Review Article

Intractable Epilepsia in Pediatric Populations: Surgical Approaches, Results, and Therapy, A Comprehensive Systematic Review of the Literature in Hemispherectomy

Abstract

A hemispherectomy is a surgical procedure in which the basal ganglia are retained but the entire cerebral hemisphere is removed. This technique was used by Dandy in 1928 to remove a glioma. McKenzie, a Canadian doctor, performed the first hemispherectomy on an epileptic patient in 1938. A comprehensive review of the scientific literature was carried out using the recommended guidelines. Using PRISMA (Preferred Reporting Items for Systematic Reviews) guidelines, this study carefully evaluated the scholarly literature on surgical outcomes and treatment regimens. We followed the EXCEL criteria, Rayyan (Intelligent Systematic Review), and R software. Academic publications were found in databases such as ScienceDirect and PubMed/MEDLINE Studies published in English up until January 2024. Our study of epileptic patients with intractable epilepsy involved a total of 1157 patients, of whom 708 underwent hemispherectomy. Table 1-2-3, and Figure 2,3,4, 5show the patients' demographic breakdown: 195 patients, or 27.54%, had cortical dysplasia, seizures, or Rasmussen encephalitis; 305 patients, or 43.08%, had seizures; 87 patients, or 12.29%, had strokes or Weber syndrome; 449 patients, or 72.8% of the patients, out of 325 patients, had the Engel type 1 classification; and 232 patients, or 51.67% of the patients, had Engel type 2. The results of this pediatric systematic review led us to the conclusion that, once an infant's nonexistent seizure count is reached, either through conservative or immunoregulatory therapy or brain stimulation, hemispherectomy is the most stable course of action. Intractable epilepsy is essentially treatable.

Keywords: Intractable epilepsia, hemispherectomy, disconnections, syndromes, outcomes and treatments.

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Introduction

A hemispherectomy is a surgical procedure in which the basal ganglia are retained but the entire cerebral hemisphere is removed. This technique was used by Dandy in 1928 to remove a glioma. McKenzie, a Canadian doctor, performed the first hemispherectomy on an epileptic patient in 1938. Patients who underwent surgery experienced hemiplegia and intractable epilepsy. Twelve infants with intractable epilepsy and infantile hemiplegia underwent hemispherectomy. [1]. Hemispherectomies are among the most significant surgical procedures used to treat pediatric epilepsy. 16–21%. As a result, to administer this treatment, a vertical parasagittal route is employed in addition to the lateral aspect through the Sylvian fissure. Additionally, this method prevents postoperative seizures in up to 90% of instances. As a result, these hemisphere abnormalities may cause or provoke difficult-to-cure epilepsy in a child at a young age. in addition to CSF alterations being the main 1–15% issues. [2].

The most recent classification of epilepsy and seizures was released in 2017 by the International League Against Epilepsy. This group of seizures includes epileptic, hyperkinetic spasms such as automatism, focal motor, myoclonic, tonic or tonic-clonic, clonic, and atonic seizures. These are categorized as just generalized seizures that progress into focal onset seizures. Myoclonic-atonic or generalized epileptic; focal, non-motor; behavioral or emotional; absence with myoclonic genesis in the eyelids; and myolonic-tonic or clonic spasms. [3]. More and more epileptic patients are being connected to a location that may be successfully removed surgically, but is untreatable due to tumors, hippocampal atrophy, or underlying focal cortical dysplasia, thanks to the use of modern imaging techniques like magnetic resonance imaging. Accordingly, generalized epilepsy may also be successfully surgically removed, in the same way as the so-called infeasible spasms brought on by underlying focal cortical dysplasia can be treated surgically based on initial findings. Sturge-Weber and megalencephalic syndromes are categorized as catastrophic seizure diseases requiring prompt hemispherectomy. and one was the preoperative assessment, which identified the various regions of epileptic anomalies by utilizing data from electroencephalograms, positron emission tomography, magnetic resonance imaging, and photon alone type emission tomography. Further evidence suggests that epilepsy is also frequently seen in patients with

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Ethics committee approval: There is no need for ethics committee approval.

Marfan type 1, in patients with brain tumors associated with mesial temporal sclerosis that may be associated with or coexist with focal cortical dysplasia, in patients with a variety of epilepsy-related syndromes, and in situations where the epilepsy site is affected [4]. Sometimes they will show signs of drug resistance. Patients with concomitant medial temporal lobe cortical dysplasia, Marfan type 1, and mesial temporal sclerosis may be treated with medial temporal lobectomy [5].

This study intends to determine the effectiveness of the technique in connection to the location, frequency, and responsiveness to the intervention in order to better understand how hemispherectomy has improved the treatment of intractable epilepsy in pediatric patients.

