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Unleashing the potential of epilepsy surgery in Pakistan: A possible game-changer for refractory epilepsy

Dear Editor,

Epilepsy is one of the most prevalent chronic neurological diseases in a developing country like Pakistan (Sheerani M., 2005). With a population of over 241.5 million people, about 1.38 million people suffer from epilepsy in the country. Estimated prevalence of epilepsy in Pakistan is 9.99 per thousand, with the disease more commonly affecting the younger age groups particularly those aged less than 30 years of age (Sheerani M., 2005). In cases where medical management proves inefficient, surgical options become the next best step in management of such drug resistant or intractable epilepsies. Although there are no official statistics on the number of intractable epilepsy cases in our country, this does not change the fact that intractable epilepsy is quite common in Pakistan and there is a dire need to address this issue (Sheerani M., 2005).

Antiepileptic drugs are the mainstay of treatment for epilepsy, which need to be taken daily to prevent the recurrence of epileptic seizures. However, they are often unsuccessful or inefficient in the long-run due to numerous factors not limited to inadequate or inappropriate treatment, various misconceptions and societal stigmas, low awareness and poor compliance. For refractory epilepsy, there are other options available including surgery and neurostimulation to control seizures thereby improving the quality of life. Amongst the less invasive procedures are neurostimulation device implantations, such as vagus nerve stimulation (VNS), responsive neurostimulation and deep brain stimulation (DBS) (Engel J Jr., 2018). These procedures are 50% effective in controlling seizures and are preferred in patients who are not suitable candidates for resectional procedures (Sheerani M., 2005). Radiofrequency thermocoagulation and laser intermittent thermal ablation treatment are two minimally invasive procedures effective for small discrete lesions such as hypothalamic hamartomas and heterotopias (Engel J Jr., 2018). Different surgeries are available for different types of epilepsy. These include resectional operations such as temporal lobe resection and extratemporal resection, including focal neocortical resection, selective amygdalohippocampectomy, lesionectomy, and hemispherectomy and disconnection procedures, such as corpus callosotomy and multiple subpial transections (Imtiaz et al., 2023). Despite being the fifth most populous country in the world, Pakistan only has a few notable neurosurgical centers available that carry out a fraction of the aforementioned procedures – only one such private sector hospital exists in Karachi (Bajwa et al., 2023; Sheerani M., 2005).

Epilepsy surgery offers a chance for permanent cure in such cases where traditional medical management fails. This fact can be demonstrated by a retrospective cohort study conducted in Agha Khan University Hospital. The study followed the cases of 31 patients over a 20-year period, out of which 67.74% were males. Majority of the patients suffered focal epilepsy unresponsive to at least two to three different anti-epileptic drugs and underwent surgical treatments for their drug resistant ailments. Follow up visits after six months and a year revealed some promising reduction and even complete resolution of their symptoms with 32.3% of patients (10/31) attaining complete freedom from seizures at six months and 45.2% (14/31) at one-year follow-up (Imtiaz et al., 2023).

Surgery proves to be an excellent treatment option in temporal lobe epilepsy, which is highly resistant to treatment with anti-epileptics. Mohan et al. conducted a randomized controlled trial comparing patients suffering from refractory temporal lobe epilepsy receiving both surgical and non-surgical treatment. It was reported that 38% patients were completely seizure-free one year after surgery in comparison to 8% who became seizure-free in the non-surgical group (Mohan et al., 2018). In another study from Liverpool, 284 patients were studied who had undergone surgery for treatment of refractory epilepsy. Follow-ups revealed that 47% patients remained seizure-free at 5 years and 38% at 10 years after surgery regardless of the type of surgery with an overall 8.4 mean number of years to remain seizure-free after surgery (Mohan et al., 2018).

Underutilization of surgical interventions to treat intractable epilepsy in Pakistan could be explicated by the fact the Pakistan is a low-middle-income country (LMIC) with a low health budget. Epilepsy surgeries are highly technology-dependent, requiring extensive preoperative assessment and evaluation to identify candidates suitable for the procedures (Sheerani M., 2005). Among some tests done in the evaluation and candidate selection are magnetic resonance imaging (MRI), high resolution computerized tomography (CT) scan of brain, angiography and functional imaging, electroencephalography (EEG), continuous video-EEG (VEEG) monitoring system and computerized spike and event detection, all of which require high costs (Sheerani M., 2005). Another contributing factor is the lack of specialized centers dedicated to epilepsy surgery along with a non-availability of neurosurgeons trained and skilled enough to carry out such meticulous procedures. Regrettably, the lack of awareness of surgery as a viable option to treat medically intractable epilepsy is so low in our country that even trained neurologists overlook and disregard it as a possible option to treat epilepsy. They do not even consider the remote possibility of a referral to neurosurgeons in patients with chronic epilepsy taking multiple anti-epileptics with no control or improvement in their symptoms whatsoever. Several misconceptions due to the lack of awareness further pose a hindrance in the implementation of epilepsy surgery in Pakistan. These include the inherent limitations of these surgical procedures, such as the fact that it can only be performed in temporal lobe epilepsy and in seizures arising from non-dominant hemisphere, as well as high morbidity, low efficacy, and the possibility of undue psychiatric and cognitive risks (Sheerani M., 2005). Another important fact that needs to

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List of abbreviations:

VNS	vagus nerve stimulation
RNS	responsive neurostimulation
DBS	deep brain stimulation
LMIC	low-middle-income country
MRI	magnetic resonance imaging
CT	computerized tomography
EEG	electroencephalography
VEEG	video electroencephalography
WHO	World Health Organization

be highlighted is that referral of patients with intractable epilepsy should not be for epilepsy surgery but rather for a thorough consultation at specialized epilepsy centers where potential candidates who can benefit from timely surgical interventions are recognized early through proper evaluation and assessment by a multidisciplinary team of epilepsy specialists (Engel J Jr., 2018).

The World Health Organization (WHO) delineates epilepsy as one of those serious neurological disorders that affects not only the individual but has a deep impact on the family and society in general. Individuals diagnosed with epilepsy suffer from adverse physical and psychosocial consequences, severely impacting all aspects of their lives often causing them to lead a low-quality life. This treatment gap is due to inadequate utilization of anti-epileptic drugs, poor optimization of anti-seizure medications and underutilization of epilepsy surgery owing to factors such as low awareness among the masses regarding the treatment options of the disease, particularly epilepsy surgery.

To bring about out a change in the current situation of the scarcity of specialized epilepsy surgery centers and trained surgical teams in Pakistan, the first initiative should be to create awareness of this important yet highly neglected field among neurophysicians and neurosurgeons. The introduction of the idea might encourage them to pursue this field for specialization and they might seek specialized training in epilepsy surgery abroad. Comprehensive epilepsy surgical programs need to be introduced and established in the country in order to take advantage of this therapeutic modality for those with multiple drug-resistant epilepsy and failure of all conservative measures, having left with no other options to improve their long-term life quality. Furthermore, the government should approve and subsidize the international training of a few selected neurosurgeons so they can obtain the knowledge and skills needed to promulgate epilepsy surgery in Pakistan. The ultimate goal should be the development of an epilepsy surgery center in all the provinces' major and high-volume centers dedicated to early surgical intervention in all suitable candidates with intractable epilepsy.

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