

# Somatoform Disorders After Temporal Lobectomy

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**Objective:** Depression, anxiety, and psychosis are the most frequent psychiatric disorders after epilepsy surgery. The only new-onset somatoform disorder reported postoperatively is conversion disorder. We identified 10 patients who developed somatoform disorder other than nonconversion epileptic seizures after anterior temporal lobectomy.

**Method:** We retrospectively reviewed the charts of 325 anterior temporal lobectomy and 125 extratemporal surgeries between 1991 and 2000.

**Results:** Seven of the patients developed undifferentiated somatoform disorder after anterior temporal lobectomy, 1 had pain and body dysmorphism, another had pain disorder, and another had body dysmorphism alone, but none were found after extratemporal surgeries (chi-square = 3.93;  $P \leq 0.05$ ). Somatoform disorder was significantly more common in right anterior temporal lobectomy ( $n = 9$ ) than left anterior temporal lobectomy ( $n = 1$ ) (chi-square = 6.5;  $P \leq 0.025$ ).

**Conclusions:** Our findings suggest that right temporal resection contributes to the development of somatoform disorders in our patients and that right temporal dysfunctions may contribute to idiopathic somatoform disorders.

**Key Words:** somatoform disorders, temporal lobectomy

(*Cog Behav Neurol* 2004;17:57–61)

Diverse spectrums of behavioral changes occur during ictal, interictal and periictal periods. After epilepsy surgery, depression, anxiety, psychosis, delusions, mania, hypersexuality, and other behavioral disorders can first develop.<sup>1–6</sup> Studying postoperative psychiatric disorders is complicated by (1) high rates of preoperative behavioral disorders, (2) environmental factors, (3) psychological adjustment after surgery, (4) simultaneous improvement in some behavioral areas (e.g., aggression) and deterioration in others (e.g., depression), (5) changing nature of behavioral problem over time, (6) positive

or negative psychotropic effects of medications, and (7) limitations of diagnostic criteria (e.g., *Diagnostic and Statistical Manual of Mental Disorders*, fourth edition–revised [DSM-IV-R]) that were not created for neurobehavioral disorders. The features and frequencies of some postoperative psychiatric disorders are characterized, but the causative factors remain uncertain. A transient, mixed mood disorder with emotional lability often occurs during the first 3 postoperative months after anterior temporal lobectomy (ATL).<sup>3,4,7–9</sup> Approximately one third of patients who undergo ATL develop new psychiatric problems in the 6 months after surgery, most often depression and anxiety.<sup>10,11</sup>

The only somatoform disorder (SD) well characterized after ATL is conversion disorder, specifically, nonepileptic seizures.<sup>3,12,13</sup> All SDs have 1 or more physical symptoms that suggest a medical or neurologic condition but are not fully accounted for by a physical disorder, another mental disorder, or substance abuse. None of the other 4 SDs identified in DSM-IV-R<sup>14</sup> are clearly described after ATL. These include somatization disorder (combination of pain, gastrointestinal, sexual, and neurologic symptoms), hypochondriasis (preoccupation with fear of having or developing a serious disease based on misinterpretation of bodily symptoms or functions), body dysmorphic disorder (preoccupation with an imagined or exaggerated defect in physical appearance), and pain disorder (pain as the predominant focus of clinical attention). In this study, we report 10 cases of new-onset SDs after epilepsy surgery and compare them with surgical patients who did not develop these disorders.

## METHODS

We reviewed medical and surgical records of patients at the New York University Comprehensive Epilepsy Center who underwent epilepsy surgery between 1991 and 2000. Demographic data included age, sex, age at seizure onset, etiology of epilepsy, and history of febrile seizures. Results of preoperative neurologic and neuropsychological examinations, ictal and interictal scalp electroencephalogram, ictal and interictal intracranial electroencephalogram, magnetic resonance imaging, positron emission tomography, single photon emission computed tomography, and intracarotid sodium amobarbital test were recorded. The lateralization and localization by lobe of the seizure focus or foci were recorded.

Received August 1, 2003; revised November 13, 2003; accepted December 8, 2003.

