Migraine Headache in Patients With Tourette Syndrome

Carolyn Kwak, MS, PA-C; Kevin Dat Vuong, MA; Joseph Jankovic, MD

Background: Tourette syndrome (TS) is recognized as one of the most common childhood movement disorders, characterized by motor and phonic tics often associated with neurobehavioral comorbidities, such as obsessive-compulsive disorder. Neurotransmitter dysregulation, particularly involving the serotonin system, has been implicated in the pathogenesis of TS, obsessive-compulsive disorder, and migraine headache.

Objectives: To investigate the possible association between migraine headache and TS and to report preliminary findings of family history of migraine headache in patients with TS.

Methods: Subjects diagnosed as having TS at the Baylor College of Medicine Parkinson’s Disease Center and Movement Disorders Clinic were administered a migraine headache questionnaire based on the migraine criteria established by the Headache Classification Committee of the International Headache Society.

Results: Of 100 patients with TS, 25 (25.0%) satisfied the diagnostic criteria for migraine headache, significantly greater than the estimated 10% to 13% in the general adult population (P < .001) and the estimated 2% to 10% in the general pediatric population (P < .04). There was no significant (P = .44) difference in the presence of comorbid obsessive-compulsive traits in the TS migraine and TS nonmigraine sample groups. Furthermore, our TS group with migraines was not more likely to have features of obsessive-compulsive disorder compared with attention-deficit/hyperactivity disorder. Of patients with TS, 56.0% reported a family history of migraines, 44.0% of whom were first-degree relatives.

Conclusions: The frequency of migraine headache in a clinic sample of TS subjects was nearly 4-fold more than the frequency of migraines reported in the general population. Contrary to previous reports, the co-occurrence of migraines and TS in our sample group may possibly be attributed to another TS comorbidity, other than obsessive-compulsive traits.

Arch Neurol. 2003;60:1595-1598

Gilles de la Tourette syndrome (TS) is among the most common childhood genetic movement disorders, with a reported frequency in children as high as 3%.1 The condition is characterized by motor and phonic tics that fluctuate in distribution, severity, and frequency, often preceded by premonitory sensations.2-4 Tourette syndrome is commonly associated with attention deficit with or without hyperactivity, obsessive-compulsive traits, and other neurobehavioral comorbidities, such as poor impulse control, self-injurious behavior, anxiety, and mood disorders.5-7

In addition to the various neurobehavioral comorbidities, patients with TS have been described as having a high frequency of headaches. Barabas6,9 and colleagues reported that 27% of children with TS met the diagnostic criteria for migraine headache, significantly higher than the estimated prevalence of 3% to 13% in the general population of school-aged children, adolescents, and adults.10-13 Migraines may be as debilitating as symptoms of TS, accounting for school absences and disruption of daily functioning. Commonly described as pulsatile unilateral headaches, migraines are often associated with nausea, vomiting, photophobia, auras, or other sensory phenomena.16,17 In the pediatric and adolescent populations, migraine variants may present as abdominal pain with cyclic vomiting, benign paroxysmal torticollis, or paroxysmal vertigo.18 Migraines in the younger population have also been commonly reported to be of shorter duration and bilateral in distribution.19

5-Hydroxytryptamine receptor dysfunction has been implicated in obsessive-compulsive disorder (OCD) and mi-
One hundred TS patients (78 males), whose mean age was 20.2 ± 14.2 (range, 7-69) years, were included in this study. Of the 100 patients with TS, 25 satisfied the diagnostic criteria for migraine headache based on International Headache Society criteria. Sixteen percent of pediatric and 39% of adult patients with TS had migraines, significantly greater than the 6% (range, 2%-10%) reported in otherwise healthy children 10-13 (χ²=0.03, P<.04) and the 11% (range, 10%-13%) reported in the general adult population 14,15 (χ²=0.11, P<.001), respectively (Table 1). Of the 25 TS patients with migraine, 12 (48%) reported migraine with aura.

