ILAE Mentorship Program

Sfax Epilepsy Surgery Program- Tunisia

Local Faculty
Pr Chahnez Charfi Triki
Pr Fatma Kamoun
Pr Zaher Boudawara
Pr Hichem Ammar
Pr ag Fatma Kolsi
Dr Wafa Bouchaala

Mentors
Pr Bertil Ryhendag
Pr Cigdem Ozkara

BACKGROUND

Sfax is the second most populated city in Tunisia. It has 1 million inhabitants for a general population of 12 million. It includes 3 university hospitals, two of which are located approximately 500 meters from the university and a military hospital located approximately 12 km from the city center. There is a pediatric neurology department at the Hédi Chaker University Hospital and an adult neurology department at the Habib Bourguiba University Hospital, and two neurosurgery departments. The pediatric neurology department specializes in the treatment of children with epilepsy. It drains patients from southern Tunisia (approximately 3 million inhabitants) and treats drug-resistant epilepsies. It includes a neurological exploration unit with two video EEGs, one of which is long-term. Its medical staff is trained in epileptology. Since 2005, the department has been trying to set up an epilepsy surgery program to allow patients with drug-resistant epilepsy, mainly lesional with cortical malformations and porencephalic cavities, to benefit from surgical treatment after failure of medical treatment. A long-term EEG unit with video has been set up, training of neurologists and neurosurgeons, EEG technicians and neuropsychologists in epileptology. However, this program was evolving very slowly due to a lack of human and especially technical resources (such as neuro navigation, etc.). When we were contacted by Pr Cigdem Ozkara & Pr Bertil Rydenhag on behalf of the surgical commission to help us increase the local awareness of Epilepsy Surgery and increase the team competence, it was a real boon for us and we were fully committed to making this program a success.

PHASE 1: ONLINE DISCUSSION CASES

We began with virtual meetings (Figure 1) under the mentorship of our two professors, with the participation of neurologists, neurosurgeons, radiologists, and neuropsychologists.

figure 1: Online case discussion

From March 2024 to September 2024, we held one meeting per month and presented 28 patients from child neurology department and one from Military hospital with drug-resistant epilepsy of various etiologies (Table1). These meetings allowed us to improve our knowledge and perfect our presurgical assessment.

Date of Birth	Type of Epilepsy	EEG	PET	MRI
28/06/2014	Parieto-occipital focal epilepsy	right hemispheric activity in the right parieto-occipital region	ongoing	Right occipital ulegyria (2022)
22/06/2008	Frontal motor focal epilepsy	Electroclinical recording of a seizure that preceded by diffuse flattening, followed by discharge with rhythmic spike and sharp wave activity starting in the right frontal region and rapidly spreading throughout the cortex	Right frontal hypometabolism	Right frontal focal dysplasia
19 years old	Temporal motor focal epilepsy	Left temporal ictal seizure	Not necessary	Left DENET
16/02/2016	Clonic motor focal epilepsy	electrical status epilepticus,	Not necessary	Left polymicrogyria
25/04/1998	Non-motor sensory occipital epilepsy	Left slowing of the background pattern with slow left occipital waves.		Left posterior focal dysplasia
06/12/2008	Clonic focal epilepsy	Left focal posteriour abnormalities		Extensive dysplasia? DENET?
31 years old	Focal epilepsy	in interictal EEG a slow spike and spike waves in anterioer region T4		orbito-frontal lesion; DENET?
06/07/2011	Focal epilepsy	right frontotemporal focus	ongoing	Frontal dysplasia
28 years old	Right motor focal epilepsy	No seizure recorded, discharge starting in left fronto-temporal region		Dysplasia? Or left hippocampal sclerosis
12 years old	Clonic and tonic focal epilepsy	seizure we can see fast activity before and after starting motor activity we observe rapid activity predominant iin the left hemispheric fronto-central region With rhythmic alpha activity initiating on the right and spreading contralaterally	Inconclusive	Left sequellar lesion
4 years old	Focal epilepsy	predominat right spike and spike wave fronto-central regions		Dysplasia? Glioma?
29/07/2013	Focal epilepsy	showed abnormalities such as spikes, polyspikes, and high-amplitude slow spikes in the bilateral temporoparietal regions, which were activated during sleep.		Bilateral polymicrogyria
28/12/2015	Tonic epilepsy			Suspected dysplasia, slight vermian atrophy

27/08/2010	Epilepsy, normal motor function, onset of cognitive decline	Left fronto-temporal spikes and polyspikes	Not necessary	Central left ulegyria
04/03/1999	Frontal epilepsy			Cortical dysplasia
24/08/2013	EME			History of subdural hematomas + left hemispheric ischemic sequelae
11/04/2022	ID, ASD, epilepsy	Parieto-temporal spikes and spike-wave		Right compressive temporal arachnoid cyst
31/08/1998	Focal epilepsy	Has focal seizures		VNS 2023
—	Rasmussen syndrome			
04/04/2019	Motor focal epilepsy	spike and waves in right temporo-pariétal region		Glioma
03/06/1998	Motor and sensory focal epilepsy with internal temporal semiology	left temporal spikes		Incompletely operated hippocampal sclerosis
6 years old	Motor focal epilepsy (EPC)	spikes and waves in the Right hemisphere; continus partial epilepsy		sequela lesion in the right hemisphere
8 years old	LG syndrome	LG EEG		Sequelae of meningoencephalitis
15 years old	Motor focal epilepsy; EME	temporo-frontal spikes		Hippocampal hypotrophy
15 years old	Tonic and clonic motor focal epilepsy	Bilateral anomalies		Sequelae lesion
12/03/2008	Motor focal epilepsy	EEG recording 15 minutes after a seizure: Slowing with slow delta waves in bilateral fronto-temporal regions, Reappearance in the sequence of the EEG of faster activity with spikes and sharp waves in temporo-parieto occipital		Lesion with microcysts in right parasagittal parietal area
27/08/2010	Focal epilepsy	spikes and polyspikes in left fronto-temporal region		left sequalae lesion type ulegyria
42 ans	focal temporal epilepsy	slow activity is recorded in the left temporal region, with a maximum in the lower temporal (T5) and posterior (T9) areas.		left temporal lesion, located in T3, ganglioglioma?

Table 1: List of patients discussed during the online meeting

PHASE 2: 1st VISIT IN SFAX MEDICAL CENTERS (30 September-2 October 2024)

In September 2024, our two mentors Pr Bertil Rydenhag and Pr Cigdem Ozkara came to Sfax to visit the and epilepsy unit in the child neurology department and the two neurosurgery departments of Sfax in the Habib Bourguiba University Hospital and the Sfax Military Hospital in order to gain an idea of the surgical possibilities and the availability of the necessary equipment to perform surgery on patients. The program (Figure 2) of this visit consisted of a first day visiting the epileptology unit and the operating room (figure 3) in the morning and in the afternoon reviewing some cases face to face (figure 4).

