Case Report

Worsening Hypothyroidism in a Patient with Nephrotic Syndrome - A Case Report

ABSTRACT

The therapy of patients may be complicated by the coexistence of nephrotic syndrome and hypothyroidism, which might exacerbate the thyroid condition. In this case report, a 55-year-old woman with previously well-controlled hypothyroidism is described. Her symptoms deteriorated as a result of recently discovered nephrotic syndrome. Increased gut edema and urine loss of thyroxine-binding globulin were likely to blame for the hypothyroidism's worsening, as well as changed levothyroxine absorption. The patient's symptoms improved after receiving more levothyroxine and the proper care for nephrotic syndrome, which was shown by lower levels of thyroid-stimulating hormone. This instance highlights the significance of taking nephrotic syndrome into account as a potential reason for patients' hypothyroidism to worsen when they are receiving levothyroxine therapy.

Keywords: *Hypothyroidis; nephrotic syndrome; gut edema; urine loss*

1.INTRODUCTION

The management and treatment of people with various medical disorders can become more challenging. One such situation is the co-existence of hypothyroidism and nephrotic syndrome, which can provide difficulties in the therapeutic strategy. The kidney condition known as nephrotic syndrome causes excessive protein loss in the urine, which causes edema and other systemic problems. Contrarily, hypothyroidism occurs when the thyroid gland is unable to create enough thyroid hormones, leading to a variety of symptoms that have an impact on numerous biological systems [1,2].

When nephrotic syndrome and hypothyroidism coexist, the interplay between these two conditions can significantly impact the patient's overall health and the management of their thyroid disorder. This case report presents the clinical course of a 55-year-old woman with well-controlled hypothyroidism who experienced worsening symptoms due to the onset of nephrotic syndrome.

This case report highlights the potential influence of nephrotic syndrome on the worsening of hypothyroidism and altered levothyroxine absorption. The primary treatment for hypothyroidism is levothyroxine, and anything that affects how it is metabolized or absorbed can throw off the body's equilibrium of thyroid hormones. It's essential to comprehend how the two conditions interact to improve patient care and prevent needless complications.

We go over the patient's clinical presentation, the diagnostic results, and the subsequent management techniques used to deal with the worsening hypothyroidism in the context of nephrotic syndrome in this report. Further underscoring the need to take into account nephrotic syndrome as a potential exacerbating factor in patients with concurrent hypothyroidism, the symptoms of hypothyroidism in patients with concurrent nephrotic

syndrome have resolved after appropriate dosage adjustments of levothyroxine and thorough nephrotic syndrome care [3, 4].

By presenting this case, we hope to raise awareness among healthcare providers about the intricate relationship between nephrotic syndrome and hypothyroidism. We urge them to be vigilant when managing these patients and ensure appropriate monitoring and treatment adjustments to optimize outcomes.

2. CASE STUDY

A 55-year-old female patient with a history of hypothyroidism arrived at the outpatient clinic complaining of recent hair loss and bilateral lower leg pedal edema as shown in Figure 1. The Institutional Ethics Committee approved the study then the patient had been taking levothyroxine 50 mcg daily for her hypothyroidism, and her prior thyroid profile had revealed well-controlled thyroid function with TSH levels of 0.7 mcg/ml and T4 levels of 1.5 ng/dl.

Table 1 shows various results of different test parameter. Table 1 shows when the patient was first admitted to the hospital, a routine laboratory examination found new-onset proteinuria with a urine protein-to-creatinine ratio of 6960.93 mg/gm, hypoalbuminemia (serum albumin level of 1.6 gm/dl), and hyperlipidemia (568 mg/dl). The patient's thyroid function tests revealed deteriorating hypothyroidism, with a considerably raised TSH level of 84 mcu/ml and a lowered T4 level of 0.8 ng/dl. However, the patient's renal function was unaffected. While complement levels, ANA, Hepatitis B, Hepatitis C, HIV, urine protein electrophoresis, free light chain assay, and serum protein electrophoresis were all negative in the patient, the anti-thyroid peroxidase antibody was positive (180 iu/ml).

An interventional radiologist performed a kidney biopsy to assess the renal disease further. As shown in Figures 2-5, the histological analysis of the biopsy specimen produced results consistent with the focal and segmental glomerulosclerosis (FSGS) damage pattern.

