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A Case of Cardiocerebral Infarction in a 33-Year-Old Male with Primary Antiphospholipid Antibody Syndrome

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Case Report: A 33-year-old male from Cadiz City, Negros Occidental presented with a sudden onset right-sided weakness and slurring of speech, associated with subsequent crushing chest pain and difficulty of breathing. In the emergency room, the patient was found to have a Glasgow Coma Score of 15. Pertinent neurologic examination revealed weakness on the right (Manual Muscle Test grade: 3/5) and no sensory deficits, with a National Institute of Health Stroke Scale Score (NIHSS) of 9. Cranial Computed Tomography (CT) Scan was done, showing an acute infarct in the left temporooccipital area. Electrocardiogram was taken, wherein ST elevation infarction was noted in leads I and AVL. Other pertinent laboratory results revealed the following: Troponin I of 98.000 mg/dL (elevated), creatinine of 0.94 mg/dL (normal), Antinuclear Antibody (ANA) negative, and chest radiograph with cardiomegaly. The patient was admitted to the intensive care unit. The patient was started on antplatelet and low molecular weight heparin. Further work up was done to establish the cause of stroke and AMI in this young patient. Activated Prothrombin time (APTT) with mixing studies was requested, showing elevated values not corrected by adding normal plasma. Given the APTT result, an Antiphospholipid Antibody panel was requested, revealing values consistent with antiphospholipid antibody syndrome. On the sixth hospital day, the patient showed improvement with a NIHSS of 4; thus, the patient was sent home.

Conclusion: Cardiocerebral infarction has rarely been reported, with an incidence of 0.009%. The management is challenging and carries an increased risk of mortality for the patient.

Clinical Outcomes of Post-Stroke rTPA Recipients: A Pilot Study

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Background and Objectives: Recombinant Tissue Plasminogen Activator (rTPA) administered intravenously within three hours (up to 4 ½ hours) of symptom onset is the only US Food and Drug Administration (USFDA)-approved treatment for acute ischemic stroke which showed a promising outcome. We specifically examined the outcomes of patients in terms of National Institutes of Health Stroke Scale, Modified Rankin Scale and Barthel Index of Activities of Daily Living on admission, discharge and subsequent follow-up.

Methods: This is a retrospective, cross-sectional study. Total enumeration of patients eligible for rTPA in Mariano Marcos Memorial Hospital & Medical Center from January 2016 to December 2018 was reviewed. Patients diagnosed and managed as Cerebrovascular Disease, Infarct, in the hyperacute phase.

Results: Administration of rTPA in eligible patients managed as CVD infarct showed promising response. A total of 34 patients were qualified to receive rTPA. Patients arrived at the emergency department with a median time of 118 minutes from onset to treatment time. Males are more likely to manifest the disease. Hypertension is the most prevalent nonmodifiable risk factors followed by coronary artery disease, atrial fibrillation and diabetes. Alcoholism and smoking were the most common modifiable risk factors. Severity of neurologic deficits before and after the administration of rTPA showed improvement from their deficits until subsequent follow-up. Recognizing rTPA-treatable patients could lower pharmacy costs, shorter intensive care unit stays and rehabilitation than patients who did not receive rTPA. Further post-stroke chronic rehabilitation costs could determine the costeffectiveness of the drug.

Conclusion: Lower Glasgow Coma Scale, higher NIHSS scores and lower Barthel Scores upon admission showed higher risk for mortality and disability as well as length of hospital stay.

Potential Role of Serpina3n in Neuroprotection after Ischemic stroke

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Background and Objective: Ischemic stroke is a ruinous CNS insult with finite effective therapeutic approaches. Primary limitation to develop novel restorative drugs is partially understood multidimensional underlying mechanisms and complicated crosstalk between them aiding to this pathophysiology. Recently, extracellular liberation of Granzyme B has been reported as an aider to neurodegeneration followed by CNS Ischemia. Inhibition of Granzyme B can be considered as one of the potential approach to reduce the neuronal damage. Murine serine protease inhibitor Serpina3n has a unique affinity for granzyme B while its human homolog serpina3 is incapable to inhibit granzyme B. By considering such reports, serpina3n can be considered as a potent therapeutical strategy to induce neuroprotection subsequent to ischemia by inhibiting granzyme B and serpina3 can be taken in parallel to investigate the underlying mechanism and unveil the contributing factors.

Methods: Recombinant serpina3n and serpina3 proteins were overexpressed using mammalian cells and purified. Recombinant proteins were tested for their invitro granzyme B inhibition. Neuroprotective effects of both proteins at different concentrations 20mM, 50mM and 100mM were investigated with N2A cell line by using invitro enzymatic ischemia/reperfusion model. Furthermore, invitro experiments were undertaken by generating photothrombic ischemic mouse model and treated intranasally with 50mg/kg of recombinant proteins. Harvested brains were used to evaluate the infarct volume, immunohistochemical tests and western blot analysis for treated and untreated groups.

Results: Treatment with recombinant serpina3n and serpina3 increased cell viability in dosage dependent manner invitro followed by enzymatic ischemia. Post-ischemia 50mg/kg administrated intranasally induced neuroprotection confirmed by infarction volume. Exogenous proteins were successfully delivered to the ischemic lesion site across the blood brain-barrier.

Conclusion: Post- ischemia Serpina3n and Serpina3 induce neuroprotection and can be delivered successfully to the lesion focal area.
Mortality and Functional Outcome After First-ever Acute Stroke at 1 and 12 Months: Analysis of INTERSTROKE Data from a Tertiary Care Hospital in Pakistan

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Background and Aim: Identification of early and long-term outcomes after stroke and predictors of poor outcome is important in stroke management strategies. The aim of this study was to analyze predictors of functional outcome at 1 and 12 months post stroke.

Methods: This was a prospective study of first-ever stroke in patients enrolled between April 2013 and July, 2015 from a single centre tertiary care hospital. Patients were followed-up at 1 and 12 months post-event and assessed using the modified Rankin Scale (mRS). A structured questionnaire was used to assess socio-clinical demographics, vascular risk factors, imaging characteristics and outcomes.

Results: Overall mortality was 11.1% and 22.3% at 1 and 12 month follow-up respectively. At 1-month 34.6% of the stroke cohort had regained independent function (mRS 0-2), while 54.1% remained dependent (mRS 3-5). At 1 year, 303 (76.7%) completed the follow-up over telephone. Of 137 who were independent (mRS 0-2) at 1 month, 32.4% deteriorated to dependency (mRS 3-5) at 12 months. Multivariate analysis showed that older age, mRS assessed at the 1 month follow-up, and reduced level of consciousness as independent predictors of poor outcome.

Conclusion: Long term follow-up identified a high proportion of patients who experienced functional decline from independence to dependency between 1 month and 1 year follow-up. These results challenge the perception that functional outcome stabilises within 3 months after a stroke.

Neuropsychiatric Dysfunction in Patients with Aneurysmal Subarachnoid Hemorrhage at a Tertiary Hospital in Baguio City

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Background and Objectives: Local studies on the neuropsychiatric deficits that focus on the cognitive and emotional impairments after aneurysmal subarachnoid hemorrhage (aSAH) have been limited. The objective of this study is to determine the neuropsychiatric dysfunction at least 3 months after aSAH and to correlate the domain-specific deficits with aneurysm location.

Methods: This is a prospective, observational study over a 17-month period using simple random sampling. Assessment measures included the Montreal Cognitive Assessment Scale (MoCA) and Hospital Anxiety and Depression Scale (HADS) at least 3 months after discharge. Data were analyzed using descriptive statistics. The relationship between the neuropsychological dysfunction with the aneurysm location was determined using Chi square test of independence. P-value was set at ≤ 0.05.

Results: Seventy one percent of the subjects had MoCA-defined cognitive impairments. Executive function (63%), language (65%) and delayed recall (69%) were the top 3 cognitive domains with the lowest MoCA scores. Mild anxiety was seen in 25% of the patients while moderate levels were found in the remaining 21%. Twenty five percent were mildly depressed while only 8% were in the moderate to severe depression range. There was no significant relationship between the location of the aneurysm and the MoCA-assessed cognitive domains and depression. However, there was a statistically significant relationship between aneurysm location and anxiety. Mild cases of anxiety were associated with ACOM and MCA aneurysms while moderate levels were associated with ACA, ICA and MCA aneurysms.

Conclusion: We were able to show that cognitive and emotional domain impairments persist after aSAH. Seventy one percent had MoCA defined cognitive impairment, 46% had mild to moderate anxiety levels and 33% experienced post-SAHI depression. Only anxiety was found out to have a significant relation with aneurysm location, specifically in the anterior circulation.

Vein of Galen Malformation Presenting as Juvenile Melting Brain Syndrome: A Case Report

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Background: Vein of Galen arteriovenous malformations (VGAM) are rare cerebral malformations where arterial feeders connect to a persistent median prosencephalic vein. It is usually diagnosed through fetal ultrasound or during the neonatal period when patients present with heart failure as consequence of impaired cerebral physiology.

Case Report: We report a case of a developmentally normal 9-year old boy who presented with headache and seizures. Over a course of one year, subsequent neurologic deficits developed such as cognitive regression, gradual paraplegia and loss of verbal output. Cranial CT scan showed diffuse cortical-subcortical atrophy with intracerebral calcifications (“melting brain”). Catheter angiogram demonstrated VGAM with feeders from the posterior circulation.

Conclusion: This report showcased that VGAM can manifest with late onset symptoms and high index of suspicion is required to prevent delay in diagnosis and management. This is the first reported case of VGAM with this rare presentation in the local setting.

Stroke in the Young Associated with Methamphetamine Abuse

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Background: Methamphetamine, a potent sympathomimetic drug, also commonly called as “ice, crystal or shabu” has become the dominant recreational drug across Southeast Asian region. The authors aim to present a case of methamphetamine – induced stroke in a young patient showing the vascular effect of such drug.

Case Report: The patient is a 31-year-old, Chinese, male, smoker with no known vascular risk factors, denies illicit drug use, found to be lethargic, dysarthric with right sided weakness, no fever or witnessed seizure. On examination, the blood pressure was 145/118, heart rate was 112, afebrile. He had expressive dysphasia, dysarthria, right hemianopia and neglect and right sided hemiparesis with initial National Institute of Health Stroke Scale (NIHSS) 8. The Computed tomography (CT) of brain showed left middle cerebral artery territory infarct. Transthoracic echocardiogram showed cardiomyopathy with ejection fraction of 15% and 2 mobile left ventricular (LV) apical thrombi. On Day 2 of hospitalization, both feet were noted to be dusky, diagnosed with acute bilateral limb ischemic. The CT angiography of lower limbs showed diffusely small caliber of bilateral lower limb arteries with no discrete filling defects which suggest generalized vasospasm. Subsequently, he went into acute renal failure requiring...
hemodialysis for 2 days and acute hepatic failure. The CT scan of abdomen showed bilateral renal infaracts. The toxicology report detected methamphetamine. He was started on anticoagulation for the LV thrombus and was sent for rehabilitation.

Conclusion: The stroke of this patient is a result of an embolus from a LV Thrombus caused by methamphetamine induced cardiomyopathy. He experienced the toxic effect of methamphetamine causing hepatocellular injury leading to hepatic failure, damage to renal arteries causing acute renal failure and vasculitis of middle to small-sized peripheral arteries causing limb ischemia. He admitted consuming methamphetamine for 3 months prior to admission.

Cost-Effectiveness Analysis of Time to Endovascular Thrombectomy Treatment Following Acute Ischemic Stroke: A Singapore Healthcare Perspective

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Background and Objectives: The benefits of endovascular thrombectomy (EVT) in acute ischemic stroke patients are time-dependent. Our aim was to evaluate the cost-effectiveness of EVT in different time periods after stroke onset from the Singapore healthcare perspective.

Methods: A Markov model was built to estimate the cost-effectiveness of EVT therapy, in multiple time frames from onset to treatment initiation. The windows of time evaluated were: 61-120 min, 121-180 min, 181-240 min, 241-300 min and 301-360 min. The analysis was performed from the Singapore healthcare perspective. Input parameters were based on clinical trials, electronic medical records, community surveys, literature and experts’ opinions. All costs were in 2018 Singapore Dollar. In addition to outcomes differences by timing of EVT initiation from onset, the model also considered the proportion of patients who become EVT-ineligible over time. Sensitivity analyses were performed to assess the independent impact of individual input uncertainties and overall robustness of the base-case model.

Results: EVT initiated within 61-120 min was the most cost-effective time window for treatment, with an incremental cost-effectiveness ratio (ICER) of $7,196 when compared to treatment at 121-180 min, and an ICER of $4,939 when compared to treatment at 181-240 minutes. Using a Willingness-to-Pay of $50,000 as the threshold, these ICERs can be considered cost-effective. Comparing treatment at 61-120 min to 241-360 min, earlier treatment was associated with improved quality-adjusted life years and lower costs; thereby representing the “dominant” treatment scenario. Results from sensitivity analyses demonstrated that within pre-specified ranges of the input parameters, treatment performed within 61-120 min time window remained cost-effective.

Conclusion: This study shows that from the Singapore healthcare perspective, earlier initiation (61-120 min) of EVT treatment had the highest cost-effectiveness. Treatment delay also reduced patients’ QALYs. Thus, healthcare policies and procedures should aim to improve efficiency of pre-hospital and in-hospital workflow processes to reduce the door-to-puncture duration.

Cost of Hospitalization for Stroke in a Low-Middle Income Country: Findings from a Public Tertiary Hospital in the Philippines

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Background and Aim: Determining the cost of hospitalization for acute stroke is important in the appropriate allocation of resources for public health facilities and in the cost effectiveness analysis of interventions. Despite being the second leading cause of mortality in the Philippines, there are no published data on the cost of stroke in the country. The study aims to determine the in-hospitalization cost for stroke (IHCS) in a tertiary public hospital in the Philippines and identify the factors influencing IHCS.

Methods: The study was a retrospective review of the medical and billing records of the hospital. Adult patients admitted for acute stroke between June 1, 2017 and May 31, 2018 were included in the analysis. After the mean cost of stroke was determined, multivariate logistic regression analysis was done to determine demographic and clinical characteristics that were predictive of stroke cost.

Results: A total of 863 patient records were analyzed. The median in-hospitalization cost for stroke was PHP 17,141.50 or USD 329.52 USD (mean cost: PHP 39,089.31 or USD 751.43). Independent determinants of higher cost include male sex (p=0.021), stroke type (hemorrhagic stroke, p=0.001; subarachnoid hemorrhage, p<0.001), lower GCS on admission (p=0.023), surgical intervention (p<0.001), intravenous thrombolysis (p<0.001), infection (p<0.001), length of hospital stay (p<0.001), and mechanical ventilation (p=0.008).

Conclusion: The study provided current data on the in-hospitalization cost of acute stroke in a public tertiary hospital in the Philippines. Male sex, stroke type, lower GCS on admission, surgical intervention, intravenous thrombolysis, infection, length of hospital stay, and mechanical ventilation were independent predictors of cost.

A Case of 53-Year-Old Man with Malignant Stroke Who Underwent Decompression Craniectomy with Very Good Functional Outcome Post-Hospitalization

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Background: The use of decompressive craniectomy has been studied in different conditions, including in malignant middle cerebral artery infarction. Some studies showed that overall functional outcome was poor with mRS &gt; 4. Decompressive craniectomy is a life saving procedure that appears to benefit patients with malignant middle cerebral artery infarcts, however, decompressive craniectomy results in mild improvement of neurological scores with poor functional outcome after six month.

Case Report: On this particular case of a 53-Year-Old man with a presentation of headache during his flight from Jeddah to Manila, the patient had no symptoms up to approximately 10 hours prior. The symptom of headache initiated and felt stronger on the right temporal
area with a severity of 4 out of 10. It was non-radiating and throbbing in characteristic and he was brought to the emergency department and diagnosed with acute ischemic stroke due to occlusion of the right middle cerebral artery. Initial NIHSS score was 7 out of 42 and with ASPECTS score of 4 out of 10. On the third day of hospitalization, patient was noted to be restless, associated with decreased in sensorium, anisocoric pupils (R&gt;L), with NIHSS score of 13. Surgical intervention for decompression craniectomy was done. The recommendations from the 2007 American Heart Association guidelines for Decompression craniectomy in malignant stroke were created before the results of three relevant multicenter randomized clinical trials (DESTINY, DECIMAL, and HAMLET) were published. In 2007, the results of a pooled analysis of the three studies, including favorable and unfavorable outcomes as determined by the modified Rankin Scale (mRS), showed a significant reduction in 1-year mortality. Mortality was 29% in patients who underwent Decompression craniectomy, compared to 78% in the control group. The patient underwent decompression craniectomy and had a remarkable neurologic recovery. He was discharged from the hospital 1 month after his admission with a mRS score of 1.

Conclusion: The management of malignant ischemic stroke with rapid initiation and recognition, and a rapid detection to do an early mechanical decompression craniectomy is proven to be effective to be done during the evaluation for the cause of stroke and before the initiation of preventive measures of a recurrent stroke.

Safety and Clinical Outcome of Good-Grade Aneurysmal Subarachnoid Hemorrhage in Non-Intensive Care Units

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Background and Objective: Patients with good-grade aneurysmal subarachnoid hemorrhage (aSAH) defined as Hunt and Hess I-II achieve favorable outcomes. The early recognition and rapid intervention of complications justify the recommendation for intensive care unit (ICU) admission. The objective of this study is to compare the safety and clinical outcome of good-grade aSAH admitted in ICU and non-ICU.

