Seminar

MS1
Cerebrovascular disease and Epilepsy

Yasukazu Kajita
National Hospital Organization Nagoya Medical Center

The relationship between cerebrovascular disease (CVD) and epilepsy has long been appreciated since Jacksonian march following the acute stroke was reported. Seizures often occur after a stroke in the descending order of subarachnoid hemorrhage, intracerebral hemorrhage and ischemic stroke. In the elderly, CVDs are the most frequent causes of epilepsy.

Some CVD-related seizures occur immediately after or in a few days after ischemic or hemorrhagic events, the others are due to chronic ischemic or repeated micro-hemorrhage in cerebral vascular malformation, moyamoya disease and cavernous hemangioma. Partial motor and secondarily generalized tonic-clonic seizures occur more frequently as compared with complex partial seizures. Convulsive or non-convulsive status epilepticus is also associated with CVD.

Antiepileptic drugs (AEDs) will be started if the risks of further seizures outweigh the adverse effects. The first-line medications should be chosen among those effective for partial seizures. However, for the aged or patients with CVD who take antiplatelets, anticoagulants or other drugs, the use of newly-developed drugs including lacosamide should be initially recommended because the likelihood of pharmacodynamic interactions between antiepileptic and other drugs is lower than that of conventional drugs, such as carbamazepin. CVD-related Seizures are generally well controlled with AEDs. However, in some cases of vascular malformation or other CVDs, seizures may become refractory to adequate trials with at least two antiepileptic drugs. In such cases, surgical therapy should be considered.

In preoperative evaluations, ictal video-electroencephalography is necessary to confirm that the seizure onset is localized to the identified lesion in neuroimaging data sets, and detailed neuropsychological tests are also required. In the cases of lesion adjacent to the eloquent areas, invasive intracranial monitoring is carried out to evaluate the precise seizure-onset zone and functional areas. Based on these preoperative evaluations, surgical approach (lesionectomy alone or lesionectomy plus resection of surrounding epileptogenic cortex) will be determined. Especially, in the case of cavernous hemangioma, lesionectomy plus resection of surrounding epileptogenic cortex guided by intraoperative electrocorticography produces an acceptable postoperative seizure-free rate.

MS2
Utility of a novel surgical microscope laser light source and its application with integrated dual-image videoangiography (DIVA)

Jun Sakuma[1], Taku Sato[1], Kyoichi Suzuki[2], Mudathir S Bahkit[1], Kiyoshi Saito[1]

[1]Department of Neurosurgery, Fukushima Medical University, Fukushima, Japan,
[2]Department of Neurosurgery, Fukushima Red Cross Hospital, Fukushima, Japan

Indocyanine green videoangiography (ICG-VA) is a useful tool to evaluate vessel patency and aneurysm occlusion in cerebrovascular surgery. Vessels are clearly shown as white over a black background, however, anatomic relationships of other structures are sometimes difficult to understand. We had developed at a high-resolution intraoperative imaging system (dual-image videoangiography, DIVA) to simultaneously visualize light and near-infrared fluorescene images of IVG-VA.

Recently, we developed also a new laser light source for surgical microscope as an alternative to the conventional xenon light source. The new system does not consist of a complex line spectrum as other light sources have. The wavelength of the laser illumination includes only four bands, all witch are combined to produce a white color: 464 nm (blue), 532 nm (green), 640 nm (red), and 785 nm (near-infrared/NIR). This spectrum was narrowed as much as possible to avoid the harmful high-energy ultraviolet spectrum. The NIR 785 nm wavelength is mainly for ICG excitation.

A chromaticity analysis demonstrated that the laser light has a wider range of color coordinates, and that it has a wider range of brightness. With the DIVA system developed by our department, the laser light provided an excellent view for ICG-VA.

We'll present our system and show some clinical cases.