ILAE EASTERN MEDITERRANEAN

ILAE-EMR Course
Chirurgie de l'épilepsie :
30 Septembre / 01-02 Octobre 2024
Faculté de Médecine Sfax- Tunisie

1er Jour : 30/09/24
Visite au bloc opératoire du service de Neurochirurgie CHU Habib Bourguiba Sfax Visite du service de Neuropédiatrie CHU Hédi Chaker Sfax

2ème jour Matin de 9h-13h		
Session 1		
	Conferences	**Conferencier**
8.30-9.00	Registration	
9.00-09.30	Important semiological consideration for epilepsy surgery	**Pr Cigdem Ozkara**
9.30-10.00	The contribution of EEG in the detection of the epileptogenic focus	**Pr ag Leila Triki**
10.00-10.30	Neuropsychological assesmant for presurgical evaluation	**Dr Salma zouari**
Break Coffee		
Session 2		
11.00-11.30	General principles of epilepsy surgery including presurgical evaluation,	**Pr Cigdem Ozkara**
11.30-12.00	La lobectomie temporale : techniques et indications	**Pr Ag Hichem Ammar**
12.00-12.30	Focal lesionectomy for Drug-Resistant Epilepsy	**Pr Ag Sofien Bouali**
12.30-14.30	**Break Lunch**	
Session 3		
14.30-15.0	Surgically amenable epilepsies.	**Pr Cigdem Ozkara**
15.00-15.30	overview of the paediatric epilepsy surgery	**Pr Bertil Rydenhag**
Break Coffee		
16.00-16.30	La stimulation du nerf vague	**Pr Fatma Kamoun**
16.30-17.00	Grids, strips and SEEG	**Pr Bertil Rydenhag**

3ème jour : 02/10/24		
Session 4 :		
09.00-09.30	Résultats du traitement chirurgical de l'épilepsie mésiotemporale pharmacorésistante : experience de l'Hopital millitaire ,tunis, tunisie	**Pr Ag Hichem Ammar**
09.30-10.00	Results and prognosis of operated patients	**Pr Cigdem Ozkara & Bertil Rydenhag**
10.00-10.30	Surgery in eloquent areas	**Bertil Rydenhag**
Break Coffee		
Session 5 : Clinical cases		
11.00-13.00	Not every flame needs a fire, nor every seizure a scalpel What is hidden affects what is seen	**Dr Wafa Bouchaala** **Pr Ag Fatma Kolsi**
13.00- 13-30	Discussion and Conclusion	

Figure 2: program of the surgery course in September 2024

Figure 3: Visit to the operating room in H Bourguiba Hospital

Figure 4: Case discussion in child neurology department-Sfax Tunisia

The other two days were devoted to theoretical presentations by professors Bertil Rydenhag and Cigdem Ozkara and presentations by the neurosurgery teams of Sfax with presentations of some old cases operated on in Sfax (figure 5-6-7-8-9). These two days were very fruitful in terms of information and discussion.

Figure 5-6: Pr Ozkara and Pr Rydenhag presenting during the epilepsy surgery course

Figure7-8-9: Surgery epilepsy course in Sfax Medical School, September 2024

To facilitate the implementation of this program, we met with the Sfax Regional Health Director, who was very cooperative and enthusiastic about implementing this program and encouraging hospital administrations and the Ministry of Health to help us secure the necessary equipment and personnel (figure 10). This meeting facilitated the acquisition of surgical equipment and reinforced the epileptology unit with the necessary personnel to ensure recordings for at least two nights and three days.

Figure 10: Meeting with Sfax Regional Health Director (Dr Hatem Cherif)

We would like to thank Professor Bertil Rydenhag for coming to our center even though he was recovering from his fracture.
After 3 days of intense work, a moment of relaxation during a dinner together and a visit to the El Jem colossum (figure 11-12).

Figure 11 : Dinner in Borj ediafa

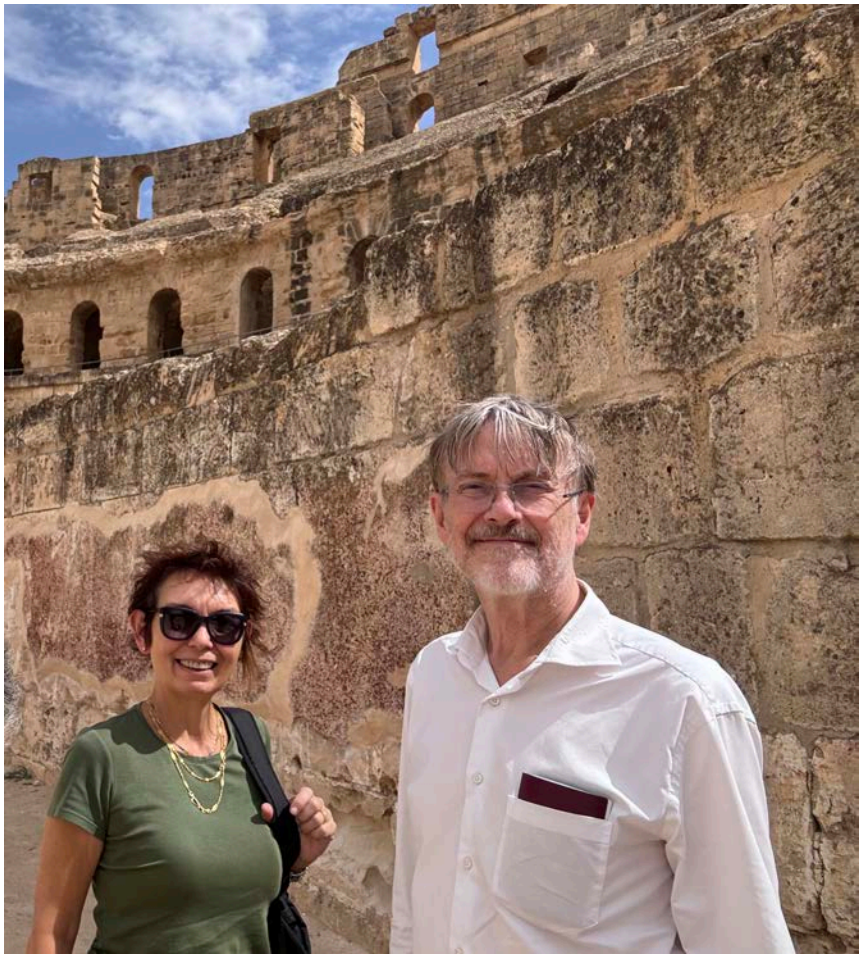


Figure 12: Visit to the El Jem colossum

This meeting encourages two members of Sfax team to participate in the EPODES course in Brno in January: Fatma Kolsi, neurosurgeon and Bouchaala Wafa, pediatric neurologist, as a direct consequence of the mentorship program (figure 13)

Figure 13: Fatma Kolsi, neurosurgeon and Bouchaala Wafa, pediatric neurologist in 14th EPODES

PHASE 3: PATIENT PREPARATION FOR SURGERY

After this visit, the discussions of clinical cases continued and became more productive. Through the discussion of clinical cases and after verifying the surgical teams' capabilities, five patients were selected for surgery (Table 2).