Methods: We reviewed 242 records of patients with good-grade aSAH admitted in our hospital over the past five years. Three classifications were used for analyses based on the duration of admission: Group A (ICU days>non-ICU), Group B (non-ICU days>ICU days) and Group C (non-ICU only). Primary outcome measures were mortality and functional outcome at discharge. Secondary outcome measures included complication rates and total length of hospital stay. The medical and surgical interventions were also compared.

Results: There were no significant differences in the mortality rate, functional outcome and medical and surgical interventions between three groups. Delayed cerebral ischemia and nosocomial infections were significantly higher in the ICU compared to the non-ICU (91.67% vs. 8.33%, p=0.001 and 76.47% vs. 23.53%, p=0.001, respectively). On the other hand, rebleeding was significantly higher in the non-ICU (75%; p=0.02). Patients who developed complications had a significantly longer total hospital stay compared to those who did not develop complications across all three groups (p=0.05).

Conclusions: Admission of good-grade aSAH in a non-ICU maybe safe and may decrease the likelihood of developing nosocomial infection. Rebleeding is more frequent in the non-ICU. The development of complications is a predictor of unfavorable outcome and mortality, and is consequently associated with longer hospital stay.

ABO Blood Group and Ischemic Stroke Where Were We: Meta-analysis and The Scenario in Malaysia

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Background and Objectives: Ischemic stroke is the top three most burdensome diseases in Malaysia since past decades. Hence, the objectives of this study were to (i) perform meta-analysis in determining the association between ABO blood group and ischemic stroke risk word widely, and (ii) to investigate if ABO blood group is a risk factor for ischemic stroke among Malaysian or not.

Methods: Ethical approvals were obtained from the Malaysia NMRR and MREC, and UTAR SERC. The steps of meta-analysis include an extensive searching on 15 databases, and two-rounds of articles screening against the inclusion and exclusion criteria. Data from the eligible studies were extracted and analyzed with fixed-effect or random effect model. Publication bias was determined from the funnel plot. Meta-analysis was done via Revman 5 software. Likewise, 200 cases and 248 healthy controls (age and ethnicity matched), fulfilled the inclusion and exclusion criteria were recruited from the Northern region of Malaysia such as Hospital Seberang Jaya (Penang state), Hospital Taiping (Perak state) and Hospital Sultanah Bahiyah (Kedah state). Sampling period was from October 2015 till May 2019. ABO blood group of the study subjects was determined through serology method or molecular characterization. In addition, the ABO blood group distribution between cases and controls for the Northern region of Malaysia were incorporated with the meta-analysis results obtained world-widely.

Results: Meta-analysis results suggested a non-significant association between ABO blood group and ischemic stroke risk. Similarly, ABO blood group was not associated with ischemic stroke risk among Malaysian who resided in the Northern region. No publication bias was detected in the meta-analysis results.

Conclusion: Both of the meta-analysis results and the scenario in Malaysia suggested a non-significant association between ABO blood group and ischemic stroke risk.

Risk Factors for First and Recurrent Stroke in Childhood: A Prospective Study

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Background and Aim: Stroke is relatively rare in children, but can lead to significant morbidity and mortality. Strokes present differently in children than adults and often present with unique risk factors. Understanding the risk factors will optimize outcomes in children. Published cohorts of children with stroke recurrence rates are variable. This study has been done to determine rates and predictors of recurrent stroke in a developing country.

Methods: We prospectively enrolled 98 children with stroke, 16 children were excluded due to incomplete investigations and lost in follow up. This study has been done in a tertiary care hospital in Dhaka, Bangladesh from 2016 to 2019. Detail history, investigations including MRI of brain, MRA and MRV was done if needed. Each child was followed up minimum 3 months and outcome were studied.
Results: We studied 82 patients, among them 52 presented with first attack and 30 with recurrent attack of stroke. Age range of onset was 4.78±3.90 and 5.30±4.25 in first and recurrent stroke respectively. Recurrence rate was 57% (37% in infarction, none in hemorrhagic stroke). Commonest cause of recurrent stroke was intracranial vasculopathy (66.7%) most common being vascular narrowing and Moya Moya syndrome. In follow up the commonest outcome was motor deficit. No significant difference was found in risk factors of first and recurrent stroke.

Conclusion: In children with recurrent stroke most common cause was vasculopathy. Thus, targeted investigation and treatment should be done in these cases and follow up should be done.

Cultural Appropriateness of the National Institutes of Health Stroke Scale in Northern Mindanao: A Survey of Healthcare Providers

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Background and Aim: The National Institutes of Health Stroke Scale (NIHSS) is a clinical assessment tool that is widely used in clinical trials and practice to evaluate stroke-related neurological deficits. The aim of this study was to assess if the dysphasia and dysarthria components of the NIHSS are culturally-appropriate for stroke patients in Northern Mindanao in the perspective of the healthcare providers in Northern Mindanao.

Methods: This study conducted a survey on the healthcare providers who administer the NIHSS in stroke patients in Northern Mindanao. The cultural appropriateness of the dysphasia and dysarthria components of the NIHSS in the said region was assessed. The respondents were also asked how they addressed the cultural issues of some of the items.

Results: Most respondents think that at least one of the items in the dysphasia objects (71%), dysphasia phrases (52%) and dysarthria (42%) are culturally inappropriate. There were varied strategies in overcoming the cultural issues but most of the respondents substituted the items with another object/word verbally, while the others would substitute it in written form or skip the items altogether.

Conclusions: This study has noted that the healthcare workers in Northern Mindanao find the dysphasia and dysarthria components of the NIHSS are culturally inappropriate and this can be a basis for the modification of the NIHSS to better fit the stroke patients of Northern Mindanao.

Initial Experiences on Early Surgery for Spontaneous Basal Ganglia Intracerebral Hemorrhage

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Background and Objectives: Intracerebral hemorrhage (ICH) is a leading cause of death and disability secondary to stroke. The effects occur as early as an hour, peaks after 3 to 7 days and persists up to a month after ICH. In order to mitigate these effects before they occur, our institution has decided to adapt early surgery for spontaneous ICH (sICH). Factors and outcomes of early surgery for sICH is described.

Methods: A retrospective case control study of spontaneous basal ganglia ICH patients who underwent surgery at St. Luke’s Medical Center – Global City from January 2013 to December 2018.

Results: Institutionalization ensured 100% compliance rate among our Neurosurgeons. Mean time from ictus to surgery significantly decreased to 6.3 hours. Neurosurgeons can perform surgery at an average of 3.5 hours from ictus. Early surgery was performed to 71.4% of patients. Improvement in GCS was not significant. Operative times, blood loss, rebleeding rate, length of hospital stay and the types of surgery were similar between the early and late surgery groups however, mortality decreased to 17.6% for the early surgery group and showed increased survival by our patients by seven times. Median survival increased to 110 days. A subgroup of minimally invasive surgery showed significantly decreased blood loss. Operative time, length of hospital stay and rebleeding rate were the same but mortality was better for the MIS group.

Conclusion: Institutionalization promoted compliance among Neurosurgeons and early surgery for sICH decreased mortality.

Admission Neutrophil to Lymphocyte Ratio as a Predictive Factor in the Outcome of Acute Spontaneous Intracerebral Hemorrhage (ICH)

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Background and Objectives: A growing body of evidence supports that inflammatory mechanisms are involved in secondary brain injury after intracerebral hemorrhage (ICH) which has implications on the morbidity and mortality of stroke patients. Neutrophil to lymphocyte ratio (NLR) is a comprehensive index marker of inflammation and immune status of a patient. The prognostic value of NLR in predicting in-hospital mortality and functional outcome of patients with spontaneous intracerebral hemorrhage will be assessed in this study.

Methods: We retrospectively selected 151 hemorrhagic stroke patients and demographic and clinical characteristics were collected and computed for NLR. The association of NLR with the in-hospital mortality and functional outcome was assessed using Logistic regression analysis. Pearson Product Model Correlation was utilized to evaluate the correlation of NLR with ICH volume.

Results: Admission NLR showed a significant association (p<0.001 OR 7.99) with in-hospital mortality. Receiver operating characteristics yielded a NLR threshold of 7 with a sensitivity of 70.83% and specificity of 72.82%. An NLR of more than 7 showed a greater superiority in predicting in-hospital mortality than poor functional outcome (sensitivity=31%, specificity=86.67%). In addition, computed NLR of more than 6.4 showed significant association (p=0.04 OR 2.92) with poor outcome. However, admission NLR showed a low level of correlation (r=0.2968, p=0.002) with the volume of ICH.

Conclusions: This study demonstrated that ICH patients with an elevated NLR is associated with increased in-hospital mortality and poor functional outcome and that NLR can be used to predict clinical outcome among patients with spontaneous ICH.

Correlation Between Bleeding Volume and Mortality Rate of Intracerebral Hemorrhage patient in RSUD

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Background and Objective: Cerebrovascular disease is one of the leading causes of death. This disease killed approximately 7 million of people in the world. In Indonesia the number of people that registered as stroke patient is approximately 1.2 million. One kind of stroke that caused this was Intracerebral haemorrhage. Intracerebral haemorrhage is one of the deadliest acute condition with 30 - day mortality rate of 40
Geometry of Carotid Artery may be related to Different Pattern of Ischemic Lesion and Atherosclerotic Plaque Location

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Background and Purpose: Atherosclerotic plaque of internal carotid artery (ICA) is an important cause of ischemic stroke. We hypothesized that the geometry of ICA and the lesion pattern of cerebral infarction would be associated with the location of carotid plaque.

Methods: Acute ischemic stroke patients with symptomatic proximal ICA disease were enrolled. The location of carotid plaque was divided to high-apical and low-body type. The geometric parameters of carotid artery (including the angle between arteries of carotid bifurcation) were measured and ischemic lesion patterns were classified according to the number, location, and size of lesion. Clinical, geometric parameters and ischemic lesion patterns were compared between the high-apical and low-body type plaques. Factor associated with lesion pattern and location of plaque was investigated. Lesion pattern was dichotomized to those with only small lesions (small lesion only group) and those with a large lesion (large lesion including group).

Results: One hundred patients (36 patients with high-apical type and 64 patients with low-body type) were studied. Hyperlipidemia was more prevalent in low-body type plaque than in apical type plaques. Distal ICA-external carotid artery (ECA) angle was wider in patients with high-apical than low-body type plaques (31.3±16.0° vs 22.8±10.0°, p=0.005). The lesion pattern in patients with low-body type was more frequently observed as small scattered or cortical lesion (53.1% vs. 30.6%; p=0.029), whereas large plus additional lesion (38.9% vs. 12.5%; p=0.002) were most frequently observed in patients with high-apical type plaque. Low-body type plaque (Odd ratio=3.261, 95% confidence interval 1.185-8.974, p=0.022), but not the bifurcation angles were independently associated with small lesion only type.

Conclusions: The narrow ICA-ECA angle is associated with low-body type plaque of carotid artery. Ischemic stroke with low-body type plaque more appears small-scattered lesions, whereas a stroke with high-apical type plaque more appears as large plus additional lesions.

Influence of Ethnicity on Neuroimaging and Clinical Outcomes Post Stroke

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Background and Aim: Ischemic core, as estimated by CT perfusion utilizing relative cerebral blood flow (rCBF) threshold of <30%, correlates with final infarct volume in acute ischemic stroke patients. This ischemic threshold is derived from studies in Western populations and has not been investigated and critically evaluated in Asian populations.[3] It is known that cerebrovascular reserve is etiological diverse with regard to different racial groups and is multifactorial. It is important to establish accurate rCBF thresholds in Asian population. The aim of this study is to investigate and establish the optimal threshold of rCBF correlates with final infarct volume for Asian populations.

Methods: This is an observational study investigating the optimal ischemic threshold on rCBF comparing Australian and Indonesian ischemic stroke patients. Patient data sourced from CT perfusion (rCBF) at presentation and MRI Diffusion Weighted Imaging (DWI) sequence within 72 hours to demonstrate the final infarct volume. Ischemic core volumes were modelled using different rCBF thresholds. These modelled thresholds provided the basis for comparing and matching the appropriate thresholds in the both populations.

Results: From January 2018 to June 2019, 429 patients have been recruited. Data from 90 patients (45 in Jakarta (Indonesia), 45 in
Predictors of Hemorrhagic Transformation: An Observational Cross-Sectional Study Among Recombinant Tissue Plasminogen Activator Recipient Ischemic Stroke Patients Admitted at a Tertiary Hospital
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Background and Aim: Thrombolytic canalization is the standard of therapy among ischemic stroke patients. However, hemorrhagic transformation is a feared complication which causes hesitancy among clinicians in doing thrombolysis. The aim of the study is to determine clinicodemographic factors that can predict hemorrhagic transformation among recombinant Tissue Plasminogen Activator recipient ischemic stroke patients.

Methods: This is an observational cross-sectional study. Age, history of atrial fibrillation, previous use of anti-platelet, baseline systolic blood pressure, diastolic blood pressure, pre-treatment National Institute of Health Stroke Scale (NIHSS), baseline glucose, prothrombin time, partial thromboplastin time, creatinine of rTPA recipient ischemic stroke patients were extracted from retrospective chart review. Evaluation of Head Computed Tomography Scan Images of these patients was done to search for dense middle cerebral artery sign, cortical sulcal effacement, loss of insular ribbon, loss of gray-white matter interface or obscuration of basal ganglia. Logistic regression and Fisher’s Exact test were used to identify possible predictors of hemorrhagic transformation.

Results: We studied 31 patients and found a hemorrhagic transformation rate of 35.5%. A mean NIHSS of 15.55 and mean creatinine of 113.73 mmol/L was associated with hemorrhagic transformation, but this was not able to predict hemorrhagic transformation after IV thrombolysis. Dense middle cerebral artery sign, cortical sulcal effacement, loss of insular ribbon, loss of gray-white matter interface or obscuration of basal ganglia had p-values of 0.001, 0.007, 0.003, 0.002 and 0.001 respectively, thus, could individually predict hemorrhagic transformation.

Conclusions: Early infarct signs can predict hemorrhagic transformation after thrombolysis.

Efficacy of Repetitive Transcranial Magnetic Stimulation (RTMS) in Facilitating Lower Extremity Recovery and Gait Among Stroke Patients: A Meta-Analysis
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Background and Aim: Repetitive transcranial magnetic stimulation (rTMS) has been shown to facilitate neuroplasticity and recovery post-stroke. Objective. This meta-analysis aims to determine the efficacy of supplementing rTMS to conventional rehabilitation in facilitating improvement of lower extremity (LE) function and gait recovery among post-stroke patients.

Methods: literature search was done using PubMed, Cochrane Library and GoogleScholar with keywords repetitive transcranial magnetic stimulation and lower extremity function and gait and stroke. Study Selection. Studies were appraised by three independent reviewers. Inclusion criteria for study selection included studies with subjects aged 18-80 years old, who are ambulatory, had first onset of stroke, with unilateral hemiparesis and able to follow simple commands, studies with rTMS as intervention and Fugl Meyer-LE (FMA-LE) score, cadence and walking speed as outcome measures. Studies with robot-assisted gait training were excluded. Three randomized placebo-controlled trials were included in analysis.

Results: Review Manager was used to construct Forest plots. Data Synthesis. The change in FMA-LE score in rTMS groups was significant at 6.35 [3.12 to 9.58] points higher. The change in walking cadence in rTMS groups was significant at 8.72 [8.10 to 9.33] steps more per minute. The change in walking speed of 24.35 [-0.61 to 49.30] cm/sec was not significant in the pooled analysis due to heterogeneity.

Conclusions: Overall, among post-stroke patients, rTMS is beneficial as a supplement to conventional rehabilitation in facilitating motor recovery of lower extremities. However, this may not translate to improvement in gait.

Bridging Therapy and Direct Thrombectomy for Acute Ischemic Stroke: A Prospective Cohort Study
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Background and Aim: It remains controversial if intravenous thrombolysis (IVT) prior to mechanical thrombectomy (MTE) is superior to MTE alone in patients with acute ischemic stroke caused by large vessel occlusion. In this study, we compare functional
Thrombolysis Outcome in Patients with Diabetes Mellitus and Prior Cerebral Infarction Treated Within 3-45 Hours

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Background and Aims: IV alteplase is a proven treatment for acute ischemic stroke however, diabetes mellitus (DM) and previous cerebral infarction (PCI) were considered relative contraindications for thrombolysis. The study aims to determine the safety and efficacy of giving of IV-rtPA among diabetic patients with PCI presenting with acute ischemic stroke.

Methods: Relevant studies evaluating the outcome of IV-rtPA in terms of symptomatic intracerebral hemorrhage, functional outcome measured as mRS, and death among diabetic patients with PCI presenting with acute ischemic stroke were included in the review. Cochrane-Mantel-Haenszel test of independence and odds ratios (OR) and 95% CI were used for dichotomous outcome measures. The degree of heterogeneity was assessed using the I² statistic.

Results: The unadjusted rates of symptomatic intracerebral hemorrhage were not increased among DM+/PCI+ patients. Giving IVtPA among DM+/PCI+ patients did not result in increase in rate of sICH (OR, 1.13; 95% CI, 0.90, 1.42; p = 0.29); however, there is a trend towards higher mortality (OR, 1.67; 95% CI, 1.47, 1.90; p < 0.00001) not resulting from sICH. DM+/PCI+ group showed better functional outcome at 3 months (OR, 2.76; 95% CI, 2.51, 3.04; p < 0.00001) becoming more independent.

