increased common carotid artery intima-media wall thickness, in middle-aged eastern Finnish men.
Microembolic Load in Asymptomatic Patients With Cardiac Aneu-
rysm, Severe Ventricular Dysfunction, and Atrial Fibrillation: Clin-
ical and Hemorheological Correlates—Nabavi DG (Dept of Neurol-
yogy, Univ of Münster, Albert-Schweitzer-Strasse 33, D-48129 Münster,
Germany), Arato S, Droste DW, Schulte-Altedorneburg G, Kemény V,
Reinecke H, Borggreve M, Breithardt G, Ringelstein EB—Cerebrovasc

Transcranial Doppler sonography has become a widely used method for
detecting cerebral circulating microemboli (ME) arising from the
carotid arteries or the heart. Yet, studies on subgroups of patients with
distinct cardiac sources of embolism are still limited. The same holds true
for investigations on the relationship between microembolization and
hemorheological parameters. A total of 142 patients suffering from left
ventricular aneurysm (LVA, n=52), severe left ventricular dysfunction
(LVD, n=43), or chronic atrial fibrillation (AF, n=47) were enrolled in
this study. All patients had been neurologically asymptomatic for at least
1 month. Further relevant embolic disorders of the carotid arteries and the
heart had been excluded. Unilateral monitoring for ME over the middle
cerebral artery was performed for 30 min. Blood was drawn after each
monitoring for determination of plasmatic coagulation parameters, as
well as plasma viscosity, and platelet reactivity. The overall prevalence
of ME was 31%, with a slightly higher prevalence in patients with LVA
(37%) compared to patients suffering from AF (30%) or LVD (26%).
With single-factor analysis, a trend towards higher ME prevalences was
found with (a) a history of remote embolic events, (b) ineffective
anticoagulation, (c) increased platelet aggregation, or (d) increased plasma viscosity (all p>0.1). The combination of ineffective anticoagu-
lation in conjunction with increased platelet aggregation, however, was
significantly associated with higher ME rates even after adjustment for
other factors by logistic regression analysis. Our results demonstrate a
low ongoing microembolic activity in asymptomatic patients suffering
from LVA, LVD and AF. An activated plasmatic coagulation system
together with increased platelet aggregation contributes to ME

Pharmacology/Therapeutics

AB-14266-98

Results of Urgent Thrombolysis in Patients With Major Stroke and
Atherothrombotic Occlusion of the Cervical Internal Carotid Ar-
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PURPOSE: Atherothrombotic occlusion of the cervical internal
carotid artery (ICA) without collateral flow is one of the most critical
forms of acute ischemia. We report the results of urgent thrombolysis
treatment of patients with major stroke in this clinical category.

METHODS: Clinical findings and outcome in 33 patients were
investigated. All patients had suffered a major stroke, with a score of 24
or higher on the NIH Stroke Scale on admission. Ischemic abnormalities
were not detected on initial CT studies. Diagnoses were made at
angiography, and patients were treated by intravenous or intraarterial
local thrombolysis within 6 hours of stroke onset.

RESULTS: Recanalization was accomplished in eight patients with
intraarterial local thrombolysis; four of these patients had a good clinical
outcome. Two factors characteristic of those whose treatment was
successful were dramatic improvement of symptoms after partial recana-
ralization achieved within 3 hours of ictus and stabilized improvement
after subsequent percutaneous transluminal angioplasty or carotid end-
arterectomy for residual atherosclerotic stenosis at the ICA origin.

CONCLUSION: The results of this study suggest that urgent intraar-
teral local thrombolysis may be a successful treatment method for some
patients in this critical clinical category if the treatment can be accom-
plished within 3 hours of ictus and followed by either angioplasty or
endarterectomy for residual stenosis.

Surgery

AB-14268-98

Aortic Arch Surgery: Retrospective Analysis of Outcome and Neu-
roprotective Strategies—Ceriana P (Viale Ludovico il Moro 33, 27100
Pavia, Italy), Barzaghi N, Locatelli A, Veronesi R, De Amici D—J Car-

To review intra- and postoperative data regarding surgical reconstruc-
tion of the aortic arch performed at our cardio-surgical centre during the
past four years, and thus to deepen understanding of neurologic morbid-
ity and of what constitutes the most effective neuroprotection.