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During presurgical evaluation, all patients were seen by an epileptologist, a neuropsychiatrist, and given neuropsychological testing. Routine follow-up after surgery was approximately every 3 months for the first year and every 6 to 12 months thereafter. Patient seizure frequency was recorded for a 6-month baseline before surgery and at each follow-up visit after surgery.

We reviewed all charts to identify patients who developed a new SD after epilepsy surgery. We excluded patients who developed conversion symptoms, such as nonepileptic seizures after epilepsy surgery. Limitations in the diagnostic criteria of SDs restricted us from classifying 6 patients with a specific SD. These patients were categorized under undifferentiated somatoform disorder (USD).<sup>14</sup> Patients presenting with USD had 1 or more physical complaints that persisted for 6 months or longer that could not be fully explained by a general medical condition, medication side effects, or physical complaints or impairments that would otherwise not be expected. These symptoms interfered with social and occupational functioning. After complete description of the study to the subjects, written informed consent was obtained.

The chi-square analysis determined the significance of SD in right temporal lobectomy (RTL) compared with left temporal lobectomy (LTL) and temporal versus extratemporal groups.

## RESULTS

Between 1991 and 2000, 450 surgical resections were performed in adults: 325 ATL and 125 in extratemporal areas, such as the frontal, parietal, or occipital lobes. Ten (3%) of the 325 ATL patients developed a somatoform disorder, 7 USD, 1 body dysmorphism and pain disorder, 1 pain disorder, and 1 body dysmorphism. Nine patients had RTL: 6 females and 3 males. One male had a LTL. One of the 9 RTLs also had multiple subpial transections, and another RTL had a previous craniotomy to remove a hemangioma. All ATLs had amygdalectomy and entire hippocampectomy. Eight of the 10 patients were dominant for language in the left hemisphere, 1 had bilateral language, and 1 had mixed but probable left dominance.

The cohort of 325 ATLs was composed of 160 (49%) RTLs: 79 females, 81 males, and 165 (50%) LTLs: 89 females, 76 males. Chi-square analysis demonstrates significantly more SD after RTL than LTL (chi-square = 6.50;  $P \leq 0.025$ ). There was a trend for SD in ATL versus extratemporal lobectomy, 10/325 versus 0/125, respectively (chi-square = 3.93;  $P \leq 0.05$ ).

Nine of the 10 patients had no history of SD before surgery; however, 7 of these patients had history of a psychiatric disorder. One patient's history is unknown. Table 1 summarizes the somatoform complaints in the 10 patients, including lightheadedness, tingling in the head, whole body numbness, somatic complaints of head and the gastrointestinal system, somatic delusions, pins and needles in legs, cardiac and respi-

ratory complaints, chronic pain, and feelings of tiredness in the right side of the body. According to Engel's<sup>15a</sup> classification of seizure outcome, 7 patients were Class I (free of disabling seizures), 2 patients were Class III (worthwhile improvement), and 1 was Class IV (no worthwhile improvement). No patients were found Class II (rare disabling seizures).

Long-term follow-up revealed that symptoms resolved within 12 to 18 months after surgery in 3 of the 10 patients with SD. For the 7 other patients, symptoms persisted for an average of 42.8 months. Six of these patients are still treated with psychotropic drugs. One representative case is presented below.

This 58-year-old right-handed woman developed partial epilepsy at age 51 years without an identifiable etiology. Three antiepileptic drugs (AEDs) were unsuccessful in controlling complex partial seizures. Magnetic resonance imaging showed mild diffuse atrophy. Scalp/sphenoidal interictal and ictal electroencephalogram demonstrated a right temporal focus. Positron emission tomography revealed right temporal hypometabolism. Neuropsychological testing revealed both mild verbal and nonverbal impairment. Prior to her seizures, the patient had no history of psychological problems. However, after the onset of seizures, she became anxious and saw a psychologist to help her adjust to her seizure disorder. Right ATL was performed. Pathology showed cortical and hippocampal gliosis.

Within 2 months after surgery, the patient complained of gastrointestinal, cardiac, and respiratory problems and thought she had a tumor growing inside of her. These problems led her to see her internist as well as several subspecialists and undergo extensive gastrointestinal and cardiac evaluations. No organic pathology was identified. She also developed nonepileptic "head bobbing" seizures and postoperative depression. Antidepressants were prescribed in conjunction with continued visits to her psychologist.

