

Surgery for temporal lobe epilepsy in Semarang, Indonesia: The first 56 patients with follow up longer than 12 months

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Abstract

Until October 2005, surgery were performed for 76 intractable temporal lobe epilepsy patients. Among them, 56 patients had follow-up of 12-76 months. The patients consisted of 35 males and 21 females, age between 3-38 year-old. Magnetic Resonance Imaging diagnoses were hippocampal sclerosis in 50 patients, temporal lobe tumor in 3 patients, hemispheric hemiatrophy, calcified hippocampal lesion and normal imaging one patient each. Intracranial subdural grid EEG was performed in the patient with normal imaging. Psychological evaluation was performed in all patients, while Wada test was performed on patients with left-sided lesion. All patients underwent anterior temporal lobectomy. Seizure free (Engel's I) was seen on 46 patients (82%). Six patients (11%) had less than 2 seizures per year (Engel's II). Seizure decreased by more than 75% (Engel's III) in 4 patients (7%). There was a trend with increased number of patients with Engel's II and III with longer duration of seizures. Complications were extradural empyema in 5 patients (9%), depression in 2 patients (4%), transient hemiparesis in one patient (2%). Thirty-one patients were able to withdraw the antiepileptic drugs. In *conclusion*, epilepsy surgery can achieve good results in developing countries.

INTRODUCTION

Despite availability of modern antiepileptic drugs (AEDs), up to 30-40% of epilepsy patients continue to have seizures^{1,2} and approximately half of these are potential candidates for surgery.³ Complex partial seizures with seizure focus mostly in the temporal lobe made up most of these intractable cases.⁴ Surgery to abolish seizures is recommended for mesial temporal lobe epilepsy (MTLE), which is possibly the most common form of human epilepsy and the most refractory to AEDs.⁵⁻⁷ Approximately 65% of patients are seizure free after surgery, while another 21% improved.^{8,9} The first randomized controlled trial on patient with refractory epilepsy¹⁰ has shown that in TLE, surgery is superior to optimized AED therapy, with more than 64% seizure free with surgery, and 8% with medical therapy.

In TLE the surgical procedure is a standardized anterior temporal lobectomy including amygdalo-hippocampectomy. All pre-surgical evaluation is directed to determining the epileptogenic temporal lobe. Magnetic resonance imaging (MRI) is currently the best imaging modality for patient with partial epilepsy.¹¹⁻¹⁴ Visual MRI is able to identify mesial temporal sclerosis (MTS) in 80-90% of patients, and nearly 90% patients will be

seizure free after anterior temporal lobectomy.¹⁵⁻¹⁹ Quantitative MRI studies, showing unilateral volume loss, further improves the sensitivity of detecting epileptogenic temporal lobe.^{20,21} The volumetric MRI is particularly useful in patients with bilateral hippocampal atrophy, subtle unilateral atrophy, and symmetric appearing hippocampi.^{21,22}

Assuming an epilepsy prevalence rate similar to elsewhere at 0.5%, there are 1.1 million Indonesians with epilepsy in the 220 million populations, 276,000 to 386,000 are likely to be refractory to AEDs, and 138,000 to 193,000 may benefit from surgery.

Epilepsy surgery started on July 1999 at Diponegoro University Hospital in Semarang, Central Java, Indonesia. Since then, surgery has been performed on 84 patients, partial epilepsy in 78 and generalized epilepsy in 6. Among partial epilepsy cases, 76 were TLE receiving a standard anterior temporal lobectomy and 56 of them had follow-up of more than 12 months. This is a review of the 56 patients.

METHODS

All the 56 patients had at least one 0.5T MRI evaluation and interictal scalp EEG. Subdural

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grid EEG was performed in one patient where MRI was unable to lateralize the lesion. Psychological evaluation was performed in all, while Wada test was performed in those with left-sided lesion. All patients with MTLE underwent anterior temporal lobectomy with amygdalo-hippocampectomy. The results were evaluated based on Engel's Outcome Scale as follows: Class Ia: Seizure free; Class Ib: aura only; Class II: Not more than 2 attacks per year; Class III: Seizure frequency decreases $\geq 75\%$ per year; and Class IV: Seizure frequency decreases $< 75\%$ per year.²³ Surgery was regarded as beneficial for patients in Engel's Class I-III.^{4,24} Improvements in socialization was based on reports by family members. The surgery was performed by the author. AEDs were continued postoperatively. For those with Engel's Class I, the AEDs were tapered after six months.

