

given 2 days before testing. However, one patient was given the instructions 20 days before conducting the test. The patient’s serum levels of TSH, free thyroxine (FT4), and free triiodothyronine (FT3) were measured at 0, 60, and 120 minutes after administration of 1,000 mcg of levothyroxine orally as 10 tablets of 100 mcg each, using the rapid levothyroxine absorption test protocol.

In all patients, both FT4 and FT3 levels increased substantially in subsequent samples at 60 and 120 minutes, as shown in Figure 1, thereby excluding the poor levothyroxine absorption.

The baseline TSH level was raised in all patients who were scheduled 2 days before the test; however, a normal TSH level was seen in the patients scheduled 20 days before the test. The normal baseline TSH in that patient indicated that the patient had taken his prescribed dose of levothyroxine before the absorption test. However, despite the normal baseline TSH level, this patient also showed increased FT4 levels in subsequent samples at 60 and 120 minutes, as shown in Figure 2.

Discussion

The absorption of levothyroxine occurs primarily in the jejunum and ileum of the small intestine. Approximately 80% of absorption takes place in the fasting state [7], with peak serum levels at or near 2 hours after oral administration [8].

A rapid levothyroxine absorption test at 2 hours is described in the literature in a small number of patients [9]. We describe the case series of six patients who had raised TSH levels over a period of 24-36 months despite the adequately prescribed doses of levothyroxine. We performed a rapid levothyroxine absorption test in these patients using a 2-hour protocol after administering 1,000 µg of levothyroxine.

Five patients had raised baseline TSH levels; however, one had a normal baseline TSH level. The patient with a normal baseline TSH level was scheduled 20 days before the test; however, the remaining three with raised TSH levels were scheduled 2 days before the test. Therefore, the prolonged prior scheduling may let the patient adhere to his prescribed dose, resulting in normal TSH levels as

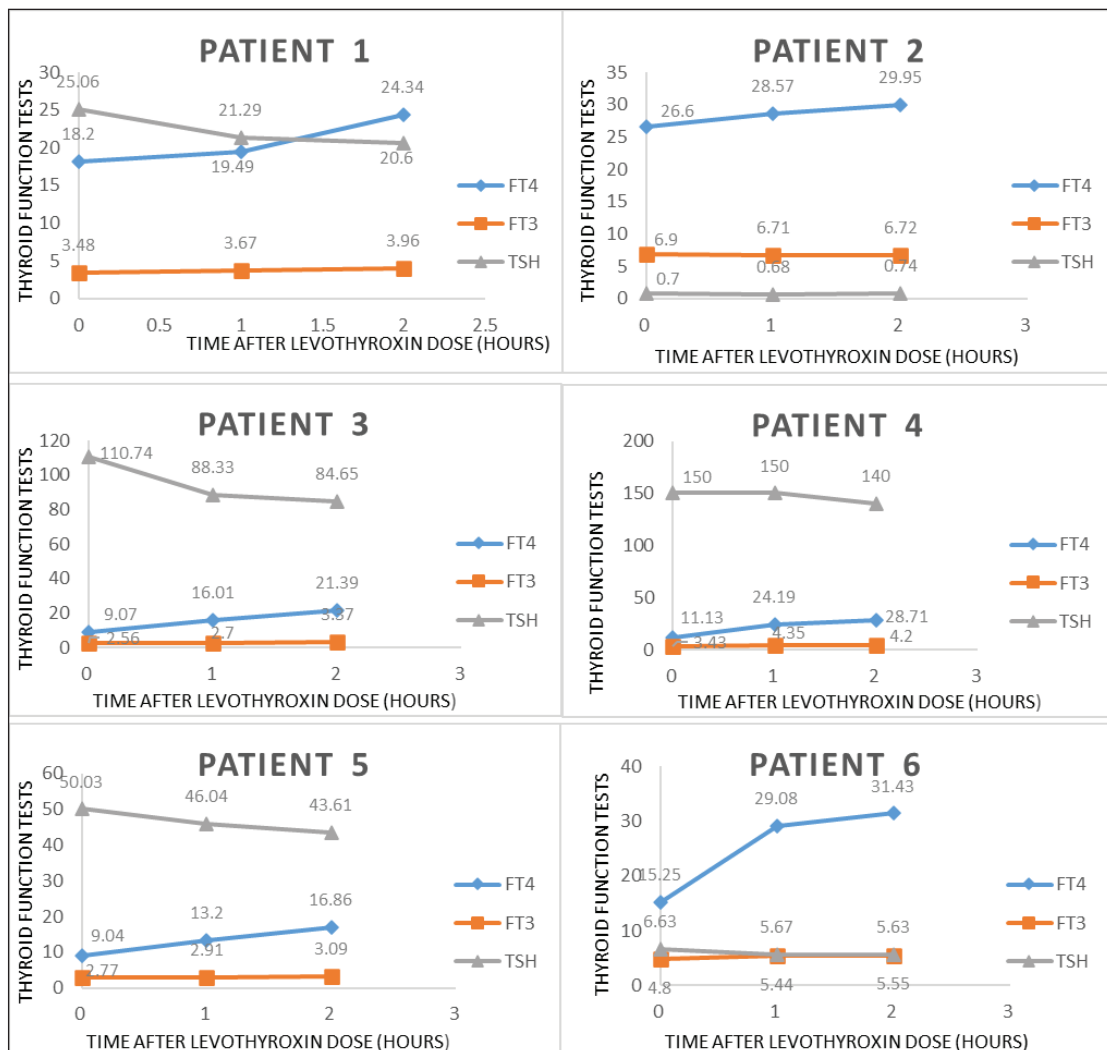


Figure 1. Two-hour levothyroxine absorption test in six patients.

