Case Report **IJCR (2019) 4:102**

International Journal of Case Reports
(ISSN:2572-8776)

Levothyroxine malabsorption induced by gastroparesis in type one diabetic patient: effect of intravenous levothyroxine therapy case report

Homaid Alsahafi, Bandar Damanhori, Faisal AL Malky, Ashjan Alrogi, Khulood Alkhuzaie

Department of Endocrinology & Diabetology, Hera General Hospital, Makkah, Saudi Arabia

ABSTRACT

19 year old female known case of primary hypothyroidism on levothyroxine replacement, type one diabetes on insulin pump with good glycemic control and stable thyroid function, developed diabetic gastroparesis with worsening response to oral levothyroxine therapy. Her symptoms of hypothyroidism and her thyroid function improved dramatically by intravenous levothyroxine three times weekly for 4 weeks then she restarted on her usual dose of oral levothyroxine.

Intravenous levothyroxine three times weekly for 4 weeks followed by oral levothyroxine therapy maintained her euthyroid, improved hypothyroidism and gastroparesis symptoms till the date of editing of this report (more than 15 months.).

***Correspondence to Author:**
Homaid Alsahafi
Department of Endocrinology & Diabetology, Hera General Hospital, Makkah, Saudi Arabia

How to cite this article:
Homaid Alsahafi, Bandar Damanhori, Faisal AL Malky, Ashjan Alrogi, Khulood Alkhuzaie. Levothyroxine malabsorption induced by gastroparesis in type one diabetic patient: effect of intravenous levothyroxine therapy case report. International Journal of Case Reports, 2019 4:102

eSciPub LLC, Houston, TX USA.
Website: https://escipub.com/

INTRODUCTION

Gastroparesis is defined as delayed gastric emptying in the absence of mechanical obstruction [1, 2]. The prevalence rates of gastroparesis were 4.8% and 1% in patients with type 1 diabetes mellitus (DM) and type 2 DM, respectively [2, 3]. Higher prevalence rates of gastroparesis, ranging from 25 to 55% in type 1 DM and as high as 30% in type 2 DM have also been reported [1, 2]. The features of gastroparesis are complex and include abnormal gastric motor function, impaired glycemic control, extrinsic and intrinsic neuropathy, abnormalities of interstitial cell, loss of neuronal nitric oxide synthase, and possibly myopathy [4].

About 15 to 21% of patients with type 1 DM test positive for thyroid auto-antibodies [2, 5, 6], and this may be relevant as hypothyroidism itself is associated with impaired gastrointestinal motility.

In this report, we report a patient with type 1 DM and hypothyroidism who developed gastroparesis with impaired absorption of oral levothyroxine. This may be the fourth patient described in the literature with LT4 malabsorption caused by diabetic gastroparesis.

Case report:

19-year-old known female case of primary hypothyroidism on levothyroxine replacement, type I diabetes on insulin pump with good glycemic control, and stable thyroid functions was seen in endocrinology clinic in November 2016 with symptomatic hypothyroidism. (fatigueability, cold intolerance, dry skin) which was associated with rising thyroid stimulating hormone (TSH) level requiring increment of the dose of levothyroxine. She was complaining at that time of chronic nausea, vomiting and fullness.

Gastroparesis was confirmed by upper Gastrointestinal endoscopy. Adherence to levothyroxine therapy was confirmed by history and pill counting. Primary adrenal insufficiency was ruled out by normal response to short adrenocorticotrophic hormone (ACTH) stimulation test, morning cortisol and ACTH. Serum cortisol was 905 nmol/L (normal response above 500 nmol/L) 60 min after 250mcg intravenous cosyntropin and serum adrenocorticotropic hormone ACTH was 15.2 pg/ml (7.2-63.3). She had negative celiac disease serology.

She was not tolerating high levothyroxine loading dose because of diabetic gastroparesis symptoms including repeated nausea and vomiting. Medical treatment of gastroparesis was tried by using metoclopramide and Domperidone tables but failed. Jejunostomy tube was suggested by gastroenterologist, but unfortunately the patient refused it.