Conclusions: DM and previous cerebral infarction do not result in higher incidence of symptomatic intracerebral hemorrhage and showed trends toward better functional outcome.

Current Role of Tranexamic Acid in Treatment of Spontaneous Intracerebral Haemorrhage - A Systematic Review

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Background and Objectives: Currently no treatment is available for primary intracerebral haemorrhage (ICH) other than intensive blood pressure control. Tranexamic acid (TXA), an antifibrinolytic agent is an effective haemostatic agent in controlling bleeding in trauma and obstetric haemorrhage. We reviewed the current evidence and the effect of TXA in patients with primary ICH.

Methods: CENTRAL, PUBMED, Google Scholar, and Embase databases were searched for articles published between July 2009 – 2019 in English language. Adult patients with ICH presenting within 8 hours were included in the study. 46 publications were screened, and 11 articles were retrieved. Three randomised control trials (RCTs) and three observational studies were included.

Results: Out of the completed RCTs (n= 2379) there was a decrease in haematoma expansion between TXA (2.07- 3.72 ml) and placebo (4.9 -13.7 ml) at 24 hours. No difference was seen in the functional outcome at 90 days (OR 0.88, 95% CI 0.76-1.03, p=0.11). However, in one trial there was an early mortality reduction at 7 days (9% vs 11%, p=0.406). In a subgroup analysis of one trial, patients with systolic BP <170 mm-Hg had favourable outcome with TXA (OR 0.73, CI 0.59-0.9) vs placebo (OR 1.05, CI 0.85-1.29, p=0.01). Currently, there are five ongoing RCTs. No serious adverse events are seen with TXA.

Conclusions: Despite no significant improvement in functional outcome with TXA, studies have shown significant moderate decrease in the haematoma expansion along with early mortality benefit in ICH patients. TXA is cheap, safe and easy to administer. Smaller treatment
Antithrombin III Deficiency as a Likely Etiology of Cerebral Venous Thrombosis in a 48-Year-Old Male: A Case Report

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Background: Cerebral venous thrombosis (CVT) is a rare cause of stroke. Diagnosis relies on high index of suspicion. Risk factors may either be acquired or hereditary. Among hereditary causes are thrombophilias and most common among them are Factor V Leiden mutation and prothrombin gene G20210A mutation, others include antithrombin III, Protein C and Protein S deficiencies.

Case Report: We report a case of a 48-year-old male presenting with a four-week history of progressive generalized headache and first onset seizure. The patient had a personal history of mesenteric vein thrombosis and deep venous thrombosis in the lower extremities and a family history of portal vein thrombosis and sinus venous thrombosis. Contrast venography showed thrombosis in the left transverse sinus. Workup for an inherited thrombophilia was done. The patient and his one sibling had a 50% reduction in the plasma AT III activity level, highly suggesting a congenital AT III deficiency.

Conclusion: Antithrombin III deficiency is a rare autosomal dominant thrombophilia that leads to increased risk for recurrent venous thromboembolism. We emphasize the value of considering hereditary thrombophilia as an etiology of CVT for the anticoagulant prescription and genetic counselling of the patient and his relatives.

Multiple Intracerebral Hemorrhage as Initial Presentation of Acute Leukemia: A Case Report

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Background: Intracerebral Hemorrhage had been a harbinger of morbidity and mortality in patients diagnosed with hematologic malignancy. Spontaneous Intracerebral hemorrhage prior to diagnosis is Leukemia however, is very rare and to our knowledge, only 6 have been reported.

Case Report: This is a case of a 21-year-old female, who was rushed to the emergency department due to decrease in sensorium. Patient had no significant headaches, no signs of increased intracranial pressure, and no signs of bruising or bleeding prior. Plain cranial CT scan revealed multiple intracerebral Hemorrhages of at least 18 in number. The Results of cytology revealed Acute Myeloid Leukemia.

Conclusion: Several factors from previous comprehensive studies have been highlighted to increase the risk of Intracerebral Hemorrhage amongst these populations. Approximately 5% of patients with acute leukemia will develop intracerebral hemorrhage and predictors for mortality have different in reported studies. Hyperleukocytosis is a strong consideration for increased mortality, the level of which still undetermined due to lack of literature. Although a probable association between Hyperleukocytosis and survival has been theorized, there is still insufficient data to conclude with certainty. More case reports or retrospective studies are needed so that an association may be established that can help in acute management of these patients.

Carotid Artery Stenosis in Patients with Ischaemic Stroke in a Sri Lankan Tertiary Care Centre: Prevalence and Associated Factors

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Background and Objectives: Data on the prevalence of carotid artery stenosis (CAS) among Sri Lankan stroke patients is limited. We sought to determine the prevalence and associated factors of significant CAS in patients with ischaemic stroke admitted to a Sri Lankan stroke unit.

Methods: We prospectively studied all stroke patients admitted to the stroke unit in a Sri Lankan tertiary care hospital over a five-year period. Presence and degree of CAS was evaluated by doppler ultrasonography (US). Degree of CAS was classified as low (<50%), moderate (50-69%), significant (70-99%) or total occlusion (100%) according to NASCET criteria. Factors associated with significant CAS were identified by stepwise multiple logistic regression analysis.

Results: Out of 867 stroke patients studied, 704 (81.2%) had ischaemic strokes (59.7% male, mean age 59.0±10.3 years), and 550 (78.1%) had carotid doppler data available. Of them, 528 (96.0%) had low degree stenosis, 12 (2.2%) had moderate stenosis, 7 (1.3%) had significant stenosis and 3 (0.5%) had total occlusion. Older age was associated with significant CAS (OR 1.14, p=0.011) on stepwise multiple logistic regression analysis. Sex, smoking, BMI, total cholesterol, LDL cholesterol, history of diabetes mellitus, hypertension, hyperlipidaemia or ischemic heart disease, and premorbid aspirin or statin use were not associated with significant CAS.

Conclusions: Significant CAS or total occlusion is seen in only 1.8% of Sri Lankan patients with ischaemic stroke at this tertiary care centre. These figures are much lower compared to Western data. Our findings have implications for the use of management approaches such as thrombectomy and carotid endarterectomy in Sri Lankan patients.

Stroke Services in Sri Lanka: Results of an Online Survey

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Background and Objective: Data on the stroke services available in Sri Lanka is limited. We sought to describe the stroke services in Sri Lankan hospitals where a neurologist was available.

Methods: An email survey was conducted among neurologists attached to all the neurology units in state-sector hospitals in Sri Lanka.

Results: There were 38 neurologists in 22 state-sector hospitals, and data was received regarding 21 hospitals. There were no specialist stroke physicians or stroke neurologists. Nine hospitals had a stroke unit or dedicated stroke beds. CT scanning was available in 18 hospitals (85.7%), and MRI in 4 (19%). Thrombolysis was available in 14 (66.7%), and mechanical thrombectomy in one. Echocardiography was available in all hospitals, and 24-hour ECG monitoring in 19 (90.5%). Availability of multidisciplinary services was as follows: nurses trained in stroke care (12 hospitals, 57.1%); physiotherapy (21, 100%); occupational therapy (19, 90.5%); speech therapy (17, 80.9%); mental health services (19, 90.5%); social services (14, 66.7%). Multidisciplinary team meetings were conducted in eight units. On-site neurosurgical facilities were available in eight (38.1%) hospitals, and 16 (76.2%) had access to a rehabilitation hospital within the region. Availability of essential drugs for stroke prevention was rated as ‘Good’ as follows: antplatelets (20 hospitals,
95.2%); oral anticoagulants (19, 90.47%); antihypertensives (21, 100%); statins (21, 100%); antidiabetics (18, 85.7%).

Conclusions: This survey provides the first data on stroke services available in Sri Lankan hospitals. There is a need for more neurologists, more stroke units and for trained stroke specialists. Facilities for modern stroke treatments were limited. There was variation in availability of multidisciplinary services. Availability of essential drugs seemed acceptable.

### Analysis of Risk Factors for the Development of Unprovoked Seizure among Post-Stroke Patients

**Admitted in Maria Reyna – Xavier University Hospital from 2016 to 2018: A Retrospective Cohort Study**

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**Background and Objective:** Stroke is the most common cause of seizure in adult population, and is associated with poor outcome among post-stroke patients. This study aimed to determine the clinical risk factors in developing seizure after a stroke.

**Methods:** We retrospectively identified post-stroke patients admitted from year 2016 to 2018. Each patient who had post-stroke seizure (PSS) were compared to two post-stroke patients without seizure, matched according to age, sex, and type and location of stroke. Variables evaluated were cortical involvement, stroke recurrence, and size of stroke. Differences in these variables were analyzed using linear regression test.

**Results:** A total of 412 charts were reviewed, wherein 8% had post-stroke seizure and were included in the analysis. Majority (57.6%) had late onset seizure. Seizure was more common among those with involvement of cortical area (p=0.000017). Furthermore, involvement of frontal or temporal cortex was more common among those who develop PSS than those who did not, with p value of 0.138 and 0.96, respectively. For every recurrence of stroke, the risk for developing seizure increases by 27.8% (p=0.009). In addition, large stroke size increases the risk by 40.7% (p=0.01).

**Conclusions:** Cortical involvement and large stroke size significantly increase the risk in developing seizure among post-stroke patients. Post-stroke patients are also at greater risk to develop seizure with every episode of stroke recurrence. Hence, therapies targeted for prevention of stroke recurrence is of great importance in the management of stroke survivors. Prospective study, with larger sample size, may be done to demonstrate significance of secondary stroke prevention.

### Capsular Warning Syndrome in Early Post Partum Period: A Case Report

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**Case Report:** This is a case of a 34-year-old female, G1P1(1001) status post cesarean section, day 3 post-partum who presented with recurrent episodes of left sided paralysis resolving over a 30 to 45 minutes for 6 episodes. Her presentation qualifies the criteria for Capsular Warning Syndrome, a term that describes recurrent stereotyped lacunar transient ischemic attacks associated with a 40% risk of developing a complete stroke even with antithrombotic therapy within 3 weeks of the onset of symptoms.

### Cerebral Venous Thrombosis in a Single Center Tertiary Hospital of A South East Asian Country (CVST Study) – A Retrospective Study on the Clinical Profiles of Patients with Cerebral Venous Thrombosis

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**Background and Aims:** Cerebral venous sinus thrombosis (CVST) accounts for <1% of all strokes and among the young. Large epidemiological studies on CVST are few owing to the rarity of the disease and these are representative of the Western population. Small retrospective studies describe the disease among East Asians and there is paucity of Southeast Asian data. In the Philippines, the work-up and management is limited by cost. This study aims to describe the patient characteristics of Filipinos with CVST, the management done and its outcome, and compare it with the available data representing other races/ethnicity. Results may be useful in health policy making to guide Filipino doctors on the extent of diagnostics and management to optimize the cost of healthcare.

**Methods:** This is a retrospective study of Filipino patients with CVST admitted in a tertiary hospital from 2013–2018. All patients ≥18 years old and diagnosed with CVST confirmed by neuroimaging were included. Those with imaging not indicative of CVST were excluded. Demographic and clinical data were obtained through review of medical records.

**Results:** A total of 31 patients were identified. Majority were <50 years old (n=17; 54.84%) with a median age of 43 years, and with slightly more females (n=16). Thrombophilia (n=14; 45.16%) is the most common predisposing factor followed by high estrogen states (n=10; 62.5%) seen exclusively in females. Headaches were the most common initial complaint (n=21; 67.74%) and seizures were the most common reason for admission (n=11; 35.48%). Majority had no neurologic deficits (n=15, 48.39%). The superior sagittal sinus is most commonly involved (n=9, 45.16%). Treatment was anticoagulation (n=24, 77.42%) and antiepileptics were given only to those with presented with seizures (n=16, 51.61%). The majority were discharged with a good prognosis at MRS 0-2 (n=24; 77.42%).

**Conclusions:** In this study, findings are comparable with investigations done in other races. This is the first systematic data on CVST in the Philippines and Southeast Asia.

### The International Assessment of Cnm-positive Streptococcus mutans as the Risk for Spontaneous Intracerebral Hemorrhage - A Study Protocol

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**Background and Objectives:** In recent two decades, the global burden of ICH was increased especially in African and Asian populations, otherwise, there still be few novel preemptive therapy targets other than anti-hypertensive therapy even now. Recently, we found the role of chronic oral infectious disease in the development of spontaneous (hypertensive) intracerebral hemorrhage (sICH), which implicate pathological findings of hypertensive vasculopathy, focusing on Streptococcus mutans expressing the collagen-binding protein, Cnm (Cnm-positive S. mutans) in a previous hospital cohort study held in Japan. However, few data exist concerning the relationship between Cnm-positive S. mutans and sICH and dCMs in diverse ethnic groups. In this study, we planned international collaborative research in Kenya, Nigeria, and Japan to confirm these relationships in different ethnic populations.

**Methods:** The study design is an international multicenter cross-sectional, pilot study. We will enroll 100 patients who were diagnosed with acute stroke including ICH. Ischemic stroke, and subarachnoid hemorrhage using brain CT imaging after obtaining written informed consent in Kenya and Nigeria, respectively. We will detect the presence of Cnm-positive S. mutans in dental plaque or saliva specimens using the PCR technique. At the end of this pilot study, we will calculate the crude and adjusted odds ratios (95% confidential interval) of the prevalence of Cnm-positive S. mutans associated with the CT based diagnosis of ICH compared with other stroke subtypes. Furthermore, in ICH patients, we will compare the location and volume of hematoma in patients harboring Cnm-positive S. mutans in the oral cavity and those without. Perspective: The proposed study will provide essential findings on a promising method for future large-scale international cohort study assessing oral microbes and ICH in a multi-ethnic populations.

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**Role of Progesterone as Neuronal Protection Factor in Post-Ischemic Stroke: A Systematic Review and Meta-Analysis**

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**Background and Objective:** Stroke is the most frequent cause of disabilities in adults in developing countries. The majority of stroke events refer to ischemic stroke. Although tissue plasminogen activator (tPA) has been an effective early therapy in ischemic stroke, its use is still limited due to its possibility to cause unwanted adverse effects. Recent prospective approach has taken an interest on neuroprotective strategies which aim to reduce chronic neuronal damage. The objective of this study is to present and analyse supporting data regarding the efficacy of progesterone administration in post-cerebral ischemic events in form of pathological and functional outcome.

**Methods:** The systematic search to identify articles for meta-analysis was taken based on the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guideline, using the keywords of “progesterone, ischemic stroke”. The statistical data analysis regarding the outcomes of interest was conducted using Review Manager (RevMan) version 5.3 statistical software.

**Results:** The studies included in this review are published between 2009 to 2019. There was an estimated significant heterogeneity among these studies and the pooled effect size of progesterone administration known by using the random-effects analysis. The estimated pooled SMD showed significant improvement in lesion volume with progesterone administration (SMD: -1.99, 95% CI: -2.94, -1.03). Meanwhile, the estimated pooled SMD showed significant improvement Rotarod performance with progesterone administration (SMD: 1.91, 95% CI: 0.97, 2.85). Potential publication bias was evaluated using funnel plots.

**Conclusion:** This review supports considering progesterone administration as potential neuroprotective factor in post-stroke events, although there is still much needed preclinical trials before implementing it in clinical trials.

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**Fourth Ventricular Extension as Determinant of Early Death among Patients with Spontaneous Intracerebral Hemorrhage: A Cross-Sectional Study**

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**Background and Aim:** Spontaneous intracerebral hemorrhage is third among the most frequent causes of stroke, accounting for 20-30% of stroke cases in the Asian population. Mortality is high and use of various scales have been valuable in prognostication of stroke patients. This study aimed to determine if intraventricular extension into the fourth ventricle can predict early death among patients with spontaneous intracerebral hemorrhage.

**Methods:** This was a retrospective cross-sectional study of spontaneous intracerebral hemorrhage patients admitted in a tertiary hospital from June 2015 to May 2018. Non-contrast enhanced cranial CT images of these patients were reviewed to identify the presence or absence of intraventricular extension, location of intraventricular extension, volume and the modified Graeb scores. In-patient charts were reviewed to identify clinicodemographic characteristics and outcome, either death within 7 days or survival.

**Results:** Review of Non-contrast enhanced cranial CT images of 263 patients who met the inclusion criteria after randomization was done to classify participants into 2 groups: 156 patients without intraventricular extension; and 107 patients with intraventricular extension. There were 43 deaths in the intraventricular extension group: 31 patients with intraventricular extension into the fourth ventricle. Kaplan-Meier test revealed that the average survival of these patients is 6 days (mean of 5.62; SE 0.727; at 95% CI 4.202 – 7.052). Modified Graeb scores of 16 (± 8, p value 0.000221) correlated significantly with mortality.

**Conclusion:** The presence of intraventricular extension into the fourth ventricle for patients with spontaneous intracerebral hemorrhage is a useful predictor of early death.

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**Amla Fruit Extract Protects Against Cerebral Ischemia Injury via MAPK Pathways in Rats**

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**Background and Aim:** Glucose is key step for maintaining brain metabolism and energy depletion has been implicated for ischemic stroke progression. The studies demonstrated that activation of MAPK signaling pathway is responsible for inflammation and cell death after ischemic injury. The aim of this study was to investigate the neuroprotective activity of amla fruit extract in vivo against ischemia reperfusion (I/R) injury, and to explore the underlying molecular mechanism.