Patient	Age	Diagnosis	Procedure	Date of surgery	Surgeon	Assisted By
M F	25 years	Focal motor seizures/ mesial temporal sclerosis	Extension of temporal lobectomy including amygdalo-hippocampectomy	02/04/25	Pr Boudawara Pr ag Kolsi	Pr Rydenhag B
Z Ch	7 years	Focal motor seizures tonic asymmetric/ basi frontal dyslpasia	Lesionectomy and basi frontal lobectomy	03/04/25	Pr Boudawara Pr ag Kolsi	Pr Rydenhag B
O N	14 years	Tonic Clonic seizure, predominantly in the right/ Left Parietal Ulegyria	Lesionectomy	04/04/25	Pr Boudawara Pr ag Kolsi	Pr Rydenhag B
M A	42 years	Temporal cystic lesion and mesial temporal sclerosis	Temporal Lobectomy and amygdalo-hippocampectomy	05/04/25	Pr Ammar Pr ag Kolsi	Pr Rydenhag B
M M	5 years	Focal motor tonic seizures with alteration of consciousness / low grade glioma	Lesionectomy	07/04/25	Pr Boudawara Pr ag Kolsi Dr Maatoug	Pr Rydenhag B

Table 2: List of patients who underwent surgery

PHASE 4: SECOND VISIT (31 March-8 arpil 2025)

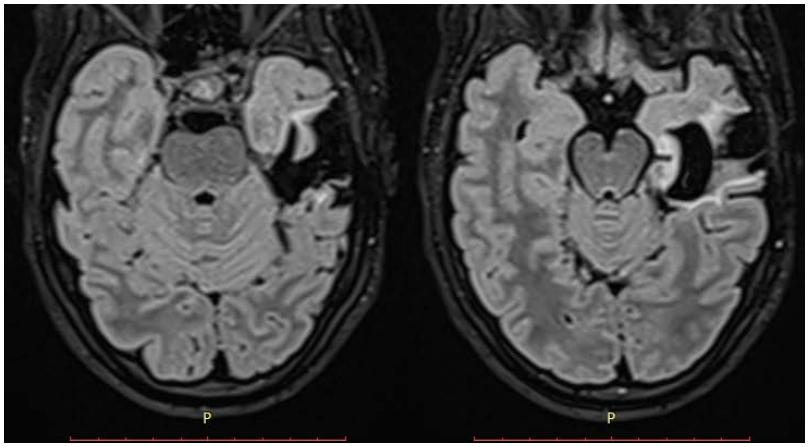
The second visit for Pr Rydenhag took place from March 31 to April 8 to ovierwed the interventions for selected patients and also continue discussion with child neurology team for other patients.

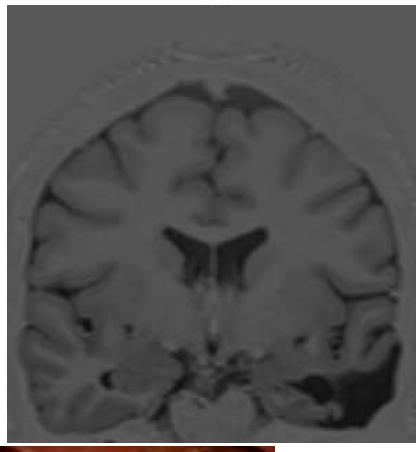
Pr Bertil Rydenhag overviewed the surgery for these 5 patients one reoperation of a failed temporal lobe resection, one resection of a suspected, rather large dysplasia in the mediobasal frontal part in a young boy, an ulegyria, parietally in a child, one combined HS and probable DNET in the left temporal lobe and finally a right frontal glioma in a young child, peroperative pathoanatomical diagnosis probably a pilocystic astrocytoma.

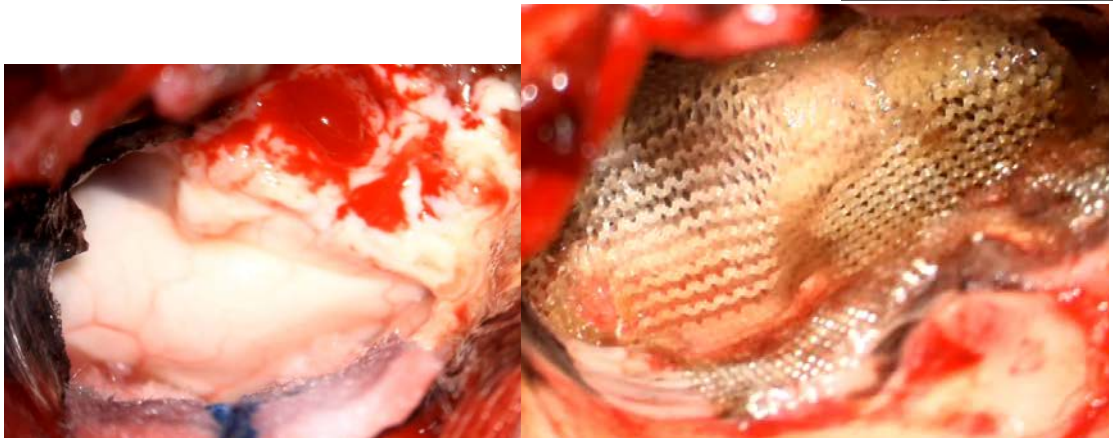
1, Reoperation left temporal, due to continues seizures, remaing hippocampus and signal changes in the temporal pole and the middle temporal gyrus.

25 years old, normal development, febrile seizures. Then focal seizures, with asymmetry of the upper limbs, head deviation . Now, one seizure per month, no aura. Neurological evaluation normal, Surgery at the age of 18 years, sparing the hippocampus. New examination, she has memory problems. Decision to suggest an extended resection, of the temporal pole, middle temporal gyrus, the hippocampus (with extensive signal changes in it). Of course there is a risk of further memory decline.

At surgery, it was straight forward to identify the superior temporal gyrus, the middle temporal gyrus, that was to be partially resected, then hippocampus and the temporal pole. The final result included a nice cleansing up to the pial borders, giving a peroperatively judged adequate resection according to the intention.







To the left above the remaining hippocampus to be removed, the lowest the final.

