



Submitted: 07.03.2023
 Accepted: 11.05.2023
 Early publication date: 18.07.2023

Endokrynologia Polska
 DOI: 10.5603/EPa2023.0047
 ISSN 0423–104X, e-ISSN 2299–8306
 Volume/Tom 74; Number/Numer 4/2023

Difficulties in achieving euthyroid status in a patient with differentiated thyroid cancer after sleeve gastrectomy

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Key words: thyroid cancer; sleeve gastrectomy; liquid levothyroxine

Introduction

Proper levothyroxine (LT4) replacement therapy is crucial for maintaining euthyroid status and reducing oncological risk for patients with differentiated thyroid cancer (DTC) [1, 2]. However, some patients may struggle to maintain target TSH concentrations even with theoretically adequate doses of LT4. Sleeve gastrectomy (SLG) is currently the most common type of bariatric surgery, and one of its potential complications may be malabsorption syndrome [3].

This manuscript presents a case study of a patient with DTC who underwent SLG and subsequently experienced absorption dysfunctions and difficulties in achieving target TSH concentrations.

A 37-year-old female with pT2N0M0R1 papillary thyroid cancer (PTC) underwent thyroidectomy in 2015, followed by radioactive iodine treatment [104.3 mCi (3.86 Gbq) of ¹³¹I] 2 months later. Despite using LT4, the patient struggled to achieve optimal TSH concentration and was subsequently treated with a combination of levothyroxine and liothyronine [LT4 + levotriiodothyronine (LT3)]. This combination allowed for a decrease in TSH concentration to the recommended levels for thyroid cancer treatment [2]. During the patient's control hospitalizations (November 2015, February 2019, and February 2020), TSH, antithyroglobulin antibodies (aTg), thyroglobulin (Tg), and stimulated thyroglobulin (sTg) were within normal limits (Tab. 1). Additionally, scintigraphy (3mCi of ¹³¹I) showed no accumulation of iodine, leading to a diagnosis of an excellent response to DTC treatment. Due to severe obesity [body mass index (BMI) > 45 kg/m²], the patient underwent bariatric surgery – sleeve

gastrectomy (SLG) — in August 2021. The previous treatment (150 ug LT4 + 30 ug LT3) was maintained. The patient reported for her next endocrinological visit in September 2022 — more than a year after the SLG procedure - at that time biochemical results showed severe hypothyroidism (Tab. 1). The patient was claiming to take the medication as recommended — fasting and at least an hour before consuming any food or coffee. The patient denied skipping doses or taking other substances simultaneously. She was advised to switch from the solid to the liquid form of the drug (200 ug per day) due to its better absorption profile [4, 5].

A reference was made for endoscopy to exclude gastroduodenitis, coeliac disease, or any other malabsorption syndromes, but stomach and duodenum biopsies excluded any gastrointestinal tract disorders. In October 2022, during liquid levothyroxine therapy (200 ug/d), the results improved slightly. However, the patient demanded to change the drug back to the solid form of LT4/LT3. She was strongly advised not to do so, but she did not believe in liquid form of treatment. She also did not like the sweetish glycerol taste of the liquid form, so she returned to the solid tablets and was taking 200 ug LT4 + 40 ug LT3 per day. Because of severe clinical symptoms of hypothyroidism, she switched back to the liquid form of LT4 on her own after just one week. The results then showed hypothyroidism [thyroid-stimulating hormone (TSH) 86.2 mIU/L; free thyroxine (fT4) 0.56 ng/dL; free triiodothyronine (fT3) 1.36 pg/mL], so the liquid LT4 was recommended (400 ug per day). After 2 weeks, she observed headaches and tremors, and again on her own, changed the treatment to 200 ug of liquid LT4 + 200 ug of solid LT4 + 40 ug of LT3. A month later, she presented with signs and symptoms of hypothyroid-



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Table 1. Results depending on a period and doses of levothyroxine

Date of visit	Drug [ug]	Body mass [kg]	TSH [0.27–4.2 mIU/L]	fT4 [1.0–1.6 ng/dL]	fT3 [2.04–4.4 pg/mL]	Tg [3.5–77 ng/mL]	sTg [3.5–77 ng/mL]	Anti-Tg [0–115 IU/mL]
V 2015	Euthrox 150	121	4.20	N/A	N/A	N/A	N/A	25.5
X 2015	Novothyral 200	168	0.13	N/A	N/A	0.04	0.04	10
II 2019	Novothyral 200	120	0.09	N/A	N/A	0.04	0.07	10
II 2020	Novothyral 150	112	2.32	N/A	N/A	0.04	0.09	10
IV 2021	Novothyral 150	122	3.15	1.08	2.64	0.04	N/A	10
VIII 2021	Novothyral 150	132	N/A	N/A	N/A	N/A	N/A	N/A
IX 2022	Novothyral 150	82	92.45	0.38	1.47	N/A	N/A	N/A
X 2022	Tirosint Sol 200	84	55.80	0.8	1.62	N/A	N/A	N/A
X 2022	Novothyral 200	86	86.20	0.56	1.36	N/A	N/A	N/A
XI 2022	Tirosint Sol 400	85	14.75	0.94	2.42	0.04	N/A	10
XII 2022	Novothyral 200 + Tirosint Sol 200	87	53.93	0.8	1.99	N/A	N/A	N/A
I 2023	Tirosint Sol 200+0+100	87	11.36	1.1	2.6	N/A	N/A	N/A

TSH — thyroid-stimulating hormone; fT4 — free thyroxine; fT3 — free triiodothyronine; Tg — thyroglobulin; sTg — stimulated thyroglobulin; anti-Tg — antithyroglobulin antibody; N/A — not available

ism, and serum results confirmed the clinical condition. Again, liquid LT4 was recommended in doses of 200 ug in the morning and 100 ug in the evening. Blood results performed a month after the new dose showed stabilization of the clinical state and free thyroid hormones. The patient did not tolerate higher doses of LT4. The possible oncological outcomes of non-optimal TSH were carefully explained to the patient in order to increase her adherence to therapy. The decision was made to sustain the present dose and form of the drug, with laboratory and ultrasonographic tests every 3–6 months.

Summarized clinical and blood parameters are presented in Table 1.

The case highlights that bariatric surgery, while offering an opportunity to reduce body mass and lower the number of obesity complications, may cause malabsorption. Low patient adherence to therapy was also an issue hindering treatment in this case. When combined, these factors can make it difficult to control other diseases, such as DTC. Although SLG is considered the safest bariatric procedure, other comorbidities should be carefully analysed before surgery [3]. In some patients with gastrointestinal diseases, such as malabsorption syndromes, liquid levothyroxine may be the only possible form of the drug due to its absorption profile, which bypasses the gastric part of the process. Because of possible complications, patients with hypothyroidism should be monitored more frequently after bariatric surgery, and liquid LT4 could be a better option in these cases [4, 5].

Bariatric surgery, even SLG, may cause malabsorption syndrome.

In patients with thyroid cancer difficulties in achieving target TSH due to levothyroxine malabsorption may increase oncological risk.

Liquid levothyroxine has a better absorption profile and should be considered in patients after bariatric, gastric, or gut surgeries.

Funding

This study received no external funding.

Acknowledgments

The authors thank IBSA Poland Sp. z o. o. for financial support in publication of the manuscript.

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