**Methods:** 18 male Sprague Dawley (SD) rats divided into 3 groups: sham group, I/R group, amla group. Rats were subjected to transient middle cerebral artery occlusion (MCAo) for 60 min. Animals received oral administration of amla fruit extract 3 hr post to MCAO. Brain tissues were collected for biochemical measures such as adenosine triphosphate (ATP), brain derived neurotrophic factor (BDNF), glucose transporter-3 (GLUT-3). In addition, the phosphorylation levels of MAPK signal pathways (ERK1/2, JNK1/2 and p-38) and phosphorylated c-AMP response element binding (p-CREB) protein were elucidated via western blot analysis.
Results: Amla administered group showed increase ATP level. Moreover, it was found that amla significantly and dramatically increase protein level of p-CREB, BDNF and GLUT-3. In addition, the phosphorylation levels of MAPK signal pathways components were strikingly abrogated by amla treatment.

Conclusion: In conclusion, data of this study reveal that treatment with amla protects ischemic brain injury against stroke in rats by mediating the phosphorylation levels of MAPK pathway component and may have the potential for development as a clinical candidate in the treatment of ischemic stroke.

Association of Platelet Function and Activity with Stroke Development, Severity and Outcomes among Stroke in the Young Patients

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Background and Aim: Mean platelet volume (MPV) and Platelet count, measures of platelet activity and function, may serve as indicators of the risk of stroke in different patient groups. However, there is a paucity of data clarifying their role in the acute and rehabilitative phases of stroke in the younger population especially in the Philippines. Thus, this study investigated the association of platelet parameters in the stroke development, severity and prognosis.

Methods: This case-control study included patients aging 18-45 years old admitted as a case of first time stroke. On the other hand, the control group came from age and gender-matched healthy controls. Patients with conditions that may alter platelet count, measures of platelet activity and function were excluded. Review of the Blood sample results was done. The PC, MPV and MPV/PC ratio and their association to stroke occurrence (infarction and hemorrhage), severity (NIHSS score for infarction / blood volume for ICH) and prognosis (mRS score) were evaluated.

Results: Nineteen infarction (mean age = 39 ± 5; 13 male, 6 female) and 20 intracerebral hemorrhage cases (mean age = 38 ± 7; 12 male, 8 female) were included in the study with age- and sex-matched healthy controls. No significant difference was seen in PC between infarct cases and controls (mean±SD: 310±80 vs 307±50, P = 0.45) as well as between hemorrhagic cases and controls (mean±SD: 326±77 vs 350±63, P = 0.82). MPV was significantly higher in patients with hemorrhagic stroke than the control group (9.13±1.09 vs 8.53±0.80, P = 0.04) but there was no significant difference in the MPV of infarct patients and controls (8.75±0.90 vs 8.73±0.69, P = 0.48). Similarly, higher MPV/PC ratio was noted among hemorrhagic stroke patients: 0.030±0.009 versus 0.025±0.006, P = 0.06 (marginally significant) while no significant difference was found in MPV/PC ratio between infarct cases: 0.030±0.009 vs 0.029±0.005, P = 0.35. On the other hand, although not statistically significant, results showed that for every unit increase in MPV, the likelihood of poor prognosis increases by 2.03 times among the infarction cases (P=0.235) and by 1.70 times among the hemorrhagic stroke cases (P=0.266).

Conclusion: There is higher MPV/PC ratio levels on hemorrhagic patients. No significant associations were noted between platelet activity and function and stroke severity. A higher number of sample size is needed to elucidate the relationship of the MPV and MPV/PC ratio to stroke in the young outcomes.

Intra-arterial Thrombolysis after Failed Mechanical Thrombectomy: A STRATIS Registry Subgroup Analysis

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Background and Aim: Limited prospective data exists on the use of intra-arterial (IA) thrombolytics as rescue therapy (RT) after failed mechanical thrombectomy (MT) in acute ischemic stroke (AIS) patients with large vessel occlusions (LVO). The aim of this study is to investigate the use of IA recombinant tissue plasminogen activator (IA-rtPA) as RT in the prospective Systematic Evaluation of Patients Treated with Neurothrombectomy Devices for Acute Ischemic Stroke (STRATIS) Registry.

Methods: Data from the STRATIS Registry, a multicenter, non-randomized, observational study of AIS LVO patients treated with the Solitaire stent-retriever as the first-choice therapy within 8 hours from symptoms onset, were analyzed. Clinical and angiographic outcomes were compared between patients treated with and without IA-rtPA. Both anterior and posterior circulation occlusions were included in this substudy.

Results: Of the 938 STRATIS patients with IA-rtPA use reported, 809 and 129 were in the no IA-rtPA (83.2%) and IA-rtPA (13.8%) groups, respectively. No difference was seen in baseline demographics, with the exception of pre-stroke modified Rankin Scale (mRS) score, which was significantly lower in the IA-rtPA group (mRS 0; 84.5% versus 76.1%, p=0.04). Site of occlusion was similar between the groups, with the majority occurring in the MCA (72.4% versus 73.6%, p=0.74), IV-rtPA was administered in 63.0% and 70.5% of no IA-rtPA and IA-rtPA patients (p=0.11). Median IA-rtPA dose was 4mg (IQR 2–12). Mean onset to arterial puncture time was shorter in the IA-rtPA group (200.2±104.6 versus 228.2±98.5 minutes, p=0.003); however, mean puncture to procedure end time was longer in the IA-rtPA group (78.7±33.1 versus 63.1±35.9 minutes). Mean number of passes (2.2±1.4 versus 1.8±1.2, p=0.001) and rate of distal embolization (67.8% versus 54.5%, p=0.007) was significantly higher in the IA-rtPA group. Core lab adjudicated substantial reperfusion (mTICI≥2b) was achieved in 88.4% and 84.7% of no IA-rtPA and IA-rtPA patients (p=0.16). No difference was observed in rates of symptomatic intracranial hemorrhage (sICH) (1.4% versus 1.6%, p=0.70), good functional outcome (mRS≤2; 57.3% versus 59.2%, p=0.86), or mortality (15.5% versus 13.3%, p=0.80) at 90-days.

Conclusion: Use of IA-rtPA after failed thrombectomy was not associated with an increased risk of sICH or mortality in the STRATIS Registry. These results suggest that IA thrombolysis may be a safe option as rescue therapy in select patients.
**Functional Outcome of Patients who Underwent Surgical versus Non-surgical Intervention after Aneurysmal Subarachnoid Hemorrhage**

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**Background and Objective:** Subarachnoid hemorrhage (SAH), is a medical emergency associated with substantial morbidity and a 30-day mortality rate of 30% to 40%. Even in the advent of microsurgery and endovascular intervention, the mortality rate remains high. In the Philippines, many patients would still opt for forego brain surgery due to several reasons such as financial constraints and/or fear of surgical complications. Therefore, a follow-up data on patients who refused surgical intervention, in terms of mortality rate and functional outcome, will provide new insights on the medical conservative treatment strategies some patients opt to choose.

**Methods:** This study compared the functional outcome of patients who refused surgical intervention and those who underwent clipping of aneurysm after aneurysmal subarachnoid hemorrhage in terms of Modified Rankin Score after 1-year follow-up.

**Results:** A total of 134 patients were included. Those who underwent surgical clipping of aneurysm compromised 46% (62 patients) of the subjects and the remaining 54% (72 patients) were patients who opted for medical conservative treatment. The mean age of subjects was 51.32 years with female preponderance. Majority (78%) of the subjects had normal blood pressure. The most common location of aneurysm is in the ACOM (47%). At 1-year follow-up, there is no significant difference in the mortality rate, which was approximately 30%, between the groups of patients who underwent clipping of aneurysm and those who opted for medical conservative treatment. In the Surgical Group, 33% had neurological deficit compared to 50% in the Non-surgical Group at 1-year follow-up.

**Association of Neutrophil Lymphocyte Ratio to The Severity of Acute Ischemic Stroke Patients**

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**Background and Aims:** Stroke is a clinical syndrome consisting of rapidly developing clinical signs of focal (or global) disturbance of cerebral function lasting more than 24 hours or leading to death with no apparent cause other than a vascular origin. White blood cell (WBC) is an independent predictor of stroke severity. Neutrophil lymphocyte ratio (NLR) is a simple marker that can be easily calculated from the differential WBC count. This study aims to evaluate the relationship between the NLR with the severity of acute ischemic stroke patients in General Adam Malik Hospital and network hospital in Medan, Indonesia.

**Methods:** This study used a cross-sectional design, in patients with acute ischemic stroke who were treated at stroke corner and inpatient room neurology. Ischemic stroke was confirmed by computerized tomographic. Blood samples of all patients were collected and analyzed on admission and stroke severity was assessed based on the National Institutes of Health Stroke Scale (NIHSS) on admission.

**Results:** This study involved 48 acute ischemic stroke patients consisting of 23 males (47.9%) and 25 females (52.1%) with the characteristics of respondents average age is 60.58 ± 11.65, standard deviation of NLR is 6.35 (1.09-32.82) and the highest severity of stroke in the moderate NIHSS category (score 6-15) as many as 31 patients (64.6%). Based on the Spearman test obtained there was a positive correlation between NLR and NIHSS score (r= 0.632, p = 0.001).

**Conclusions:** There is a significant relationship between NLR and severity in acute ischemic stroke patients.

**External Validation of the Primary Pontine Hemorrhage (PPH) Score:A Predictor of Mortality for Primary Pontine Hemorrhage**

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**Background and Aims:** Primary pontine hemorrhage (PPH) has a high mortality among the subtypes of intracerebral hemorrhage. This study aimed to validate a PPH scoring for predicting 30-day mortality in patients with PPH.

**Methods:** A retrospective chart review was done in patients diagnosed with primary PPH in a tertiary hospital from 2010–2015. Variables from those patients were assessed as independent factors associated with 30-day mortality and their corresponding PPH scores were presented as area under the curve of the receiver operating characteristic.

**Results:** The GCS, SBP, glucose level, pupillary light reflex, maximum diameter of hematoma, and presence of intraventricular hemorrhage were independent factors associated with 30-day mortality. The AUC was lower (0.78), but percentage mortalities had a similarly increasing trend.

**Conclusion:** The PPH scoring is an easier prognostic tool for PPH mortality, however, additional validation studies are warranted.

**A Giant Saccular Basilar Artery Aneurysm Presenting as Multiple Infarctions: A Case Report**

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**Case Report:** This is a case of a 58-year-old male patient with an unruptured giant aneurysm of the basilar artery presenting with multiple infarctions involving the posterior circulation. Computerized tomography scan, brain magnetic resonance imaging and magnetic resonance angiography revealed a giant saccular basilar artery aneurysmal dilatation with intraluminal thrombus. We narrated the unique presentation of this case appearing with features of a CP angle tumor as well as with multiple infarctions and with symptoms manifesting abruptly. The entity of large basilar artery aneurysm presenting as a stroke is quite uncommon. The long term effects and prognostic implications of this ailment make it important to examine and recognize.
Efficacy of Oral Anticoagulants in Patients with Cerebral Venous Thrombosis: A Systematic Review

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**Background and Objectives:** Cerebral venous thrombosis (CVT) is a rare type of stroke that causes disability and high mortality. Oral anticoagulants are currently the primary long-term treatment to prevent recurrence. Their effects have been proven to give satisfactory outcomes. There hasn’t been enough evidence to support administration of novel oral anticoagulants (NOACs) alternatively to substitute vitamin K antagonist (VKA). This systematic review evaluates the efficacy and safety of the oral anticoagulants therapy in patients with CVT.

**Methods:** We conduct a systematic review of all studies published between 2010-2019, on CVT report confirmed by brain imaging that received long term therapeutic anticoagulants. Through a comprehensive search on PubMed, J-Store, Cochrane Library, Proquest, and EBSCOhost databases, we identified six eligible studies. Risk of bias analysis was performed using the STROBE checklist.

**Results:** Of all 158 patients included in our systematic review, 63.92% (n=101) patients received low molecular weight heparin (LMWH) and warfarin, 2.53% (n=4) received intravenous heparin and/or argatroban then followed by oral apixaban, 29.11% (n=46) received unfractionated heparin (UFH) or LMWH and warfarin or enoxaparin. 1.89% (n=3) were lost to follow up after initial therapeutic anticoagulants, and the other 2.53% (n=4) didn’t receive anticoagulants due to physician’s clinical judgement. Duration of oral anticoagulants and follow up ranged from 1-60 months. Recanalization was found in 15.8% (n=25) patients, 3.16% (n=5) experienced recurrence, all 5.69% (n=9) CVT-pregnancy cases could give birth at term, 9.49% (n=15) patients had one or more residual symptoms. However, 1.26% (n=2) patients died due to complications of CVT, before receiving therapeutic anticoagulants.

**Conclusion:** CVT patients who received long term oral anticoagulants have satisfactory outcome, lower risk of recurrence and mortality, with high rate of recanalization. However, residual symptoms could still emerge and require ongoing follow up.

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Thrombolysis for Stroke at the Philippine General Hospital: A Descriptive Analysis

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**Background and Objectives:** Despite the widespread use of intravenous recombinant tissue plasminogen activator (IV rtPA) worldwide, there is limited experience of its use in our institution primarily due to its cost. The study aims to describe acute ischemic stroke patients admitted at a tertiary government hospital within 4.5 hours post-ictus and evaluate treatment effect of intravenous rtPA.

**Methods:** This is a retrospective descriptive study using chart review involving acute ischemic stroke patients admitted within 4.5 hours from stroke onset at the Philippine General Hospital from January 2016 to May 2017. Demographics, stroke timelines, stroke outcomes, and complications of thrombolytic therapy were obtained from the charts. The median and interquartile range (IQR) were calculated for ordinal variables while frequencies and percentages were obtained for nominal data. All analyses were done using Microsoft Excel.

**Results:** For 17 months, 38 out of 1774 (2.14%) acute ischemic stroke patients were admitted less than 4.5 hours post-ictus at our institution, 30 of whom were eligible for rtPA treatment. The median age is 58 (IQR 50-66), 71% are males. The median admission NIHSS score is 12 (IQR 7-18). The median door-to-needle time is 112 minutes. Out of the 30 patients who were given IV rtPA, 57% had minimal or no disability after 3 months. Symptomatic intracranial hemorrhage rate is 13.3%.

**Conclusions:** The use of intravenous thrombolysis for acute ischemic stroke patients in our institution has recently increased. The stroke timelines are still far from the recommended ones, needing further improvement. Despite this, favorable outcomes are at par with published data.

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Ischemic Stroke in Young Adult with Atrial Septal Defect

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**Case Report:** A 27-year-old Chinese male, 4 packs year smoker, with no significant past medical history, presented with acute right sided numbness which started in right upper limb then progressed to right lower limb, trunk and face over past 1 week. Neurological examination revealed decrease in sensation over the right face, right upper limb and lower limb associated with right sided hyperreflexia. The power was preserved. There was no cranial neuropathy, no cerebellar and no cortical sign. There was no acute intracranial haemorrhage or territory infarct in CT brain. Hence MRI brain was performed, it showed subacute non-haemorrhagic infarcts in the posterior aspect of the left corona radiata and left lentiform nucleus. MRA showed no significant flow limiting stenosis. Further investigation was conducted to workup for young stroke. Autoimmune screen and prothrombotic screen were unremarkable. Echocardiogram with agitated saline contrast study with and then without Valsalva, revealed strongly positive for right to left shunt. Abnormal left-to-right flow across the inter-atrial septum by colour Doppler suggestive of atrial septal defect. No atrial fibrillation was seen in 24hour holter. Lower limbs Doppler ultrasound revealed no clot. Cardiologist was then referred for consideration of ASD closure. Transesophageal echocardiogram was performed revealed small secundum atrial septal defect (1 x 0.7cm) without intracardiac thrombus; predominant left-to-right shunt. The patient underwent ASD closure successfully with no residual shunt on bubble study during follow up. There was no further stroke in 2 years follow up and discharge from neurology.

**Conclusion:** It is important to consider atrial septal defect as cause of young stroke and consider atrial septal defect closure as treatment.

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Association of Obstructive Sleep Apnea and Acute Ischemic Stroke Outcome

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**Background and Aims:** Stroke is the primary cause of disability among adults. Stroke cases in hospitals in North Sumatra, Indonesia showed the incidence of stroke in women was 52.7% and males 47.3% with an average age of 59 years (age range between 20 years to 95 years). Obstructive sleep apnea (OSA) is found in 50-70% stroke patients. Obstructive sleep apnea is not only a risk factor for stroke, but also might worsen the disease. This study was aimed to evaluate the association of obstructive sleep apnea and stroke outcome.

**Methods:** This study was done in Adam Malik Hospital, North Sumatera, Indonesia. This prospective study was done in stroke patients with OSA and without OSA stroke patients, which were recruited using consecutive sampling. OSA was diagnosed with home sleep test device to assessed Apnea-Hypopnea Index (AHI). We also used STOP-Bang questionnaire score to stratify the severity of OSA.
The functional outcome of stroke was assessed with modified Rankin Scale (mRS) at day 1 and day 14 of admission.

