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Letter to the Editor

Steps toward narrowing the surgical epilepsy treatment gap through private practice

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Dear Editor,

Unlike spinal degenerative disease, which is painful and may prompt patients to self-refer to a neurosurgeon, and unlike stroke, which causes dramatic and acute-onset disability, drug-resistant epilepsy (DRE) does not cause somatic pain, yet its morbidity in multiple aspects of life (physical, psychosocial, personal, and professional) can be profound and insidious. Repeated seizures can lead to gradual and incremental worsening of memory, cognition, mood, executive processing, behavior, and psychosocial function. And while epilepsy mortality rates are increasing in the United States,[4] the risk of death in patients with DRE remains largely overlooked.

At this point, a plethora of academic papers laments the underutilization of epilepsy surgery. The salient points are as follows: (1) epilepsy surgery is *effective* for patients with DRE, leading to seizure freedom or substantial palliation in the vast majority,[11] (2) epilepsy surgery is largely *safe* with a small risk of mortality or major morbidity,[7] (3) epilepsy surgery may offer the *only chance for seizure freedom* for the one million Americans who live with DRE,[5] (4) only a small percentage of patients who are appropriate candidates for surgery will ever learn about, much less undergo surgery,[6] and (5) when they do, the typical delay to surgery can have devastating quality-of-life implications.[1] The reasons for underutilization are multiple and complex,[10] but its disastrous consequences behoove the field to consider ways to increase capacity for providing complex epilepsy surgery. With certain caveats and provisions, we are confident that complex and high-volume epilepsy surgery programs can exist outside of the traditional academic medical center, and indeed must if the substantial surgical treatment gap is to be closed.

Given that 1.2% of the population suffers from active epilepsy[3] and that one-third of these patients harbor a drug-resistant form,[9] we estimate that approximately 15 thousand individuals are candidates for epilepsy surgery in northern New Jersey alone, demonstrating a high degree of unfulfilled need for local neurosurgeons to address. At the Epilepsy Institute of New Jersey, we have been able to build one of the largest surgical epilepsy practices in New Jersey over a few years. From 2019 to the end of 2023, we project a cumulative total of over 120 major cases [Figure 1]. These numbers continue to grow on an annual basis, with an anticipated year-over-year increase of 10–15% over the next five years due to various strategies that have gradually been implemented since 2019.

The large volume of complex and advanced presurgical and surgical procedures can be attributed to high-quality resources and trained personnel in our vicinity. Nearly all of the epilepsy

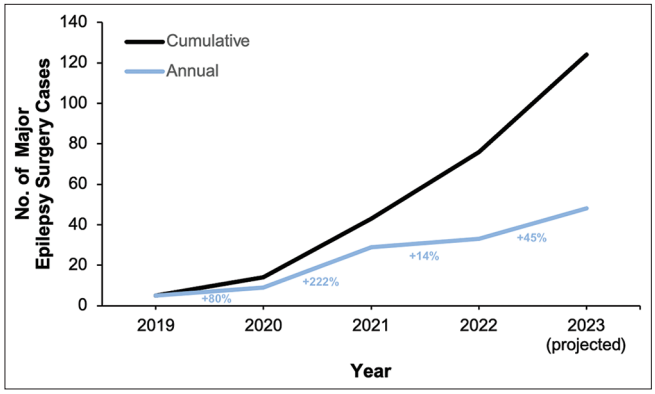

Figure 1: Major cases in epilepsy surgery (i.e., depth electrode insertion for stereoelectroencephalography (sEEG), craniotomy for grids, craniotomy for resection or disconnection, and laser ablation) performed by L.D.T. in private practice from 2019 to 2023. Numbers correspond to major cases performed on an annual basis and cumulative basis (i.e., total number of cases performed to date). Projections for 2023 are based on cases performed in the first half of the year. These cases exclude vagus nerve stimulator implantation, vagus nerve stimulator revision, skull fiducial placement for stereotactic planning, and removal of sEEG electrodes.

