Complications After Surgery for Mesial Temporal Lobe Epilepsy Associated with Hippocampal Sclerosis

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■ BACKGROUND: **Hippocampal sclerosis is the most common cause of drug-resistant epilepsy amenable for surgical treatment and seizure control. This study aimed to analyze morbidities related to surgery of mesial temporal lobe epilepsy associated with hippocampal sclerosis and to identify possible risk factors for complications.**

■ METHODS: **A retrospective analysis of postoperative complications was made for 389 operations performed between 1990 and 2015 on patients aged 15–67 years (mean 36.8). Three surgical approaches were used: anterior temporal lobectomy (ATL) ($n = 209$), transcortical selective amygdalohippocampectomy (SAH) ($n = 144$), and transsylvian SAH ($n = 36$). Complications were classified as minor or major if there was a neurologic impairment or if further surgical or medical treatment was necessary.**

■ RESULTS: **Complications followed 15.4% of operations. They were classed as major for 4.1% of patients, but there were no mortalities. Persistent neurologic deficits occurred in 0.5% of patients. In 3 cases (0.8%) additional surgery was necessary to treat an intracranial hematoma, a delayed hydrocephalus, and a subdural empyema. Symptomatic visual field defects (VFDs) were frequent and included contralateral superior quadrantanopia (8.2%) or hemianopia (1.3%). Overall complications ($P = 0.04$) and symptomatic VFDs ($P = 0.04$) were most frequent in operations on men. Major complications occurred most often with the ATL surgical approach than with transcortical SAH ($P = 0.03$).**

■ CONCLUSIONS: **Major complications occur rarely after mesial temporal surgery on epileptic patients. They occur more often following the ATL rather than transcortical SAH approach. Complications tend to be temporary with symptoms of limited duration for surgery performed by experienced teams on carefully selected and evaluated patients.**

INTRODUCTION

Mesial temporal lobe epilepsy (MTLE) associated with hippocampal sclerosis (HS) is the most common focal, intractable epilepsy.[1] Mesial temporal lobe surgery, the standard treatment for this syndrome, has been widely evaluated.[2] Diverse surgical approaches ensure a reduced seizure frequency. They include a selective transsylvian or transcortical amygdalohippocampectomy (SAH) and an anterior temporal lobectomy (ATL).[1,2]

While these surgical approaches are safe, possible morbidities and even mortality must be discussed with patients before surgery. Few studies have focused on adverse events after MTLE surgery.[3] Accurate data on outcomes and complications would aid presurgical discussions with patients and also permit a useful comparative evaluation of different surgical approaches. We therefore conducted a 25-year retrospective study on the morbidity and mortality of MTLE-HS surgery in all patients operated in our institution. Mesial temporal lobe surgery has evolved over the duration of this retrospective study, so we could compare different surgical approaches for mesial temporal

Key words
- Adverse events
- Epilepsy surgery
- Mesial temporal sclerosis
- Morbidity
- Predictors
- Visual field defects

Abbreviations and Acronyms
ATL: Anterior temporal lobectomy
EEG: Electroencephalogram
HS: Hippocampal sclerosis
MRI: Magnetic resonance imaging
MTLE: Mesial temporal lobe epilepsy
MTLE-HS: MTLE associated with HS
OR: Odds ratio
SAH: Selective amygdalohippocampectomy
VFD: Visual field defect

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Supplementary digital content available online.

Citation: World Neurosurg. (2017) 102:639-650.
http://dx.doi.org/10.1016/j.wneu.2017.03.128

Journal homepage: www.WORLDNEUROSURGERY.org

Available online: www.sciencedirect.com

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lobe resection. Each approach had its own advantages and consequences.

The primary aim of this report is therefore to describe, analyze, and discuss the complications related to MTLE-HS surgery. A secondary end point was to search for factors that might increase the possibility of postoperative complications.

METHODS

Patients

We analyzed retrospectively the after-effects of surgery for MTLE-HS in all adults and teenagers (over 15 years) who were treated in our institution between November 1990 and December 2015 and then followed for at least 6 months. This study was approved by the French National Technologies and Civil Liberties Commission, which ensures the protection of personal data.