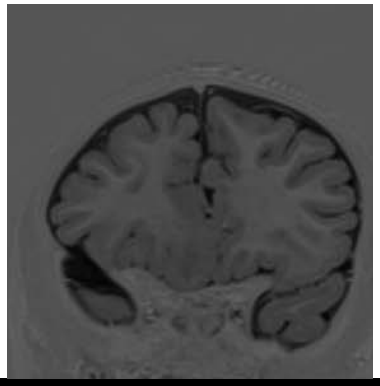
In the immediate postoperative situation at extubation she experienced a seizure, however no neurological deficits, and did wake up fully

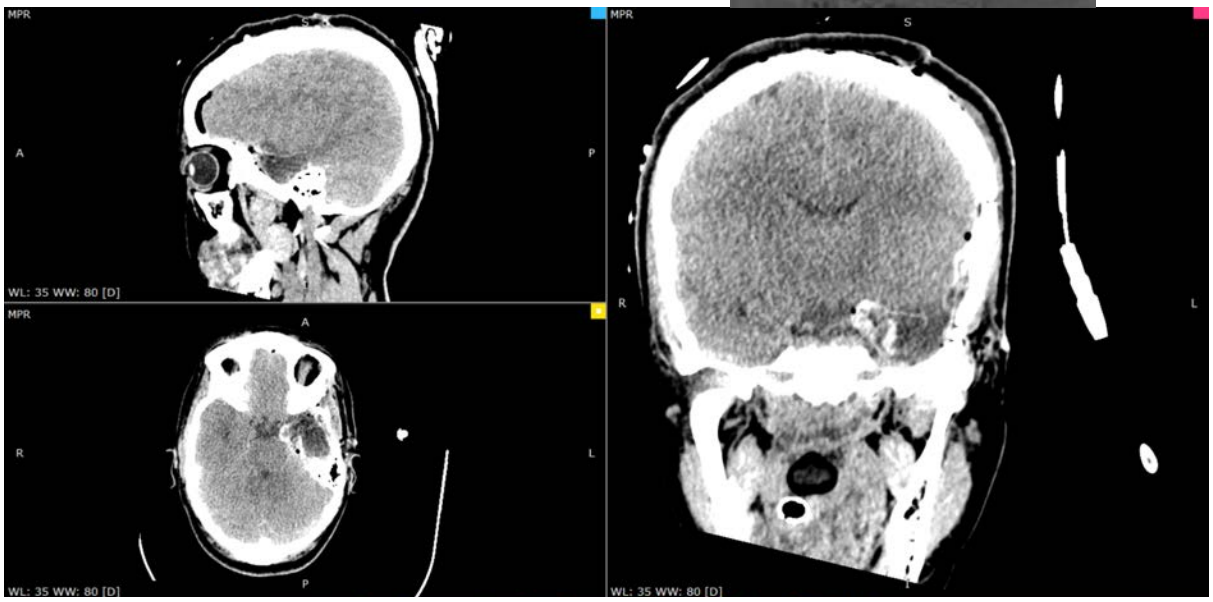
A postoperative CT scan was performed and showed satisfactory findings. She was discharged on postoperative day 7.

Her antiepileptic treatment regimen was maintained without changes.

She was seen in follow-up consultation on April 30, 2025. She is doing very well, reports no new seizures, and is very satisfied with the outcome, as is her family. The surgical scar is clean and healing properly.

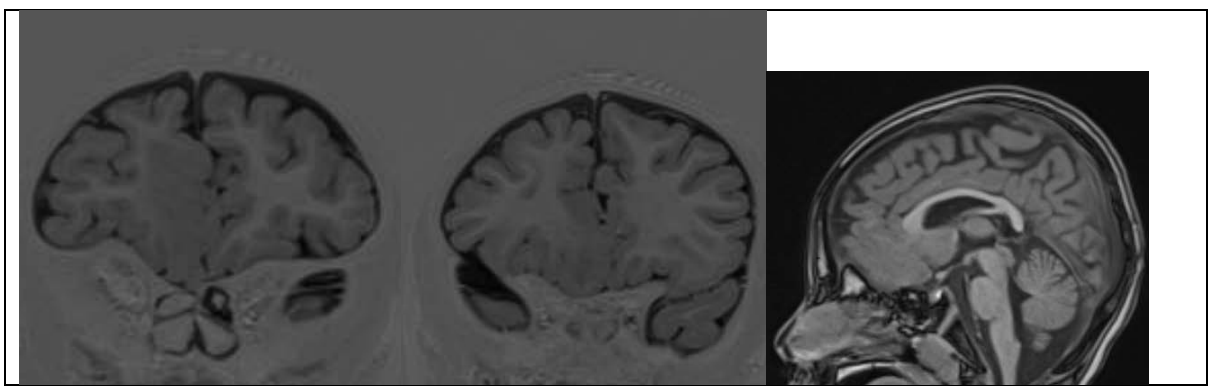
The histopathological report is still in progress.

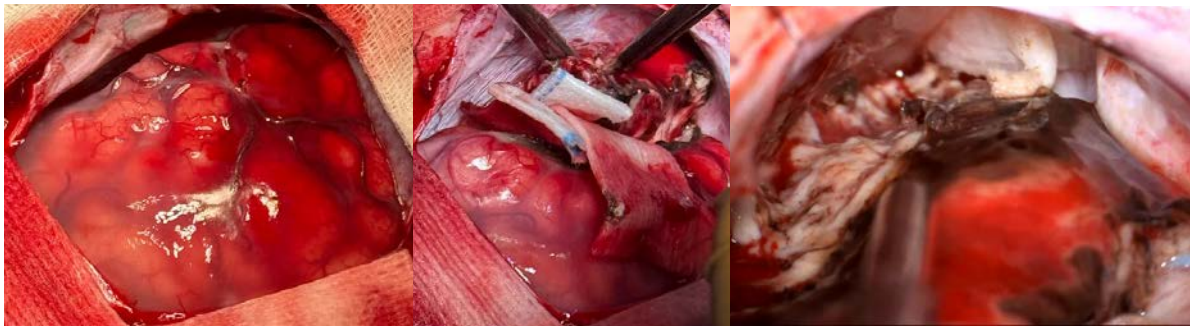


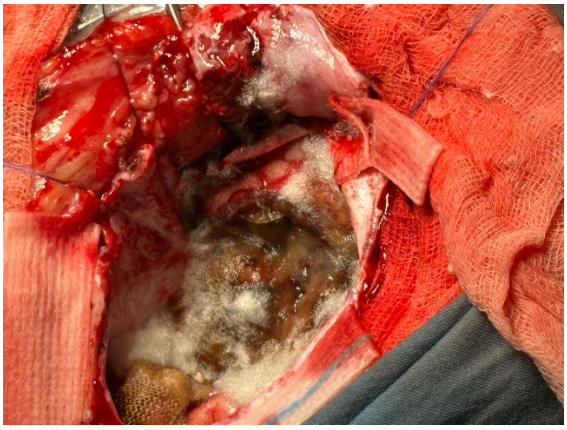


2, Z Right basofrontal dysplasia

7 years old, right hands. Focal motor seizures tonic asymmetric since 17 months, predominantely left sided. MRI reveals a probable dysplasia mediofrontal basal right. Surgery was planned to remove, using genu, falx and the olfactorial frove as landmarks. Neuronavigation. Bone trepanation until the midline

