A Survival Case of Myxedema Coma of Pituitary Origin

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Synopsis

A successfully treated patient with myxedema coma of pituitary origin is reported. A forty-three year old woman, having a typical history of Sheehan's syndrome, was precipitated into the state of shock and coma. The coma was characterized with clinical features of myxedema coma, such as hypothermia, bradycardia and shallow respiration. The patient recovered from shock after intravenous administration of adrenocortical hormone and glucose. However, no recognizable improvement of her consciousness was obtained. She recovered from deep coma after oral administration of triiodothyronine. In addition to adequate supply of the deficient hormones, respiratory support by means of artificial respirator must have played an important role in the treatment of this patient.

Myxedema coma of pituitary origin is a medical emergency. The incidence of this condition is extremely rare, but, if it once develops, this disorder is almost always fatal. The present paper describes a patient with pituitary myxedema coma, who was successfully treated with an adequate therapy. Special comments will be focused on clinical management of this serious condition.

Report of a case

A forty-three year old Japanese woman was admitted in a comatose and shock state on December 30, 1971 to the Kashimanada hospital. Nineteen years previously she had had a massive postpartum hemorrhage followed by the failure of lactation. Subsequently she developed complete amenorrhea. Her family told that the patient often consulted her home doctor because of the physical weakness, and that she had been mentally torpid. She has fainted three times, from which she recovered either spontaneously or by medical treatments, the details of which is not clear. During past five years she has become intolerant to cold, and noticed gradual thinning of her hair. The previous evening before admission she complained a feeling of "catching cold" and went to bed without having dinner.

The patient was a relatively well-nourished comatose woman. The pulse rates were 40 per min and the blood pressure was not obtainable. Her respiration was slow and shallow. Her skin was edematous, pale and cold to the touch. Her temperature was 96 ºF. The eyebrows were scanty, and both the pubic and axillary hair were almost totally absent. The thyroid gland was not palpable. The heart sounds were distant but no murmurs were audible. Examination of the lungs and abdomen revealed no abnormalities. Muscle cramps occurred frequently and were easily induced at a touch.

Laboratory data revealed a serum total cholesterol of 308 mg/100 ml. The serum sodium was 140 mEq/l, potassium 4.2 mEq/l, chloride 102 mEq/l and calcium 4.6 mEq/l. The hemoglobin was 9.6 g percent, and white blood cell count 7,400 per cc mm. The electrocardiogram showed sinus bradycardia, low voltage and prolonged Q-T interval with inversion of the T waves in leads III and aVF. Roentgenogram of the chest revealed a slightly enlarged cardiac silhouette. Skull X-ray showed no abnormalities of

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sella turcica. Serum thyroxine concentration prior to treatment was 1.0 μg/100 ml (normal: 5.3-14.5) and T₃ resin uptake 22.1% (normal: 25-40).

After admission she received general emergency treatment and regained consciousness. But two days later she was precipitated again into the state of shock and deep coma (Fig. 1). Assisted ventilation by means of artificial respirator was applied, because her respiratory condition deteriorated. She received an intravenous administration of 30 mg of prednisolone and an infusion of glucose solution. The patient recovered from shock and muscle cramps subsided. However, no recognizable effect on the level of consciousness was obtained as long as nine days. Then administration of thyroid hormone, an initial daily dose of 5 micrograms of triiodothyronine, was started via a gastric tube. On the third day of triiodothyronine therapy she awoke and thereafter she gradually restored her consciousness. Three weeks later, she was able to eat by herself and to walk without assistance, and six weeks later, to communicate with her surroundings. After three months of therapy she recovered her usual consciousness and was discharged from the hospital receiving 5 mg of prednisolone.

Table 1. Details of survival patients with pituitary

<table>
<thead>
<tr>
<th>Authors</th>
<th>Age &amp; Sex</th>
<th>Body temperature (°F)</th>
<th>Pulse rate (/min)</th>
<th>Blood Pressure (mmHg)</th>
<th>Respiration (/min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perlmutter (1964)</td>
<td>49 F</td>
<td>94°</td>
<td>50</td>
<td>70/50</td>
<td>12</td>
</tr>
<tr>
<td>Perlmutter (1964)</td>
<td>65 F</td>
<td>94°</td>
<td>36</td>
<td>n.o.</td>
<td>10</td>
</tr>
<tr>
<td>Paull (1964)</td>
<td>41 F</td>
<td>97</td>
<td>—</td>
<td>70/50</td>
<td>14</td>
</tr>
<tr>
<td>Monto (1967)</td>
<td>65 F</td>
<td>94.4°</td>
<td>—</td>
<td>n.o.</td>
<td>—</td>
</tr>
<tr>
<td>Present case</td>
<td>43 F</td>
<td>96</td>
<td>40</td>
<td>n.o.</td>
<td>slow &amp; shallow</td>
</tr>
</tbody>
</table>

T₃: Triiodothyronine, n.o.: not obtainable, °: rectal temperature.
and 100 mg of desiccated thyroid per day.