Her serum TSH ranged from 100 uIU to 819.7 uIU (0.270-4.2). Serum Free thyroxin (FT4) 9.2 pmol/L (12-22), Glycosylated hemoglobin HbA1c 6.8. (Less than 7), serum sodium (Na)137mmol/L(136-145), serum potassium K 4.6 mmol/L and serum creatnine (Cr) was 0.7 mg/dl(0.5-0.9).

Intravenous levothyroxine 200 mcg three times weekly was started for controlling hypothyroid symptoms and was continued for 4 weeks. Then, she was shifted to her usual dose of oral levothyroxine100 mcg daily. Her hypothyroidism status and gastroparesis symptoms were improved dramatically. Her thyroid function improved as serum TSH became 0.28 uIU/mL and serum FRREE THYROXINE (FT4) became 21.27 pmol/L.

Her levothyroxine oral doses ranged from 100-150 mcg daily throughout her endocrinology clinic visits later on.

She had stable thyroid function for 15 months after intravenous levothyroxine for 4 weeks course followed by oral levothyroxine therapy.

DISCUSSION

Levothyroxine (LT4) appears to be absorbed into the body through the jejunum and ileum, with residual absorption in the cecum [7]. About 70 to 100% of the administered dose is

absorbed within the gastrointestinal tract with maximal serum levels reached within 2 to 4 hours following ingestion [8]. A mean daily dose of 1.6 ± 0.4 mcg per kg is required to normalize TSH levels in patients with hypothyroidism; a daily dose more than 2.4 mcg per kg is considered excessive [7].

Various medications and medical conditions may affect LT4 absorption [2, 8, 9]. If levothyroxine pseudo-malabsorption is suspected, an absorption test is performed in the outpatient setting. This test requires measuring baseline TSH and T4 levels before administering 1,000 mcg of LT4 orally, and then additional blood is drawn every 1 to 2 hours for a total of 6 hours [8, 10]. Our patient's LT4 absorption test cannot be done because the patient was given the loading levothyroxine dose but unfortunately she vomited it immediately and couldn't tolerate it.

If we can rule out non-compliance, then the approach to the levothyroxine malabsorption would be to look for factors that prevent thyroxine absorption or increase its metabolism. It can be broadly divided into dietary factors, drug interactions and malabsorption syndromes [9, 11, 12].

In our case levothyroxine non-compliance was ruled out by pill counting and administration witness. Other courses like drugs interaction also ruled out. She had negative serology of celiac disease. Primary adrenal insufficiency was ruled out by good response to short corticotrophin stimulation and normal level of serum adrenocorticotropic hormone [13].

Up to our knowledge, this is the fourth reported case with levothyroxine malabsorption induced by diabetic gastroparesis. First case[14] was for 77 year old patient with diabetes and hypothyroidism. She was treated with increasing dose of oral thyroxin. Second case [15] was for 42 year old patient with type one diabetes with hypothyroidism. She maintained euthyroid status by using daily gelatin levothyroxine capsule formulation. Third case[2] was for 23 year with type one diabetes and hypothyroidism. She reached euthyroid status by using weekly intramuscular levothyroxine therapy followed by using daily gelatin levothyroxine capsule formulation because she did not tolerate intramuscular injection.

In our patient, because unavailability of gelatin levothyroxine or intramuscular levothyroxine formulation, her hypothyroid and gastroparesis symptoms improved dramatically after we started her on Intravenous levothyroxine 200 mcg three times weekly which continued for 4 weeks. Then she was shifted to her usual dose of oral levothyroxine 100 mcg daily. Her hypothyroidism and gastroparesis symptoms were improved dramatically. TSH level decreased to 0.28 uIU/mL and serum FT4 increased to 21.27 pmol/L. She had stable thyroid function for 15 months after using 3 times weekly course of intravenous levothyroxine for 4 weeks followed by oral levothyroxine therapy.

