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Selective amygdalohippocampectomy versus standard temporal lobectomy in patients with mesiotemporal lobe epilepsy and unilateral hippocampal sclerosis: post-operative facial emotion recognition abilities

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Abstract Surgical treatment of mesial temporal lobe epilepsy (mTLE) patients involves the removal either of the left or the right hippocampus. Since the mesial temporal lobe is responsible for emotion recognition abilities, we aimed to assess facial emotion recognition (FER) in two homogeneous patient cohorts that differed only in the administered surgery design since anterior temporal lobectomy (ATL) or selective amygdalohippocampectomy (SAH) were performed independently of the underlying electroclinical conditions.

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Selective amygdalohippocampectomy;
Outcome

The patient selection for the two respective surgical procedures was carried out retrospectively between 2000 and 2009 by two independent epilepsy centres, the Kork Epilepsy Centre, Germany and the University Hospital of Strasbourg, France. All included patients had presented with unilateral hippocampus sclerosis (HS) without associated dysplasia or white matter blurring and had become seizure-free postoperatively. Psychometric evaluation was carried out with the Ekman 60 Faces Test and screened for depression and psychosomatic symptoms with the SCL-90 R and the BDI. Thirty healthy volunteers participated as control subjects.
Sixty patients were included, 27 had undergone SAH and 33 ATL. Patients and controls obtained comparable scores in FER for surprise, happiness, anger and sadness. Concerning fear and disgust the patient group scored significantly worse. Left-sided operations led to the the most pronounced impairment. The ATL group scored significantly worse for recognition of fear compared with SAH patients. Inversely, after SAH scores for disgust were significantly lower than after ATL, independently of the side of resection. Unilateral temporal damage impairs FER. Different neurosurgical procedures may affect FER differently.

Introduction

Patients with mesial temporal lobe epilepsy (mTLE) do not only suffer from cognitive difficulties but also frequently from maladapted social cognition (Blumer et al., 1995; Kirsch, 2006; Pauli and Stefan, 2009). Clinical and epidemiological studies demonstrate high rates of depression and anxiety in mTLE patients, which are directly correlated with psychosocial maladjustment and affect their quality of life (Hermann et al., 2000; Gilliam et al., 2004; Kanner et al., 2004).

Although the nature of the pathological processes associated with the dysfunction of social cognition remains unclear, disturbances in mTLE patients could be associated with the quotidian inaccurate interpretation of facial emotion recognition (FER) (Pauli and Stefan, 2009).

Patients with mTLE often present neuronal loss and gliosis of the hippocampus, the entorhinal cortex and the amygdala complex (Thom et al., 2009). Epilepsy surgery is well established as effective treatment for drug resistant TLE (Wiebe et al., 2001). There are two main methods for the resection of the mesial temporal lobe region: the anterior standardized temporal lobectomy (ATL) or the selective amygdalohippocampectomy (SAH) as a more restricted surgical alternative (Yasargil et al., 1993). ATL consists of the resection of anterior parts of the TL including amygdala, hippocampus and adjacent neocortical temporal tissue (Doyle and Spencer, 1997). SAH is restricted to the mesial structures of the temporal lobe (i.e., amygdala, hippocampus and parahippocampal gyrus) and preserves the lateral parts of the temporal neocortex (Niemeyer, 1958; Wieser and Yaşargil, 1982). Both neurosurgical approaches have been demonstrated to be equally effective with regard to seizure outcome (for review, see Schramm, 2008; Wendling et al., 2013). However, some studies pointed out their differing impact on cognitive functions depending on the respective surgical method (Helmstaedter et al., 2008; Wendling et al., 2013). Considering the potential role of the temporal pole as a part of the network that contributes to the emotional functioning it was our hypothesis that ATL might affect emotional perception in a different was than SAH. For example, a recent report described a relationship between left hippocampal atrophy and overall social interference abilities and between left anterior neocortical atrophy and sarcasm comprehension (Cohn et al., 2014). The anterior temporal cortex has been named a convergence zone of higher-order perceptual and emotional processes in this work.

Amlerova et al. (2014) recently reported on the impact of TLE surgery on emotion recognition and social cognition in a partly longitudinal and partly cross-sectional study. They described presurgical impairment and a rather neutral effect of surgery although few individuals showed a clear decline. To our best knowledge, the impact of the two surgical methods for the resection of the mesial part of the TL, SAH and ATL on FER, has not been studied yet. For us it was tempting to investigate (i) the impact of TLE surgery and (ii) the potentially different impact of the surgical approach. As in our previous work on different effects of SAH and ATL on postoperative outcome (Wendling et al., 2013) we tried our best to investigate patient groups with highest possible homogeneity. Therefore only patients with unilateral mesial temporal epilepsy with hippocampal sclerosis were included if any additional pathological findings such as temporal pole blurring were not apparent. In addition, patients were only included if they had become seizure-free postoperatively so that the correct presurgical assumption of the epileptogenic zone could be suggested.

Materials and methods

Subjects

Patients

Patients were included if they had remained seizure-free for a minimum of three years postoperatively and were invited to participate in the study by mail. We considered patients who had undergone surgery between 2000 and 2009. Written informed consent was obtained. Twenty-seven patients underwent preoperative evaluations at the Kork Epilepsy Centre, which was followed by SAH at the University Hospital of Freiburg, Germany. Thirty-tree patients