

# Status of epilepsy surgery in Japan: Results of 2004 national survey

Taisuke OTSUKI *MD, PhD*

*Department of Neurosurgery, National Center of Neurology and Psychiatry, Tokyo, Japan*

## **Abstract**

The total number and types of epilepsy procedures performed from January to December 2004 in Japan was surveyed retrospectively, which revealed that the number of treated patients was 436 cases in total. This was far below the number that might benefit from epilepsy surgery of at least 2,000 cases per year. It was also revealed that the number of reference epilepsy surgery center performing more than 25 surgical cases per year was only 5 institutions, which was insufficient. However, the number of neurosurgical institutions capable of performing epilepsy surgery at an average of 3.4 per 10 million may be adequate. Reference epilepsy surgery center consisting of pediatric and adult neurologists, psychiatrists and neurosurgeons to select and care for the epilepsy surgery patients is mandatory for further growth of epilepsy surgery service in Japan.

## **INTRODUCTION**

Epidemiologic studies suggest that 60,000 persons develop epilepsy *de novo* annually in Japan. Based on an estimated incidence of 50 per 100,000<sup>1</sup>, in whom 20% (12,000 patients) may become medically intractable<sup>2</sup>, 3.33% of *de novo* patients<sup>3</sup>, or 2,000 Japanese epilepsy patients per year might benefit from epilepsy surgery. The author, as President of Japanese Epilepsy Surgery Society (2005-2006), performed a retrospective survey on epilepsy surgery carried out from January to December 2004 in Japan, to evaluate the total number and types of epilepsy procedures currently performed in Japan.

## **METHODS**

All practicing epilepsy neurosurgical institutions identified through the Japanese Epilepsy Surgery Society and all the university hospitals in Japan (186 in total) were sent a postal questionnaire asking if they had performed any epilepsy surgery from January to December 2004. Each identified surgeon was then asked to record the types and numbers of surgical procedures performed at their institutions in a short questionnaire mailed to them in March 2005.

## **RESULTS**

Of the 186 institutions, 91 (48.9%) responded. None of the nonresponders had a constant epilepsy

surgery practice. Forty-three institutions were identified, where epilepsy surgery were carried out in the year 2004. A total of 586 operations, including 150 intracranial electrode implantations were performed in the said institutions (**Figure 1**). Table 1 lists the surgical procedures performed. As shown, among the 436 resective and palliative epilepsy surgeries, the commonest surgical procedure was temporal lobe resection (176 cases, 40.4%) including anterior temporal lobectomy (118 cases, 27.1%) and selective hippocampectomy (58 cases, 13.3%). One-hundred-and-sixty-four cases (37.6%) of extratemporal neocortical resections including lesionectomy were performed. Both hemispherectomies (9 cases, 2.1%) and corpus callosotomies (38 cases, 8.7%) were infrequently performed. Four radiosurgery and 10 multiple subpial transections were performed during the study period. Table 2 lists the distribution of institutions and the number of epilepsy surgery performed in each of the districts in Japan. As shown, the number of resective and palliative epilepsy surgery in each district of Japan was from 17.4 to 46.3 (average 35.9) per 10 million population per year. Whereas number of neurosurgical institutions performing epilepsy surgery was from 2.8 to 4.2 (average 3.4) per 10 million population. Twenty-nine out of 43 (67.4%) institutions performed less than 12 cases per year.

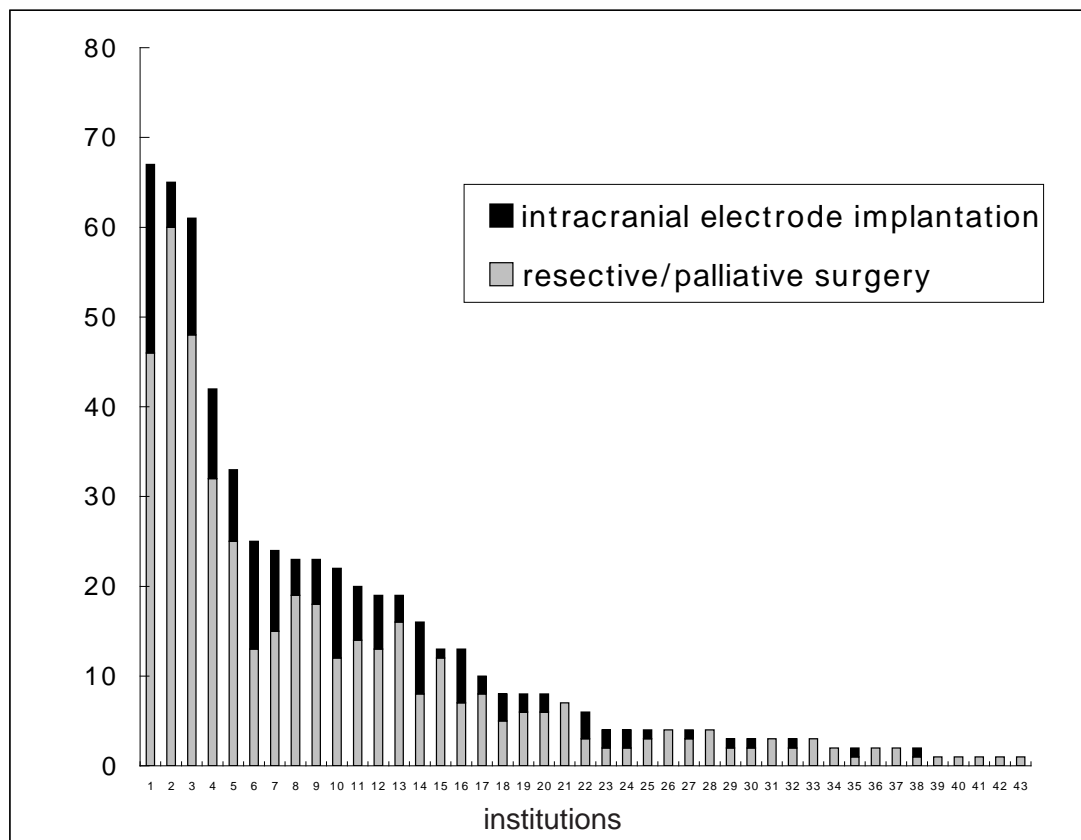


Figure 1: Epilepsy surgery performed in Japan from January to December 2004 (total 43 institutes, 586 operations).

