Short report

Frequency of hypergraphia in temporal lobe epilepsy: an index of interictal behaviour syndrome

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Summary Frequency and degree of hypergraphia were studied in order to assess interictal behaviour change in temporal lobe epilepsy. Patients with temporal lobe epilepsy tended to reply more frequently to a standard questionnaire, and wrote extensively (mean: 1301 words) as compared to others (mean: 106 words). The incidence of temporal lobe epilepsy was 73% in patients exhibiting hypergraphia compared to 17% in patients without this trait. These findings suggest that hypergraphia may be a quantitative index of behaviour change in temporal lobe epilepsy.

The question of behavioural changes in patients with temporal lobe epilepsy (TLE) has received considerable attention. However, while hyper-emotionalism, obsesssionalism, religiosity, altered sexual behaviour, circumstantiality and hypergraphia have been described, their relation to temporal lobe dysfunction remains controversial. Only a few studies have attempted to quantify these behavioural changes, but Bear and Fedio were able to quantify and relate personality traits to a right or left temporal lobe focus. Hypergraphia is one of the relatively more obvious traits of the interictal behaviour syndrome. We have attempted to measure this trait and to identify its specificity to any particular types of seizure disorder.

Methods

A letter was sent to all patients who had been admitted to hospital at PAVAMC from 1972 to 1978, whose discharge index card listed “epilepsy” or “seizure disorder” as the primary or secondary diagnosis. The letter asked the patient to “. . . describe to the best of your ability, your present state of health, understanding of the disease (seizure disorder) and the changes in your life resulting from it. You may choose to write as much as you wish, in any form, on any kind of paper.” A return envelope was included. Thus we attempted to make the question as broad as possible and to leave a great deal of flexibility for the patient to reply. Letters were mailed to 63 patients. Nine letters were returned undelivered, 21 answers were received. Four responses (from relatives) indicated that patients were deceased. Thus, we presume that 33 patients received letters but did not reply. We divided our patient population into three groups: (1) those who changed residence without leaving any forwarding address, (2) those who did not reply, (3) those who did reply. EEG reports and case histories for all patients were reviewed. All patients had been evaluated by neurologists other than those conducting the present study. The letters of 17 patients who replied were divided (without knowledge of the histories or EEG reports) on the basis of content [description of ictal or interictal events, reference to “meaning” or “significance” of seizures, philosophical, ethical or religious themes and style (calligraphy, use of unusual symbols or drawings, length)] into three groups: (A) probable interictal syndrome, (B) possible interictal syndrome, (C) no evidence of interictal syndrome (table 1). The person who rated the replies did not know the number or proportion of TLE patients in the response sample. In addition, a second division was based upon the number of words (table 2).

Results

Number of patients responding Of 63 patients to whom letters were mailed, 33 patients did not reply and nine did not receive letters. Of the 33 patients...
Frequency of hypergraphia in temporal lobe epilepsy

Table 1

<table>
<thead>
<tr>
<th>Groups</th>
<th>Temporal lobe epilepsy</th>
<th>Major motor seizures</th>
<th>Abnormal but non-epileptiform EEG</th>
<th>Normal EEG</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>EEG + History +</td>
<td>EEG + History +</td>
<td>History—as mentioned</td>
<td>History—as mentioned</td>
</tr>
<tr>
<td>Group 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N=9</td>
<td>Letters returned undelivered</td>
<td>1—Left temporal focus</td>
<td>2—Generalised bursts of epileptiform activity</td>
<td>2—Diffuse slowing on EEG; no focus. Metabolic encephalopathy</td>
</tr>
<tr>
<td>Group 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No=33</td>
<td>Did not reply</td>
<td>3—Left temporal focus</td>
<td>2—Generalised epileptiform activity; corticoreticular epilepsy</td>
<td>3—Major motor seizures</td>
</tr>
<tr>
<td>Group 3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No=17</td>
<td>Replied</td>
<td>4—Bitemporal foci</td>
<td>2—Generalised epileptiform activity; No focus</td>
<td>2—Temporal lobe epilepsy</td>
</tr>
</tbody>
</table>