Experimental design. Retrospective study.

Setting. Regional University Hospital.

Patients. 29 patients who underwent reconstruction of aneurysm or
dissection of the aortic arch.

Intervention. Surgical replacement of the diseased aorta during deep
hypothermia, alone or with selective cerebral perfusion (antegrade or
retrograde).

Measures. Overall mortality rate, neurologic morbidity rate, duration
of extracorporeal circulation, of hypothermic circulatory arrest or of
selective cerebral perfusion. Evaluation of the importance to neurological
outcome of age, modality of operation (emergency or routine), biochemical
parameters (glycemia, hematocrit) and perfusion technique. Recording
of postoperative time of arousal, and possible correlation with length of
selective cerebral perfusion.

Results. We observed a mortality rate of 39% (11 deaths) and a
neurologic morbidity rate of 34%. Hypothermic circulatory arrest alone
did not assure valid neuroprotection (5 cases, all with severe neurologic
impairment), while better results were obtained with selective cerebral
perfusion, especially antegrade (14 cases, with only 7% of neurologic
morbidity rate). Hyperglycemia (>250 mg%) proved to be significantly
associated ($p=0.002$) with increased incidence of adverse neurologic outcome, and the same association was observed between emergency status and adverse neurologic outcome ($p=0.002$). Moreover, we found an unexpected linear correlation between time of selective cerebral perfusion and postoperative time of arousal ($r=0.728$, $p=0.000$).

Conclusions. Deep hypothermic circulatory arrest with selective cerebral perfusion currently represent a valid therapeutic option for brain preservation during reconstruction of the aortic arch in adults. It is mandatory to carry out a tight control of perfusion parameters (flow, pressures and temperature gradients) and biochemical variables (avoidance of hyperglycemia and modified ultrafiltration for fluid balance).

AB-14269-98

To determine population-based estimates of in-hospital mortality following carotid endarterectomy (CEA) and identify potential risk factors for in-hospital death. Methods: Data from the Healthcare Cost and Utilization Project (HCUP-3) were analyzed for the year 1993. Nationally representative estimates of risk were calculated by age, sex, race, income, census region, hospital location (urban versus rural), teaching status of hospital, number of hospital beds, hospital ownership, third-party payer, principal procedure, and presence of surgical complications. Multivariate models were developed using stepwise logistic regression and a logit model fit by generalized estimating equations. Multivariate models were developed using stepwise logistic regression and a logit model fit by generalized estimating equations. Multivariate models were developed using stepwise logistic regression and a logit model fit by generalized estimating equations. Multivariate models were developed using stepwise logistic regression and a logit model fit by generalized estimating equations.

Nationally representative estimates of risk were calculated by age, sex, race, income, census region, hospital location (urban versus rural), teaching status of hospital, number of hospital beds, hospital ownership, third-party payer, principal procedure, and presence of surgical complications. Multivariate models were developed using stepwise logistic regression and a logit model fit by generalized estimating equations.

Results: There were 228 deaths among 18,510 CEAs performed in 17 states of the United States in 1993, yielding an estimated in-hospital mortality rate of 1.2%. Multivariate analysis showed that age, principal procedure, and presence of any surgical complication were significant predictors of in-hospital mortality. Mortality increased with increasing age (from 0.9% in those younger than 65 years to 1.7% in those age 75 and older) and was markedly higher with CEA performed as a secondary procedure (6.1% versus 0.9%) or with any surgical complication (5.9% versus 0.7%). Moreover, we found an unexpected linear correlation between time of selective cerebral perfusion and postoperative time of arousal ($r=0.728$, $p=0.000$).

Conclusions. Deep hypothermic circulatory arrest with selective cerebral perfusion currently represent a valid therapeutic option for brain preservation during reconstruction of the aortic arch in adults. It is mandatory to carry out a tight control of perfusion parameters (flow, pressures and temperature gradients) and biochemical variables (avoidance of hyperglycemia and modified ultrafiltration for fluid balance).

Items of Interest


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Abstracts of Literature
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