## DISCUSSION

We identified new-onset SD in 4% of patients who underwent ATL, with a significant predominance of right-sided surgeries. Nine patients developed de novo SDs after right ATL and 1 after left ATL. There was a trend for SD to develop more often after ATL than after extratemporal surgery. These findings suggest that removal of right temporal areas contributed to the pathogenesis of SD symptoms in these patients.

Several lines of evidence support the concept that right hemisphere dysfunction facilitates the development of SDs. Briquet, who first provided a detailed analysis of somatization disorder (Briquet syndrome) observed "3 left-sided hysterical anesthetics existed for every right-sided one."<sup>15</sup> Subsequent studies also found a left side of body predominance of somatoform, hypochondriacal, or conversion symptoms.<sup>16-20</sup> One possible explanation for this left-sided symptom predominance is the "most convenient symptom" theory. Thus, symptoms would involve the hand or side that is less functional. However, left-sided conversion symptoms are more frequent

**TABLE 1.** Clinical Features of Patients With Somatoform Disorders After Temporal Lobectomy

| Sex | Age Onset | Language Dominance | Presumed Etiology                                   | MRI                             | Operation | Pathology                        | Preop Psych                                             | Postop Psych                                                                     | Psych Outcome                                     | Comments Psych Meds                   |
|-----|-----------|--------------------|-----------------------------------------------------|---------------------------------|-----------|----------------------------------|---------------------------------------------------------|----------------------------------------------------------------------------------|---------------------------------------------------|---------------------------------------|
| F   | 25        | L                  | Unknown                                             | NL                              | R ATL     | MTS                              | Psychotherapy, postictal psychosis (paranoid delusions) | GI complaints, lightheadedness, tingling in head, anxiety                        | Panic disorder                                    | Paroxetine                            |
| F   | 23        | L                  | Unknown                                             | Cortical atrophy                | R ATL     | CD                               | Anxiety                                                 | Whole body numbness, anxiety                                                     | Anxiety                                           | None                                  |
| M   | 18        | L                  | Head injury 6 mos.                                  | NL                              | R ATL     | CD                               | Anxiety and depression                                  | Pervasive body feeling, multiple somatic complaints of head & GI system, anxiety | Still with anxiety & some depression              | Nefazodone                            |
| F   | 19        | L                  | Unknown                                             | R MTS/low grade astrocytoma     | R ATL     | Low grade astrocytoma            | Psych therapy—possibly for anorexia                     | Somatic delusions of her head shrinking, anxiety, depression                     | Delusions resolved, anxiety & depression resolved | None                                  |
| M   | 20        | Bilateral          | Depressed skull fracture                            | Mild R hippoc atrophy           | R ATL     | Neocortical gliosis              | Organic personality syndrome                            | Distorted body image, paranoia, anxiety                                          | Delusions resolved                                | Buspirone, Risperidone, Citalopram    |
| F   | 31        | Probable L         | Coma of unknown duration                            | Nonspecific                     | R ATL     | Hemangioma                       | Anxiety                                                 | Somatic complaints of intense dizziness, pins & needles in legs, anxiety         | Still with occasional dizziness                   | None                                  |
| F   | 51        | L                  | Unknown                                             | Mild diffuse atrophy            | R ATL     | Cortical and Hippocampal gliosis | Adjustment disorder w/anxious mood                      | GI, cardiac, respiratory complaints; NES-head bobbing, depression                | Still w/depression                                | Fluvoxamine, Quetiapine, Fumarate     |
| F   | 23        | L                  | Head trauma                                         | Multiple bilateral white matter | R ATL     | CD                               | Unknown                                                 | Multiple pain complaints, cont. delusional chronic pain                          | Still w/chronic L sided pain                      | Amitriptyline, Citalopram, Olanzapine |
| M   | 8         | L                  | Head trauma at 26 yo; superior hypophyseal aneurysm | R side hippoc. Vol loss         | R ATL     | Gliosis and neuronal loss        | None                                                    | Feelings of pain & shortness of breath, body dysmorphia, anxiety                 | Anxiety                                           | Sertraline                            |
| M   | 46        | L                  | Febrile convulsions                                 | L hippoc atrophy                | L TL      | Neuronal loss, mild CD           | None                                                    | Feelings of tiredness in R eye & leg, lightheadedness, depression                | Still w/some lightheadedness                      | None                                  |