LS1-1
The Orthodox Techniques of Cerebrovascular Aneurysm Clipping Surgery and Selection Method of Clip Type

Tsuyoshi Izumo
Department of Neurosurgery, Nagasaki University Graduate School of Biomedical Sciences

Clipping surgery for cerebrovascular aneurysms is a well-established and standard procedure to acquire for vascular neurosurgeons. The goal of this surgery is a total elimination of the aneurysms from the circulation with preservation of normal branches and neural structures. To achieve this, there are many crucial steps to keep for sure and safe surgery as followings; 1. Appropriate position for each aneurysm, 2. Widely enough craniotomy and exposure of cisterns to gain wide surgical corridor to the aneurysms, 3. Complete dissection of the aneurysms from the surrounding normal vascular or neuronal structures 4. Precise clip application along the aneurysm neck in an optimum closure line-securing manner, and 5. Meticulous confirmation of 'the goal' using intraoperative imaging studies, Doppler, and neurophysiological monitoring. In this seminar, I will present the orthodox techniques of the clipping surgery and selection of clip type for cerebrovascular aneurysms.

LS1-2
Case- and Clip selection in Aneurysm Surgery

Joshua Bederson
The Mount Sinai Hospital

TBA

LS2
Current issues in medical and surgical treatment for epilepsy

Takamichi Yamamoto
Vice Executive Director of the Seirei Hamamatsu General Hospital

Seizures can be well suppressed by anti-epileptic drugs (AEDs) in 60-70% of epilepsy patients. However, the rest of them have medically refractory epilepsy. Many treatment options including newer AEDs, surgical interventions, and vagus nerve stimulation (VNS) have been introduced. Then it may be occasionally difficult to make the best decision for a patient. These options will be reviewed in this talk to obtain knowledge and hints in selecting these treatment modalities.

The main stream of epilepsy treatment is seizure control by AEDs. Newer AEDs are now prescribed more frequently as compared to the old and established AEDs. Perampanel (PER) is one of the newest AEDs, and has a unique profile, especially the mechanisms of action. PER is a selective non-competitive antagonist of AMPA receptors. PER was started to be used for patients with residual seizures in our hospital. Although patients were those who had medically refractory epilepsy, many of them had freedom from seizure events.

Anteromedial temporal lobectomy is a procedure which is most frequently used in the world. Selective amygdalohippocampectomy is also a choice for patients with typical hippocampal sclerosis. Stereotactic EEG using depth electrodes is now obtaining a major position in the phase of invasive monitoring. Corpus callosotomy is still surviving as one of the surgical options and performed for patients with epileptic falls.

VNS is expanding its use worldwide. VNS is one of the palliative treatment options, and provide more than 50% seizure reduction in 50-60% of patients. AspireSR of VNS is the latest device which senses a heart rate. This device might be very beneficial for patients who have tachycardia when they seize. Responsive Neurostimulator (RNS) is another device for neuromodulation. However, it is not widespread and can be used in limited areas.

Science has given us many innovative treatment options, and will give us more opportunities obtaining seizure freedom for patients with medically refractory epilepsy. Therefore, we should understand indications and contraindications of these newer AEDs, surgical procedures, and devices for neuromodulation.

LS3-1
Surgical management of giant solid cerebellar hemagioblastomas

Suresh Nair
Sree Chitra Tirunal Institute for Medical Sciences and Technology

TBA

LS3-2
Subtemporal approach? for basilar tip aneurysms

Juha Hernesniemi
Department of Neurosurgery, Helsinki University Hospital and University of Helsinki, Finland

TBA

AS1-1
Current status of mechanical thrombectomy and telestroke in rural Japan

Masunari Shibata[1], Takanori Sano[2], Kazuto Kobayashi[1], Kota Maekawa[1], Masaru Seguchi[1], Hiroshi Tanemura[2], Yotaro Hitano[2], Hideki Nakajima[2], Fumitaka Miya[2]

[1]Department of Neuroendvascular therapy, Stroke Center, Japanese Red Cross Ise Hospital,
[2]Department of Neurosurgery, Stroke Center, Japanese Red Cross Ise Hospital

Japan is experiencing a “super-ageing” and “population-reduction” society especially in rural areas. Although five randomized trials have demonstrated strong efficacy of faster mechanical thrombectomy, patients in rural areas lack immediate access to such therapies. Our institute is a comprehensive stroke center in Japan which covers vast medical areas containing highly-aging and depopulated areas. In this article, we discuss mechanical thrompectomy for the aged and strategies to overcome reginal disparities in acute stroke care and improve acute treatment in remote locations. Helicopter transport is one option to rapidly deliver patients to stroke centers. Alternatively, telestroke permits remote audio-visual connection between a stroke center and community hospitals and early evaluation of acute stroke patients.