Materials and methods

A comprehensive review of the scientific literature was carried out using the recommended guidelines. Using PRISMA (Preferred Reporting Items for Systematic Reviews) guidelines, this study carefully evaluated the scholarly literature on surgical outcomes and treatment regimens. We followed the EXCEL criteria, Rayyan (Intelligent Systematic Review), and R software. Academic publications were found in databases such as ScienceDirect and PubMed/MEDLINE by using the search phrases "Hemispherectomy OR Intractable Epilepsy" AND "resection by location", "resection by Lobectomy", "focal dysplasia resection", and "associated syndromes". Ethics approval: Not need, or not applicable. Studies published in English up until January 2024.

The PICO framework (population, intervention, comparison, and outcome) was used to the pediatric population with this type of disorder, which ranges in age from 0.3M to 17 years.

Shown Figure 1.

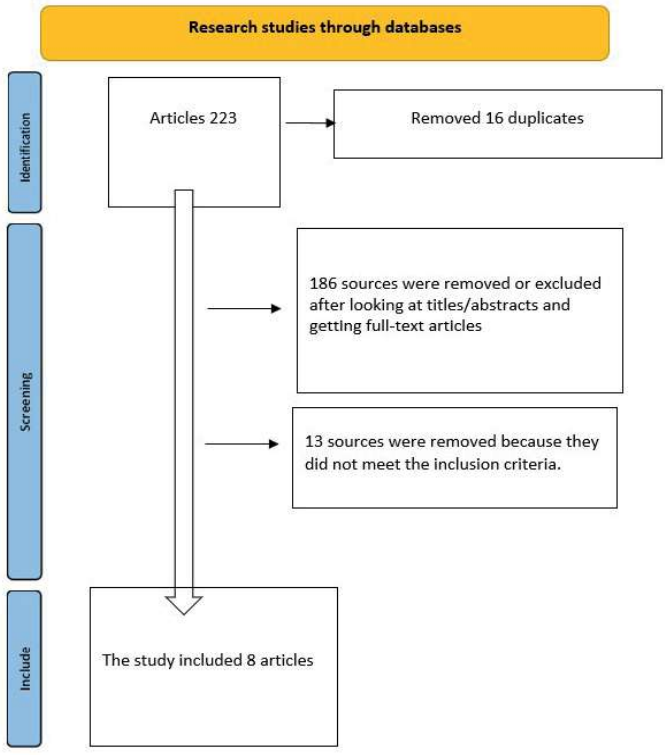

Figure 1: PRISMA Flowchart Hemispherectomy in Pediatric Patients with Intractable Epilepsia Study.

Search Strategy and Mesh Terms

The search strategy incorporated a comprehensive set of Mesh terms related to Hemispherectomy in an Intractable Epilepsia. ("Epilepsies, Partial/classification"[Mesh] OR "Epilepsies, Partial/complications"[Mesh] OR "Epilepsies, Partial/congenital"[Mesh] OR "Epilepsies, Partial/diagnosis"[Mesh] OR "Epilepsies, Partial/diagnostic imaging"[Mesh] OR "Epilepsies, Partial/drug therapy"[Mesh] OR "Epilepsies, Partial/epidemiology"[Mesh] OR "Epilepsies, Partial/etiology"[Mesh] OR "Epilepsies, Partial/genetics"[Mesh] OR "Epilepsies, Partial/history"[Mesh] OR "Epilepsies, Partial/pathology"[Mesh] OR "Epilepsies, Partial/prevention and control"[Mesh] OR "Epilepsies, Partial/psychology"[Mesh] OR "Epilepsies, Partial/radiotherapy"[Mesh] OR "Epilepsies, Partial/rehabilitation"[Mesh] OR "Epilepsies, Partial/surgery"[Mesh] OR "Epilepsies, Partial/therapy"[Mesh])

(Total Hemispherectomy AND Hemispherectomy, Total OR Partial Hemispherectomy AND Hemispherectomy, Partial OR Functional Hemispherectomy AND Hemispherectomy, Functional) AND ("Hemispherectomy/instrumentation"[Mesh] OR "Hemispherectomy/methods"[Mesh] OR "Hemispherectomy/rehabilitation"[Mesh] OR "Hemispherectomy/standards"[Mesh])

Selection Criteria and Search Strategy

The publications were found through a systematic search technique that focused on English-language journals published between January 2023 and January 2024. Strict standards were used in the selection procedure to ensure that articles about various forms of total hemisphere amputation were of high quality and applicable. surgical intervention is the last resort for localized seizure disorders associated with intractable epilepsy, or partly in epilepsy linked to syndromes displaying this type of illness.

