LETTERS TO THE EDITOR

Pituitary-Thyroid Function in Vibration Syndrome Patients

Key words: Vibration syndrome—TRH infusion test—Thyrotropin—Prolactin—Age-matched control

Some investigators have reported variations in thyroid function in vibration syndrome and have speculated changes in hypothalamus-pituitary function to be the cause.\(^1\) The thyrotropin releasing hormone (TRH) infusion test is often used to diagnose disorders of the pituitary-thyroid system.\(^4\)\(^5\) We carried out TRH tests in vibration syndrome patients and compared the results with age-matched healthy controls to determine whether or not vibration exposure of the hand-arm system causes disorders in pituitary-thyroid function.

Ten male vibration syndrome patients who had vibration induced white fingers during the previous winter were examined. They were all new outpatients [mean age 53.9 (45–59) years, mean curative period 12.8 (3–21) months, mean time exposed to vibration 12900 (4000–20000) hours], with no complications. The controls were ten healthy male volunteers [mean age 53.8 (45–59) years] individually age matched to the patients. All 20 subjects were hospitalized the day before the TRH test. Subjects lay in supine position in bed for the placement of an intravenous catheter. Before the TRH infusion, blood samples were taken for radioimmunoassay determination of serum concentrations of thyroid hormones, TSH and prolactin. All subjects were given TRH (500 \(\mu\)g) intravenously, after which blood was taken at 30, 60, 120, and 180 minutes.

Levels of serum thyroid hormones, thyrotropin (TSH) and prolactin at rest are shown in the Table. There were no significant differences in serum thyroid hormones, TSH or prolactin levels between vibration syndrome patients and healthy controls at rest. The concentrations of TSH and prolactin in both patient and control groups significantly increased following the TRH infusion, but there was no significant differences between the two groups (Fig. 1 and 2). Serum thyroxine (T\(_4\)) and triiodothyronine (T\(_3\)) levels slightly increased in both groups but again there was no significant differences between the two groups. We also tried to detect plasma catecholamines at each of the five times that blood was taken, but the levels were too small to be detected.

Takamatsu et al. examined vibration syndrome patients with the TSH test and found the concentrations of serum protein-bound iodine (PBI) to be lower and the response of PBI to TSH infusion to be less than in healthy subjects.\(^1\) Saito
et al. reported that the increase in serum T4 induced by the TRH infusion was less in vibration syndrome patients than the normal levels for healthy subjects.\textsuperscript{2) Harada et al. in investigating thyroid function in vibration syndrome patients and healthy subjects found that patients with vibration syndrome showed low T3 syndrome.\textsuperscript{3) They speculated that these findings were due to a hypothalamus dysfunction in patients with vibration syndrome. In the present study, the concentration of T3 before the infusion was not significantly different between patients and controls. One of the reasons may have been that the vibration syndrome subjects were new outpatients whose disease was still relatively mild.

<table>
<thead>
<tr>
<th>Number</th>
<th>Patient</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>TSH</td>
<td>2.25±0.28</td>
<td>2.47±0.33</td>
</tr>
<tr>
<td>T&lt;sub&gt;3&lt;/sub&gt;</td>
<td>7.14±1.21</td>
<td>7.66±1.48</td>
</tr>
<tr>
<td>freeT&lt;sub&gt;4&lt;/sub&gt;</td>
<td>1.17±0.19</td>
<td>1.15±0.17</td>
</tr>
<tr>
<td>T&lt;sub&gt;4&lt;/sub&gt;</td>
<td>1.00±0.12</td>
<td>1.03±0.15</td>
</tr>
<tr>
<td>freeT&lt;sub&gt;3&lt;/sub&gt;</td>
<td>2.53±0.22</td>
<td>2.56±0.45</td>
</tr>
<tr>
<td>reversedT&lt;sub&gt;3&lt;/sub&gt;</td>
<td>216±59</td>
<td>254±53</td>
</tr>
<tr>
<td>prolactin</td>
<td>8.04±6.42</td>
<td>9.36±6.63</td>
</tr>
</tbody>
</table>

TSH, µU/ml; T<sub>3</sub>, µg/dl; freeT<sub>4</sub>, ng/dl; T<sub>4</sub>, ng/ml; freeT<sub>3</sub>, reversedT<sub>3</sub>, pg/ml; prolactin, µIU/ml.

Fig. 1: Change in the serum thyrotropin (TSH) concentration (M±SEM, µU/ml) after the TRH (500µg) infusion in vibration syndrome patients (N=10, ●) and age-matched healthy controls (N=10, ○).
We designed this study to examine patients who had not yet shown the effect of medical treatment. In many cases, patients who have severe vibration syndrome have other systemic complications with aging. We excluded the patients with complications such as hypertension, heart diseases, diabetes mellitus and so on. Since we excluded patients with such heavy disorders in this study, the vibration syndrome conditions of those tested were not severe. The other reason is that the number of vibration syndrome patients with severe conditions who have recently been diagnosed in Japan has decreased due to efforts to prevent vibration syndrome.6,7)

There is an interaction between catecholamines and thyroid hormones.8,9 In a previous study, we studied plasma catecholamines to evaluate the sympathetic nervous system in vibration syndrome. It showed more activity under cold conditions than in healthy controls.10) We suspect that low T3 syndrome in the patients with vibration syndrome might be caused by the interaction between catecholamines and thyroid hormones. Besides this, the interaction in vibration syndrome patients must be investigated.

In conclusion this study found the responses of pituitary-thyroid system to the TRH infusion in vibration syndrome patients to be similar to healthy subjects. The TRH test could not detect any significant differences in pituitary-thyroid function between vibration syndrome patients and healthy controls.

Fig. 2. Change in the serum prolactin concentration (M±SEM, μIU/ml) after the TRH (500μg) infusion in vibration syndrome patients (N=10, ●) and age-matched healthy controls (N=10, ○).
REFERENCES

5) de los Santos ET, Mazzaferri EL. Thyroid function tests. Postgraduate Med 1989; 85: 333-52.

1) Department of Public Health, Ehime University School of Medicine, Shigenobu, Ehime 791-02, Japan
2) Niihama Kyoritsu Hospital, Wakamizu 1-7-45, Niihama, Ehime 792, Japan

(Received March 13, 1990 and in revised form July 5, 1990)