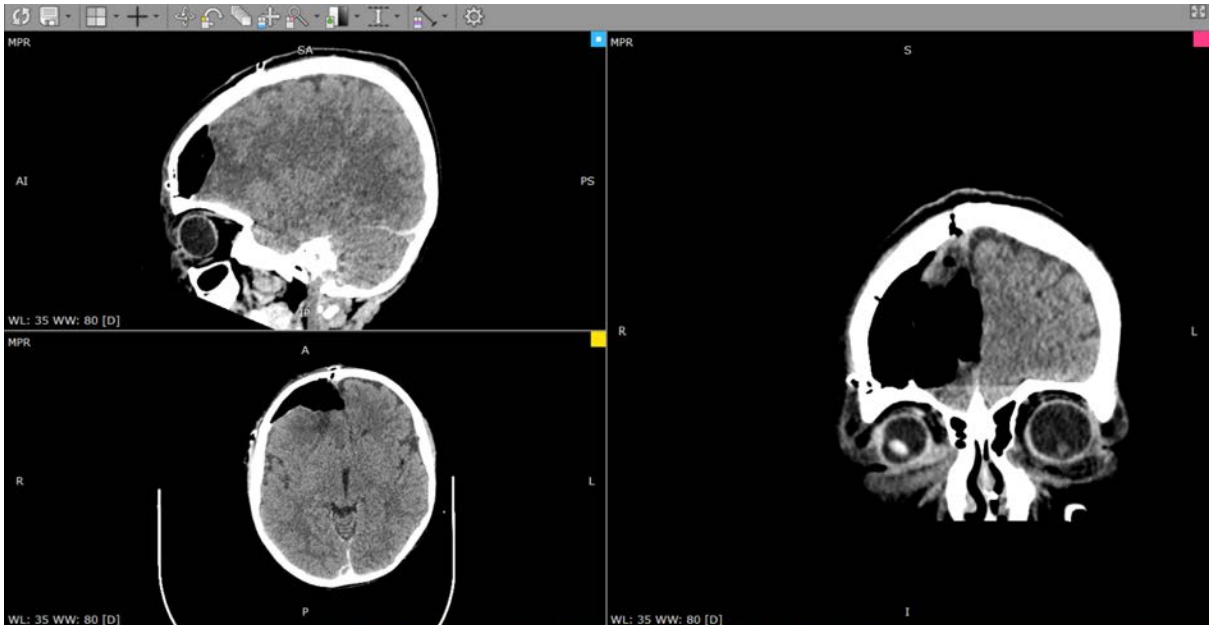






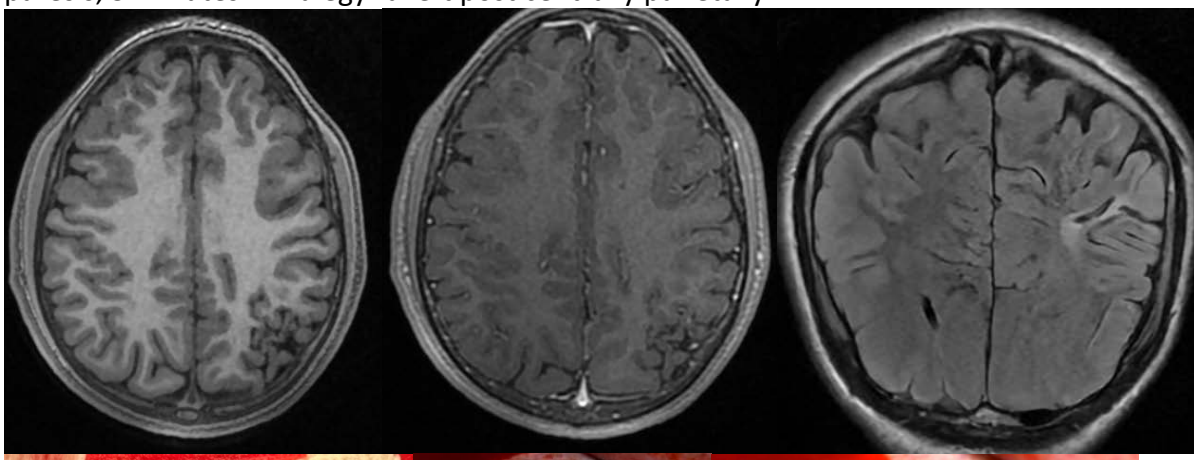
Nice resection, the tissue was obviously pathologic, PAD in a nice big portion, thereafter, cleaning up the pial surfaces with the CUSA.

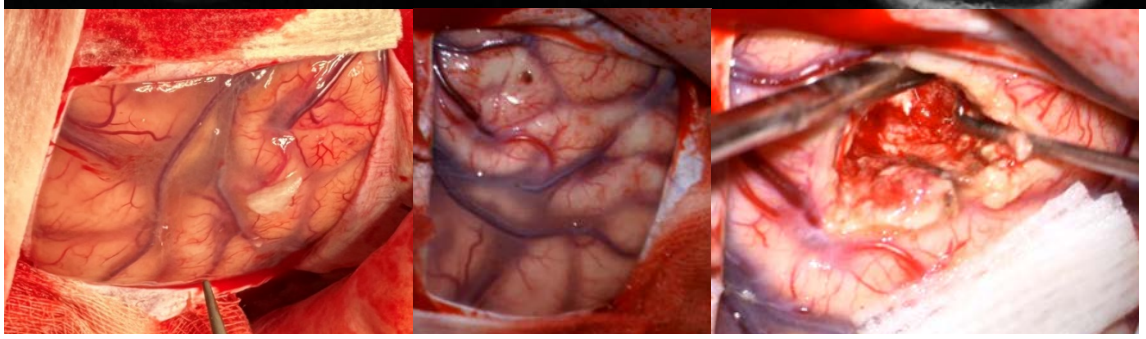
The postoperative course was generally smooth. He experienced four focal seizures on postoperative day 3, which were controlled with intravenous clonazepam. As a result, Taver® was added to his antiseizure treatment. No further seizures have occurred since. A postoperative CT scan was performed and showed satisfactory findings. He was discharged on postoperative day 15.