Comprehensive Search Strategy Keywords

In addition to the Mesh terms, keywords including "Intractable Epilepsy "Syndromes," "Hemiparesis," "Seizures," "Partial or total hemispherectomy and Pediatric epilepsy," and "treatments" were included in the search strategy.

Inclusion Criteria

Age range for children: 0.3 m to 17 yrs

Functional results, technique, care, and results of vertical interhemispheric hemispherectomy following a pediatric hemispherectomy

The purpose of hemispherectomy in Rasmussen encephalitis

Treatment for hemimegaloencephaly using hemisphere epilepsy surgery

Forecast or estimate the functional outcomes and seizure activity after a juvenile hemispherectomy.

Exclusion Criteria

Non-pediatric patients can range in age and have extremely severe epilepsy that is uncontrollably worse. For Patients with epilepsy, who hemispherectomy is not appropriate. Patients who are diagnosed with epilepsy but whose sei-

zures are proven to be tumor-related by magnetic resonance imaging are not eligible for hemispherectomy. papers that do not meet the requirements for intractable epilepsy and were not treated.

Data Extraction

Standardized approaches were employed to collect data from qualifying research, with a focus on each study's methodology, demographics, and characteristics of the intervention. This search approach took into account a number of factors, including the patient's age, the intervention's modalities, and the functional outcomes following the surgical period, in order to thoroughly locate the pertinent literature on hemispherectomy in young patients with uncontrollable epilepsy.

Results

Our study of epileptic patients with intractable epilepsy involved a total of 1157 patients, of whom 708 underwent hemispherectomy. Table 1 and Figure 2,3,4 show the patients' demographic breakdown: 195 patients, or 27.54%, had cortical dysplasia, seizures, or Rasmussen encephalitis; 305 patients, or 43.08%, had seizures; 87 patients, or 12.29%, had strokes or Weber syndrome; 449 patients, or 72.8% of the patients, out of 325 patients, had the Engel type 1 classification; and 232 patients, or 51.67% of the patients, had Engel type 2. These patients are summarized in Table 2 and Figure 5 and Table 3. In total, 1157 patients were present, and a total of 1161 people participated in 29 trials, and 1102 of them experienced seizures; the overall absence rate was 73.4%. Of the total, 16 papers (or 55%) offered relevant information about these seizures that occurred after hemispherectomy. Furthermore, although there was no significant difference (p=0.7) between this symptom and this type of procedure, nearby seizures showed 85% of acquired etiologies and another form of progressive development between 30%, 41%, and 29% consecutively. The two categories of acquired and progressive etiologies were found to be greater than the developmental etiologies, as evidenced by p=0.001. On the other hand, 20 investigations found issues. in addition to a CSF diversion of up to 14% in cases of hydrocephalus. Participants had a 30-day mortality limit of 2.2% and who had no variance in the types of hemispherectomies (p=0.8). [7].

Based on studies conducted at the Johns Hopkins Medical Institution between 1968 and 1996. A group of young kids with epilepsy underwent 27 surgeries: 7 patients had Sturge-Weber syndrome, 24 surgeries were for cortical dysplasia, 67% were for hemimegaloencephaly, and 89% of the surgeries were for Rasmussen syndrome. Despite the fact that 67% of the participants of the vascular group did not experience seizures as a result of their subpar performance, an additional item was included that included the frequency of seizures in addition to motor and intellectual dysfunction. As a result, it showed that children had better results both before and after surgery. [8].

Remarkably, a review conducted between 1979 and 2020 using 19 publications revealed that newborns who had hemispherectomy, or hemispherectomy with a range of 7% to 76%, did not have seizures one year after surgery. Seizures become independent in 40–70% of non-hemispheric type operations. Research from hemispherectomy procedures demonstrates that they help babies who have them from having seizures.[11].