Also, of the 25 TS patients with migraine, 6 (24%) were females and 19 (76%) were males; this difference did not reach statistical significance (P>.99). The mean age at onset of migraine headache between sexes was also not significantly different (P=.91). Of the 25 subjects with migraine, 24 (96%) also had comorbid obsessive-compulsive traits. However, our TS patients with migraines did not have a significantly greater comorbidity of obsessive-compulsive traits or attention deficit compared with the TS group without migraine (P=.44 and P>-.99, respectively). Fifty-six percent of patients with TS had a family member with migraine, 44% of whom were first-degree relatives; 46.0% of a non-first-degree relative reported migraines.

Our study shows that the frequency of migraine headache in a clinic sample of subjects with TS is 25.0% (39% of adults and 16% of children with TS), which suggests nearly a 4-fold increase over the frequency of migraines reported in a comparable sample group of otherwise healthy individuals 10-13 (Table 2). Although these findings are comparable to those of Barabas 8,9 and colleagues, who reported a frequency of 27% of migraines in their TS sample, our results must be interpreted cautiously because we used reported control data on the frequency of headaches collected from the general population rather than from a specialty clinic. 10-14 Control data from an age-matched group to assess the prevalence of migraines in a sample group with other neurological dis-

### Table 1. Comparison of Patients With TS and Without Migraines

<table>
<thead>
<tr>
<th>Variable</th>
<th>With Migraines</th>
<th>Without Migraines</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total No.</td>
<td>25 (19 Males)</td>
<td>75 (59 Males)</td>
</tr>
<tr>
<td>Adults (n = 38)</td>
<td>15 (39)</td>
<td>23 (61)</td>
</tr>
<tr>
<td>Children (n = 62)</td>
<td>10 (16)</td>
<td>52 (84)</td>
</tr>
<tr>
<td>Age at onset, yr†</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Of TS symptoms</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Males</td>
<td>6.7 ± 3.7</td>
<td>5.7 ± 3.2</td>
</tr>
<tr>
<td>Females</td>
<td>5.5 ± 3.5</td>
<td>7.6 ± 3.6</td>
</tr>
<tr>
<td>Of migraine</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Males</td>
<td>14.4 ± 7.8</td>
<td>NA</td>
</tr>
<tr>
<td>Females</td>
<td>14.0 ± 8.8</td>
<td>NA</td>
</tr>
<tr>
<td>Frequency of attention deficit‡</td>
<td>18 (72)</td>
<td>55 (73)</td>
</tr>
<tr>
<td>Frequency of obsessive-compulsive traits‡</td>
<td>24 (96)</td>
<td>66 (88)</td>
</tr>
</tbody>
</table>

Abbreviations: NA, data not applicable; TS, Tourette syndrome.

*Data are given as number (percentage) of patients unless otherwise indicated.

†Percentages are based on the total number of patients in each group.

‡Data are given as mean ± SD.

‡Percentages are based on the total number of patients in each group.

Our study shows that the frequency of migraine headache in a clinic sample of subjects with TS is 25.0% (39% of adults and 16% of children with TS), which suggests nearly a 4-fold increase over the frequency of migraines reported in a comparable sample group of otherwise healthy individuals 10-13 (Table 2). Although these findings are comparable to those of Barabas 8,9 and colleagues, who reported a frequency of 27% of migraines in their TS sample, our results must be interpreted cautiously because we used reported control data on the frequency of headaches collected from the general population rather than from a specialty clinic. 10-14 Control data from an age-matched group to assess the prevalence of migraines in a sample group with other neurological dis-
orders are being collected. Although other types of headache, including tension, sinus, and medication-related headaches, were reported in our TS sample, the objective of the questionnaire was to diagnose migraine headache.

A primary defect in serotonin metabolism has been proposed for TS and migraine. Serotonin abnormalities have been suggested in OCD, a hypothesis supported by marked improvement of OCD symptoms with selective serotonin reuptake inhibitors. In TS patients, cerebrospinal fluid studies have shown reduced levels of 5-hydroxyindoleacetic acid and tryptophan in the basal ganglia, decreased plasma tryptophan levels, and decreased 24-hour serotonin excretion and whole-blood serotonin. However, in contrast to the Barabas et al. pilot study, our study showed that TS patients with migraines did not have significantly greater obsessive-compulsive features. While 96% of TS patients with migraines had obsessive-compulsive traits, the frequency of these traits in our sample of TS subjects without migraines was also high (88%) (Table 1), indicating that obsessive-compulsive traits are not a predictor of migraine headache. Other biochemical abnormalities have been proposed in TS, including involvement of the cholinergic, dopaminergic, GABAergic, noradrenergic, and opioid systems. In migraines, mutations in genes involved in calcium channels, mitochondrial DNA, dopamine receptors, and prothrombic risk factors have also been detected.