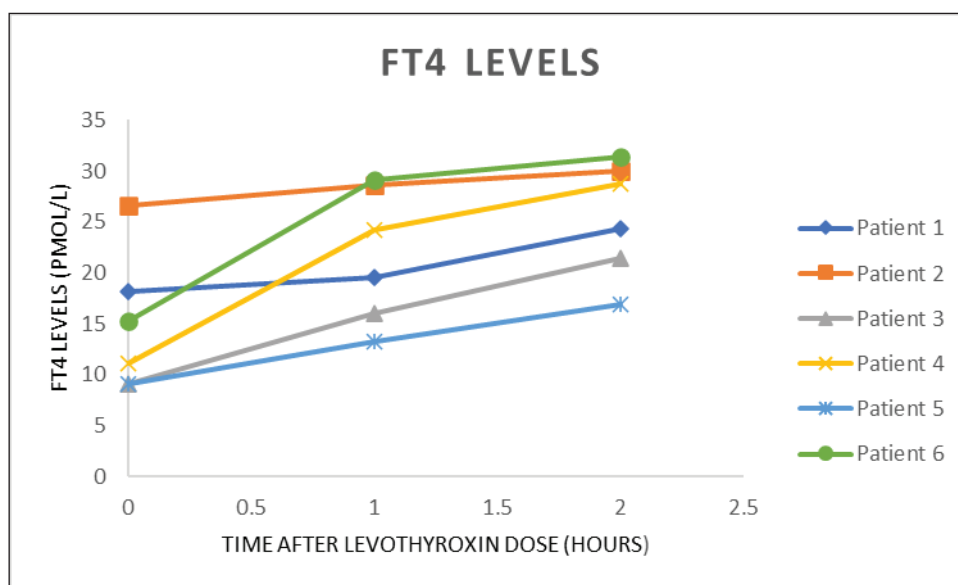


Figure 2. Two-hour levothyroxine absorption test in six patients, showing a substantial increase in FT4 levels in subsequent samples at 2 hours.

was reported previously by Balla [9]. The rapid 2-hour levothyroxine absorption test had been described previously [9], but only on 3 patients and all of them were euthyroid on baseline thyroid function testing. In our case series, we successfully performed a rapid levothyroxine absorption test on six patients, all of whom showed a subsequent increase in FT4 levels compared to baseline FT4 levels.

The possible explanation for the higher than usual levothyroxine dosage is reduced intestinal absorption, increased levothyroxine metabolism, and nonadherence to levothyroxine therapy. The intestinal absorption may be reduced in celiac disease, jejunio-ileal bypass procedures, severe hepatic cirrhosis, congestive heart failure, and the use of drugs such as sucralfate, calcium carbonate, ferrous sulfate, cholestyramine, and so on [5]. The drugs that mainly increase levothyroxine metabolism are carbamazepine, phenytoin, and phenobarbital [7]. Before evaluating a patient requiring an apparently high levothyroxine dose through cumbersome tests for malabsorption, one should consider the levothyroxine absorption testing to rule out nonadherence.

Once poor adherence to treatment is identified, different strategies can be adopted to improve treatment outcomes through a closer understanding of the patients' perspectives about illness, lifestyle modifications, and discussing health beliefs. All this can be achieved, including the elimination of false perceptions regarding the treatment, through an optimal doctor-patient relationship.

Conclusion

In conclusion, our findings suggest that the rapid levothyroxine absorption test is a valuable diagnostic tool, capable

of providing significant insights, within just 2 hours. This test effectively distinguishes between nonadherence and malabsorption in patients with persistent hypothyroidism. It can be conducted safely and cost-effectively in an outpatient setting. However, additional research is necessary to further substantiate these findings and reinforce their applicability in clinical practice.

What is new?

Limited data are available about the safety and successful completion of a rapid 2-hour levothyroxine absorption test using 1,000 µg of levothyroxine. This case series, comprising the data of six patients, strengthens the fact of safe and successful completion of rapid levothyroxine absorption test, used to rule out the nonadherence to levothyroxine treatment as the possible cause of persistent hypothyroidism.

List of Abbreviations

FT3	Free triiodothyronine
FT4	Free thyroxine
TSH	Thyroid stimulating hormone

Conflict of interests

The authors declare that they have no conflict of interest regarding the publication of this case report.

Funding

None.

Consent for publication

Written informed consent was obtained from the patient to publish this case in a medical journal.

Ethical approval

Ethical approval is not required at our institution for publishing a case series in a medical journal.

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Summary of the case report

1	Patient (gender, age)	Male, 27 years old
2	Final diagnosis	Nonadherence to levothyroxine therapy
3	Symptoms	Persistent hypothyroidism
4	Medications (generic)	Levothyroxine
5	Clinical procedure	Levothyroxine absorption test