Techniques for functional surgery in the posterior quadrant

This technique, similar to peri-insular hemispherectomy, makes the opercular cortices and the central peri-Roland area visible. The entire epithelium is intended to be punctured by the excision. A leptogenic lesion can be easily identified upon close inspection, and the core region, which includes the motor and sensory cortex, should be avoided. We also used somatosensory or motor evoked potentials to do a magnetic resonance imaging examination of the intraoperative anatomical surface based on arteries and veins in order to achieve resection and guarantee surgical safety. Similar to a periinsular hemispherectomy, the functional posterior quadrantectomy involves removing the mesial temporal region through the infra-insular window. The mesial temporal excision enabled by the infra-insular window in the superior temporal gyrus includes the uncus, amygdala, and hippocampus areas. A step before surgery is the disconnection of the temporal and parietal neocortex or the occipital lobes. The so-called infra-insular window extends posteriorly down the temporal horn to the trigone of the lateral ventricle, taking into account the preservation of the Labbe vein and the branches of the middle cerebral artery. the cortical incision at a higher level and the suprasylvian cortex, which is situated behind the primary sensory core, respectively, through the temporal cingulate. Complete eradication using subpial aspiration of the tainted area, a decision made at the cloister level. The third stage is entry. The trans-parietal disconnection is located in the superior diagonal cortical incision, directly behind the postcentral gyrus. The excision was carried out along the falx and its disconnection, up to the pia mater, till the sagittal position. A posterior callosotomy, or the removal of the corpus callosum inferiorly and at the superior level, would be the last operation. The parietal and occipital temporal lobes remain anatomically positioned after the procedure; however, they are completely severed from both the contralateral hemisphere and the ipsilateral frontal section of the lobe.[12].

The hippocampal and amygdala are removed during a temporal lobectomy known as a functional hemispherectomy. The body of the lateral ventricle is first made visible through a central excision. Subsequently, the anterior basal frontal area and the pericallosal cerebral artery separate the corpus callosum from the ventricle. At last, the corpus callosum is severed from the ventricle by performing the subpial disconnection. Lastly, the anterior basal frontal region and the subpial level of the cingulum gyrus divide the corpus callosum from the ventricle. [13].

Anterior temporal lobectomy

Compared to adult patients, we have a different understanding of the pathology of the pediatric temporal lobe. Although the underlying cause of refractory seizures is more likely to be neoplastic lesions or congenital problems like cortical dysplasia, the pathological basis of mesial temporal sclerosis is a less common finding in adults than in children. This results in changes to the degrees and frequency of approaches of the temporal lobe. For adults with refractory epilepsy, Anterior temporal lobectomy (LBTA) is the most prevalent resection method, with a lower percentage of procedures performed in the infantile form. It is noteworthy that these techniques are derived from the seminal

work of Spencer et al. from the middle of 1984. Consequently, we observed certain differences, including the degree of hippocampal resection and the extension of the temporal neocortical excision, which usually happens less than 4 and less than 6 cm from the front temporal lobe, respectively, on the dominant side. The modifications to the procedure will be based on the results of the electrophysiological test and the preoperative photographs. The surgery has a comparatively low 0-5% fatality rate, according to LBTA, while the review's morbidity ranged from 0-9.3. Common problems include the visual field, infection, and so-called neuropsychological alterations, namely the decline in verbal memory that results from removal of the dominant hemisphere. The contralateral hemisphere is attributed to the cognitive alterations in children, and the LBTA results are positive. Though verbal memory may deteriorate, children may experience better neuropsychological alterations than adults. [14].

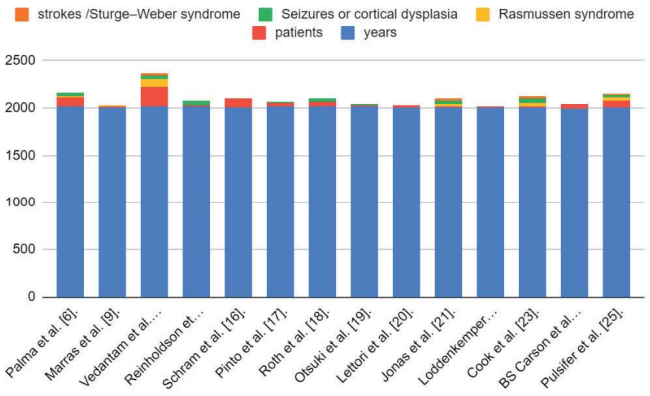

Figure 2. Research on hemispherectomy-treated intractable epilepsy and the most common disorders associated with it in children.

Table 1: Intractable Epilepsia in the Pediatric Population: Hemispherectomy as the Optional Treatment