surgery at the Epilepsy Institute of New Jersey is conducted at a teaching hospital with resident staff and a pediatric intensive care unit as well as operating rooms equipped with neuronavigation technology, operating microscopes, sophisticated neuromonitoring including the ability to conduct phase reversal and direct cortical and subcortical stimulation, robotic technology for depth electrode implantation for stereoelectroencephalography, laser ablation technology, and intraoperative magnetic resonance imaging (MRI). The full gamut of non-invasive presurgical testing is available in New Jersey, including high-quality video electroencephalogram, 3 Tesla MRI, fluorodeoxyglucose-positron emission tomography, ictal single-photon emission computed tomography, and magnetoencephalography. Functional MRI, neuropsychological testing, and intracarotid amobarbital testing are commonly employed. While all of these studies are not typically offered at a single center, a thorough presurgical evaluation can be obtained, although in a somewhat piecemeal fashion. Furthermore, all surgical patients are reviewed in a multidisciplinary conference typically attended by epileptologists, surgeons, neuropsychologists, and radiologists, among other specialists. Access to these resources and the curation of a highly experienced network of healthcare professionals ensure that patients receive complete and the most up-to-date care.

The identification of patients with DRE who may benefit from surgery encompasses several approaches. Selection of surgical candidates should ideally be spearheaded by a fellowship-trained epileptologist in close collaboration with a neurosurgeon who possesses a deep understanding of epilepsy syndromes, surgical treatments, and requirements for surgical candidacy. First, our team continues to be actively involved in training courses as well as national and international epilepsy conferences, in addition to actively contributing to the clinical research literature. Second, multidisciplinary clinics have served as a mechanism for introducing patients to the surgeon as an integral team member early in the disease process, presenting the family with the full range of treatment options should seizures prove intractable. Third, hospital-employed surgical epilepsy nurse coordinators streamline the often-arduous presurgical testing regimen and coordinate timely conference discussions for patients who are under consideration for surgery. Fourth, quality improvement programs have been initiated at various hospitals to use electronic medical record systems to aid in the identification of patients who have failed three or more anti-seizure medications and might be surgical candidates. Fifth, in addition to delivering didactic lectures to neurologists, we have focused on speaking to intensivists, pediatricians, neonatologists, and emergency physicians, encompassing all specialties that are likely to encounter patients with epilepsy. Encouraging emergency physicians to call neurosurgery in addition to neurology for every patient who presents with seizures has helped identify surgical candidates, given that seizures account for about 1 million emergency department visits annually in the United States.[8] While many involve infants with febrile seizures or adults with acute symptomatic seizures (often alcohol-related), a considerable minority involves "repeat attendees" with DRE, of whom many, if not all, may merit consideration for surgery.[2] Finally, relationships with industry groups and patient advocacy organizations and the use of social media marketing with podcasting allow us to appeal directly to patients. Using these various complementary approaches, we have extended our reach and have attracted several patients from outside of the state and even the country with the goal of attaining seizure freedom.

Altogether, our implemented strategies in private practice have allowed epilepsy surgery to reach more patients with DRE in northern New Jersey. Alongside academic medical centers, private practice can play a pivotal role in tackling the underutilization of epilepsy surgery throughout the United States in an effort to help more patients attain seizure freedom. While complex spine surgery and brain tumor surgery were once exclusively within the purview of the academic neurosurgeon, these operations are now routinely being performed in private practice. We envision a similar trajectory for epilepsy surgery. Despite the challenges inherent in providing care for patients with DRE, neurosurgeons must evolve to address the formidable and devastating surgical treatment gap.

Ethical approval

The Institutional Review Board approval is not required.

Declaration of patient consent

Patient's consent not required as there are no patients in this study.

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Nil.

Conflicts of interest

L.D.T. is the founder and sole partner of the Epilepsy Institute of New Jersey, Inc. No other disclosures were reported.

Use of artificial intelligence (AI)-assisted technology for manuscript preparation

The authors confirm that there was no use of artificial intelligence (AI)-assisted technology for assisting in the writing or editing of the manuscript and no images were manipulated using AI.

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