3, Left parietal ulegyri

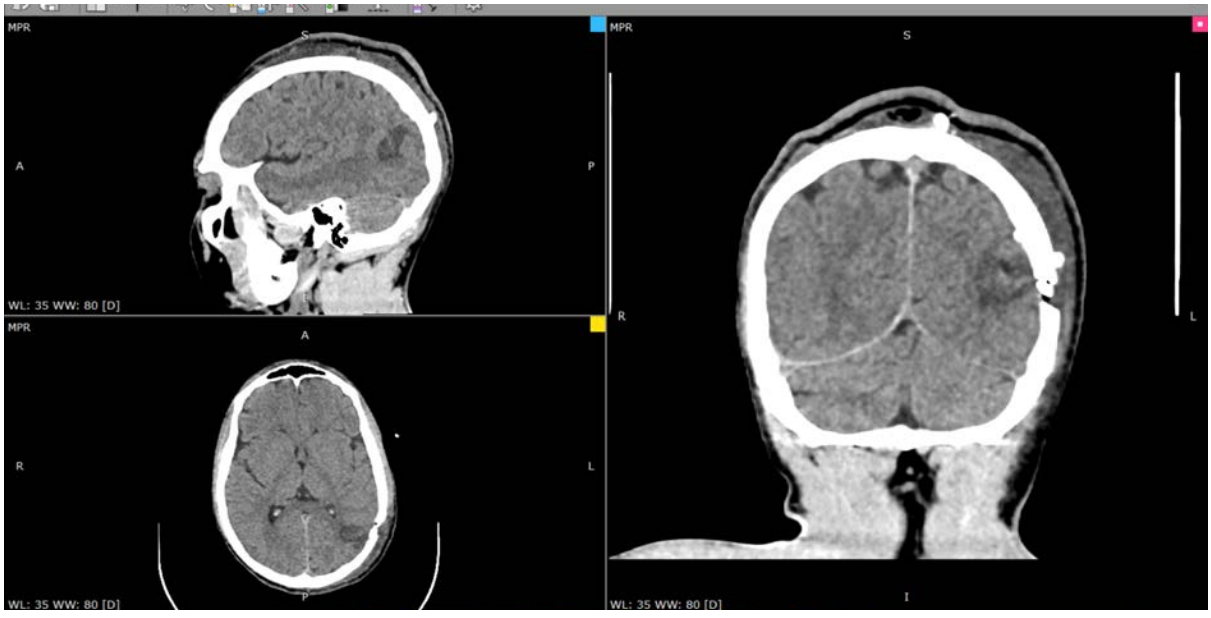
Male, 14 years old, right sided tonic-clonic seizures since the age of 7. Right hand Todds paresis, 5 minutes. An ulegyria left post centrally parietally.





At surgery identification by the neuronavigation, and visual inspection. At surgery the cortex was immediately identified as pathologic after having entered the pial surface. The resection went out nice, with a border of subpial regions giving a nice compartment to be removed.

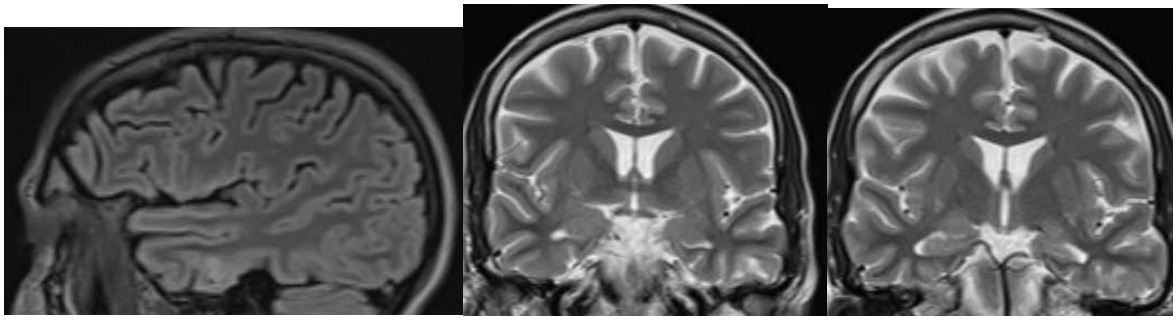
Postoperative CT scan was performed and showed satisfactory findings. The patient was discharged on postoperative day 5.



On postoperative day 15, he experienced a single generalized tonic-clonic seizure lasting approximately 30 seconds, triggered by emotional stress. No further seizures were reported thereafter.
The same antiepileptic treatment regimen was maintained.
The histopathological report is still pending.

4, Temporal DNET and HS

42 years old. Aura, epigastric pain. Dizziness followed by GTC, then focal seizures: Derealisation, detached, postictal afasia, frontal headache. Basal left temporal probable DNET, and signs of HS. Plan to perform a Spencer type, resection of T2, T3, fusiform and parahippocampal gyrus and hippocampectomi, including amygdalar parts.

