

History of Epilepsy management and Epilepsy surgery in Thailand

Thailand has a population of 67 million people, a survey of rural Thailand reported a prevalence of 7.2/1000, which was underestimated and about 30% of cases had refractory seizure. It has the oldest epilepsy surgery program in SEA. It also had the largest number of epilepsy surgery cases performed (>300) in the last 10 years (2010), with accordingly high numbers of epilepsy cases, low average income per capita, and limited resources (Human Development Index rank 74 by United Nations Development Program's *Human Development Report 2006*), the comprehensive epilepsy program with a limited resource had been developed in Thailand since 1998.

Epilepsy surgery, temporal lobectomy, was first done by the Ramathibodi group (Bunyaratavej S and Visudhipan P, 1990) with a small series of cases who had temporal lobe epilepsy with mesial temporal lobe sclerosis by using a limited investigation e.g. MRI brain and routine EEG. The epilepsy society of Thailand (EST) has been established since 1996. The first epilepsy program was formed at the Chulalongkorn university hospital in 1994 known as Chulalongkorn Comprehensive Epilepsy Program. However, the epilepsy surgery program was first started in 1988 by team of Neurologists and Neurosurgeon (Locharernkul C, Chinvarun Y and Suwanwela C). By using video-EEG monitoring, MRI brain 1.5 T with epilepsy protocol, ictal SPECT, neuropsychological test and WADA test, thirty-five cases with temporal lobe epilepsy had epilepsy surgery done in the first two years of the program. After that, the Phramongkutklao CEP was formed in 2000 (Y. Chinvarun and Sakoolnamarka S). Since then these two CEP programs, the Chulalongkorn CEP and the Phramongkutklao CEP had been gradually developed and became an advanced CEP. About >300 cases of both refractory temporal and extratemporal lobe epilepsy had epilepsy surgery done between 2000-2010. A few years later, the others comprehensive epilepsy program had been built up in many centers in Bangkok including Siriraj hospital, Ramathibodi hospital, Bangkok hospital and the Prasat Neurological Institute.

At the beginning, the 24 hours video-EEG monitoring unit (EMU) had been used from 1998. The MRI brain with 1.5 tesla using epilepsy protocol was used since 1998. The single photon emission tomography (SPECT) had been first used in Thailand for presurgical evaluations in May 1998 (By Chinvarun Y). The ^{99m}Tc- ECD SPECT has been used for ictal and interictal study. The Thai language Wada test was first used in 1999 (By Desudchit T and Chinvarun Y) for assessment of language and memory function in temporal lobe epilepsy. The interictal PET had been used for presurgical evaluation in epilepsy since 2006, two cyclotrons were located at the Chulabhorn Research Institute (CRI) and at the Bangkok hospital.

Initially, surgical series were mostly temporal lobe epilepsy (TLE) with unilateral MTS and lesional focal epilepsy including a few of corpus callosotomy and functional

hemispherectomy etc. Then, epilepsy surgery procedures had been expanding in extra-temporal resection in both lesional and non-lesional extra-temporal lobe epilepsy.

The intra and extra operative EEG monitoring using subdural grid and depth electrode had been widely used for exploring to identify epileptogenic focus in refractory epilepsy with lesional or non-lesional epilepsy in the last ten years. Cortical stimulation had been commonly used for assessment of the functional cortex when epileptogenic focus located nearby to the eloquent cortex.

Other alternative treatment with Vagal nerve stimulation (VNS), ketogenic diet and Radio-therapy using Gamma knife were used to treated patient with epilepsy. The VNS had been first used in 2006 at the CEP Phramongkutklao hospital, Bangkok hospital and Chula hospital and about >40 cases had been implanted with the VNS device. In addition, the radio-therapy using Gamma knife had been used in six cases with refractory lesional epilepsy at the Bangkok hospital in 2004 (Chinvarun Y). Also, the ketogenic diet which initially had been first used at the Siriraj hospital since 1997 and later had been modified to be Thai recipes ketogenic diet for using to treat patient with epilepsy (Chinvarun Y).

At present, several other new investigations had been used in Thailand such as fMRI, EEG-fMRI, EEG source localized imaging (ESI) etc., for presurgical evaluation. The stereo-EEG (SEEG) was first experienced used at the Phramongkutklao hospital and at the Prasart Neurological institute since last year.

The epilepsy fellowship training program in Thailand had been established and approved by the Royal College of Physicians of Thailand (RCPT) since 2005. The fellowship program is a 2-year post-graduated program for the neurologists and currently, there are three epilepsy training centers in Thailand (Pramongkutklao hospital, Chula hospital and Prasart Neurological institute).