**Results:** A total of 30 stroke patients were included during period February until July 2019, consisted of 17 (56.67%) women and 13 (43.33%) men were studied. In these 15 stroke patients with OSA and 15 patients without OSA, we found a significant difference of stroke outcome (p = 0.031) (OSA - mRS Day 1: 3.07±1.49, mRS Day 14: 2.67±1.50; non OSA - mRS Day 1: 2.40±0.99, mRS Day 14: 1.60±2.67). Difference of stroke outcome were also found between AH1 and STOP-Bang score groups (p = 0.028 and p = 0.013)

**Conclusions:** OSA is one of risk factor for stroke that is often ignored and rarely studied in clinical settings. In this study, OSA was strongly associated with worse stroke outcome.

**Assessment of Post-Stroke Caregivers’ Burden through the Modified Caregivers Strain Index (MCSI) in a Tertiary Center in the Philippines: A Cross-Sectional Study**

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**Background and Objective:** Stroke is a leading cause of disability globally. In developing countries like many Asian countries, stroke is the first leading cause of disability. Caregivers of poststroke patients mainly engage with the patient’s difficulty in ambulation or mobility, impairment in communication, constant support in facilitating activities in daily living, personality and temperamental changes, and even depression. They are also faced with these challenges as they cope with sudden changes such as long-term care of a disabled person, financial and emotional strain, and role reversals. This study focused on the assessment of caregiver burden through the Modified Caregiver Strain Index (MCSI). The identification of the sources of strain and the strain index of post-stroke caregivers can provide the basis for further discussion and implementation of functional coping strategies for the caregivers with predisposition to strain or those with severe strain. The objective of this study is to apply the Modified Caregiver Strain Index (MCSI) on caregivers of poststroke patients to determine caregiver burden.

**Methods:** This is a cross-sectional study of caregivers of post-stroke patients interviewed utilizing the MCSI. Baseline characteristics of the caregivers (which includes duration of caregiving and relationship of the caregiver to the patient) and the post-stroke patients they cared for (which includes disability by Modified Rankin Score [mRS]) were compared among caregivers assessed without strain, with predisposition to strain, and with severe strain.

**Results:** A total of 74 caregivers of post-stroke patients were recruited consecutively. Using the MCSI, 35.14% were predisposed to strain and 13.51% had severe strain. Those without strain comprise 51.35%. Analyzing the MCSI scores according to the severity of the post-stroke patient’s disability, those who were assessed with severe strain had patients with higher MRS: 40% had MRS 4 (with moderately severe disability) and 60% had MRS 5 (with severe disability). Majority of the caregivers with predisposition to strain also had post-stroke patients with MRS 4 at 42.31%. These values were found to be statistically significant. Analyzing the MCSI scores according to duration of caregiving and focusing on the caregivers with predisposition to strain and those with severe strain, majority had been providing caregiving for less than a year, at 73.08% and 80% respectively. These values were not found to be significant. Analyzing the MCSI scores according to the relationship of the caregiver to the patient, majority of those assessed without strain were spouses or first-degree relatives at 60.87% and 70% respectively. Looking at the second-degree relatives, 62.5% were predisposed to strain. Those related to the patient by law yielded a high percentage of 60% with severe strain. These values were found to be significant.

**Conclusions:** Post-stroke caregivers’ burden may be assessed by the use of the Modified Caregivers Strain Index (MCSI) comparable to the prevalence of caregiver burden based on previous studies. Factors contributing to caregivers’ burden include the severity of the post-stroke patient’s disability, shown to be significant in this study. Caregiver strain was lower in caregivers who were closely related to the patient (spouses and first-degree relatives) and was found to be higher in more distant relatives (second-degree relatives and in-laws). This correlation was also shown to be significant in this study.

**Mechanical Thrombectomy for Life-Threatening Cerebral Venous Thrombosis: A Case Report**

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**Background:** Cerebral venous thrombosis (CVT) is a rare cause for stroke worldwide with variable clinical presentation. We would like to present a case of life-threatening CVT who recovered after mechanical thrombectomy (MT).

**Case Report:** A 32-year-old lady, post-partum 10 months with no previous medical illness presented with one-day history of severe headache with progressive deterioration of her consciousness requiring intubation and ventilator support. On examination, her pupils were pinpoint bilaterally and she localizes to pain stimuli. Initial CT brain showed subarachnoid hemorrhage seen in bilateral temporal and occipital lobe with venous thrombosis in the straight sinus, left transverse and sigmoid sinus. Her condition deteriorated despite early treatment with anticoagulation. Repeated plain CT brain showed cerebral hemorrhage and intracranial hypertension therefore she was referred for mechanical thrombectomy. Post thrombectomy, she was extubated at day 4 and was discharged well with warfarin. Anticoagulation therapy has been regarded as the first line management in CVT in order to prevent the progression of thrombosis and re-establishing venous flow. Mechanical thrombectomy should be considered in patients with severe CVT refractory to anticoagulation, especially in patients with severe cerebral edema and poor conscious state.

**Conclusion:** In conclusion, mechanical thrombectomy is a useful alternative in treating cerebral venous thrombosis, particularly in comatose patient or those who did not improve despite treatment with anticoagulation therapy.

**Central Nervous System Involvement in Eosinophil Granulomatosis with Polyangiitis**

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**Background and Objectives:** Eosinophil granulomatosis with polyangiitis (EGPA) is an autoimmune disease that exhibits various vascular inflations throughout the body following bronchial asthma. Due to the variety of symptoms, it takes time to diagnose and
Influence on Outcome and Treatment of Intracerebral Hematoma in Patients with Atraumatic Subarachnoid Hemorrhage

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**Background and Aims:** So far, data regarding the influence of concomitant intracerebral hematoma (ICH) on long-term outcome in patients with atraumatic subarachnoid hemorrhage (SAH) are scarce. Further, it is not established if these patients may benefit from surgical intervention. Aim of this study was to determine the influence of concomitant ICH in SAH-patients on functional long-term outcome and whether these patients may benefit from surgical evacuation.

**Methods:** Over a 5-year period (2008-2012), all consecutive patients with SAH treated at the Departments of Neurology or Neurosurgery, University Hospital Erlangen (Germany) were recorded. In addition to the extent of SAH we documented the presence, location and volume of ICH. Outcome assessment at 12 months included functional outcome (modified Rankin scale [mRS]), favorable 0-2 vs. unfavorable 3-6), health-related quality of life (EQ-5D) and long-term complications. For outcome analysis, a propensity score matching (PSM, ratio 1:1, caliper 0.2) was performed to compare SAH-patients with and without ICH on initial imaging. Further, subanalysis was performed regarding treatment modality (surgical evacuation vs. conservative) in patients with concomitant ICH.

**Results:** A total of 494 patients with atraumatic SAH were available for analysis, of whom 85(17.2%) had concomitant ICH on initial imaging. SAH-Patients with ICH had a worse clinical condition on admission (WFNS) and a greater extent of subarachnoid / intraventricular hemorrhage. Median ICH-volume was 11.0(5.4-31.8)ml with largest volumes observed in patients with ruptured MCA-aneurysm (31.4[11.7-42.4]ml). After PSM, patients with concomitant ICH had worse functional outcome at 12 months compared to patients without ICH (mRS 0-2: ICH 31.7% vs. ØICH 57.7%, p=0.001). In addition, patients with ICH suffered more frequently from epilepsy (ICH 23.4% vs. ØICH 7.3%, p=0.022) and rated their own health worse compared to patients without ICH after 12 months (EQ-5D VAS: ICH 50(30-70) vs. ØICH 80(65-95), p<0.001). In the adjusted analysis of patients with ICH, surgical treatment (n=27) was associated with a higher rate of patients achieving favorable outcome at 12 months (RR [95%CI]: 3.20 [1.61-6.37]), predominantly in those with ICH-volumes exceeding 10ml, poor functional status on admission (WFNS IV/V) and receiving early surgical intervention (within 600min). Further, mortality at 12 months was reduced in patients with surgical evacuation compared to conservatively treated patients (RR [95%CI]: 0.26 [0.10-0.71]).

**Conclusion:** Concomitant ICH occurs frequently in patients with SAH and is associated with functional and subjective impairment after one year. Surgical evacuation of ICH may improve outcomes in these patients if performed early after SAH-onset.

Reliability of Maximal Tactile Pressures of a Sustained Grasp Task Using TactArray Device in Healthy People and in People with Stroke

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**Background and Objective:** Instantaneous peak grip strength is widely used to characterise muscle weakness after stroke. Sustained grasp is essential for functional tasks in daily life. Sensor-based devices can record pressure or force over time to quantify grip strength during sustained grasping. The reliability of grip strength using the TactArray device has not been investigated. The objective of this study is to investigate the reliability of maximal tactile pressures of a sustained grasp task using the TactArray device in healthy people and in people with stroke.

**Methods:** Healthy participants (n=18) and participants with stroke (n=11) performed three trials of sustained maximal grasp. Both hands were tested in within-day and between-day sessions, with and without vision. Measures of maximal tactile pressures were reported using the highest value among the three repetitions, the mean of two repetitions, and the mean of three repetitions. Reliability was determined using changes in mean, coefficients of variation and intraclass correlation coefficients (ICCs).

**Results:** In healthy individuals, changes in mean were very good, coefficients of variation good to acceptable and ICCs very good to good for maximal tactile pressures in the dominant hand with and without vision and in the non-dominant hand without vision for within-day and between-day sessions. In people with stroke, changes in mean were good, coefficients of variation acceptable and ICCs very good for maximal tactile pressures in the affected hand with and without vision for within-day sessions and without vision for between-day sessions. In the less affected hand, changes in mean were good to very good, coefficients of variations were acceptable and ICCs were good to very good for maximal tactile pressures in between-day session with and without vision.

**Conclusion:** The TactArray device demonstrates satisfactory reliability for maximal tactile pressures during a sustained grasp for within-day and between-day testing sessions with and without vision in healthy people and those with stroke.
Hyperintense Acute Reperfusion Marker Sign in Diffusion Negative Transient Ischemic Attack Patients

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Background and Objectives: The hyperintense acute reperfusion marker (HARM) is known as a delayed enhancement of cerebrospinal fluid on fluid attenuated inversion recovery (FLAIR) images in an acute stroke, and it is supposed to indicate a blood brain barrier disruption. However, HARM without any hyperintensities on diffusion-weighted image (DWI) is occasionally found in acute stroke or transient ischemic attack (TIA) patients. Our study was to determine the prevalence of HARM sign in DWI-negative TIA patients and to identify the characteristics of HARM-positive patients.

Methods: From Jan 2015 to Sep 2018, we included the patients who had TIA and underwent MRI including DWI and gadolinium-enhanced FLAIR sequences within 7 days after onset from our prospective stroke registry. We then identified the presence of HARM sign in the relevant brain region.

Results: We identified a total of 182 TIA patients (mean age, 64.1±11.0 years old; male, 50.0%) without evident acute ischemic lesion in DWI from 223 consecutive patients of our TIA registry. Eleven patients (6%) had HARM sign corresponding to the neurological symptoms. Median (interquartile range) ABCD2 score was 4 (3, 5). Clinical characteristics of HARM-positive patients were similar to those of HARM-negative patients.

Conclusion: The observation of HARM sign can help to confirm the true ischemic TIA patients. However, the clinical characteristics was not different between HARM-positive and HARM-negative patients. Further studies including more patients are needed to confirm our observation.

Outcomes of Intravenous Tissue Plasminogen Activator in the 3 to 4.5-hour Window for Acute Ischemic Stroke Patients with Prior Ischemic History and Diabetes Mellitus

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Prevalence and Associated Factor of Prolong Hospital Stay of Acute Ischemic Stroke Patients Admitted at Stroke Unit in Bhumibol Adulyadej Hospital

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Background and Objectives: Acute ischemic stroke is a major health problem worldwide and also in Thailand. Prolonged length of hospital stay after stroke increases health care cost, risk for hospital-acquired complications and in-hospital death. Our objective is to describe prevalence and associated factor of prolong hospital stay of acute ischemic stroke patients admitted at stroke unit in Bhumibol Adulyadej Hospital.

Methods: Medical record of all acute ischemic stroke patients who admitted to stroke unit, Bhumibol Adulyadej hospital between January 2018 and June 2018 were retrospectively reviewed. Patient characteristics such as age, gender, body mass index, co-morbidity, stroke risk factors, baseline laboratory result, brain imaging, presentation, National Institute of Health Stroke Scale, Modified
Rankin Scale, treatment, complications and length of stay were collected. Prolonged length of hospital stay defined as 7 days or more. Institutional ethical board approved protocol before data collection.

Results: Fifty eight of 313 patients (18.5% (95% CI 14.4 – 23.3)) had prolonged length of stay. Atrial fibrillation (odd ratio 7.64, 95% CI 3.90-14.99), failed dysphagia screening test (odd ratio 30.66, 95% CI 14.54-64.67), cardioembolic and large artery atherosclerosis subtype (odd ratio 9.56, 95% CI 4.79-19.07), pneumonia (odd ratio 15.43, 95% CI 4.03-59.04), urinary tract infection (odd ratio 15.43, 95% CI 4.04-59.04), other infection (odd ratio 17.36, 95% CI 3.51-86.00), brain edema (odd ratio 11.93, 95% CI 2.25-63.17), progressive stroke (odd ratio 13.44, 95% CI 3.45-52.43), upper gastrointestinal hemorrhage (odd ratio 15.43, 95% CI 4.03-59.04) were found to be statistically significant (P<0.05) with prolonged length of stay.

Conclusion: Prolonged length of stay in hospitalized stroke patients had prevalence about one-fifth. It was strongly associated with failed dysphagia screening test and complications (pneumonia, urinary tract infection, other Infections, upper gastrointestinal hemorrhage and progressive stroke). Further study to prevent modifiable factors may help to reduce length of hospital stay.

Analysis of Risk Factors for Hyperperfusion Syndrome after Revascularization Surgery for Moya-Moya Disease
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Background and Objectives: Cerebral hyper perfusion (CHP) syndrome is a known complication of revascularization surgery for moyamoya disease/syndrome (MMD/S); however, the mechanism remains to be elucidated and analysis of regional CBF (rCBF) study is warranted. The purpose of this study is to evaluate the predicting factor associated with postoperative hyperperfusion syndrome.

Methods: We evaluated regional CBF (rCBF) using SPECT and perfusion CT at the site of anastomosis before and after surgery in 14 patients (19 hemispheres) with MMD/S aged between 6 and 64 years (mean, 36). All patients underwent STA-MCA single anastomosis with EDAMS. Intraoperatively, blood flow velocity of recipient artery (M4) was measured with Micro-Doppler, and pre/post-operative regional CBF were compared semi quantitatively (ΔrCBF=affected side rCBF/unaffected side rCBF).

Results: Mean blood flow velocity of recipient M4 (mBFV) before and after anastomosis were 3.5cm/sec and 11.9cm/sec, respectively. ΔrCBFs before and after surgery were 0.95 and 1.42, respectively. Postoperatively, transient neurological deterioration compatible to CHP syndrome was observed in 3 patients. Increase of mBFV and ΔrCBF after anastomosis were higher in the CHP group than no CHP group, even though there were no statistically difference (mBFV: 6.33 vs 4.15 times; ΔrCBF: 1.63 vs 1.47 times).

Conclusion: Excessive increase of mBFV and ΔrCBF are possible risk factor of postoperative CHP in MMD/S.

A Rare Case of Henoch-Schönlein Purpura and Ischemic Stroke in Adult Patient
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Background: Henoch-Schönlein Purpura(HSP) is a systemic small vessel vasculitis and commonly affects children. HSP is characterized by palpable purpura, arthritis, abdominal pain, renal abnormalities. Other organ systems may also be involved but are rare, especially central nervous system. We report an adult patient with HSP who developed ischemic stroke.

Case Report: A 55-year-old men admitted neurologic clinic complaining of sudden onset Rt. side tingling sense and hypesthesia. He had palpable purpura over both legs and buttocks 3 day ago and had history of abdominal pain 1 day before admission. Initial brain MR imaging (MRI) disclosed multiple acute infarctions involving left putamen, thalamus, pontine base from diffusion weighted image, and normal vasculature from MR angiography. Electrocardiogram, routine echocardiography, transesophageal echocardiogram and Holter monitoring were unremarkable. He was discharged after neurologic symptoms had improved. But his skin lesions were spread to both upper extremities and he developed hematuria. Also he complained of Rt. knee joint and abdominal pain. With an impression of multiple infarctions due to HSP with cerebral vasculitis, we started immunosuppressive agent and oral prednisolone. The patient’s neurologic and systemics symptoms were stabilized.

Conclusion: HSP is an immune-mediated vasculitis associated with immunoglobulin A (IgA) deposition. Cerebrovascular accident is a rare complication HSP, which is mainly described in children. But adult-onset HSP with ischemic stroke is extremely rare. Possible causes include the presence of cerebral vasculitis and reduced levels of factor XIII and prothrombin. However, the etiology of cerebral infarction remains unclear. We suggest that the possibility of neurologic involvement should be considered in HSP patients with neurological manifestation.

The Safety and Feasibility of Remote Ischemic Postconditioning for Prevention of Vasospasm in Subarachnoid Hemorrhage – Phase I Clinical Trial
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Background and Aims: Despite great improvement during the past several decades, the management of vasospasm in aneurysmal subarachnoid hemorrhage (aSAH) is still far from satisfactory, which warrants adjunctive strategies. Remote ischemic preconditioning (RIPC) is an easy to use and noninvasive therapy using the endogenous mechanism. Although RIPC has been extensively investigated in animal models. It has not been fully evaluated in humans. We aimed to assess the safety and feasibility of RIPC for prevention in aSAH patients in acute clinical period.