Table 2

<table>
<thead>
<tr>
<th>Subgroups of Group 3</th>
<th>Case No. Word count</th>
<th>Temporal lobe epilepsy</th>
<th>Major motor seizure</th>
<th>Abnormal but non-epileptiform EEG</th>
<th>Normal EEG</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No 1—5540 words</td>
<td>Bitemporal foci</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>No 2—4200 words</td>
<td>Bitemporal foci</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

who did not reply, seven had clinical diagnosis of TLE; all but one also had positive EEG. Group 1—table 1 indicates the diagnosis in patients who did not receive the letter (1 of 9 had TLE). In group 3 (those who replied): nine had a diagnosis of TLE with epileptiform activity present in EEG in seven. Thus, of 17 patients who replied, nine (53%) had TLE; while of 33 patients who did not reply, only seven (21%) had TLE. There was a significant $p<0.05$; chi-square = 5.19) overrepresentation of TLE among the responders. The proportion of temporal lobe epileptics replying was 56%, compared to 24% of patients with nontemporal lobe epilepsy.

Characteristics of the response Further evidence that there might be differences between the temporal lobe as compared to the nontemporal lobe population, was provided by an examination of the responses. All patients classified, without knowledge of clinical diagnosis or EEG findings, as “probable interictal syndrome,” had clinical evidence of temporal lobe epilepsy and EEG evidence of bitemporal foci; among the “possible interictal syndrome” patients, 67% had TLE (table 2). The proportion of TLE in all patients with hypergraphia (patients classified as either probable or possible interictal syndrome) is 8:11 (73%). This is greater than the proportion of TLE in patients without evidence of interictal changes (subgroup C, table 2, which was 1:6 (17%).

A possibly more objective index (number of words in responses) also was examined. Responses classified as “probable interictal syndrome” were 5540 and 4200 words in length. Responses classified as “possible
interictal syndrome" (subgroup B, table 2, ranged from
120 to 475 words (mean=259 words). Subgroup C
(no evidence of interictal change) used 33 to 112 words
(mean=78 words). For TLE, the mean response was
1301 words, with a median of 403. In contrast, for
nontemporal lobe epileptics, the mean response was
106 words, with a median of 100. Quantitative differ-
ences between the groups were significant (p<0.001,
Wilcoxon rank test).

Discussion

The occurrence of personality changes in patients
with TLE has been suggested by a number of workers\textsuperscript{1-9,12,13} but remains unproven.\textsuperscript{10,11} Wax-
man and Geschwind\textsuperscript{7} noted hypergraphia, circum-
stantiality, hyperreligiosity, hypersexuality and
described these as part of the interictal behavioural
syndrome in TLE. They pointed out that this beha-
vior did not occur in all patients with TLE and
that when behavioural changes occurred, they were
not necessarily maladaptive. Rodin also noted a
high incidence of behavioural change in TLE.\textsuperscript{8}
Bear and Fedio\textsuperscript{12} studied 18 different personality
traits in 27 temporal lobe epileptics and 21 con-
trols, and on the basis of these personality traits,
26 temporal lobe epileptics and 21 non-epileptics
could be correctly diagnosed.

We studied one trait, hypergraphia, in a popula-
tion of epileptics, by examining the response to a
standard stimulus. Patients with TLE tended to
reply more frequently: out of the 17 who replied
nine had TLE. Out of the 33 patients who did not
reply, only seven had TLE (table 1). The two defi-
nite hypergraphics (classified on the basis of exami-
nation of the response [without knowledge of
clinical diagnosis or EEG findings]) had clinical
features of complex partial seizure, and bitemporal
foci on EEG. Of the nine patients with possible
interictal syndrome, six were diagnosed as TLE
(four with positive EEG). Examination of the
writings of patients A1 and A2 (probable interictal
syndrome) was consistent with the changes de-
scribed previously.\textsuperscript{6,7,8} Moreover, neither of these
two patients had any difficulties with memory
(other than during the seizures), comprehension or
speech disorder. Onset of seizures in these two
patients occurred about eight years prior to this
study and neither of them has shown any evidence
of psychosis to date. It should also be pointed out
that hypergraphia does not appear to be related to
intelligence. While all temporal lobe epileptics do
not exhibit hypergraphia, the existence of hyper-
graphia in a patient with seizures should alert the

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