Physical Signs

Graves' disease presenting as pyrexia of unknown origin

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Summary: Fever is a common clinical manifestation of inflammatory processes of the thyroid and thyroid crisis. On the other hand, fever alone as a presenting symptom of thyrotoxicosis, without other manifestations, is extremely rare. A female patient is described in whom fever persisted for two months prior to hospitalization, but without clinical symptoms or signs to lead to suspicion of thyroid disease. After exhaustive investigation it was found that the patient was suffering from hyperthyroidism. Fever disappeared gradually on antithyroid therapy, recurred when the drugs were withdrawn for a rechallenge trial, and cleared up again after renewal. Four other cases of persistent fever as a presenting symptom of hyperthyroidism were found on a review of previous publications. Thyrotoxicosis should, therefore, be included in the differential diagnosis of pyrexia of unknown origin.

Introduction

Fever as an indicator of disease has always been and remains a clinical symptom of prime importance.1-3 There is no doubt that a number of inflammatory, neoplastic and other diseases may present with fever alone. Fever may also accompany a number of endocrine diseases.4-6 The first article dealing with this problem appeared in 19487 and its rarity as a presenting sign was emphasized at that time.

Diseases of the thyroid which are manifested by fever alone are considered to be extremely rare, although fever is one of the symptoms typical of inflammatory processes in the gland, such as subacute thyroiditis8,9 and thyroid crisis.10,11 This article describes a patient with persistent fever of up to 38.7°C. It became clear after an extensive investigation of her pyrexia of unknown origin (PUO) that the fever was due to a non-inflammatory thyrotoxic disorder.

Case report

A 57 year old female had open mitral commis-
Dental examinations, including panoramic X-ray, intravenous pyelography, barium enema, barium meal, ultrasound and computed tomographic examinations of the abdomen and pelvis were normal. Liver and bone radionuclide scans, Ga\(^{67}\) radionuclide whole body scan, including the region of the thyroid gland, were all normal. Thyroid gland function tests, indicating a thyrotoxic state, are shown in Table I. Serological tests for antithyroid microsomal antibodies and anti-TBG (thyroxine-binding globulin) antibodies were negative. On technetium-99m pertechnetate thyroid scan, the right lobe and isthmus of the thyroid gland appeared somewhat enlarged, with homogeneous distribution of the radionuclide (Figure 1).

Cardiac medication was continued as before (dipyridamole, frusemide and digoxin). Following a 3-week period of observation, during which the fever continued and a diagnosis of hyperthyroidism was established, antithyroid treatment was initiated with lugol solution, 5 drops, 3 times daily, and methimazole, 40mg daily. The fever started to lyse after 10 days. The patient was discharged on methimazole.

Two weeks later, on reexamination, the patient remained afebrile and in excellent condition. Thyroid function tests returned to normal values. Two months after its initiation, the antithyroidal treatment was discontinued. After 5 days, the fever rose again to 38°C at night and was accompanied by general malaise. The \(T_4\) value rose to over 18 \(\mu\)g/dl. Methimazole therapy was resumed and the patient became euthyroid again within 2 weeks, was afebrile and felt well.

**Discussion**

A large group of endocrine and metabolic diseases are mentioned among the less common causes of PUO,\(^{4,5}\) including thyroiditis, hyperthyroidism, Addison's disease, Fabry's disease, hyperlipidaemia, phaeochromocytoma, primary hyperparathyroidism, nephrogenic diabetes insipidus in the newborn and hypoglycaemia. In older textbooks, hyperthyroidism is often mentioned as accompanied by fever between 37.2–38°C.\(^{12}\) Hyperpyrexia above 38.4°C is a common sign of thyroid crisis. In the latter, tachycardia, severe agitation, profuse sweating, nausea and vomiting are frequent and even death may occur.\(^{10,11}\) In more recent articles\(^{13}\) and textbooks,\(^{14}\) fever is not mentioned as a manifestation of thyrotoxicosis. Hyperthyroidism presenting primarily as persistent fever is extremely rare. In these cases, a long-lasting fever is not accompanied by other clinical manifestations of thyrotoxicosis. In extensive reviews on PUO,\(^{15-20}\) with a single exception,\(^{21}\) hyperthyroidism is not listed as a cause.

The four previously published cases of persistent fever caused by hyperthyroidism,\(^{4,6,21}\) as well as this case, are summarized in Table II. In no case.