Methods: The study population consisted of 41 RIPC patients and 43 matched controls, there was no significant intergroup difference in age, gender, aneurysmal location, clipping and coiling, fisher grades, and Hunt and Hess grades. 41 patients underwent 2 RIPC over 1 to 3 days after rupture of aneurysm. We collected the cerebrospinal fluid and blood samples at 1, 3, 5 and 7 days postoperatively to examine new biomarker. Primary points were the prevention of a symptomatic clinical vasospasm.

Results: 41 Patients were enrolled and underwent 246 RIPC sessions on 3 consecutive days postoperatively. 39 patients were completed successfully and two patients were discontinued due to pain of clamping site. No patients developed a deep vein thrombosis or injury to the preconditioned lower limb and most of patients well tolerated the clamping time of ischemia.

Conclusions: The RIPC procedure was well tolerated and did not cause any damage to the patients. RIPC warrants further investigation in a subsequent pivotal trial in many clinical settings.
The difference in the effect of STA-MCA bypass for intracranial arterial stenosis and occlusion.
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Background and Objective: This study aimed to investigate factors related to improvement of hemodynamics and evaluated the usefulness of intraoperative Doppler for predicting postoperative hemodynamics in patients with cerebrovascular atherosclerotic steno-occlusive disease (CASD) of the internal carotid artery (ICA) or middle cerebral artery (MCA) who were treated with extracranial–intracranial (EC–IC) bypass surgery, especially focused on the difference between arterial stenosis and occlusion.

Methods: Forty-eight patients with CASD of the ICA or MCA who were treated by superficial temporal artery to middle cerebral artery bypass with a follow-up longer than 12 months were enrolled. Repeated transient ischemic attack or completed ischemic stroke was observed under optimal medical therapy in all patients. Intraoperative blood flow velocity of the MCA was evaluated by a Doppler flowmeter. Cerebral blood flow and cerebrovascular reserve (CVR) were evaluated using N-isopropyl-[123I] p-iodoamphetamine (IMP) single photon emission computed tomography (SPECT) preoperatively and 3 months after surgery. Imaging and clinical data were retrospectively reviewed.

Results: Intracranial arterial stenosis were 3 cases (6%), and occlusion were 45 cases (94%). Totally CVR was significantly increased postoperatively (p = 0.03), but there were no significant differences between the two groups on the improvement of postoperative CVR (p=0.531). The change in MCA flow velocity just after anastomosis compared with pre-anastomosis proximal and distal of the anastomosis site was a median of 3.0 and 2.6 times, respectively. (Proximal side 154% vs 336%; p value =0.212, distal side 136% vs 279%; p value=0.268) 7 stenosis cases (16%) were with symptomatic hyper perfusion, a occlusion case (33%) was with symptomatic hyper perfusion (p value=0.429). Renal dysfunction was independent predictive factor affecting the improvement of vascular responsiveness in multivariate analysis (p value= 0.036), but there were no significant differences between both groups (p=0.203).

Conclusions: We concluded there were no significant differences between intracranial arterial stenosis and occlusion on STA-MCA bypass for atherosclerotic lesion.

Diurnal Temperature Range as a Risk Factor for Ischemic Stroke Severity in Summer
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Background and Objective: Temperature affects human health. It is widely known that mean ambient temperature with both short-term and cumulative lagged effect, is the exposure measure for ischemic stroke. Recently, not only mean temperature, larger diurnal temperature range (DTR, difference between high- and low-diurnal temperatures) was associated with coronary heart disease mortality and ischemic stroke hospitalizations. We hypothesized that a larger DTR results in environmental stress to the human cardiovascular system, thereby increasing the risk for acute ischemic stroke severity.

Methods: We used both time-series and case-crossover approaches to assess the relation between DTR and ischemic stroke severity between summer of 2016 and 2018 in Korea. Data were obtained from Korean Stroke Registry and Korean Meteorological Administration. We used exposures averaged over periods varying from 1 to 14 days to assess the effects of DTR on stroke severity. We estimated the relation between DTR and ischemic stroke severity after adjustment for classical stroke risk factor and weather conditions of stroke index day (daily mean temperature, relative humidity, and air pressure).

Results: A 9,249 patients were included in both time-series and case-crossover analyses. The results showed that DTR was significantly associated with stroke severity. The magnitude of this effect appeared to increase with increasing number of days of exposure averaging for most models, with the relative risk estimates stabilizing at about 3–4 days. A 5 °C increase of three-day moving average of DTR corresponded to a 1.67 (95% Confidential Interval, CI 1.64–1.70, p<0.001) and a 5°C increase of DTR of stroke onset day corresponded to a 1.09 (95% CI 1.07–1.12, p<0.001) increase of NIHSS with unidirectional case-crossover analysis after adjustment for classical stroke risk factor and meteorological factor.

Conclusions: The current study supported our hypothesis that diurnal temperature variation could be a new severity factor for acute ischemic stroke. Moreover, the two different methods we used provided relatively similar results, suggesting that the association between DTR and stroke severity was reasonably robust. Our data added additional evidence that exposure to large DTR was associated with increased burden of stroke. This findings would contribute public health program to prevent unstable thermal environments.

Septic Embolisms as a Complication of Infective Endocarditis on PET-CT
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Background: Septic embolisms in multiple organs can occur in a patient with infective endocarditis. However, it is difficult to identify the various complications including endocarditis and embolic infections that may occur at the same time in a patient with a prosthetic valve. Here, we report a patient with prosthetic valve endocarditis and neurologic complication revealed on 18F-FDG PET/CT as a one-stop shop.

Case Report: A 59-year-old male with a modified Bentall operation for aortic valve and mitral ring annuloplasty with modified MAZE operation 7 years previously presented with high fever and 4 consecutive blood cultures positive for Staphylococcus aureus. Despite a high clinical suspicion for endocarditis, echocardiography was unremarkable. Modified Duke criteria were not fulfilled. He showed decreased awareness suddenly, and initial brain CT and MRI demonstrated multifocal acute infarctions in both cerebral and both cerebellar hemispheres, acute SAH along both high frontal sulci, and small ICH in the left occipital lobe. Two weeks from initial MRI study, PET/CT revealed that high uptake was demonstrated around the prosthetic aortic valve and aortic root. Moreover, PET/CT showed high metabolic activity around the cerebral infarctions and low metabolic activity in the splenic infarction. Brain PET/CT showed reduced FDG uptake in the ischemic core, whereas increased FDG uptake in the peri-ischemic regions in the left frontal and occipital lobes.

Conclusion: This case showed that enhanced glucose metabolism on PET/CT could detect neuroinflammation at peri-infarct regions in the subacute stage of embolic stroke as well as complicated infection in prosthetic valve endocarditis missed on echocardiography.
Spontaneous Rapid Resolution of Acute Subdural Hematoma after Acute MCA Recanalization Therapy
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Background: Acute subdural hematoma is a neurological emergency that requires hematoma evacuation or close observation. However, spontaneous resolutions of acute subdural hematoma without surgical interventions have been reported rarely. We report on a case who showed rapid regression of hematoma expanded after cerebral angiography.

Case Report: A 66-year-old female patient presented with Left side hemiparesis with neglect 1hr ago. She had scalp laceration in Left parietal areas after falling down. Brain computed tomography revealed no definite hemorrhage and hyperdense right MCA sign was suspected in Brain CT. Tissue plasminogen activator (TPA) was administered per 0.6mg/kg. After 30min, Cerebral angiography was performed. During angiography, her mentality was decreased to stupor, we had obtained Brain CT to distinguish hemorrhagic transformation. Brain CT showed large subdural hematoma in left hemisphere. After stopping of TPA infusion, she was monitored with Neuro intensive care unit. After 3 hours, her mentality was recovered and Brain CT showed rapid resolution of Subdural hematoma. Rapid resolution of acute subdural hemorrhage resulting in neurological improvement is uncommon and several reports about that have been documented Rapid resolution of Subdural hematoma can be explained to effect in resolution of pressure effect after cerebral angiography, administration of TPA may be associated with Rapid resolution of subdural hematoma through rapid redistribution of hematoma into CSF flow.

Conclusion: We report unusual case of rapid resolution in acute subdural hematoma expanded after intravenous tissue plasminogen activator and cerebral angiography.

Risk Factors of In-hospital Stroke: A Single-Center Study
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Background and Objectives: A significant proportion of strokes occur in patients already in hospital. Even though there is an advantage that quick managements could be taken, however, delays in recognition and assessment are common. Therefore, we aimed at hospital-based evaluation to assess possible factors related to in-hospital stroke.

Methods: We retrospectively assessed 247 patients who initially suspected to have suffered a stroke in-hospital setting at Seoul National University Hospital between May 21, 2015 and May 28, 2018. Patient characteristics, comorbid illnesses, medications, stroke mechanisms, and outcomes were analyzed for patients who have a final diagnosis of stroke or transient ischemic attack (TIA). We also investigated patients who have a diagnosis of non-stroke.

Results: A total of 224 patients were included in the analysis. 130 patients had true stroke and 94 patients are stroke-mimics. All patients developed symptoms in the hospital and were admitted for other medical or surgical disorders. In a multivariate analysis to predict true acute stroke in-hospital, four risk factors independently predicted stroke in patients who admitted for other diagnosis or procedure: Unilateral weakness (OR, 1.196, 95% CI: 1.160–1.266), previous history of stroke (OR, 1.126, 95% CI: 1.083–1.189), atrial Fibrillation (OR, 2.472, 95% CI: 1.255–1.529) and elevated-D dimer level (OR, 1.367, 95% CI: 1.041–1.689).

Conclusion: Four risk factors independently predicted stroke in patients who admitted for other diagnosis or procedure: Unilateral weakness (OR, 1.196, 95% CI: 1.160–1.266), previous history of stroke (OR, 1.126, 95% CI: 1.083–1.189), atrial Fibrillation (OR, 2.472, 95% CI: 1.255–1.529) and elevated-D dimer level (OR, 1.367, 95% CI: 1.041–1.689).

Risk of Epilepsy in Elderly Stroke Patients
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Background and Objective: The incidence of epilepsy in elderly stroke patients has been significant attention because planning future needs for health services and improved primary and secondary prevention of stroke are important. We evaluated the relationship between stroke and the subsequent development of epilepsy within 10 years follow-up.

Methods: This retrospective, nationwide, longitudinal study used National Health Insurance Service –Senior cohort (NHIS-Senior) 2002-2013, which was released by the KNHIS in 2016, comprising 550,000 random subjects who were selected from over than 60 years old. This study included a cohort of 42,925 patients who were first diagnoses as stroke between 2004 and 2006. To match each stroke patient, 218,478 control subjects were selected from the data-base.

Results: In this cohort, the prevalence of stroke was higher in female (62%) than in male(38%). A higher prevalence of stroke was observed in the 60-70 years age and more than 80 years age group in urban area. The incidence of stroke was increased from 2002 to 2009, but decreased from 2010 to 2013. The diagnosis of epilepsy was done at averagely 20 months after the diagnosis of stroke. Cox regression analysis showed that the HR of epilepsy was 7.658 times greater for patients with stroke (95% CI: 7.402-7.923) than for control group after adjusting for other risk factors. The HR of epilepsy was 1.08 (95% CI: 1.045-1.116) in female patients, 1.66(95% CI: 1.607-1.715) in diabetic patients, 1.679(95% CI: 1.625-1.734) in hypertensive patients, 1.831(95% CI: 1.626-2.062) in chronic kidney disease and 1.647(95% CI: 1.593-1.703) in hypercholesterol patients.

Conclusion: Our findings suggest that stroke may be independent risk factor for epilepsy in elderly patients (HR 7.658, 95% CI: 7.402-7.923). So we need to control and pay attention to epilepsy in elderly stroke patients.

Long-Term Outcomes of Real-World Korean Patients with Atrial Fibrillation–Related Stroke and Severely Decreased Ejection Fraction
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Background: The clinical implications of echocardiographic findings for long-term outcomes in atrial fibrillation (AF)-related stroke patients are unknown.

Methods: This was a sub-study of K-ATTENTION (Korean ATrial fibrillaTion Evaluation® registTreY in Ischemic stroKe patieNts), a multicenter-based cohort composed of prospective stroke registries from 11 tertiary centers. Stroke survivors who underwent transthoracic two-dimensional echocardiography during hospitalization were enrolled. Echocardiographic markers included LV ejection fraction (LVEF), left atrial (LA) diameter and peak transmural filling velocity/mean mitral annular velocity during early diastole (E/e’ ratio). LVEF was grouped as normal (≥55%) or mildly (>40%, ≤55%) or severely (≤40%) decreased. The E/e’ ratio associated with LV filling pressure was divided into normal (<8), borderline (8–15), and elevated (≥15). Kaplan–Meier and Cox regression analyses for recurrent stroke, major adverse cardiac events, and all-cause death were performed.

Results: A total of 1,947 patients were finally included. Over a median follow-up of 1.65 (interquartile range [IQR] 0.42-2.87) years, the rate of recurrent stroke, major adverse cardiac events, and all-cause death was 35.1, 10.8, and 69.6 cases per 1000 person-years, respectively. Multivariable analyses demonstrated that severely decreased LVEF was associated with a higher risk of major adverse cardiac events (hazard ratio [HR], 3.91; 95% confidence interval [CI], 1.58–9.69) and all-cause death (HR, 1.95; 95% CI, 1.23–3.10). Recurrent stroke might be associated with lower LVEF in multivariable fractional polynomial plot.

Conclusion: Severely decreased LV systolic dysfunction could be a determinant of long-term outcomes in AF-related stroke.

Low Dose Thrombotic Therapy in the Eldest Filipino at 96 years old: A Case Report
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Background and Objectives: Thrombotic therapy using intravenous tPA (Tissue Plasminogen Activator) or alteplase is the standard treatment in acute ischemic stroke. However, elderly patients have mostly been excluded from acute revascularization studies, due predominantly to their overall poor prognosis and the fear of hemorrhagic complications from these treatment. Traditionally, East Asian population have had higher prevalence of hemorrhage compared to Western population. The concern for the hemorrhagic transformation in Asian populations lead to use of low-dose alteplase (0.6mg/kg) instead of the standard dose of thrombolyis at 0.9mg/kg alteplase. Series of trials in Japan showed feasibility and efficacy of low dose thrombolysis that was soon practiced in other Asian countries. Stroke risk increases exponentially with increasing age and to date, there is a low rate of thrombolysis among the extremely old patients (>85 years old) with ischemic stroke hence this population is usually receiving suboptimal acute therapy and management.

Case Report: This case presents a Filipino nonagenarian at 96 years of age with hypertension and permanent atrial fibrillation, with a baseline functional capacity of dependent on most activities of daily living, modified Rankin Scale of 4, had a right middle cerebral territory ischemic stroke, with a total National Institutes of Health Stroke Scale (NIHSS) of 19. Patient received thrombolytics, and had significant improvement of neurologic status without adverse outcomes.

Conclusion: This showcases that carefully selected patients who meet eligibility criteria for thrombolysis should not be denied this therapy on the basis of age alone and that benefits outweighs the risks. A low-dose alteplase can be an effective safe and effective thrombolytic strategy in the extreme elderly population. This event presents valid considerations to individualize therapeutic options by pushing to the limits of a conventional therapy as there are no definitive age-specific local data for this standard of care for ischemic stroke.

The Effect of Insomnia on Stroke Severity in Acute Ischemic Stroke Patients in of Dr. Moewardi Hospital Surakarta Indonesia
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Background: Insomnia is a common problem for stroke patients. It shows poor stroke recovery measured by functional independence score. This study aimed to investigate the effect of insomnia on ischemic stroke severity.

Methods: A cross-sectional study was conducted at Dr. Moewardi Hospital, Surakarta, Indonesia from March to June 2019. The study subjects were acute ischemic stroke patients. Insomnia was assessed using the Insomnia Severity Index (ISI) while stroke severity was assessed using the Barthel index. The data were analyzed statistically using linear regression analysis.

Results: A total of 112 acute ischemic stroke patients, consist of 63 (56.25%) males and 49 (43.75%) females. Insomnia was found in 58 (51.78%) patients, with a majority in mild insomnia found in 31 (35.45%) patients who have mild dependency 30 (51.72%) based on Barthel index score. Linear regression analysis obtained a correlation of coefficient 0.782, determination of coefficient 0.612, regression of coefficient 0.469 with p = 0.000.

Conclusion: Insomnia significantly affects the severity of acute ischemic stroke. The increased ISI score of 0.01 reduces the Barthel index scores by 0.469.

Leucocyte Count and Differentiate Count Profile in Ischemic and Hemorrhage Stroke Patients in Palu General Hospital
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Background and Aims: Stroke is a clinical manifestation of cerebrovascular disturbance that could cause necrosis of brain cell. Leucocyte founded in the brain parenchyma as a response of brain injury both in ischemic and hemorrhagic stroke. The aim of this study is to identify leucocyte count and leucocyte differentiate count (neutrophil, lymphocyte, and monocyte) in ischemic and hemorrhagic stroke patients at Palu General Hospital.
Method: This study is descriptive with data from Palu General Hospital laboratory.

