Service of Endocrine Diseases, Rivadavia Hospital, Buenos Aires, Argentina

DIABETES INSIPIDUS ASSOCIATED WITH EXOPHTHALMIC GOITER

By

Enrique B. del Castillo, Eduardo Trucco and Delia Radzyminski

ABSTRACT

The case of a 42 year old female with diabetes insipidus, exophthalmic goiter, lipodystrophy and amenorrhea is described. The association of diabetes insipidus and hyperthyroidism is not frequently observed and only a few cases have been reported in the literature. Attention is drawn to what happened to this patient during the Carter-Robbins test and to her death at the end of it.

The association of diabetes insipidus with exophthalmic goiter has not previously been observed in more than a thousand hyperthyroid patients studied in our Service. It has only been possible to find a few cases in the literature with an association of these two diseases. This report concerns a patient with exophthalmic goiter who also had severe diabetes insipidus and exhibited, at the same time, other signs of possible hypothalamic origin.

CASE REPORT

Patient R. I., a 42 year old unmarried white female, was admitted on September 5, 1960. From 29 to 31 years of age, she suffered a series of emotional conflicts, developed anxiety and a sense of guilt due to broken sentimental relationships. There was a good deal of tension in the family because of an invalid mother whom the patient had to assist. Ten years before admission, she became aware of a definite increase in urinary output, thirst, nervousness and insomnia. The patient's physician made a diagnosis of diabetes insipidus and treated her with pitressin tannate posterior

237
pituitary powder given as nasal snuff. A few months later, she lost 20 kg of weight, in spite of receiving a good diet. Amenorrhoea preceded by hot flushes and increased nervousness, occurred at 39 years of age. At 41 she developed exophthalmos, enlargement of the thyroid, palpitations, occasional fine tremor, loss of strength and pain and swelling of the legs.

She had a past history of whooping cough, mumps, typhoid fever, haemorrhoids and an anal fissure, all without apparent complications. There was no history to suggest endocrine disease in any member of the family.

Physical examination on admission showed a woman 152 cm tall, weighing 66.5 kg; blood pressure 140/75; temperature 36.5° C; the face showed evidence of weight loss and her eyes had a fixed and brilliant stare. The weight loss was more marked in the upper half of the body and contrasted with abundant fat distribution in the pelvic region and legs. Her skin was thin, warm and sweaty, with disseminated pigmentary spots; red naevi and telangiectases of the face. Exophthalmos and absence of oculo-palpebral coordination of both eyes were observed, predominantly right-sided. The upper left lid was retracted in addition to the presence of chemosis and slight conjunctival congestion. Eye grounds and visual fields were normal.

The buccal mucosa was pink and damp; the thyroid showed a bilateral diffuse enlargement, more marked in the right lobe, although consistency and mobility were normal. Muscular atrophy in both temporal regions, shoulders, arms and hands was noted. Pelvic muscles were normal, but in order to get up from her bed, the patient needed help and had to support herself on her hands and then showed movements which resembled that in a myopathic patient. Plummer's sign was markedly positive; emotional instability was observed; the remainder of the physical examination was normal.

The haemogram was normal; sedimentation rate 15 mm in 1 hour; serum urea 0.29 mg/100 ml; fasting serum glucose 0.86 mg/100 ml and cholesterol 173 mg/100 ml; serological test for syphilis was negative; urinalysis was normal with specific gravity varying from 1.001 to 1.010 and no other significant findings. The 24-hour excretion of 17-ketosteroids was 17 mg (Brit. Med. Res. Council 1951); cytological study of the urine (del Castillo et al. 1943) showed a hypoestrogenic pattern; urine volume without treatment was 28–30 liters, with an equivalent fluid intake. After treatment with pitressin tannate the urine volume decreased to 3 liters. X-ray examination of the head and chest were both normal.

The arm-to-tongue circulation time was 4 seconds on admission, rising to 6 seconds a week later (Decholin). The electrocardiographic tracings showed sinus tachycardia at a rate of 125 beats per minute while the waves showed an increase of voltage with moderate alteration of repolarization, demonstrating significant changes compatible with the diagnostic impression.

Because of the patient's apprehension, it was not possible to obtain a basal metabolic rate. The electroencephalogram demonstrated focal paroxysmal cerebral dysrhythmia in the left anterior temporal region with spontaneous tachyarrhythmia.

The thyroid retained at 3 hours 100% of a tracer dose of 131I given orally, 105% at 24 hours and 100% at 48 hours. The conversion index of plasma 131I was 61%.

The following tests were performed to demonstrate activity of the antidiuretic hormone; thirst (water deprivation), nicotine (Cates & Garrod 1951; Lewis & Chamers 1951) and concentrated sodium chloride (Carter & Robbins 1947); the results of these are given in Figs. 1, 2 and 3.

The patient died during the Carter-Robbins test; her clinical course and development during this test is described in Table 1. Autopsy was not performed.
Fig. 1.
Thirst test (water deprivation). Patient deprived of water for 6 hours before and during test.

Fig. 2.
Nicotine test. There was no alteration in diuresis before or after smoking four cigarettes in 20 minutes.
Table 1.