Authors	years	Type of study	patients	Procedure / Anatomical and Functional	Rasmussen syndrome	Seizures or cortical dysplasia	strokes / Sturge–Weber syndrome	Follow up	P=value
Palma et al. [6].	2019	Retrospective	92	Hemispherectomy	10	38	71 sei-zure-free	two lost from follow-up, 73.3%	0.43
Marras et al.[9].	2010	Retrospective	13	Hemispherectomy and functional hemispherectomy	6	3	2	2–7 years	N/A
Vedantam et al. [10].	2018	Retrospective	208	Hemispherectomy	83	33	20	62.5%	0.01
Reinholdson et al. [15].	2015	Prospective observational study	12	Hemispherectomy	N/A	47	1	2 years	N/A
Schram et al. [16].	2012	Retrospective N/A	96	Hemispherectomy	N/A	N/A	N/A	1 year	N/A
Pinto et al. [17].	2014	retrospective observational study	36	Hemispherectomy	N/A	22	N/A	1 year	0.001
Roth et al. [18].	2021	Multicenter study	48	Hemispherectomy	N/A	28	N/A	51 months	.0001
Otsuki et al. [19].	2013	N/A	18	Hemispherectomy	N/A	13	N/A	N/A	N/A
Lettori et al. [20].	2008	prospective	19	Hemispherectomy	6	N/A	3	1 year	N/A
Jonas et al. [21].	2004	Comparative Study	15	Hemispherectomy	21	39	27	2 years	N/A
Loddenkemper et al. [22].	2007	Case reports	14	Hemispherectomy	N/A	N/A	N/A	6 months	N/A
Cook et al. [23].	2004	Comparative study	14	Hemispherectomy	32	55	27	0.5-2 years	N/A
BS Carson et al. [24].	1996	Review	52	Hemispherectomy	N/A	N/A	N/A	N/A	N/A
Pulsifer et al. [25].	2004	Crossectional	71	Hemispherectomy	37	27	7	2.4 to 37.5 years.	0.05

Procedures for Surgery

Benjamin Carson et al. First, a frontal lobectomy was performed, and then a temporal lobectomy involving the removal of the occipital lobe was performed. The coagulopathy was the main focus, not how long the surgery took. With a frontal lobectomy, there was no need to interfere with the anterior circulation because the majority of hemisphere bleeding happens in the midline. In order to preserve the ventricular system, the anterior cerebral artery branches were coagulated, and decortication was also performed. This left the thalamus and basal ganglia intact, along with a thin layer of white matter covering the ependymal surface. The identical trigonal area was exposed to CSF fluid leakage following a complete temporal lobectomy of the brain. gel foam and surgical mesh obstructed. It is necessary to build a ventricular surface because the cortical veins are bleeding more frequently. because they apparently enlarge as they drain into the sagittal sinus. In order to prevent hemimegaloencephaly in children, a parasagittal cortical canal connecting the anterior falx to the posterior extension of the occipital lobe is required. By blocking the cortical veins, this canal significantly reduces bleeding. Once cortical tissue is removed at the parasagittal level, the remaining portions of the cerebral venous system that enter the sagittal sinus need to clot and divide. After hemostasis is achieved, clean the region thoroughly, apply Gelfoam, and refrain from performing surgery on young children as this could cause cardiovascular instability.[24]

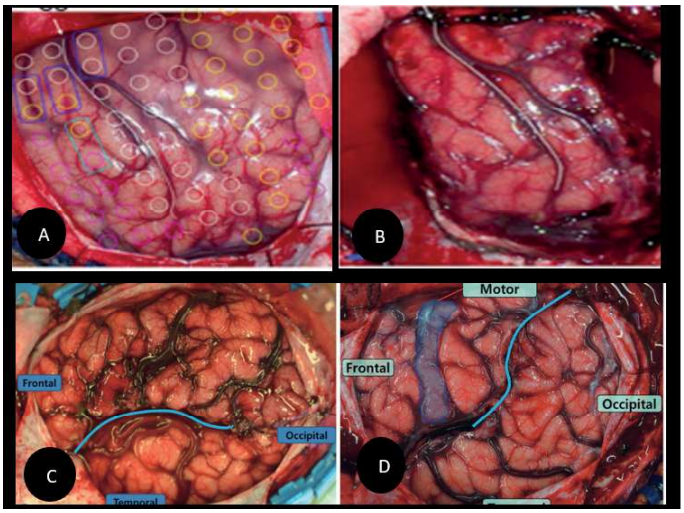

Figure 3.a: Complete and subtotal hemispherectomy; blue regions show jerks caused by stimulation; red and yellow spots show the locations of seizure initiation. b, hemispherectomy subtotal c, Frontal lobectomy after posterior quadrantectomy, seen from an operating perspective. c, the posterior quadrantectomy's final cortical incision margin, indicated in several anatomical areas.