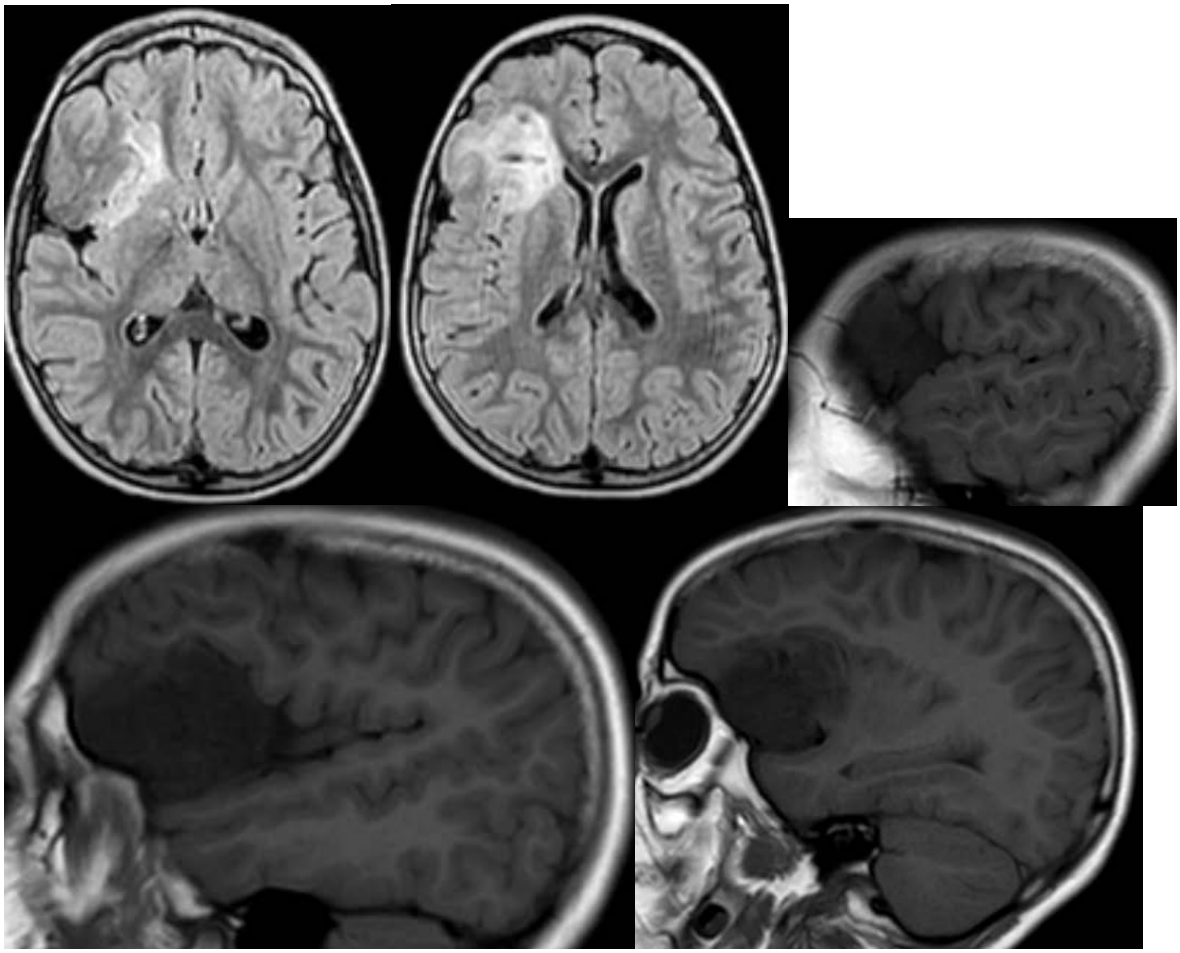


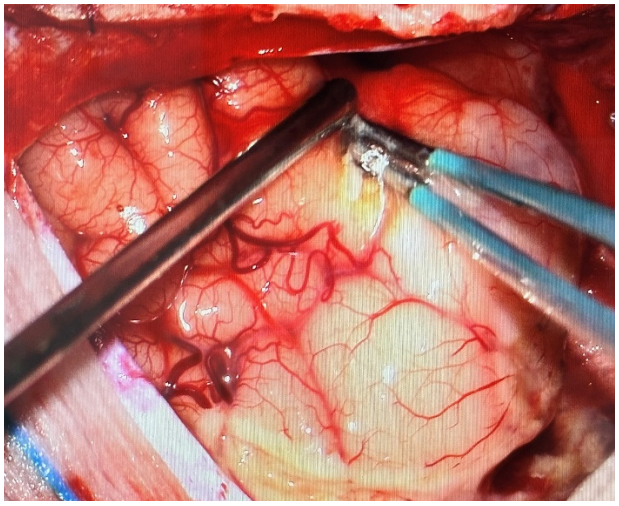
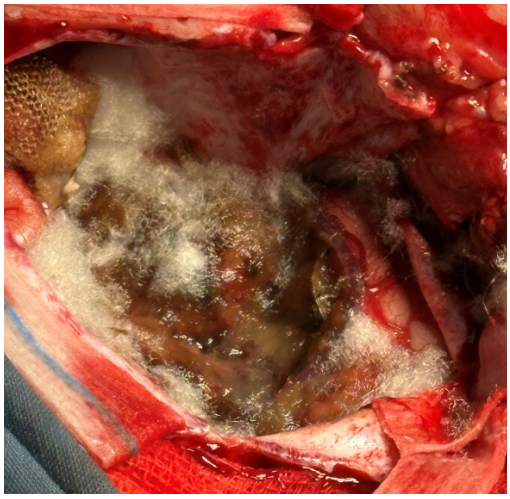
A postoperative CT scan was performed and showed satisfactory findings. She was discharged on postoperative day 14.
The postoperative course was uneventful, and she did not experience any seizures following the operation

Her antiepileptic treatment regimen was maintained without changes.
The pathology report reveals an amygdalo-hippocampal sclerosis associated with a grade I ganglioglioma.

5, Right frontal low-grade glioma

5 years old girl, normal development, focal motor seizures with alterations of the consciousness since the age of 2 years. Normal neurology.

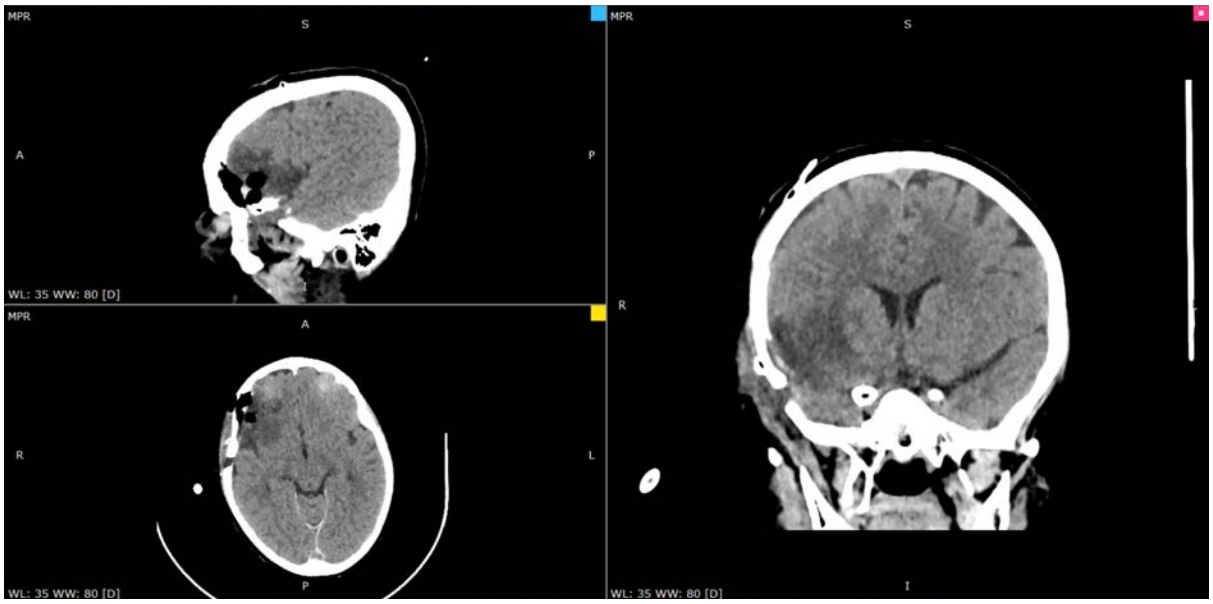


Peroperative pathoanatomical diagnosis indicates a low grade pilocystic astrocytoma, not unexpected.

The postoperative course was uneventful, and she did not experience any seizures following the operation.

A postoperative CT scan was performed and showed satisfactory findings. She was discharged on postoperative day 10.



Her antiepileptic treatment regimen remained unchanged.

Histopathological examination confirmed a WHO Grade I ganglioglioma.

Her follow-up consultation is scheduled for May 7, 2025.

According to Professor Rydenhag, the surgeons are well experienced, and the main coming learning route is the team-collaboration and selection of patients, most important may be which ones are not suitable for surgery and the acquisition of the e neuronavigational systems, ultrasonic suctions and an updated microscope will allow us to continue our program.