Conclusion

Diabetic gastroparesis should be considered one of the causes of levothyroxine malabsorption in diabetic patients who don't respond to or tolerate oral levothyroxine therapy. Intravenous levothyroxine can be considered as an alternative way to treat these patients if gelatin levothyroxine form is not available or if these patients don't tolerate intramuscular levothyroxine injection.

References

1. Parkman HP, Hasler WL, Fisher RS; American Gastroenterological Association. American Gastroenterological Association Technical Review on the Diagnosis and Treatment of Gastroparesis. Gasteroenterology 2004; 127: 1592-1622.
2. Kim PJ, Sachmechi I. Levothyroxine malabsorption induced by diabetic gastroparesis exacerbated during pregnancies: effect of of intramuscular Levothyroxine injections and Levothyrxine soft gel capsules. AACE Clinical Case Reports: Winter 2015; 1(1): e73-e78.
3. Camilleri M, Bharucha AE, Farrugia G. Epidemiology, mechanisms and management of diabetic gastroparesis. Clin Gastroenterol Hepatol. 2011; 9:5-12; quiz e7.

4. Shin AS, Camilleri M. Diagnostic assessment of diabetic gastroparesis. Diabetes 2013; 62: 2667-2673.
5. Roldan MB, Alonso M, Barrio R. Thyroid autoimmunity in children and adolescents with type 1 diabetes mellitus. Diabetes Nutr Metab. 1999; 12:27-31.
6. Kordonouri O, Hartmann R, Deiss D, Wilms, M, Gruters-Kieslich A. Natural course of autoimmune thyroiditis in type 1 diabetes association with gender, age, diabetes duration and puberty. Arch Dis Child. 2005; 90:411-414.
7. Ianiro G, Mangiola F, Di Rienzo TA, Bibbo S, Franceschi F, Greco AV, et al. Levothyroxine absorption in health and disease, and new therapeutic perspectives. European Review for Medical and Pharmacological Sciences, 2014; 18: 451-456
8. Lips DJ, van Reisen MT, Voigt V, Venekamp W. Diagnosis and treatment of levothyroxine pseudomalabsorption. Neth J Med. 2004; 62:114-118.
9. Eligar PV, Eligar VS. Levothyroxine: Factors affecting its intestinal absorption and metabolism. The West London Medical Journal 2011; 3 (4):9 -14
10. Srinivas V, Oyibo SO. Levothyroxine pseudomalabsorption and thyroxine absorption testing with use of high dose levothyroxine: case report and discussion. Endocrine Pract. 2010;16:1012-1015.
11. Thorsten Brechmann, Andre Sperlbaum, Wolff Schmiegel. Levothyroxine therapy and impaired clearance are the strongest contributors to small intestinal bacterial overgrowth: Results of a retrospective cohort study, World J Gastroenterol 2017 February 7; 23(5): 842-852.
12. Salvatore Benvenga, Giampaolo Papi, Alessandro Antonelli. Refractory hypothyroidism due to Improper storage of Levothyroxine tablets. Front Endocrinol (Lausanne). 2017 Jul 10;8:155. doi: 10.3389/fendo.2017.00155.
13. Subhadra Mandadi, Syed Sattar, Basim Towfiq, Ghassan Bachuwa. A case of nausea and vomiting to remember. BMJ Case Rep. 2015 Jan 22;2015.. doi: 10.1136/bcr-2014-207251.
14. O S K, M M AM, A N P, T K P. Gastroparesis - a novel cause of persistent thyroid stimulating hormone elevation in hypothyroidism. J La State Med Soc. 2015 Mar-Apr;167(2):47-9.
15. David P. Reardon, Peter S. Yoo. Levothyroxine Tablet Malabsorption Associated with Gastroparesis Corrected with Gelatin Capsule Formulation. Hindawi Publishing Corporation Case Reports in Endocrinology Volume 2016, Article ID 1316724. http://dx.doi.org/ 10.1155/2016/13167