Rasmussen encephalitis

RE is a rare condition that is thought to exist in a smaller population undergoing hemispherectomy; of the 32–39 documented cases of hemispherectomy, it accounts for a significant percentage of patients undergoing surgery, ranging from 1% to 42%. The primary inflammatory process associated with RE is Rasmussen syndrome has been reported to develop after a head injury or infection, and progressive unilateral hemisphere dysfunction is known to happen frequently along with inflammatory and histological imaging abnormalities. RdE affects children, but it is not normal for them; hence, there may be unilateral focal onset seizures that worsen. Autoantibodies against the glutamate receptor type 3 (GluR3) N-methyl-D-aspartate receptor (NMDA) linked to RdE and other severe forms of epilepsy are related to it. drifting, similar to classic partial epilepsy where hemiparesis is the final symptom caused by a progressive decrease of unilateral hemisphere function. Language function is also affected if the dominant hemisphere is damaged. An MRI shows areas of inflammation along with a consistent reduction. There have been several, but unevenly successful, attempts at immunomodulatory therapy to stop the illness, including plasma exchange, calcineurin inhibitors, high doses of corticosteroids, and intravenous immunoglobulin + immunoglobulin. Hemispherectomy is still the standard of care, however. [26].

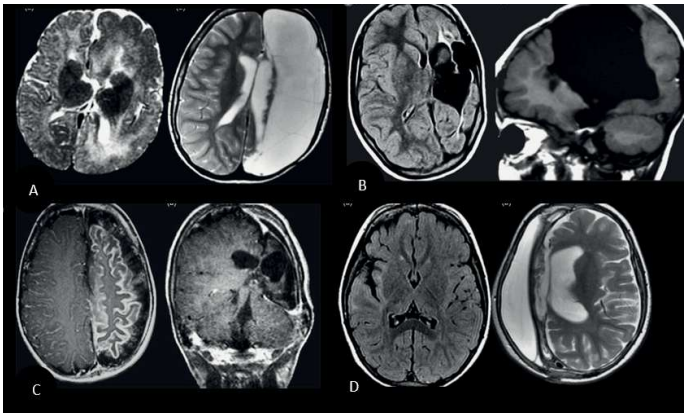

Figure 4. a) Hemimegaloencephaly. Axial T2w MRI shows extensive growth of the left hemisphere with enlargement of the white matter throughout the hemisphere, b) left porencephalic frontotemporal cyst affecting the basal ganglia and thalamus of the left ventricle with the dilated and exvacuo sylvian fissure, c) MRI of Sturge-Weber disease, axial T1w with gadolinium with cortical gyri in atrophic cerebral hemisphere. d) Rasmussen encephalitis. Preoperative axial FLAIR images, the subcortical white matter signal areas of the right insula are intensified, temporal and frontal lobes with parenchymal gliosis, with slight hemiatrophy of the right hemisphere.

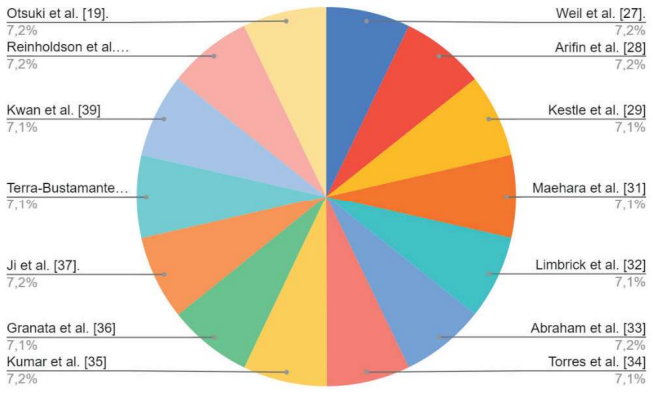

Figure 5 samples of people who had hemispherectomy treatments that went well according on the Engel type 1 and type 2 classifications.

Table 2 According to Engel's classification, studies concentrated on peri-insular hemispherectomy, which was followed by death and neurological changes such hemiparesis.

Author	year	Kind of study	Patients	Procedure	Engel 1	Engel 2	Follow up	Mortality	Neurological alterations	P=value
Weil et al. [27]	2014	Observational Study	69	Peri-insular Hemispherectomy	59	N/A	2	N/A	N/A	0.009
Arifin et al. [28]	2019	retrospective observational study	19	Peri-insular Hemispherectomy	12	13	6	N/A	Hemipare-sis 5	N/A
Kestle et al. [29]	1999	retrospective	16	Peri-insular	8	9	3	N/A	Hemiparesis	N/A
Villemure [30]		Clinical Trial	43	Peri-insular	34	N/A	9	1	N/A	N/A
Maehara et al. [31]	1998	Retrospective/ N/A	14	Peri-insular	6	12	4	N/A	Hemiparesis	N/A
Limbrick et al. [32]	2008	retrospective	35	Peri-insular	N/A	28	2	N/A	N/A	N/A
Abraham et al. [33]	2016	Retrospective	45	Peri-insular	41	43	4	N/A	N/A	N/A
Torres et al. [34]	2007	Clinical article	13	Peri-insular	10	12	3	N/A	Hemiparesis	N/A
Kumar et al. [35]	2013	Retrospective	14	Peri-insular	11	12	3	1	N/A	N/A
Granata et al. [36]	2009	Retrospective	11	Peri-insular	6	8	7	N/A	N/A	0.002
Ji et al. [37].	2017	retrospective	83	Peri-insular	69	70	2	N/A	N/A	0.019
Terra-Busta-mante et al. [38]	2005	retrospective	16	Peri-insular	62	N/A	N/A	N/A	N/A	N/A
Kwan et al. [39]	2007	Comparative Study	41	Peri-insular	N/A	N/A	72	N/A	Hemiparesis	.001
Reinholdson et al. [15].	2015	Prospective observational study	12	Hemispherectomy	1	6	2 years		14 Motor and speed impairment	N/A
Otsuki et al. [19].	2013		18	Hemispherectomy	6	19	11	N/A	N/A	N/A

