BIOTIN INTERFERENCE IN A PATIENT WITH CLINICALLY DISCORDANT HIGH THYROID HORMONES

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Introduction

Thyroid hormone resistance (beta) and TSHoma should be considered in patients with high free thyroxine (fT_4) and free triiodothyronine (fT_3) with unsuppressed thyroid stimulating hormone (TSH) levels. The aim of this study is to present the results of etiological research in a patient with Down syndrome who was clinically euthyroid but had high fT_4, high fT_3 and normal TSH levels.

Case

- A 28-day-old male with Down's syndrome was referred because of increased fT_4 levels in his examinations.

Medical history:

- The patient was born at term with a weight of 3270 g, was operated by a pediatric surgeon for hirschsprung disease and he was using **biotin** at a dose of 10 mg/day due to biotinidase deficiency

Family history:

- Parents had no known thyroid dysfunction

Physical Examination:

- Weight: 4020 g (-0.68 SDS),
- Height: 52 cm (-0.55 SDS)
- Pulse: 130/dk,
- Blood pressure : 90/50 mmHg
- Head circumference: 38 cm (0.07 SDS),
- Anterior fontanel: 1.5x1 cm
- No goiter; no findings for thyrotoxicosis
- Down syndrome stigmatism

Laboratory

- fT_3:14.9 ng/dl (2.5-4.4) TSH:2.65 mU/L (0.34-5.6)
- fT_4:4.08 ng/dl (0.54-1.24)

Reexamination after one week in the same laboratory;

- fT_3:14.3 ng/dl (2.5-4.4) TSH:2.88 mU/L (0.34-5.6)
- fT_4:3.69 ng/dl (0.54-1.24)

Clinical observation

- As the patient was clinically euthyroid and had a history of biotin use, the method used for TFT was questioned considering biotin interference.
- The patient's fT3 and fT4 tests were determined to be performed in an immunoassay system (DxI, Beckman Coulter Inc., USA) using streptavidin-biotin and cause interference accordingly.
- There was no interference in the same tests on a different immunassay platform (Architect 2000, Abbott Lab., USA) which did not use this pairing methodically.
- fT_3:3.64 pg/ml (1.5-6.4) sT_4:1.17 ng/ml (0.48-2.34) TSH:2.53 uIU/ml (0.62-8) determined as normal**.**

Results

- Biotin-streptavidin interaction is the most powerful non-covalent interaction in nature and is frequently used in immunoassay measurements.
- The direction and magnitude of the biotin interfarans may vary depending on the immunoassay platform and test.
- Particularly the use of high-dose biotin may result in erroneous results depending on the principle of the test (competing or sandwich).
- It is an appropriate approach to repeat the analyzes in alternative immunassay platforms in cases where interference is suspected.

In conclusion;

- This case report emphasizes that biotin interference should be kept in mind in patients with clinically discordant thyroid dysfunction, and the results of hormone measurements using biotin binding methods in patients using biotin may have clinically discordant abnormal results.