ATL, anterior temporal lobectomy; CD, cortical dysplasia; L, left side; MTS, mesial temporal sclerosis; NL, normal; R, right side; TL, temporal lobectomy.

among both left-handed and right-handed individuals, arguing against this theory.<sup>21</sup> Conversion nonepileptic seizures are more frequent in patients with right hemisphere dysfunction from surgery or other causes.<sup>3,12</sup> Among 60 patients with unilateral physiological or structural abnormalities and conver-

sion nonepileptic seizures, significantly more had right hemisphere dysfunction.<sup>12</sup>

The mechanisms underlying the predominance of right-sided lesions among patients with conversion and nonconversion SDs may relate to right hemisphere dominance in emo-

tional regulation and body image.<sup>22</sup> The right hemisphere dominates the perception, comprehension, and expression of emotions.<sup>23,24</sup> Emotional trauma such as sexual or physical abuse are risk factors for conversion disorder.<sup>25,26</sup> The right hemisphere may be critical in repressing or successfully resolving traumatic emotions and memories.<sup>22</sup>

The role of right hemisphere dysfunction in delusional disorders may also relate to the development of SDs in some patients. Delusions are false, sustained beliefs based on incorrect inferences about self or environment that cannot be overturned by refuting evidence. In all SDs, there are false beliefs or incorrect inferences in conscious or unconscious mental processes. For example, one patient (Table 1) developed the delusion that his legs were wasting away and shrinking. Evidence that his weight, calf, and thigh measurements had not changed did not dissuade his belief. Although delusional disorders most often occur in psychiatric disorders and diffuse neurologic disorders such as dementia, they can develop after focal neurologic insults. Delusional disorders such as Capgras syndrome, reduplication of self or environment, jealousy, fears of infidelity, and paranoia are more frequent after right hemisphere lesions.<sup>27-30</sup> Somatic delusions in psychiatric patients may also result from dysfunction in the right cerebral hemisphere.<sup>31</sup>

We identified 9 patients with SD after ATL, but none after extratemporal surgeries. This trend for SD to develop after temporal but not frontal or parietal resections supports prior studies that limbic and neocortical areas are involved in the experience of emotional stress.<sup>32-34</sup> Further, the nondominant temporal lobe may be a critical site in the network that "reacts and deals with" emotional traumas. Mechanisms such as resolving or repressing emotional traumas may be partly mediated by right temporal structures. Unfortunately, due to the large patient population followed at our center, we are unable to retrospectively review the incidence of preoperative SDs.

Nine of the cases we present have coexisting anxiety or depression with new-onset SD. Most of these cases had previous history of anxiety or depression before surgery, and postoperatively these patients remained anxious or depressed. Postoperative psychiatric disorders, such as anxiety and depression, commonly overlap with symptoms of SD. However, this particular group predominantly exhibited USD and pain disorder. Further, although anxiety and depression are common in patients with left temporal lobe epilepsy before and after epilepsy surgery,<sup>35</sup> new-onset SDs were significantly less frequent after left ATL.

Seizure freedom was 60% for patients who developed SD after ATL, similar to the outcome in 66% of the ATL patients in the Multicenter Study of Epilepsy Surgery.<sup>36</sup> Therefore, seizure control does not appear to be associated with SD after epilepsy surgery. Less than 20% of ATL and extratemporal surgery patients during this period at NYU developed psychiatric disorders; most had depression or anxiety. How-

ever, psychiatric follow-up after surgery is only obtained if a problem is reported by the patient or identified by the neurologist. The lack of systematic follow-up likely leads to an underestimate of how many patients develop postoperative psychiatric disorders.

Our findings suggest that right temporal dysfunction may contribute to the pathogenesis of SD. In patients with primary SD (i.e., not associated with neurologic or other mental disorders), right temporal systems involved in regulating emotions and body image may be impaired. This dysfunction may result from environmental stressors and genetic factors.

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