Patients were selected for surgery after medical management of seizures had failed. Standardized, noninvasive presurgical evaluation included complete neurologic, neuropsychologic, and psychiatric examinations; scalp video electroencephalogram (EEG) recording of seizures, brain magnetic resonance imaging (MRI), and, when needed, subtraction ictal single-photon emission computed tomography coaligned with MRI and interictal positron emission tomography. A multidisciplinary team then analyzed data from these investigations to decide if surgical treatment was indicated and if localization of the focus was clear. If so, strict selection criteria were used to define a single-stage surgical resection, avoiding further intracranial EEG recordings whenever possible. Selection criteria for surgery included the presence of typical partial seizures, epileptiform activity originating from the temporal lobe, and unilateral hippocampal atrophy with or without a T2 hyperintense signal, all features of a classical MTLE-HS syndrome.

We collected data on age, gender, medical history, seizure semiology, and electrophysiologic findings including invasive recordings if applicable, preoperative brain MRI, side and approach of surgery, and histologic findings. Any adverse event during the postoperative period was considered as a complication and documented from neurologic examinations, postoperative scans, and formal visual field testing.

Surgical Methodology

Three surgical approaches were used: 1) Spencer's ATL,[4] 2) SAH via transsylvian approach,[5] and 3) SAH via transcortical trans-superior temporal gyrus approach.[6] ATL was used between 1990 and 2010, and transsylvian SAH was used between 1994 and 2000. SAH with a transcortical approach was first used in 2000. The senior author (S.C.) performed all surgeries. The decision to perform an ATL or an SAH was first based on timing and then on the results of the presurgical evaluation. Before 1994, patients who underwent surgery for MTLE-HS received an ATL, as this was the practice at our center. Between 1994 and 2010, SAH was used for patients with a high risk of postoperative cognitive deterioration. In 2010, the transcortical SAH was definitively adopted as the standard operation for MTLE-HS.

Postoperative Management

Patients were monitored in the recovery unit after surgery. A computed tomography scan was done within 24 hours to exclude immediate complications, before transfer to the Neurosurgery unit. All patients were followed at regular intervals after surgery. At 6–9 months after surgery, complete neurologic and ophthalmologic assessments were made and a follow-up brain MRI was obtained.

Classification of Complications

Two severity scales for postoperative complications after MTLE surgery were designed to permit comparison with previous studies. First was the binary major/minor scale: A complication was defined as major if medical or surgical treatment was needed and/or there was a persistent neurologic impairment. Other complications including urinary tract infection and deep venous thrombosis were classed as minor. Second, a graded scale was used as follows, with composite items including a prevailing surgical component[7,8]:

- Grade 0: no complication
- Grade 1: a transient complication not needing treatment; or noninvalidating homonymous contralateral superior quadrantanopia
- Grade 2: a transient complication that resolved completely but required surgical or medical treatment

Table 1. Complications Associated with Mesial Temporal Lobe Resection

	% (n/N)	Class—Grade of Complications
Symptomatic Complications		
Transient hemiparesis	1.3% (5/389)	Minor—Grade 1
Transient aphasia	1.3% (5/389)	Minor—Grade 1
Definitive hemiparesis	0.3% (1/389)	Major—Grade 3
Definitive hemiplegia	0.3% (1/389)	Major—Grade 3
Cerebral venous sinus thrombosis	0.5% (2/389)	Major—Grade 2/3
Transient oculomotor nerve paralysis	0.3% (1/389)	Major—Grade 3
Neurologic complications (total)	3.9% (15/389)	
Meningitis	1.0% (4/389)	Major—Grade 2
Subdural empyema	0.3% (1/389)	Major—Grade 2
Intracerebral hemorrhage	0.3% (1/389)	Major—Grade 2
Hydrocephalus	0.3% (1/389)	Major—Grade 2
Surgical complications (total)	1.8% (7/389)	
Homonymous quadrantanopia	8.2% (32/389)	Minor—Grade 1
Homonymous hemianopia	1.3% (5/389)	Major—Grade 3
Visual complications (total)	9.5% (37/389)	
Urinary tract infection	1.0% (4/389)	Minor—Grade 1
Deep venous thrombosis	0.5% (2/389)	Minor—Grade 1
Other complications (total)	1.5% (6/389)	
Overall complications	15.4% (60/389)	

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