**Table 1: Surgical procedures for epilepsy performed in Japan from January to December 2004.**

Surgical procedures	No. (%)
Anterior temporal lobectomy	118 (20.1%)
Selective hippocampectomy	58 (9.9%)
Neocortical resection	87 (14.9%)
Lesionectomy	77 (13.1%)
Hemispherotomy / hemispherectomy	9 (1.5%)
Callosotomy	38 (6.5%)
Multiple subpial transection	10 (1.7%)
Others*	39 (6.7%)
Intracranial electrode implantation	150 (25.6%)
<b>Total</b>	<b>586 (100%)</b>

\* Radiosurgery, coagulation of hypothalamic hamartoma, hippocampal transection

**Table 2: Distribution of institutions and number of epilepsy surgery in each district of Japan.**

Local district of Japan	Population (x1,000)	No. of resective/palliative surgery (per 10 million population)	No of institutions (per 10 million population)	No. of institutions with >12 cases / year	No. of institutions with < 12 cases / year
Hokkaido/Tohoku	15,487	27 (17.4)	5 (3.2)	1	4
Kanto	43,160	200 (46.3)	15 (3.5)	6	9
Chubu	21,086	68 (32.2)	6 (2.8)	2	4
Kinki	20,896	69 (33.0)	7 (3.3)	2	5
Chugoku	11,878	23 (19.4)	5 (4.2)	1	4
Kyushu	14,783	49 (33.1)	5 (3.9)	2	3
Whole country	121,384	436 (35.9)	43 (3.4)	14	29

## DISCUSSION

Epilepsy, the commonest serious neurologic disorder, has a prevalence of 5/1,000 in the general population<sup>1</sup>, of which 20% consist of patients who have at least one seizure a month.<sup>2</sup> Of these patients with frequent seizures, 60% may have partial seizures<sup>4,5</sup> potentially amenable to “curative” surgery. In Japan, this means that about 72,000 patients with epilepsy in the general population constitute a “surgical pool” who potentially require surgery. The annual incident population (60,000 in Japan) will contribute 900-2,000 patients with surgically remediable refractory partial epilepsy annually (1.5% to 3.3% of 60,000) to this “surgical pool”.<sup>3,6</sup>

The present study revealed that the number of patients underwent epilepsy surgery was 436 in the year of 2004 in Japan, which was far below that required to treat all patients in this surgical pool.

According to ILAE Neurosurgery Commission report in year 2000<sup>7</sup>, surgery of epilepsy needs epilepsy centers. A basic epilepsy surgery center has a catchment of approximately 2 million population and throughput of 20-40 patients undergoing surgery per year. A reference epilepsy surgery center has a population basis of 4-10 million, and a throughput of 25-50 patients undergoing surgery per year. Comparing to this recommendation, the number of neurosurgical institutions performing epilepsy surgery in Japan, at an average of 3.4 institutes per 10 million population, may be sufficient. However, the number of operations performed in most of the institutions was far too small. That is, only 32.6%

of the institutes performed more than 12 epilepsy surgeries per year. In particular, the number of reference epilepsy surgery center operating more than 25 surgical cases per year was insufficient; i.e. only 5 institutions in the whole country.

In conclusion, the number of patients requiring epilepsy surgery is far in excess of the number actually operated on in Japan. Increase in reference epilepsy surgery center with pediatric and adult neurologists, psychiatrists and neurosurgeons to select and care for the epilepsy surgery patients is mandatory for further growth of epilepsy surgery service in Japan.

## REFERENCES

1. Sander JWAS. Some aspects of prognosis in the epilepsies: a review. *Epilepsia* 1993; 34: 1007-16.
2. Hart YM, Shorvon SD. The nature of epilepsy in the general population: I, characteristics of patients receiving medication for epilepsy. *Epilepsy Res* 1995; 21: 43-9.
3. Consensus Conference, National Institutes of Health. Surgery for epilepsy. *Conn Med* 1990; 54: 452-6.
4. Hauser WA. The natural history of drug resistant epilepsy: epidemiologic considerations. *Epilepsy Res* 1992; (Suppl 5): 25-8.
5. Semah F, Picot MC, Adam C, et al. Is the underlying cause of epilepsy a major prognostic factor for recurrence? *Neurology* 1998; 51: 1256-62.
6. Lhatoo SD, Solomon JK, McEvoy AW, Kitchen ND, Shorvon SD, Sander JW. A Prospective Study of the Requirement for and the Provision of Epilepsy Surgery in the United Kingdom. *Epilepsia* 2003; 44: 673-6.
7. Binnie CD, Polkey CE. ILAE Commission Report: Commission on Neurosurgery of the International League Against Epilepsy (ILAE) 1993-1997: Recommended standards. *Epilepsia* 2000;41:1346-9.