Pitfalls of Thyroid Stimulating Hormone Measurement in Two Cases with Hypertriglyceridemia

Hipertrigliseridemili İki Olguda Tiroid Stimulan Hormon Yanlış Ölçümü

Züleyha Can Erdi[1], Çiğdem Özkan [2], Merve Öz[1], Arif Yüksel[1]

[1] University of Health Sciences, Department of Internal Medicine, Izmir Bozyaka Training and Research Hospital, Izmir Turkey
[2] University of Health Sciences, Division of Endocrinology and Metabolism, Izmir Bozyaka Training and Research Hospital, Izmir Turkey

ABSTRACT

Thyroid function tests (TFTs) are among the most commonly requested tests by physicians. Since the diagnosis of thyroid dysfunction requires long term treatment, correct diagnosis and decision to treatment is important for the patient. In most patients the evaluation of TFTs is quite easy but in a small subgroup test results are inconsistent with clinical situation. In our two patients who have hypertriglyceridemia discrepancy between their Thyroid-Stimulating Hormone (TSH) levels and clinical status detected. In this report, we would like to emphasize the impotance of TSH pitfalls and interferences.

Keywords: Discordant thyroid function tests (TFTs), assay interference, hypertriglyceridemia

Received: 05.26.2020 **Accepted:** 03.13.2021

ÖZET

Tiroid fonksiyon testleri (TFT) klinisyenler tarafından en sık kullanılan testler arasındadır. Tiroid disfonksiyonu uzun süreli tedavi gerektirdiğinden doğru tanı ve tedaviye karar verilmesi hasta için çok önemlidir. Çoğu hastada TFT'nin yorumlanması rahatlıkla yapılabilir, ancak küçük bir grupta test sonuçları tutarsızdır. Hipertrigliseridemisi bulunan iki hastamızda Tiroid Stimulan Hormon (TSH) düzeyleri ile klinik durumları arasında uyumsuzluk tespit edildi. Bu olgu sunumumuzda olası TSH yanlış ölçümlerini ve interferans faktörlerini vurgulamayı amaçladık.

Anahtar Sözcükler: Uyumsuz tiroid fonksiyon testleri (TFT), interferans, hipertrigliseridemi

Geliş Tarihi: 26.05.2020 **Kabul Tarihi:** 13.03.2021

First case report published as a poster presentation on Endo Bridge 2019, Antalya.
ORCID IDs: Z.C.E. 0000-0002-5880-6790, Ç.Ö. 0000-0002-5501-8115, M.Ö. 0000-0001-9063-3378,A.Y. 0000-0002-8568-5787

Address for Correspondence / Yazışma Adresi: Züleyha Can Erdi, University of Health Sciences, Department of Internal Medicine, Izmir Bozyaka Training and Research Hospital, Izmir, Turkey. E-mail: zuleyhacan1@gmail.com

doi:http://dx.doi.org/10.12996/gmj.2021.73

INTRODUCTION

Thyroid function tests (TFTs) are among the most commonly requested tests by physicians (1). Thyroid stimulating hormone (TSH) measurement is recommended as first step in determining thyroid dysfunction (2). The diagnosis of thyroid dysfunction has significant impact for the patient since both hypothyroidism and hyperthyroidism are long-term conditions that can require prolonged therapy (3). There are so many factors including physiological, pathological factors, laboratory interferences and drugs that can affect TSH and thyroid hormone concentrations (4). Physicians should consider those interferences and pitfalls when TFTs are inconsistent with clinical assessment (5). In this report, we present two cases in whom TSH level was requested for evaluation the etiology of hypertriglyceridemia.

CASE REPORT

Case 1

A 35-year-old male patient with hypertension, type-2 diabetes mellitus, coronary artery disease and hyperlipidemia was admitted to the emergency department with abdominal pain. Amylase: 435 U / L (22-80) and Lipase: 933.3 U / L (0-60) were detected. The patient was diagnosed as non-biliary acute pancreatitis.

Triglyceride (TG): 3753 mg / dL (0-150) detected in the laboratory tests. Since he had hyperlipidemia, fT4 and TSH were ordered to exclude hypothyroidism. TSH was elevated 21.08 uIU / mL (0.38-5.33) and free thyroxine (fT4) level was normal: 0.82 ng / dL (0.54-1.12) consistent with subclinical hypothyroidism. The patient had no exposure to iodinated contrast agents. He had no signs and symptoms of hypothyroidism. The patient was consulted to our clinic. The patient was administered glucose-insulin-potassium (GIK) solution and fenofibrate. Control blood tests revealed TG: 1319 mg / dL (0-150), because of the discrepancy between his thyroid function test and clinical situation thyroid function tests were also repeated. Both TSH: 1.62 uIU / mL (0.38-5.33) and fT4: 0.97 ng / dL (0.54-1.12) level were normal.