RESULTS

Of the 56 patients, there were 35 males and 21 females. The age ranged from 3 to 38 years. Most patients (70%) were less than 30 year-old, while 82% had the disease for less than 20 years. Figure 1 shows the age distribution and length of epilepsy before surgery. Twenty patients (36%) were high school or university graduates, while 12 patients (21%) were still at intermediate or high school. All patients had complex partial seizures with or without secondary generalization. MRI diagnoses were hippocampal sclerosis in 50, temporal lobe tumor in 3 consisting of dysembryoplastic neuroepithelial tumor in lateral neocortex in 2 and pleomorphic xantho-astrocytoma of the hippocampus in one; hemispheric hemiatrophy, calcified hippocampal lesion, and normal MRI one patient each. The 30 minutes routine scalp EEG in 40 seizure-free patients showed bilateral epileptiform activity in 60%, ipsilateral activity in 35%, and contralateral activity in 5%. The seizure frequency was 1-10 per month despite 3-4 AEDs in combination. The operations were on the right side in 38 patients (all were right handed), and left side in 18. The patients underwent anterior temporal lobectomy with amygdalo-hippocampectomy, except the 2 cases with dysembryoplastic neuroepithelial tumor who had only anterior temporal lobectomy.

Engel's Ia was seen in 41 patients (73%), Engel's Ib in 5 patients (9%), Engel's II in 6 patients (11%), and Engel's III in 4 patients (7%). Cross analysis showed that number of Engel's II and III tend to increase as the duration of the disease is increasing. Figure 2 shows the result of

surgery in relation to the length of disease before surgery. All patients were better socialized, especially the younger and the highly educated. Many restarted school after quitting for some time. The complications were: Depression needing psychiatric referral (2), transient hemiparesis that resolved in 3 months (1). Surgical complications were extradural empyema that required bone flap removal (5). Most patients required less AEDs, while AEDs could be totally withdrawn in 31 patients (55%). Even with seizure freedom, some patients preferred to continue with at least one AED. Of the 46 Class I patients, AEDs could be totally withdrawn in 31 (70%). Figure 3 shows the number of patients who achieved Engel's I, and those whose AEDs can be withdrawn, in relation to duration of disease before surgery. As shown the proportion of patients whose AEDs can be totally withdrawn is higher in those with shorter duration of disease before surgery. Forty of our patients had follow-up of 24 months or more. Among them, 33 (83%) achieved Engel's Class I.

DISCUSSION

We depended on MRI to localize the epileptogenic focus in all but one patient. Zentner *et al*⁴ has shown that MRI's sensitivity reaches 98.7% for neoplastic lesions, 76.6% for non-neoplastic lesions such as cavernous malformation, and 69.2% for MTS / hippocampal sclerosis. Its specificity reaches 87% for neoplastic lesions, 53% for MTS / hippocampal sclerosis, and 34% for others.

We performed 30 minutes routine scalp EEG to look for interictal discharges. Bilateral and even contralateral interictal discharges were not a contraindication for surgery. Our own observation was that only 35% had interictal discharges ipsilateral or concordant with the MRI lesions, 60% showed bilateral foci, and another 5% showed contralateral foci. This is consistent with previous findings, that in good outcome after unilateral ATL, bilateral interictal discharges in routine EEG is common.²⁵⁻²⁸ Lateralized interictal discharges is seen only in 41% patient.²⁹ The reason for the 'mirror' focus is the tendency of an actively discharging epileptiform region to induce similar paroxysmal behavior in the homologous contralateral side.³⁰ Interictal discharges may incorrectly lateralize the temporal foci in 10-20% patients.^{18,19,31} The discharges from medial temporal lobe may have propagated to the lateral cortex of the opposite sides resulting in incorrect localization.^{32,33} Using scalp-sphenoidal, ictal