Invasive monitoring

Patients with temporal lobe epilepsy should have craniotomy and dural opening procedures under long-term invasive surveillance. The polarity of phase inversion in the somatosensory evoked recordings after the median nerve is electrically stimulated should also be determined in order to identify the central sulcus. This is because direct cortical stimulation validates the precentral motor convolution. 64 Ad-Tech Medical Device Co. The frontal and temporal lobe surfaces are covered by electrode surface subdural grids, which are positioned according to the speech regions determined by FMRI, the seizure semiological data, and EEG recordings in the interictal and ictal scalp, or interictal peak sources... Ipsilateral subdural strips covered the temporal lobes anterio,r temporal tip and inferior surface. Five days of monitoring is recommended to detect the occurrence of interictal epileptiform discharges and ictal seizures in patients. This is accomplished by utilizing frameless stereotaxic navigation to place electrodes at depth in order to collect ictal data from the anterior parts of the temporal lobe, which may be supplied via subdural grids, specifically in the anterior and posterior hippocampus. Consequently, the motor, sensory, and language capacities were mapped in one or two sections as well as the third and fourth days after the grid was implanted. employing intraoperative electrocorticography in specific circumstances to carry out neocortical excision; sufficient data had already been obtained from the functional cortex and the so-called regions of epileptogenic; and the data from intrusive monitoring was used to make the decision to remove the hippocampal region.[40].

Table 3. Investigations based on the kind of hemispherectomy, the pathophysiology, and the intervention

Authors	anatomic hemispherectomy	functional hemispherectomy	peri-insular hemispherectomy	hemimegaloen-cephaly	ventriculoperito-neal shunt	P=value
Pinto et al.[17]	19	4	5		15	0.001
Roth et al. [18]	N/A	N/A	N/A	17	N/A	0001
Otsuki et al. [19]	N/A	N/A	N/A	16	N/A	N/A
Lettori et al.[20]	19	5	N/A	11	N/A	N/A
Jonas et al.[21]	N/A	N/A	N/A	16	N/A	N/A
Weil et al. [27]	3	67	N/A	11	N/A	0.009
Arifin et al.[28]	N/A	N/A	23	1	N/A	N/A

A study employed a database of eighty-nine children who had surgery for temporal lobe epilepsy. Out of this group, 77 had anterior temporal lobectomies, and the other group had preoperative resections modified to address an epileptogenic region or lesion. Thirteen underwent lesionectomy plus hippocampectomy, twenty underwent amylohippocampectomy with a P=0.023 with 77%, and thirty-three underwent satisfactory results in 74% of cases. and 14 patients who underwent lateral temporal lesionectomy, which ended their seizures, and whose logistics revealed the factors of an amygdalohippocampectomy with a P=0.021 and surgery on their left side with a P=0.017 as significant samples of a poor control of convulsions. The acceptable control exhibited just a modest reduction in verbal memory following the left procedures, and was independent of the histological diagnosis, even though the neuropsychological impairment was evident following the right temporal resections. Both contralateral functioning and attention improved after surgery.[41].