Professor Cigdem Ozkara visited the epilepsy unit at Hedi Chaker Hospital and the military hospital from April 3 to 6. She reviewed the technical capabilities and trained the EEG technicians (figure 14) of these two units. We also held a session to discuss new clinical cases of drug-resistant epilepsy (figure 15).

Figure 14: Pr Ozkara Training the EEG technicians

Figure 15: Cases discussion in Military hospital

We also had the honor of having a visit from our regional health director. This visit allowed us to promote this program and advocate for improving our two epileptology units and establishing an epilepsy center in our region (figure 16-17).

Figure 16-17 : surgery program team with Dr Hatem Cherif

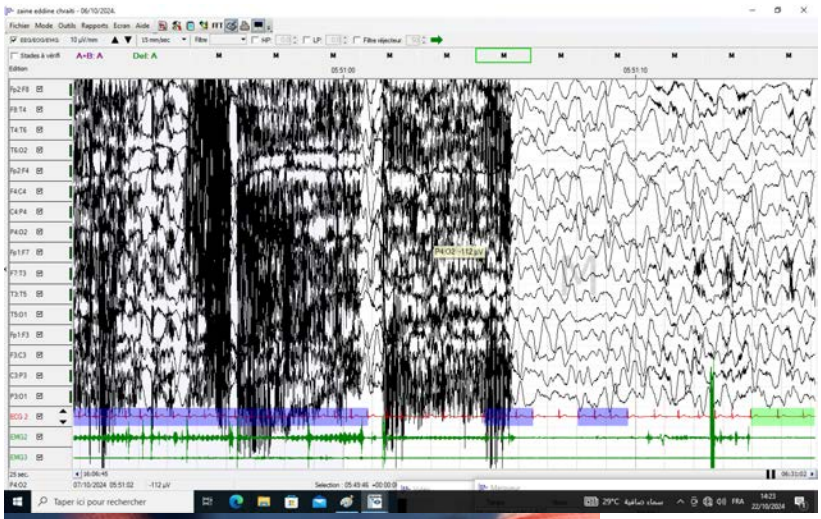
CONCLUSION … AND THE NEXT STEP

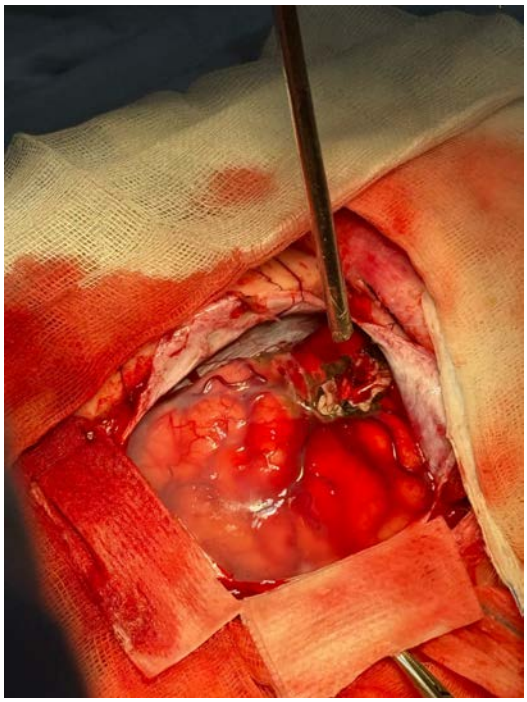
In the opinion of all participants in this program, it was an extraordinary and very fruitful experience for doctors, neuropsychologists, technicians and patients alike. This is an extraordinary breakthrough in the care of our patients who see hope reborn with this surgical possibility. We can never thank enough our two mentors who were very available, patient, professional and above all enthusiastic with a single goal to see us move forward and see our love for epilepsy surgery born. We are committed to continuing this work with our two mentors who have shown their enthusiasm to continue discussing and helping us select our next patients.

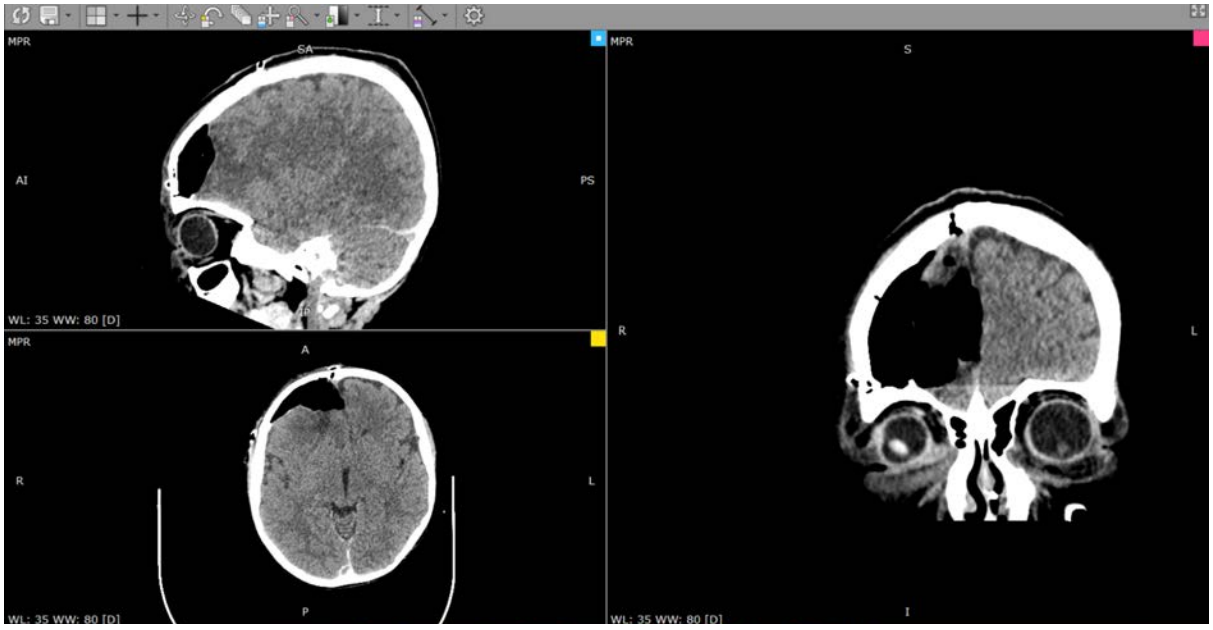
EXAMPLE OF PRESENTATION:

Case 2

- 7 years old , Right handed
- Focal motor seizures tonic asymmetric since the age of 17 months
  - predominantly in left side
- Seizure frequency
  - 1/ week sometimes:5-6 episodes per day
- Several anti-seizures medications: VPA/ LVT/BZD
- Motor Examination: normal
- Moderate Intellectual disability



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