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**Table I** Thyroid gland function tests

<table>
<thead>
<tr>
<th>Test</th>
<th>Value</th>
<th>Normal Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total serum thyroxine</td>
<td>211.5–224.5 nmol/l</td>
<td>60.6–154.8 nmol/l</td>
</tr>
<tr>
<td>Triiodothyronine resin uptake</td>
<td>66–69%</td>
<td>40–55%</td>
</tr>
<tr>
<td>Free thyroxine index</td>
<td>278.6–287.7 nmol/l</td>
<td>51.6–167.7 nmol/l</td>
</tr>
<tr>
<td>Triiodothyronine radioimmunoassay</td>
<td>3.8 nmol/l</td>
<td>1.47–3.0 nmol/l</td>
</tr>
<tr>
<td>Thyroid stimulating hormone radioimmunoassay</td>
<td>1.2 U/ml</td>
<td>0.5–4.0 U/ml</td>
</tr>
</tbody>
</table>

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**Figure 1** Anterior view thyroid scan (with technetium-99 m-pertechnetate) shows a mildly enlarged gland mainly in the right lobe with homogeneous distribution of the radioactivity, except for some lobularity in the widened right lower lobe region. (Sternal notch and thyroid cartilage are marked by V signs.)
Table II  Cases of hyperthyroidism presenting as pyrexia of unknown origin

<table>
<thead>
<tr>
<th>Case no.</th>
<th>Age in years</th>
<th>Duration of pyrexia*</th>
<th>Max. temp. (°C)</th>
<th>Other symptoms</th>
<th>Physical findings</th>
<th>Results of thyroid function tests</th>
<th>Therapy</th>
<th>Response</th>
<th>Final Diagnosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (21)</td>
<td>NS</td>
<td>NS</td>
<td>38.9</td>
<td>Chills Arthralgia Night sweats Nausea Weight loss</td>
<td>Lymphadenopathy Hepatosplenomegaly</td>
<td>NS NS NS NS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 (4)</td>
<td>NS F Several</td>
<td>NS</td>
<td>38.2</td>
<td>Night sweats Fatigue Myalgia</td>
<td>Persistent tachycardia</td>
<td>None T₄ 18.4 mcg/dl</td>
<td>NS NS</td>
<td>Graves' disease</td>
<td></td>
</tr>
<tr>
<td>3 (6)</td>
<td>58 F 1</td>
<td>NS</td>
<td>37.8</td>
<td>Night sweats</td>
<td>Exophthalmus</td>
<td>T₃ 5.00 ng/dl</td>
<td>PTU†</td>
<td>Afebrile within 2 months</td>
<td>T₃-Toxicosis</td>
</tr>
<tr>
<td>4 (6)</td>
<td>48 M 4</td>
<td>NS</td>
<td>38.7</td>
<td>Night sweats Fatigue</td>
<td>Slight thyroid enlargement</td>
<td>T₄ 211 nmol/l</td>
<td>Lugol + Methimazole</td>
<td>Afebrile 3 weeks</td>
<td>Graves' disease</td>
</tr>
<tr>
<td>5 (ours)</td>
<td>57 M 2</td>
<td>NS</td>
<td>38.7</td>
<td>Night sweats Fatigue</td>
<td></td>
<td>T₃ 3.8 nmol/l</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*In months prior to admission; NS – not stated; †PTU – propylthiouracil; T₄ – thyroxine; T₃ – triiodothyronine.

were there clinical symptoms which would lead to suspicion of thyroid disease, although night sweats were present in each case, loss of weight occurred in two cases and exophthalmos in one. Sub-febrile temperature (around 37.5°C) is often found in typical cases of thyrotoxicosis, together with other clinical manifestations, but these are usually so prominent that the sub-febrile temperature can easily be overlooked. In all cases (Table II), and in particular in our own, fever was the presenting symptom and the other manifestations of thyrotoxicosis were absent, or so mild that they were ignored.

Unexpected tachycardia should normally direct attention to thyrotoxic states, but the absence of tachycardia does not eliminate this possibility, especially when the patient receives various medications which may slow the pulse. It is said that thyrotoxicosis should be suspected if digitalis does not slow the pulse in atrial fibrillation, but this was not the case in our patient.

The pathogenesis of fever in thyrotoxicosis is not well understood and various theories are presented. Discussion on this point is beyond the scope of this paper and the reader is referred to the listed articles. In the light of the above, it should be concluded that fever may be the only, or at least the most prominent clinical manifestation of thyrotoxicosis. We feel, therefore, that thyrotoxicosis should be included in the list of causes of pyrexia of unknown origin.

References

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