Discussion

Based on the etiologies, the demographic data displayed in the study photographs varied from prior studies that demonstrated hemispherectomy as a treatment, indicating a substantial decrease in seizures in 90% of cases of hemispheric disconnections in children. more than successful in treating uncontrollably occurring seizures. Records indicated that 73% of the 186 patients who had hemispherectomy for disconnection recovered from their seizures. 78 individuals revealed that 85% of the 92 juvenile epileptic patients in the research who underwent disconnection were seizure-free at follow-up. [42]. Observing malformations of cortical development in 25-72% of children in the magnetic resonance imaging, the contralateral type anomalies in the altered hemispheres shown in the preoperative magnetic resonance imaging with an extensive insular or subcortical heterotopic gray matter recognized as poor predictive factors of seizures. [43]. According to reports, somatic constitutional mutations of genes like AKT1, AKT3, DEPDC5, MTOR, NPRL2/3, PIK3CA, PIK3R2, and TSC1/2 are related to a continuous phenotype of malformations of cortical development, such as cortical dysplasia type II UP TO MEGALENCEPHALY OR DYSPLASTIC MEGALENCEPHALY. MTOR is a key regulator of cell growth, proliferation, and survival, autophagy, transcription, and protein synthesis in mammals. In 79% of type II patients, the brain mosaic rate was less than 5%, indicating a mutation. Up to 50% of the remaining individuals have dysplastic tissue mutations, with mosaic rates ranging from 6.5% to 18.6%. Of these, 50% carry constitutional alterations, with 41% of type II individuals unable to identify the source of these mutations. [44]. The incidence increased from 1.2 per 100,000 and other admissions in 2000 to 2.2 per 100,000 between 2009 for a p=0.05, according to the literature, in a study of 552 admissions admitted to hospitals for hemispherectomy procedures. The average age was 6.7 years with a range of 0-20. revealed a notable rise in the overall cost, from $42,807 in 2003 to $57,443 in 2009 (adjusted in 2009 currency; p=0.015). demonstrating no in-hospital mortality or postoperative complications in 5 patients, or 0.9%. nonetheless, revealed a rise in the use of ventricular shunts during hemispherectomy hospital stays, with a p-value of 0.056 for an increase in ventricular shunt usage from 6.7% to 16.5%. There was a higher rate of blood transfunctions (OR 3.7, p = 0.01) but a reduced incidence of mortality (OR of 0.08, p = 0.04).[45]. A structural lesion in intractable epilepsy will require surgery to be postponed in order to avoid the significant blood loss that is linked with intraoperative morbidity or fatality in infants receiving immunomodulatory treatment. If hemispherectomy is used in children, the literature states that the recovery period for hemimegaloencephaly is seven weeks. It is uncommon to do a functional hemispherectomy on newborns weighing less than 12 months. In inflammatory epilepsy, Rasmussen's encephalitis with a paradigmatic immune system resulted in a 50% reduction in seizures when steroid pulse therapy was used in 81% of cases, as opposed to 42% in tacrolimus cases or 42% in steroid therapy cases. blood-stream immunoglobulin. demonstrating that young patients can release up to 71% after hemispherectomy, compared to 8% and 5% with tacrolimus respectively. This was not observed when receiving intravenous immunoglobulin treatment.[46].

Limitations

According to this study, the outcome of left-sided amygdalohippocampectomy patients was not satisfactory in terms of seizures (P = 0.017). It was also highlighted how verbal memory impairment might develop after temporary resections for left surgeries that cause cognitive or neuropsychological damage, and how functional hemispherectomy in newborns under 12 months of age is uncommon. neglecting to mention that there is a 2.2 fatality rate from hydrocephalus diversion in 14% of pediatric patients, and that evaluations of language or reading behavior are scarce? Furthermore, it was not possible to ascertain in the

adolescent population the length of time for both the preoperative initial rehabilitation and the postoperative follow-up after hemispherectomy.

Conclusion

The results of this pediatric systematic review led us to the conclusion that, once an infant's nonexistent seizure count is reached, either through conservative or immunoregulatory therapy or brain stimulation, hemispherectomy is the most stable course of action. Intractable epilepsy is essentially treatable. technique that has demonstrated a 90% success rate in stopping seizures with infrequently repeating interventions.

An MRI shows areas of inflammation and progressive atrophy. To treat the disorder, immunomodulatory therapy has included calcineurin inhibitors, intravenous immunoglobulin plus high doses of corticosteroids, and/or plasma exchange, with varied degrees of success. Patients with epilepsy who undergo hemispherectomy have a good chance of recuperating normally from the procedure since children's recovery and adaption are significantly better than adults. Hemispherectomy also causes a kind of cognitive harm.

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Author contribution subject and rate:

Daniel Antonio Encarnacion-Santos (50%): Design the research, data collection and analyses and wrote the whole manuscript.

Gennady Chmutin (20%): Organized the research and supervised the article write-up.

Ismail Bozkurt (10%): Contributed with comments on research design and slides interpretation.

Jack Wellington (5%): Contributed with analysis of the manuscript.

Aysi Gordon Gullanyi (5%): Contributed to conceptualization of the manuscript

Bipin Chaurasia (10%): Contributed to vizualisation of the manuscript.

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