Although genetic linkage analyses have excluded 5-hydroxytryptamine receptor genes in the TS population, until the TS gene is located, the presence of migraine headache, if present also in family members of patients with TS, may be used as a clinical marker for this complex genetic disorder. However, must be interpreted cautiously, because the reported risk in the general population for migraine headache if one parent is affected is high for the offspring.

A recent review on migraine headache in patients with psychiatric disorders concluded an association between affective disorders, particularly anxiety and depression. Further studies should investigate whether TS subjects with migraines also have an increased prevalence of anxiety, depression, or other psychiatric comorbidities. Furthermore, studies should determine if TS patients with migraine respond more favorably to adjunctive therapy designed to treat TS psychiatric comorbidities, compared with those without psychiatric conditions.

In summary, TS is a spectrum disorder, with varying degrees of severity in individual patients. Because the complexity of the TS gene has yet to be determined, the presence of migraine headache, if present also in family members of patients with TS, may be used as a clinical marker for this complex genetic disorder.

Accepted for publication April 21, 2003.

Author contributions: Study concept and design (Ms Kwak and Dr Jankovic); acquisition of data (Dr Jankovic); analysis and interpretation of data (Mr Vuong and Dr Jankovic); drafting of the manuscript (Ms Kwak and Dr Jankovic); critical revision of the manuscript for important intellectual content (Mr Vuong); statistical expertise (Mr Vuong); study supervision (Ms Kwak and Dr Jankovic).

Corresponding author: Joseph Jankovic, MD, Parkinson’s Disease Center and Movement Disorders Clinic and Department of Neurology, Baylor College of Medicine, 6550 Fannin St, Suite 1801, Houston, TX 77030.

Table 2. Comparison of Migraine Studies in TS and Non-TS Populations

<table>
<thead>
<tr>
<th>Source</th>
<th>Population</th>
<th>Sample Size</th>
<th>Prevalence of Migraine, %</th>
<th>Male-Female Ratio</th>
<th>Age at Onset, y*</th>
<th>Family History (First-degree Relative, %)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Present study</td>
<td>TS patients</td>
<td>100</td>
<td>25</td>
<td>3:1</td>
<td>14.4 ± 7.8</td>
<td>14.0 ± 8.9</td>
</tr>
<tr>
<td>Barabas and Matthews, 1985</td>
<td>TS patients</td>
<td>65†</td>
<td>27</td>
<td>NR</td>
<td>NR</td>
<td>NR</td>
</tr>
<tr>
<td>Barabas et al., 1984</td>
<td>TS patients</td>
<td>60</td>
<td>27</td>
<td>NR</td>
<td>NR</td>
<td>NR</td>
</tr>
<tr>
<td>Mavromichalis et al., 1999</td>
<td>General adult</td>
<td>4000</td>
<td>6.2</td>
<td>1.4</td>
<td>5.0</td>
<td>12.0</td>
</tr>
<tr>
<td>Aromaa et al., 1998</td>
<td>General pediatric</td>
<td>968</td>
<td>6.0</td>
<td>NR</td>
<td>4.0†</td>
<td>4.0†</td>
</tr>
<tr>
<td>Metsahonkala et al., 1997</td>
<td>General pediatric</td>
<td>3580</td>
<td>2.7</td>
<td>NR</td>
<td>8.5†</td>
<td>8.5†</td>
</tr>
</tbody>
</table>

Abbreviations: NR, not reported; TS, Tourette syndrome.

*Data are given as mean or mean ± SD.
†Five patients were added to the original study of Barabas et al.
‡Unspecified sex.

REFERENCES

3. Leckman J, Peterson B, King R, Scähill L, Cohen D. Phenomenology of tics and

(REPRINTED) ARCH NEUROL/VOL 60, NOV 2003 WWW.ARCHNEUROL.COM

©2003 American Medical Association. All rights reserved.

Downloaded From: https://archneur.jamanetwork.com/ by a Non-Human Traffic (NHT) User on 03/08/2019