Case 2

A 33-year-old female patient with hypothyroidism and hyperlipidemia was admitted to the outpatient clinic for routine check-up. She was using levothyroxine 25µg and fenofibrate 267 mg daily. Her serum level of TG: 1833 mg / dL and TSH: 7.55 uIU / mL were detected. Since she had hypertriglyceridemia, we didn't change levothyroxine dose due to suspicion of TSH pitfall. The patient was administered GIK solution and fenofibrate. Control tests revealed TG: 542 mg / dL (0-150) and TSH: 3.82 uIU / mL.

In both patients, TSH was evaluated with the Beckman Coulter Access TSH (3rd IS) immunoassay system.

DISCUSSION

Diagnosis of thyroid dysfunction has long-term consequences (3). Physcians must consider the other illness status and drugs of the patient when interpreting thyroid function tests (6). Unnecessary and inappropriate treatment may lead to undesirable side effects in patients (7). Moreover, it can pose economic burden on health care system (7).

As mentioned before, when interpreting the thyroid function tests of the patient, it is important to consider the factors that may cause erroneous results and interfere with clinical evaluation (8). The serum of our both cases were lipemic and actually it is not appropriate to order TFT when the serum was lipemic. Clinican who request these tests may not able to be suspicious about erronous results and may start or change treatment unnecessarily. Especially pitfalls may be more challenging in patients who are already under levothyroxine treatment (9). Retesting under appropriate conditions is important in diagnosis and treatment of thyroid dysfunction.

As far as we know; there is no study in Turkey reporting what is the social and economic consequences of unnecessary or inappropriate treatment due to these pitfalls and interferences both for patients and our health care system. Case reports may increase clinicians' awareness but we need more data and especially research in this field.

In conclusion, thyroid dysfunction is an important diagnosis. Physicians should be aware of the factors that may affect TFTs especially when TFTs are inconsistent with clinical evaluation of the patient. Reobtaining a thorough medical history and reassessment of laboratory tests may be a good option but if there is still inconsistency patients should be referred or consulted to a specialist for further evaluation.

Conflict of interest
No conflict of interest was declared by the authors.

REFERENCES

1. Koulouri O, Moran C, Halsall D, Chatterjee K, Gurnell M. Pitfalls in the measurement and interpretation of thyroid function tests. Best Pract Res Clin Endocrinol Metab 2013; 27(6): 745-62.
2. Sheehan MT. Biochemical Testing of the Thyroid: TSH is the Best and, Oftentimes, Only Test Needed – A Review for Primary Care. Clin Med Res 2016; 14: 83–92.
3. Jonklaas J, Razvi S. Reference intervals in the diagnosis of thyroid dysfunction: treating patients not numbers. Lancet Diabetes Endocrinol 2019; 7(6): 473–83.
4. TEMD, Tiroid Çalışma Grubu. Tiroid Fonksiyon Testleri(TFT) ve Değerlendirilmesi. TEMD Tiroid Hastalıkları Tanı ve Tedavi Kılavuzu. Türkiye Klinikleri, Ankara, 2019: p4-5.
5. Favresse J, Burlacu MC, Maiter D, Gruson D. Interferences With Thyroid Function Immunoassays: Clinical Implications and Detection Algorithm. Endocr Rev 2018; 39(5): 830-850.
6. Soh SB, Aw TC. Laboratory Testing in Thyroid Conditions – Pitfalls and Clinical Utility. Ann Lab Med 2019; 39(1): 3-14.
7. Werhun A, Hamilton W. Thyroid function testing in primary care: Overused and under-evidenced? A study examining which clinical features correspond to an abnormal thyroid function result. Fam Pract 2015; 32(2): 187-191.
8. Haddad RA, Giacherio D, Barkan AL. Interpretation of common endocrine laboratory tests: technical pitfalls, their mechanisms and practical considerations. Clin Diabetes Endocrinol 2019; 24: 5: 12.
9. Jonklaas J, Bianco AC, Bauer AJ, Burman KD, Cappola AR, Celi FS, et al. Guidelines for the treatment of hypothyroidism: Prepared by the American thyroid association task force on thyroid hormone replacement. Thyroid 2014; 24(12): 1670–751.