**PATIENT'S EVOLUTION FOLLOWING SODIUM CHLORIDE INFUSION UNTIL DEATH**

<table>
<thead>
<tr>
<th>HOUR</th>
<th>11:30</th>
<th>12:30</th>
<th>14</th>
<th>15</th>
<th>16</th>
<th>18</th>
<th>19:30</th>
<th>20:30</th>
<th>22</th>
<th>22:30</th>
<th>23:30</th>
<th>0:30</th>
<th>1:30</th>
<th>2:30</th>
<th>3:30</th>
<th>4:30</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>BLOOD PRESSURE</strong></td>
<td>180/80</td>
<td>200/80</td>
<td>230/90</td>
<td>160/80</td>
<td>140/90</td>
<td>120/80</td>
<td>140/90</td>
<td>150/80</td>
<td>Un determinable</td>
<td>100/70</td>
<td>Un determinable</td>
<td>id.</td>
<td>id.</td>
<td>110/50</td>
<td>Un determinable</td>
<td>id.</td>
<td></td>
</tr>
<tr>
<td><strong>PULSE</strong></td>
<td>Tachycardia</td>
<td>id.</td>
<td>id.</td>
<td>Tachycardia</td>
<td>id.</td>
<td>Tachycardia</td>
<td>id.</td>
<td>150</td>
<td>Tachycardia</td>
<td>200/80</td>
<td>8:4</td>
<td>120</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td><strong>URINE SPEC. GRAV.</strong></td>
<td>1001</td>
<td>1010</td>
<td>1006</td>
<td>1015</td>
<td>1007</td>
<td>1005</td>
<td>1015</td>
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<tr>
<td><strong>TEMPERATURE</strong></td>
<td>39°5</td>
<td>39°5</td>
<td>39°5</td>
<td>40°</td>
<td>39°5</td>
<td>41°</td>
<td>40°</td>
<td>40°5</td>
<td>41°</td>
<td>40°4</td>
<td>40°4</td>
<td>40°4</td>
<td>39°5</td>
<td></td>
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<tr>
<td><strong>PLASMA ELECTROLYTES</strong></td>
<td></td>
<td>Na 103</td>
<td>K 2,6</td>
<td></td>
<td>Na 180</td>
<td>K 4,19</td>
<td>Cl 135</td>
<td>HCO 49%</td>
<td></td>
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<td><strong>SYMPTOMS</strong></td>
<td>Tainted unconscious</td>
<td>id.</td>
<td>Excited</td>
<td>id.</td>
<td>Increased agitation</td>
<td>Generalized seizures</td>
<td>Tractional contractions</td>
<td>Tachycardia</td>
<td>id.</td>
<td>Tonic-clonic</td>
<td>Agitation</td>
<td>Improved</td>
<td>Convulsive respiratory arrest</td>
<td>Meninges</td>
<td>Tonic convulsions</td>
<td></td>
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<tr>
<td><strong>PITRESSIN</strong></td>
<td>10 U</td>
<td>5 U</td>
<td>10 U</td>
<td>10 U</td>
<td></td>
<td></td>
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<tr>
<td><strong>LIQUID ORAL INTAKE</strong></td>
<td>Gastric tube 3000 ml</td>
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<td></td>
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<tr>
<td><strong>INTRAVENTRICULAR THERAPY, etc.</strong></td>
<td>Glucose 500 ml</td>
<td>Isotonic saline 500 ml</td>
<td>Insulin 500 ml</td>
<td>Prednisolone 25 mg</td>
<td>K 15 meq</td>
<td>Li 15 meq</td>
<td>Prednisolone 25 mg</td>
<td>Ga Analeptics</td>
<td>Antipyretics</td>
<td>id.</td>
<td>id.</td>
<td>Ga Analeptics</td>
<td></td>
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</table>
COMMENTS

A case showing the rare association of diabetes insipidus and exophthalmic goiter has been described in the present paper. The only similar observations found in the literature are those of Rieber & Silver (1952) in a patient who recovered completely from both thyrotoxicosis and diabetes insipidus after one single treatment with radioactive iodine. Furthermore, attention is called to the unexpected events during the administration of chloride in the Carter and Robbins test.

The impossibility of performing an autopsy as well as carrying out a complete functional and humoral study, in this case, do not detract from the interesting clinical observation of both diseases.

The obscure vinculation here deserves further study; it is almost impossible to demonstrate the cause of death which occurred during the Carter-Robbins test. Consideration is also given to a possible irreversible electrolyte disturbance developing in the course of a hyperthyroid crisis; this diagnosis is supported by psychomotor agitation, rise in temperature, arterial hypertension, warmth and sweat of skin, tachycardia, intensity of the cardiac sounds, etc. The symptoms described are similar to those observed in the so-called "hypothalamic crisis" which is apt to occur in patients with diencephalic tumours whether in the natural or post-operative development of the condition. This similarity refers especially to the series of neurovegetative manifestations, but
unfortunately, in the absence of a necropsy, it is hypothetical whether a hypothalamic crisis was the cause of death.

The diagnosis of exophthalmic goiter was definite; that of diabetes insipidus was based on the 26–30 liters daily with proportional liquid intake, its normalization after administration of pitressin and the absence of an adequate response to nicotine.

The patient was treated with pitressin for nine years before the apparent onset of exophthalmic goiter. In this respect, the possibility should be considered whether this treatment produced an alteration in thyroid function, as demonstrated by Harris (1955) in animals with prolonged and continued administration of pitressin. This fact could not be reproduced in humans in short-termed experiments (Moses et al. 1961).

Increase of the antidiuretic hormone produced in thyroid insufficiency (Goldberg & Reivich 1962) and these authors suggest that these is an interaction between the thyroid gland and the antidiuretic hormone.

The association of both clinical entities (thyrotoxicosis and diabetes insipidus) therefore is interesting from a theoretical point of view.

It should be noted that the patient died during the Carter-Robbins test showing that this diagnostic procedure is not without danger.

REFERENCES


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