A confident diagnosis of anterior hypopituitarism was made by the following special endocrine examinations. Plasma concentration of thyroid-stimulating hormone (TSH) prior to treatment, measured by radioimmunoassay, was not detectable (<3 μU/ml). Intravenous administration of 500 μg of synthetic thyrotropin releasing hormone (TRH), under the treatment with daily dose of 35 μg of triiodothyronine, failed to raise plasma TSH levels. Immunoreactive growth hormone (GH), lutenizing hormone (LH) and follicle stimulating hormone (FSH) in plasma were undetectable (GH: < 0.1 ng/ml, LH: < 5 ng LER-907/ml, FSH: < 50 ng LER-907/ml), and showed no elevation after an infusion of arginine (0.5 g/kg body weight in 30 min) and an intravenous administration of 100 μg of lutenizing hormone releasing hormone (LH-RH), respectively. Intravenous injection of 250 μg of β1-24 ACTH produced a subnormal rise in plasma levels of cortisol (Murphy, 1967) from 0.3 μg/100 ml (normal 6-17) to 3.8 and 4.2 at 30 and 60 min respectively, when the patient received 0.5 mg of dexamethasone, which suggests adrenocortical insufficiency secondary to ACTH deficiency. Plasma level of vasopressin determined by bioassay (Yoshida et al., 1963) was 5.2 μU/ml (normal 3.5-9.0) after a 16-hrs deprivation of water drinking, indicating that the posterior pituitary function was normal.

Comments

This is a successfully treated case of myxedema coma of pituitary origin. The patient had a characteristic history of Sheehan's syndrome (Sheehan and Summers, 1949), which was confirmed by pituitary function tests. There is little doubt that thyroid insufficiency was the primary cause of the impaired consciousness of this patient, because she regained her consciousness after initiation of thyroid hormone replacement. The administration of adrenocortical hormone and glucose improved circulatory collapse and muscle cramps, and this suggests that adrenocortical insufficiency and hypoglycemia were involved in the crisis. In addition to the appropriate supplementation of thyroid and adrenocortical hormones, respiratory assistance must have played an important role in the treatment of this serious condition.

Hypopituitarism is often precipitated into coma, if no therapy is indicated (Sheehan and Summers, 1949). Some patients with hypopituitary coma recover after administration of adrenocorticoid and glucose, however in other cases the coma is characterized with hypothermia and respiratory derangement, leading to the fatal result (Sheehan and Summers, 1952). The later condition is designated myxedema coma of pituitary origin and was first emphasized by Summers (1953). Myxedema coma of pituitary as well as thyroid origin carries a very high mortality rate. In the era when thyroid hormone was not

<table>
<thead>
<tr>
<th>Blood Sugar (mg/dl)</th>
<th>Serum Cholesterol (mg/dl)</th>
<th>Thyroid Hormone (dose/day)</th>
<th>Corticosteroid (dose/day)</th>
<th>Glucose</th>
<th>Duration of coma</th>
</tr>
</thead>
<tbody>
<tr>
<td>45–84</td>
<td>371</td>
<td>T₂: 5 μg (per os)</td>
<td>Hydrocortisone: 200 mg (i.v.)</td>
<td>+</td>
<td>3.5 hours (stupor)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>T₂: 12.5 μg (per os)</td>
<td>Hydrocortisone: 300 mg (i.v.)</td>
<td>+</td>
<td>not stated</td>
</tr>
<tr>
<td>62–80</td>
<td>273</td>
<td>Desiccated Thyroid (per os)</td>
<td>Hydrocortisone: (i.v.)</td>
<td>+</td>
<td>a few hours</td>
</tr>
<tr>
<td>18</td>
<td>—</td>
<td>T₃: 100 μg (i.v.)</td>
<td>Hydrocortisone: 200 mg (i.v.)</td>
<td>+</td>
<td>one day</td>
</tr>
<tr>
<td>—</td>
<td>308</td>
<td>T₃: 5 μg (per os)</td>
<td>Prednisolone: 50 mg (i.v.)</td>
<td>+</td>
<td>12 days</td>
</tr>
</tbody>
</table>
introduced into the treatment of this condition, the coma terminated in death in almost all cases. Up to date only four survival patients with myxedema coma of pituitary origin have been described in English literatures (Perlmutter and Cohn, 1964; Paull, 1964; Monto and Bedingfeld, 1967) (Table 1), whereas approximately thirty cases of myxedema coma of thyroid origin were reported to be successfully treated with thyroid hormone.

Myxedema coma of both pituitary and thyroid origin requires emergency therapy. As soon as the clinical diagnosis of myxedema crisis is made, specific therapy should be started. Two important aspects of treatment of this serious condition are a rapid replacement of thyroid hormone and a careful management of respiratory dysfunction. Both triiodothyronine (Perlmutter et al., 1964) and thyroxine (Hovey et al., 1964) can be used intravenously, intramuscularly or via a gastric tube. Triiodothyronine appears to be the agent of choice, because of the rapid onset of its action. An initial dose of 5 to 10 micrograms of the agent might be sufficient. Large doses are sometimes harmful to myxedema heart. Perlmutter et al. (1964) described a patient who received 10 micrograms of triiodothyronine intravenously, which resulted in ventricular extrasystoles. Thyroid hormone replacement alone is also hazardous, since metabolic acceleration deteriorates adrenocortical insufficiency. In patients with pituitary myxedema coma, adrenal crisis and hypoglycemia are usually accompanied, therefore a large amount of adrenocorticoid in combination with glucose should be administered concomitantly.

Norquist et al. (1960) emphasized that, in patients with myxedema, carbon dioxide retention due to insufficient ventilation, may trigger the coma. Respiratory derangement which is one of the complications of myxedema, might be due to both dysfunction of muscles of respiratory system and relative depression of the respiratory center (Massumi and Winnacker, 1964). Hypoxemia caused by respiratory insufficiency may lead to a further deterioration of hypometabolism. Therefore, in addition to adequate supply of the deficient hormones, respiratory support seems to be very important in the treatment of myxedema crisis.

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References