Results: We obtained 62 samples of patients with 23 hemorrhagic and 39 ischemic strokes. Mean leucocyte count in hemorrhage stroke was 14,808/µL. In ischemic stroke we found mean leucocyte count was 11,761/µL. Increased leucocyte count in hemorrhage stroke patients was 43.5% and in ischemic stroke was 38.5%. Whereas for leucocyte differentiate count we found that increased neutrophil in hemorrhagic stroke was 26.1%, decreased 4.3% and normal 69.6% with mean 30.8. Increased neutrophil count in ischemic stroke was 23.1%, and normal 76.9% with mean 31.91. Increased lymphocyte count in hemorrhagic stroke was 0%, decreased 47.8% and normal 52.2% with mean 17.94, increased lymphocyte count in ischemic stroke was 2.6%, decreased 53.8% and normal 43.6% with mean 17.4. Increased monocyte count in hemorrhagic stroke was 13.0%, decreased 13% and normal 73.9% with mean 6.51. Increased monocyte count in ischemic stroke was 17.9%, decreased 23.1% and normal 59% with mean 20.3.

Conclusion: Changing of leucocyte count more found in hemorrhagic stroke patient and increased leucocyte count (neutrophil) in hemorrhagic stroke patients, whereas lymphocyte and monocyte in ischemic stroke patients.

Bilateral Thalamic Infarction in a 51-Year-Old Female Presenting with Doubling of Vision
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Background and Case Report: Bilateral thalamic infarction is a rare cerebral vascular disease. This condition usually results from obstruction of a rare variant of arterial supply that supplies both thalami. The most common findings are acute impairment in consciousness, vertical gaze paresis, and cognitive disturbances. In this paper, we discuss a case of bilateral thalamic infarction with dizziness, impaired awareness, and impaired upward gaze.

Association of Body Temperature Fluctuations with Outcome in Acute Ischemic Stroke
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Background and Objective: In acute ischemic stroke, an increase in body temperature is associated with poor prognosis. We sought to evaluate body temperature fluctuations on outcome after ischemic stroke. The aim of this study is to determine the relationship of body temperature fluctuations on outcome after ischemic stroke.

Methods: This study used a cross-sectional design in acute ischemic stroke patients treated in a stroke corner room where head CT scans and body temperature were examined in first 24 hours assessed in relation to outcome based on the National Institutes of Health Stroke Scale Score (NIHSS) in Haji Adam Malik General Hospital, Medan. To analyze data on the relationship of body temperature fluctuations on outcome after ischemic stroke are using the Spearman test.

Results: This study involved 62 ischemic stroke patients that consisted of 37 males (59.7%) and 25 females (40.3%). The median age of subject was 59 (42-72) years. The results of the statistical analysis showed a significant correlation between body temperature fluctuations with outcome after ischemic stroke (p = 0.001).

Conclusion: Body temperature fluctuations was significantly correlated with outcome after ischemic stroke.

A Case of a Nine Syndrome with a DWI-Negative Imaging
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Background: The brainstem contains important structures and nuclei that give an array of clinical manifestations in neuropathic processes that mostly involve the gaze circuit. One-and-a-half syndrome and its spectrum of disorders were reviewed and here, we report a case of “Nine Syndrome” in an adult male who was admitted in our institution five hours post-ictus with no acute findings on DWI imaging. The exact prevalence of Nine Syndrome has been accounted to only four cases reported in the literature, and noted to be due to a pontine tegmentum lesion.

Case Report: Our patient is a 65-year-old hypertensive, who presented with an ipsilateral gaze palsy, internuclear opthalmoplegia, a lower motor neuron type of facial palsy, and a contralateral hemiparesis. Using a 1.5T MR cranial scanner and Philips scanner of the time-of-flight (MRA) of the intracranial vessels, there was no evidence of acute territorial infarct but an old lacunar infarct in the right pontine area. Both the anterior and posterior circulations are within normal course and caliber with no focal dilatation or narrowing seen. Patient was started on dual anti-platelet, high dose statin, and started on anti-hypertensives on the fourth hospital day.

Conclusion: Nine syndrome is a rare case, and its diagnosis rely on its clinical manifestations, neuroanatomy, and diagnostic imaging. An acute posterior ischemic infarct such as this may yield a negative DWI finding but should not impede us, the clinicians, in its early recognition and management.

Characteristics of Intracranial Stenosis in Dr. Moewardi Hospital Surakarta Indonesia 2013-2018
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Background and Objective: Intracranial stenosis is the leading causes for high incidence of recurrent strokes. Cerebral DSA is the gold standard for examining patients with cerebrovascular disorders. The objective of this study is to investigate the association of intracranial stenosis with demographic factors.

Methods: Descriptive analytical study was conducted in Dr. Moewardi hospital in patients with non-hemorrhagic strokes undergoing cerebral DSA procedure. The data were from medical record of patients between June 2103 and December 2018. Chi square test was used to assess the relationship between demographic factors and the incidence of intracranial stenosis.

Results: A total of 327 non-hemorrhagic stroke patients, 229 patients had intracranial stenosis with characteristics: age (n = 61.2 years), male (65%), and risk factors> 2 (40%), hypertension (25%), diabetes mellitus (15%) , dyslipidemia (9%), coronary heart disease (6%), obesity (3%), and smoking (2%). Most stenosis was found in MCA (29.3%). Risk factors were associated with the incidence of intracranial stenosis (p value <0.019)

Conclusion: Risk factors are significantly associated with intracranial stenosis. Therefore, they should be targeted in preventive therapy.
Analysis of Risk Factors for the Development of Unprovoked Seizure among Post-Stroke Patients Admitted in Maria Reyna – Xavier University Hospital from 2016 to 2018: A Retrospective Cohort Study

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Background and Objective: Stroke is the most common cause of seizure in adult population, and is associated with poor outcome among post-stroke patients. This study aimed to determine the clinical risk factors in developing seizure after a stroke.

Methods: We retrospectively identified post-stroke patients admitted from year 2016 to 2018. Each patient who had post-stroke seizure (PSS) were compared to two post-stroke patients without seizure, matched according to age, sex, and type and location of stroke. Variables evaluated were cortical involvement, stroke recurrence, and size of stroke. Differences in these variables were analyzed using univariate regression test.

Results: A total of 412 charts were reviewed, wherein 8% had post-stroke seizure and were included in the analysis. Majority (57.6%) had late onset seizure. Seizure was more common among those with involvement of cortical area (p=0.000017). Furthermore, involvement of frontal or temporal cortex was more common among those who develop PSS than those who did not, with p value of 0.138 and 0.96, respectively. For every recurrence of stroke, the risk for developing seizure increases by 27.8% (p=0.009). In addition, large stroke size increases the risk by 40.7% (p=0.001).

Conclusion: Cortical involvement and large stroke size significantly increase the risk in developing seizure among post-stroke patients. Post-stroke patients are also at greater risk to develop seizure with every episode of stroke recurrence. Hence, therapies targeted for prevention of stroke recurrence is of great importance in the management of stroke survivors. Prospective study, with larger sample size, may be done to demonstrate significance of secondary stroke prevention.

Knowledge Level of Nurse in Palu General Hospital about Management of Stroke

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Background and Aim: Stroke is the second mortality rate in global and Europe. From 56 million death per year worldwide, 10.8% caused by stroke, 85% death by stroke in developing country. Nurses have an important role in the management of stroke in every stage and responsible in coordination of stroke nursing that affected the outcome. Therefore, the need for nurses who have a level of knowledge and skills in stroke management is categorized as good or very good. The aim of this study is to increase nurse’s knowledge in Palu General Hospital about the management of stroke.

Methods: This study was categorical descriptive with cross-sectional approach from December 2018 – January 2019.

Results: We obtained 176 nurses from Palu General Hospital and the general knowledge about management of stroke that categorized very good was 124 (70.5%), good was 45 nurses (25.5%), sufficient was 7 (4%). Specific knowledge management about communication disturbance with the highest percentage was very good with 143 subjects (81.3%) and the lowest was about cerebral perfusion management was 11 subjects (6.3%).

Conclusion: The level of knowledge between nurses in the management of stroke mostly sufficient categorized but still founded less or very less knowledge about cerebral perfusion, increased intracranial pressure, and airway stabilization.

A Case of Mechanical Thrombectomy in Pregnant Stroke Patient

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Background: Intravenous thrombolysis(IVT) and mechanical thrombectomy(MT) are approved treatments for hyperacute ischemic stroke. However, pregnant women were not included in the clinical trials and only several cases have been reported. Therefore, the effectiveness and safety of IVT and MT in these patients remains unclear. Here, we describe a rare case of a patient in the second-trimester, who underwent MT.

Case Report: A 30-year-old woman, in the 25th gestational week of her first pregnancy, visited the emergency room due to sudden left hemiparesis and drowsiness which developed 2 and a half hour ago. Initial MR scans showed acute ischemic lesions in right insular and frontal cortex on diffusion-weighted images and total occlusion of right petrous ICA without any collateral flow. Because of potential risks of recombinant tissue-plasminogen activator, we tried MT alone, using stent retriever and right ICA and MCA were successfully recanalized(TICI IIb) without hemorrhagic conversion. Her body was shielded by radiation protector during the procedure, and the amount of radiation exposure during MT was 647 mGy. She discharged without any serious sequelae and delivered healthy baby with Cesarean section at 38 weeks of gestation.

Conclusion: Radiation exposure during pregnancy should be minimized during pregnancy, and it is still uncertain whether MT alone or combination of MT and IVT is better treatment option in this situation. Our case added some evidence for the feasibility and safety of MT in pregnancy even though caution should be taken for the generalization.

The Role of Glycemic Profile in Predicting Infarct Volume in Acute Ischemic Stroke Patients in Dr. Moewardi Hospital Surakarta Indonesia

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Background and Objective: Hyperglycemia can affect clinical severity and ischemic damage in the brain. This condition is also common in acute stroke patients with the incidence of 20-50%. The objective of this study is to investigate the role of glycemic profiles in predicting infarct volume in acute stroke ischemic patients treated in Dr. Moewardi Hospital Surakarta, Indonesia.

Method: This cross-sectional-observational study with purposive sampling technique was conducted in March to June 2019. The research subjects were acute ischemic stroke patients. The infarct volume was calculated based on the largest diameter shown in the CT scan. The glycemic profiles examined were Random Blood Glucose (RBG), Fasting Blood Glucose (FBG), 2-Hours Postprandial Blood Glucose (2HPBG) and Glycated Hemoglobin (HbA1C). The statistical analysis applied linear regression and p<0.05 was considered significant.

Results: There were 113 subjects, with the mean infarct volume, RBG, 2HPBG, FBG and HbA1C of 1.67 cm³, 156.05 mg/dL, 126.3
mg/dL, 111.67 mg/dL and 6.13%, respectively. Multivariate analysis obtained that infarct volume was significantly related to RBG (p = 0.004) and HbA1C (p = 0.000). The cut off value of RBG 111.5 mg/dL had a sensitivity of 71% and a specificity of 68% in predicting infarct volume (OR = 3.789, 95% CI = 1.728 - 8.309, p = 0.001). The cut off value of HbA1C 5.65% had a sensitivity of 75.8% and a specificity of 80.4% in predicting infarct volume (OR = 12.847, 95% CI = 5.207 - 31.697, p = 0.000).

Conclusion: Random blood glucose and HbA1C are significantly correlated to infarct volume; the cut off values of RBG 111.5 mg/dL and HbA1C 5.65% can predict the infarct volume.

Association of Serum Albumin Level to the Severity of Acute Ischemic Stroke Patients

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Background: Serum albumin is a multifunctional protein offers neuroprotective effect. In acute ischemic stroke, lower level albumin may worsen the functional status. This study aims to determine the association between serum albumin level with the severity of acute ischemic stroke patients in General Adam Malik Hospital, Medan, Indonesia.

Methods: This study used a cross-sectional design, in patients with acute ischemic stroke who were treated at stroke corner and inpatient neurology room. Ischemic stroke was confirmed by computerized tomographic. Serum albumin level of all patients were collected and analyzed on admission and stroke severity was assessed based on the National Institutes of Health Stroke Scale (NIHSS) on admission.

Results: This study involved 33 acute ischemic stroke patients consisting of 19 males (54.5%) and 14 females (42.4%) with the characteristics of respondents average age is 57.51 ± 9.19 standard deviation of serum albumin level is 0.4 (2.2-4.1). Based on the Spearman test obtained there was a negative correlation between serum albumin level and NIHSS score (r = -0.440, p = 0.001).

Conclusions: There is a significant relationship between serum albumin level and severity in acute ischemic stroke patients.

Prehospital Statin Use and its Outcome in Patients with Nontraumatic Intracerebral Hemorrhage

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Background and Objectives: The use of statins may be associated with improved outcome for patients with intracerebral hemorrhage, but remains controversial. We examined the effects of statins on their outcome in nontraumatic intracerebral hemorrhage patients admitted to our facility.

Methods: We analyzed 201 patients with cerebral hemorrhage who were admitted to our hospital between 2011 and 2017, and analyzed the relationship between the use of statins and NIHSS at admission, mortality, and mRS at discharge.

Results: Of the 201 enrolled patients (mean age, 73 years, 44% women), prehospital statin use was identified in 29 patients (mean age 78 years, 45% women). Mortality at discharge was 13.8% in the statin group and 5.2% in the non-statin group. The average hospital admission NIHSS was 11 for the statin group and 12 for the non-statin group. In addition, the rate of 0-2 good outcome at discharge mRS was 13.8% in the statin group and 20.9% in the non-administered group.

Conclusions: The use of prehospital statins had no positive impact on mortality, hospitalization severity, or discharge outcomes.

Aortic Dissection and Hyperacute Stroke in the Advent of IV Thrombolysis

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Background: Acute aortic dissection is a life-threatening medical emergency that can be catastrophic if not detected early. Stroke is one of the uncommon presentations up to 5-10% of patients. We present a case report to highlight the importance of recognising aortic dissection in selecting candidates for thrombolysis therapy.

Case Report: A 46 years old gentleman with no known past medical history, presented to emergency department of our centre with non-vertiginous giddiness. At triage, he had sudden onset right sided weakness with slurring of speech. On examination, his NIHSS was 5, he had right hemiparesis. There were no other neurological deficits such as dysphasia or hemianopia. Non-contrast CT scan of the brain was performed, followed by CT angiography. Non-contrast CT brain did not reveal any intracranial hemorrhage, with good ASPECT score of 10. CT angiography showed Stanford type A aortic dissection involving the ascending aorta and aortic arch, with dissection flap extending to common trunk and into bilateral common carotid arteries. Acute dissection is a medical emergency with a high mortality rate. It is one of absolute contraindications of IV thrombolysis in ASA 2018 guideline. IV thrombolysis may increase the risk of aortic rupture. However, in view of narrow therapeutic window of IV thrombolysis, aortic dissection may be missed in this group of patients. In our patient, aortic dissection was found upon CT angiography as part of workup for consideration for endovascular thrombectomy.

Conclusion: Careful selection of patients for IV thrombolysis is required to prevent potential life-threatening complications especially in aortic dissection.

A New Rodent Model of Cnm-positive Streptococcus mutans Associated Spontaneous Intracerebral Hemorrhage

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Background and Objectives: Hypertension is the well-established risk factor for spontaneous intracerebral hemorrhage (sICH). In the previous studies, we reported the relationship between Streptococcus mutans expressing collagen-binding protein, Cnm, (Cnm-positive S. mutans) and sICH. However, the interaction between hypertension and Cnm-positive S. mutans on sICH remains unknown even now. In this study, we aimed to establish rodent model of Cnm-positive S. mutans associated sICH and investigate the effects of salt diet and intravenous administration of Cnm-positive S. mutans in the exacerbation of sICH using stroke-prone spontaneously hypertensive rats (SP-SHRs).

Methods: We used adult male SP-SHRs/Izm (10 weeks of age), which were divided into four groups (each group, n=8) depending on a salt diet or normal diet and injections of clinically isolated Cnm-positive S. mutans (strain TW295) or its Cnm-defective isogenic mutant (strain TW295CND) via tail vain. We evaluated the time course of body weight, blood pressure, and neurological deficit score. At 15 weeks, rats were sacrificed for further assessment for ICH, area (%) of macroscopic ICH in coronal sections, the number of microscopic acute ICH using H&E staining and chronic ICH using Berlin-Blue staining.

Results: There was significantly increased blood pressure in SP-SHRs with salt diet compared with those with normal diet, whereas
there were no significant differences in body weights or neurological deficit score among four groups. In TW295-treated SP-SHRs with salt diet, the area (%) of macroscopic ICH and total number of microscopic acute ICH was significantly higher than any other groups. Chronic microscopic ICH on Berlin-Blue staining was not detected in all groups. Consistently, salt diet and Cnm-positive S. mutans were tended to be synergistically associated with severity of ICH.

Conclusion: Our results suggest that both hypertension due to salt intake and Cnm-positive S. mutans could exacerbate ICH in middle aged SP-SHRs.

Effect of Alteplase vs Aspirin on Functional Outcome for Patients with Acute Ischemic Stroke
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Background and Aim: Although intravenous thrombolysis with alteplase is the approved treatment for patients with acute ischemic stroke, which must be administered within a short time window to appropriate patients to optimize its therapeutic efficacy. The purpose of this study was to assess the effect of alteplase vs aspirin on function outcome for patients with acute ischemic stroke within 24 hours onset.