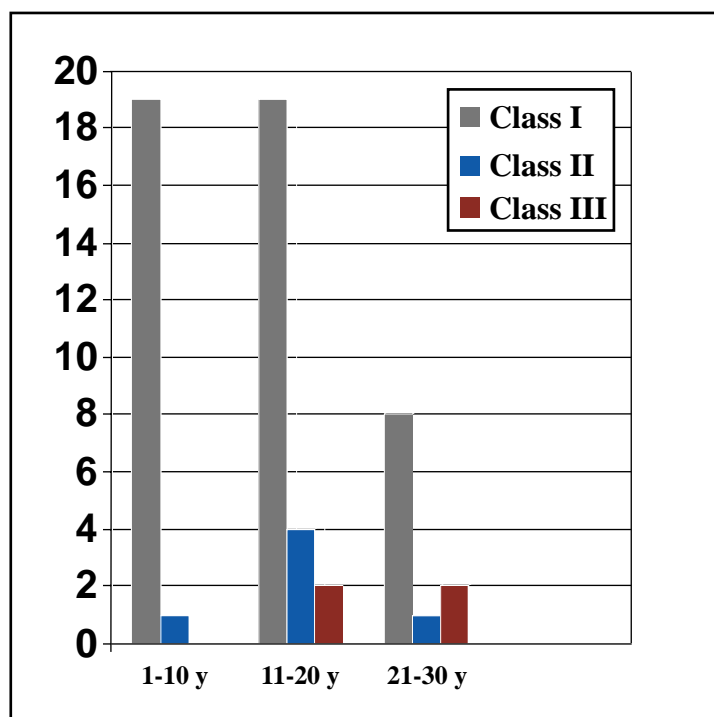


Figure 1: Age distribution and length of epilepsy before surgery in 56 TLE patients.

Figure 2: Result of surgery in 56 TLE cases with follow up 12-76 months, in relation to length of disease.

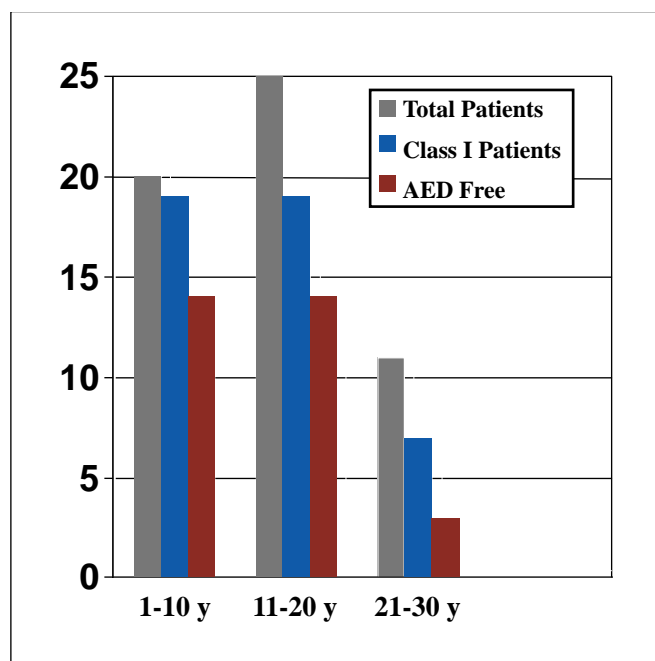


Figure 3: Graph showing the number of patients who achieved Engel's I, and those whose AEDs can be withdrawn, in patients with different duration of disease before surgery. .

video-EEG recording, accurate localization is possible in 65-70% of TLE patients.³⁴ We hope a video-EEG monitoring service can soon be established in our Center to improve our selection of patients. We performed subdural grid EEG in one patient with doubtful MRI laterality, while routine scalp EEG showed bilateral interictal discharges. The result clearly showed right-sided focus, and surgery was then performed.

Engel's Outcome Scale²³ is the most widely used reference for the results of epilepsy surgery. According to Engel's criteria, all of our patients were Class I to III, all benefited from the surgery. Those with Engel's Class I gained most from the operation, and 82% of our patients are in this group. Our result is consistent with others, where 65-75% achieve seizure freedom after anterior temporal lobectomy with amygdalo-hippocampotomy, another 20% has meaningful improvement.^{23,35-39} Wyler AR²⁴ reported that seizure free probability reached 90% after one year, and increased to 94% after two years. Evaluation at the end of 2nd postoperative year is thus a good predictor of the long-term seizure outcome. Of our patients with 2 years follow up, 83% were in Engel's Class I.

Recent advances has elucidated several biological basis for refractoriness, such as the presence of certain structural abnormalities, particularly MTS / hippocampal sclerosis and cortical dysplasia.⁴⁰⁻⁴² In a recent long term study of newly diagnosed epilepsy, the probability of achieving seizure-free declined rapidly and progressively after the first two monotherapy treatment.^{2,43,44} Many adult epilepsy centers define medical intractability as persistent seizures despite 2 years and 2 maximally tolerated AEDs.⁴⁵⁻⁴⁷ thus, all patients with partial epilepsy who fail two AEDs, and in patient with resectable brain abnormality, particularly hippocampal sclerosis and cortical dysplasia, should be considered for epilepsy surgery. Our studies has shown that epilepsy surgery can acheve good results in developing countries with limited resources, as also reported by Chinvarun⁴⁸ and Srikiyvilaiikul⁴⁹ from Thailand, and Panda from south India.⁵⁰ Delay in surgery results in psychosocial, educational, and vocational problems which are difficult to overcome even though the seizures have been eliminated by surgery.^{51,52} Such delay with "lost of years" is no longer acceptable.^{53,54}

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