Introduction

ROHHAD syndrome (Rapid-onset Obesity with Hypoventilation, hypothalamic and autonomic dysregulation) is a rare and complex disease with potential severe outcome. To this day there have been 158 cases reported in the literature while whole exome sequencing has not yet revealed any responsible genes. It usually presents at the age of 2-7 years. In about 40% of the patients, neuroendocrine tumors have also been reported (ROHHAD-NET).

Case report 1

A 9.5 year old female initially presented to the pediatric endocrinology outpatient care with premature menarche and rapid onset obesity (Figure 1).

Clinical findings:
• Height 146cm (90th percentile), weight 59kg, BMI 27.6 kg/m² (>97th percentile)
• Tanner stage: breast V, pubic hair V

Currently, the patient is on full hormone replacement therapy (HRT, hydrocortisone, thyroxine, ADH).

Laboratory findings: Hypernatremia, hyperprolactinemia, hypoventilation, alveolar hypoventilation, hypogonadism, GH deficiency with normal cortisol secretion, hypothryoidism and insulin resistance (Table 3).

Table 1. Patient’s laboratory findings at ages 9.5 and 14.

<table>
<thead>
<tr>
<th>Age</th>
<th>IGF1</th>
<th>GH</th>
<th>PRL</th>
<th>TSH</th>
<th>FSH</th>
<th>LH</th>
<th>T</th>
<th>T4</th>
<th>T3</th>
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<td>0.08</td>
<td>25</td>
<td>0.3</td>
<td>6.1</td>
<td>0.2</td>
<td>2.5</td>
<td>6.2</td>
<td>1.2</td>
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<tr>
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<td>158</td>
<td>0.07</td>
<td>28</td>
<td>0.3</td>
<td>8.1</td>
<td>0.4</td>
<td>2.8</td>
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<td>1.3</td>
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</table>

Imaging:
• Bone age: 12 years according to Greulich and Pyle
• Pituitary MRI: Rathke cyst without any other abnormal findings
• Pelvic ultrasound: pubertal ovaries and uterus

During follow up, the patient developed secondary amenorrhea, hypernatremia, severe thermal dysregulation, hypothryoidsm, while further testing with sleep study revealed obstructive sleep apnea, strongly suggesting ROHHAD syndrome (Table 1, Figure 2).

Case report 2

A 14 year old boy presented for the first time to the endocrinology outpatient care with significant obesity (BMI 38.08, >97th percentile) and metabolic syndrome (Figure 3).

Clinical findings:
• Height 152cm (10th percentile)
• Delayed puberty (Tanner stage: breast II, pubic hair II, testicular volume 6ml)
• Acanthosis nigricans

Laboratory findings: Hypernatremia, hyperprolactinemia, hypoventilation, alveolar hypoventilation, hypogonadism, GH deficiency with normal cortisol secretion, hypothryoidism and insulin resistance (Table 3).

Table 3. Patient’s laboratory findings at the age of 14.

<table>
<thead>
<tr>
<th>Age</th>
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<tr>
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</table>

Imaging:
• Bone age compatible with chronological age
• Pituitary MRI: without abnormal findings.

Sleep study: obstructive sleep apnea hypopnoea syndrome of increased severity

Clinical and laboratory findings suggested ROHHAD syndrome. Currently, the patient is on metformin, thyroxine, testosterone and non invasive ventilation device (C-PAP).

Conclusion

Prompt recognition of the syndrome as well as treatment of hormonal dysfunction and alveolar hypoventilation may prevent severe complications and increased morbidity mainly due to cardiopulmonary arrest.

References