AS1-2
Each technique in the Penumbra system

MASATAKA TAKEUCHI
Department of Neurosurgery, Seishou hospital, Kanagawa, Japan

Mechanical thrombectomy in acute cerebral large vessel occlusion is clearly stated as the use of a stent type device in terms of the effectiveness in the AHA guideline, as a result of each randomization study. This was the result of general use of stent type devices in each randomized study. On the other hand, in the Penumbra system which is a suction type device, the thrombus suction power has dramatically improved by improving the ACE 68 and the suction tube · MAX pump whose diameter at the tip of the catheter is increased. In addition, due to the technique referred to as ADAPT (A Direct Aspiration first pass technique), there are reports that thrombus recanalization rate is equal to or higher than that of stent type devices and hemorrhagic complications are low. This time, I will outline the induction of the aspiration device Penumbra system and thrombus collection technique. We present each technique of Penumbra system. There are ADAPT technique, Pull-back technique, Double suction technique, stent combination technique, etc. as thrombus collection technique, and it is necessary to use each technique properly depending on occlusion position and thrombus volume. The suction type device has improved inductivity and thrombus recovery rate. In addition, traction of distal vessels is low and hemorrhagic complications are low compared to stent type devices.

AS2-1

Advantages and pitfalls of intraoperative indocyanine green-based videoangiography and our first experience with the next-generation microscope "KINEVO 900"

Soichi Oya, Toru Matsui
Saitama Medical Center/University

Indocyanine green-based videoangiography (ICG－VA) has been widely used to intraoperatively evaluate the cerebral vascular flow in-situ. Various uses have been described in the literature. In this presentation, our unique usage of ICG－VA to enhance the safety of microneurosurgery such as bypass, clipping, and obliteration of AVM will be presented. ICG－VA is useful not only to confirm the patency of the targeted artery but also to identify the location of hidden vasculature in the bone or dura, which especially contribute to the complication avoidance during craniotomy. Despite its usefulness, surgeons should also keep in mind some potential drawbacks related to its use. We will discuss the pitfalls of ICG－VA we have encountered in vascular surgeries. In addition, we will introduce our initial experience with KINEVO 900 in cases of moyamoya disease, STA-SCA bypass and trapping of the fusiform aneurysm, and thalamic cavernous malformation with rapid enlargement. As well as its excellent manipulation capability and high-resolution images, some new functions such as point lock and position memory to reduce surgeons' stress and assist accurate procedure will be demonstrated.

AS2-2
Early Experience with KINEVO 900

Michael T Lawton
Barrow Neurological Institute, Phoenix, Arizona - USA

Background: The new Zeiss microscope offers new functions such as a robotic visualization system, QEVO (the new microinspection tool), and digital hybrid visualization. Here we report our early experience with Kinevo.

Methods: We report all Kinevo cases from January 2017 to present.

Results: Kinevo has been used in 55 cases including aneurysm clipping (n=13), arteriovenous malformation resection (n=4), cavernous malformation resection (n=2), carotid endarterectomy (n=3), bypass (n=1), microvascular decompression (n=1), intracerebral hemorrhage evacuation (n=1), intracranial tumor resection (n=22), degenerative spine surgery (n=6), and spinal tumor resection (n=2). Functions used included position memory (n=6), point lock (n=9), exo-scope (n=9), micro hand took (n=12), IR 800 (n-11), and YE 560 (n=8).

Conclusion: Our early experience with Kinevo includes a wide variety of cerebrovascular, oncologic, and spinal pathology. The additional technology incorporated into Kinevo improves its overall handling, increases the feedback to the neurosurgeon, and captures surgical video and images in higher resolution.