Methods: This study was a hospital based cross-sectional study conducted on the 124 ischemic stroke patients within 24 hours from onset who were admitted to Department of Neurology, Yangon General Hospital from December 2017 to August 2018. After exclusion criteria, intravenous rtPA (Actilyse) 0.9 mg/kg was given in patients within 3 to 4.5 hours from onset. For patients not eligible rtPA, who were treated with aspirin 325 mg on admission. Both groups were admitted to stroke unit, and aspirin 75 mg once per day was given. Functional outcome was assessed by using modified Rankin Scale (mRS) at discharge, 1 month and 3 months after onset, as favorable outcome (mRS 0 or 1) or as poor outcome (mRS 2 to 6).

Results: Among 124 patients enrolled (51 alteplase vs 73 aspirin) (meanage,59 [SD,12]years; 78 [63%] mean NIHSS score of 11.64 in rtPA group and 14.06 in aspirin group; mean time to treatment, 1.5 hours, 122 (98.3%) completed the trial. At 90 days, 43 patients (84.3%) in the alteplase group vs 44 (60.3%) in the aspirin group achieved a favorable outcome (adjusted OR, 3.67; 95% CI1.27-9.89). Eight alteplase-treated patients (15.7%) vs 29 aspirin-treated patients (39.7%) had poor outcome.

Conclusion: This is the first study in Myanmar to assess the potential benefits of different stroke interventions on acute ischemic stroke patients. In this study, patients with acute ischemic stroke benefited from treatment with intravenous alteplase administered 3.5 hours after the onset of stroke symptoms as compared with aspirin. The treatment effect remained significant after adjustment for all prognostic baseline characteristics. These findings are consistent with results from other randomized, controlled trials of thrombolysis in patients with acute ischemic stroke. The initial severity of a stroke is a strong predictor of the functional and neurologic outcome and of the risk of death.

Association of Serum Calcium Level with Infarct Volumes in Acute Ischemic Stroke
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Background and Objective: In ischemic stroke, an increase in excessive accumulation of serum calcium triggers a cascade of cytotoxic events leading to activation of enzymes involved in cell death. The objective of this study is to determine the relationship of serum calcium levels with infarct volume in acute ischemic stroke.

Methods: This study used a cross-sectional design in acute ischemic stroke patients treated at stroke corner and inpatient neurology room. Ischemic stroke was confirmed by computerized tomographic. Serum calcium level of all patients were collected and analyzed on admission and then the infarct volume were counted. The data analyzed using the Spearman test.

Results: This study involved 33 ischemic stroke patients that consisted of 16 males (48.5%) and 17 females (51.5%). The mean age of subject was 58.45±7.85 years with the most age group being 56-65 years were 17 people (51.5%). The mean serum calcium of subject was 8.32±2.58 and the mean infarct of subject was 44.09±62.04. Based on the sparmen test obtain there was a negative correlation between serum calcium with infarct volume (p=0.005, r =-0.476).

Conclusion: There is a significant relationship between serum calcium level and volume infarct.

Exploring the Neural Mechanism of Motor Imagery Training in Subcortical Stroke Patients by Resting-State Functional Connectivity Analysis
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Background and Objectives: Motor imagery training (MIT) is a noninvasive treatment technique involving repetitive cognitive rehearsal of physical action without actual output. Although MIT has been widely used to facilitate motor recovery in stroke patients, little is known about its neural mechanism. The aim of this study was to investigate the reorganization of brain networks after MIT with resting-state fMRI (rs-fMRI).

Methods: A total of 34 chronic hemiplegic subjects with subcortical stroke were recruited and randomly allocated to either the conventional rehabilitation therapy (CRT) or the CRT+MIT. The upper limb section of Fugl–Meyer assessment Scale (FM-UL) and rs-fMRI were assessed in all subjects before and after the 4-week treatment. Functional connectivity (FC) of the ipsilesional primary motor cortex (M1) were calculated to investigate the relationships between the motor recovery and the plasticity of motor networks before and after the treatment.

Results: The patients in the MIT group showed more improvement in the FM-UL scores compared with the CRT group. Both groups presented increased inter-hemispheric and decreased intra-hemispheric FC of the ipsilesional M1 after intervention, corresponding to the shared neural response after intervention. Moreover, the MIT group demonstrated a significant increase of FC between the ipsilesional M1 and ipsilesional postcentral gyrus, middle cingulate gyrus and supramarginal gyrus, while the CRT group showed a significant decrease in all these areas.

Conclusion: MIT might contribute to the motor recovery in subcortical stroke patients through the reorganization of intrinsic FC involving wide brain areas in both hemispheres, especially the ipsilesional brain areas related to motor imagery and learning.

Recurrent Stroke in the Young: A Case Report
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Background: Stroke in individuals less than 45 years of age is not uncommon but poses a great economic and emotional burden to society. Though uncommon, recurrent stroke in the young can present as a disabling disease which can cause permanent incapacity to the patient.

Case Report: We present a case of a 31-year-old Filipino male with a 3-month history of intermittent right upper arm numbness which
Sex differences in clinical characteristics and outcomes among older ischemic stroke patients in Eastern China: results from the Nanjing First Hospital Stroke Registry

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Background and Aim: Few studies reported sex differences in clinical characteristics and prognostic outcomes among older stroke patient. The aim of our study was to investigate sex differences in clinical characteristics and outcomes among older patients with acute ischemic stroke (AIS) using data from Nanjing First Hospital Stroke Registry.

Methods: Of 2073 AIS patients over 50 years of age and being recruited between the years 2004-2008, 1893 patients with 1-year follow-up data were included in the present analyses. Baseline patient characteristics between males and females were compared using Wilcoxon or Chi-square test. Crude and multivariable logistic regressions were also performed to assess sex differences in 1-year outcome among older AIS patients.

Results: We found that female patients were generally older (70±10 vs. 69±9, P=0.016), had higher level of random blood glucose (7.6±4.5 vs. 7.1±4.6, P=0.002) and admission cholesterol (4.9±1.2 vs. 4.5±1.1, P<0.001). Males also presented with less severe stroke as indicated by the NIHSS score [4(2-9)] vs. 5(2-10.5), P=0.007]. Although crude analyses showed that females were more likely to have poor outcomes at 12 months than males (OR: 1.38; 95% CI: 1.15-1.66), the association was no longer significant (adjusted OR: 1.30; 95% CI: 0.98-1.74) after adjusting for potential confounders.

Conclusions: Our study revealed there are significant differences in clinical characteristics between older male and female AIS patients in Eastern China. However, sex did not significantly affect death or dependency at 1-year follow-up.

Acute Ischemic Stroke Successfully Treated with Thrombolytic Therapy and Endovascular Thrombectomy with NCCT and CTA protocol

Tsun-Haw TOH, Khairul Azmi ABDUL KADIR, Mei-Ling Sharon TAI, Kay-Sin TAN

Division of Neurology, Faculty of Medicine, University of Malaya, Kuala Lumpur, Malaysia

Background: Early endovascular thrombectomy leads to improved outcomes for patients with proximal occlusions when started within 6 hours from onset of symptoms.

Case Report: We present a case illustrating the flow of events for a patient who underwent endovascular thrombectomy in our centre after conventional imaging - a brain non contrast CT (NCCT) and CT angiogram (CTA), achieving a door-to-groin time of 195 minutes. The patient is a 65-year-old who presented with signs and symptoms of a right middle cerebral artery (MCA) territory infarct. His NIHSS score was 15 on presentation and his brain NCCT showed an ASPECTS of 8. A CTA showed no flow after distal M1 of the left MCA and a focal area of proximal left internal carotid artery (ICA) calcification and stenosis. He was subsequently thrombolysed and underwent thrombectomy successfully, with a door-to-groin-puncture time of 195 minutes. A TICI 2b reperfusion was achieved. His NIHSS score improved to 9 over the next 2 days.

Conclusion: For cases with straightforward NCCT and CTA with no contraindications, endovascular thrombectomy should be pursued without delay. A review of current available literature for the usage of NCCT, CTA and also the importance of ASPECTS scoring in patient selection for EVT was included.

Safety and Efficacy of Early Antiplatelet Therapy in Acute Ischemic Stroke Patients Receiving Endovascular Treatment: A Systematic Review and Meta-analysis.

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Background: Endovascular treatment (ET) has been proved as safety and effective in acute ischemic stroke. However, early recanalisation is an inevitable complication following ET. There is uncertainty effect of early antiplatelet therapy on outcomes in patients with acute ischemic stroke undergoing endovascular treatment.

Methods: We searched major databases for articles published from 2011 to 2019 in the present study. Safety outcomes were any intracranial hemorrhage (ICH), symptomatic intracranial hemorrhage (sICH) and mortality. Efficacy outcomes were recanalization rate and follow-up functional outcome. Review Manager 5.3 and Stata Software Package 14.0 were used to perform the meta-analysis.

Results: Seven studies with a total of 1251 patients were included. A total of 451 (36.1%) patients were administrated by antiplatelet agent following ET. Meta-analysis suggested that early antiplatelet did not increase the risk for ICH (OR 1.15; 95% CI 0.56–2.37; P =0.70), sICH (OR 1.29; 95% CI 0.79–2.09; P = 0.31) and mortality (OR 0.71; 95% CI 0.45–1.12; P = 0.14). There was no association between antiplatelet therapy and recanalization rate (OR 1.03; 95% CI 0.73–1.46; P =0.30) or functional outcome (OR 0.97; 95% CI 0.55–1.69; P =0.90). Sensitivity analysis indicated tirofiban did not associated with any ICH and mortality, nor improve the recanalization rate and functional outcome in patients receiving ET or mechanical thrombectomy (all P>0.05).

Conclusions: Early antiplatelet therapy may be safe in acute ischemic stroke patients, further studies are needed to confirm the efficacy.

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Factors Associated with Hemorrhagic Stroke in Indonesia: An Observational Study Based on National Health Insurance Database

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Background and Aim: Stroke is the leading cause of death and disability around the world. In Indonesia, it remains one of the most common noncommunicable diseases. This study aimed to identify the profile of hemorrhagic stroke and its associated risk factors based on the real-world data from National Health Insurance Database of Indonesia (Jaminan Kesehatan Nasional – JKN).

Methods: We conducted a population-based study using data retrieved from JKN Indonesia. Data comprised of randomly selected 911,101 patients who utilized the service in all types of hospitals in Indonesia from 2015 – 2016. We retrieved patient aged >30 years who had primary diagnosis in any types of stroke. We classified them into two groups: ischemic stroke and hemorrhagic stroke. The influence of Independent variables, i.e. age, sex, marital status, membership category, enrollment group, hospital class, region, severity level, prognosis, and comorbidity, were analyzed. We used Cox proportional hazard models to calculate the hazard ratio of hemorrhagic stroke and logistic regressions model to analyze the odds ratio (OR) of the covariates.

Results: From 7180 stroke patients, we found 5728 patients (79.71%) with ischemic stroke and 1458 patients (20.29%) with hemorrhagic stroke. Surprisingly, a higher percentage of hemorrhagic stroke (22.43%; p < 0.0001) were observed among younger age patient of 31-50 years. The hazard ratio of death from hemorrhagic stroke is twice as much than ischemic stroke (HR 2.075; 95% CI 2.03-2.12; p < 0.0001). According to enrollment group of the insurance system, nonsalaried workers were 24.6% less likely to have a hemorrhagic stroke compared with the subsidized group of patients (aOR 0.754; 95% CI 0.72 – 0.79; p < 0.0001).

Conclusion: Our study supports the evidences that the hemorrhagic stroke was associated with poor outcome and more likely occurred among the disadvantage population group in Indonesia. This address the need of effective health-policy in targeting these population through the better preventive program.

Effectiveness of Tocilizumab and Impacts of Coexisting Cancer for Large-vessel Giant Cell Arteritis Developing Refractory Ischemic Stroke: A Case Report

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Background and Objectives: Ischemic strokes (IS) have been reported in 3-4% of patients with giant cell arteritis (GCA), especially about 0.15% of first-ever IS. Some reports suggested the correlation between GCA and cancers. However, there have been no reports with GCA and adrenal cancer. Here we report a rare case of large-vessel GCA (LV-GCA) with adrenal cancer refractory to antithrombotic drugs and corticosteroid.

Case Report: A 76-year-old woman has had recurrent cerebral embolisms three times for five months despite optimal antithrombotic treatments. She presented with right-side dominant tetraparesis, transcortical motor aphasia, and left-side cerebellar ataxia with frontal releasing signs. Cardiovascular examinations detected neither atrial fibrillation nor arterial stenosis. Brain MRI showed multiple cortical and subcortical high intensity lesions in both anterior and posterior circulations. Blood investigations indicated elevated erythrocyte sedimentation rate, d-dimer, and anti-cardiolipin antibody without other abnormal findings associated with cerebral embolisms. Contrast and FDG-PET CT revealed abnormal enhancement in the thoracic aorta with its branches suggesting vasculitis and left adrenal tumor without hormonal abnormalities. Urologists and Radiologists diagnosed it as benign adenoma then. Biopsy of left temporal artery showed no findings of vasculitis. We diagnosed her as LV-GCA with recurrent IS. Treatment with corticosteroid, aspirin, and apixaban temporarily prevented IS for only two months, but induction of
tocilizumab resolved recurrent IS. However, serial CT showed increased adrenal tumor with invasion to adjacent tissues and systemic metastases. Carcinoma was detected from gingival biopsy. Finally, she had frequent IS due to Trousseau’s syndrome and died of sepsis due to duodenal perforation caused by tumor invasion.

**Conclusions:** We recommend paying more attention to coexisting cancer for patient with GCA. FDG-PET CT should be useful to detect both LV-GCA and cancer. Treatment of tocilizumab with corticosteroid might be effective for preventing recurrent IS related to LV-GCA.

**In Vivo Direct Reprogramming of Glial Lineage to Mature Neurons in Post-stroke Brain**

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**Background:** The therapeutic effect of in vivo direct reprogramming on ischemic stroke has not been evaluated.

**Methods:** In the present study, a retroviral solution (1.5-2.0×10^7 /ul) of mock pMX-GFP (n=13) or pMX-Ascl1/Sox2/NeuroD1 (ASN) (n=14) was directly injected into the ipsilateral striatum and cortex 3 days after 30 min of transient cerebral ischemia.

**Results:** The reprogrammed cells first expressed neuronal progenitor marker Dcx 7 and 21 days after viral injection, then expressed mature neuronal marker NeuN. This was accompanied by morphological changes, including long processes and synapse-like structures, 49 days after viral injection. Meanwhile, therapeutic improvement was not detected both in clinical scores or infarct volume.

**Conclusion:** The present study provides a future novel self-repair strategy for ischemic stroke with beneficial modifications of the inducer-suppressor balance.

**Intensive Ambulance-delivered Blood Pressure Reduction In Hyper-acute Stroke Trial**

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**Background and Aims:** Uncertainty persists over benefits of early intensive blood pressure (BP) lowering both in acute intracerebral hemorrhage (ICH) and acute ischemic stroke (AIS). Only BP control can be implemented in ambulance settings before stroke type diagnosis which may be a potential effective treatment to reduce haematoma expansion, or shorten the time of onset to reperfusion therapy. The primary aim of this study is to compare against guideline-recommended BP management, that more intensive BP lowering initiated in ambulance is superior at improving functional outcome according to an ordinal analysis of the full range of scores on the mRS. The secondary aims are to determine the effectiveness of hyper early intensive BP lowering on haematoma volume in patients with acute ICH; safety in all randomised patients; reperfusion treatment related symptomatic ICH (sICH, according to standard definitions) in patients with AIS; and poor outcome, separately on death and dependency, and HRQoL, days of hospitalisation, and living circumstances in all stroke patients; haematoma volume at presentation and on expansion at 24 hours in ICH; and infarct size, the time to and overall rate of reperfusion treatment (thrombolysis and/or thrombectomy) in AIS patients.

**Methods:** An investigator initiated and conducted, prospective, multicentre, randomised outcome-blinded study of pre-hospital blood pressure lowering treatment in patients with presumed acute stroke. (ClinicalTrials.gov: NCT03790800). Total sample size are 3,116 subjects, recruited from 2-4 regions involving 20-30 hospitals 90% power (p=0.05) to detect a 22% reduction in the odds (common odds ratio of 0.78) of a worse outcome using an ordinal logistic regression.

**Conclusion:** INTERACT4 will provide reliable evidence on the effectiveness and safety of ambulance-delivered intensive BP lowering with a standard intravenous regime in patients with presumed acute stroke.

**Intraoperative Fluorescence Cerebral Angiography by Laser Surgical Microscopy: Simultaneous Observation of Cerebral Blood Flow and Surrounding Structures**

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**Background and Objectives:** Laser surgical microscopes should enable uniform illumination of the operative field and require less luminous energy compared with existing xenon surgical microscopes. This study is aimed to examine the utility of laser illumination in fluorescence cerebral angiography.

**Methods:** Fluorescein sodium (fluorescein) was used as a fluorescent dye. We assessed use of the laser illuminator for simultaneous observation of blood flow and surrounding structures during fluorescence angiography. Furthermore, the study was designed to evaluate usefulness of the thus determined excitation light in clinical cases.

**Results:** Fluorescence angiography using illumination with excitation light consisting of a combination of 3 types of laser (higher level of blue light, no green light, and lower level of red light) enabled both blood flow and surrounding structures to be observed through the microscope directly by the surgeon.

**Conclusion:** The laser providing strong blue light and weak red light for excitation light enables simultaneous visual observation of fluorescent blood flow and surrounding structures by the surgeon using a surgical microscope.