The nephrologist was consulted for additional care after receiving the diagnosis of FSGS. The patient started high-dose prednisolone therapy at 60 mg per day for four weeks, then underwent a tapering schedule that included 50 mg per day for one week, 40 mg per day for one week, 30 mg per day, 20 mg per day, 10 mg per day for two weeks, 5 mg per day for two weeks, and 2.5 mg per day before the medication was stopped.A lipid-lowering medication was also recommended.

Levothyroxine dosage was raised from 50mcg to 100mcg to treat uncontrolled hypothyroidism. Six weeks later, a follow-up report showed a declining TSH level, indicating improved thyroid function from the modified levothyroxine dose.

The clinical difficulties that arise when a patient with well-controlled hypothyroidism develops nephrotic syndrome are highlighted in this instance. To prevent the interplay between these two illnesses from exacerbating hypothyroidism, the dosage of levothyroxine must be changed, and endocrinologists and nephrologists must work closely together. To maximize patient outcomes, timely recognition and adequate management are essential.

Table 1. Comparison of lab tests before and after treatment with levothyroxine

	Before treatment	**After treatment**	**Reference value**
TSH	84 mcu/ml	7.7 mcu/ml	0.3-5 mcu/ml
T4	0.8 ng/dl	0.9ng/dl	0.6-1.9 ng/dl
Anti thyroperoxidase antibody	180 IU/ml	5 IU/mL	0-6 IU/mL
Urine protein/gmcreatine	6960.93 mg/gmcreat	2100 mg/gmcreat	0-150 mg/gm

Sr. albumin	1.6 gm/dl	2.7 gm/dl	3.2-5.5 gm/dl
Total cholesterol	568 mg/dl	350 mg/dl	< 200 mg/dl

Fig. 1. Patients 55 years of age presented with hypothyroidism with nephrotic syndrome

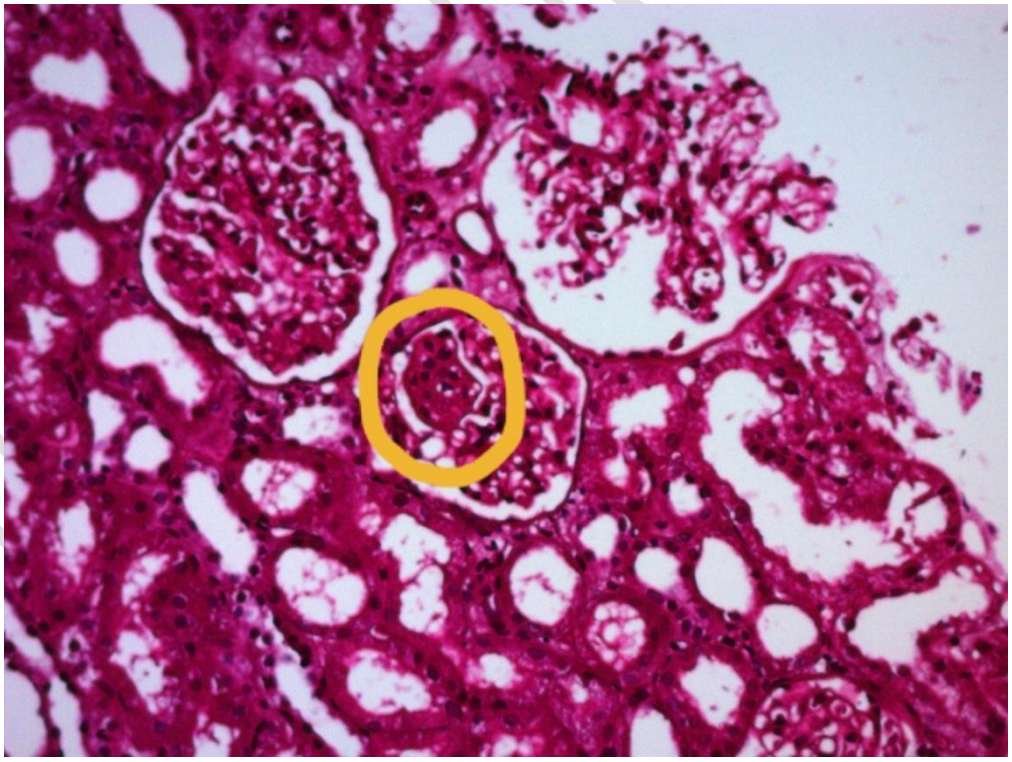

Fig. 2. Renal biopsy result showing focal and segmental glomerulosclerosis (FSGS) injury pattern

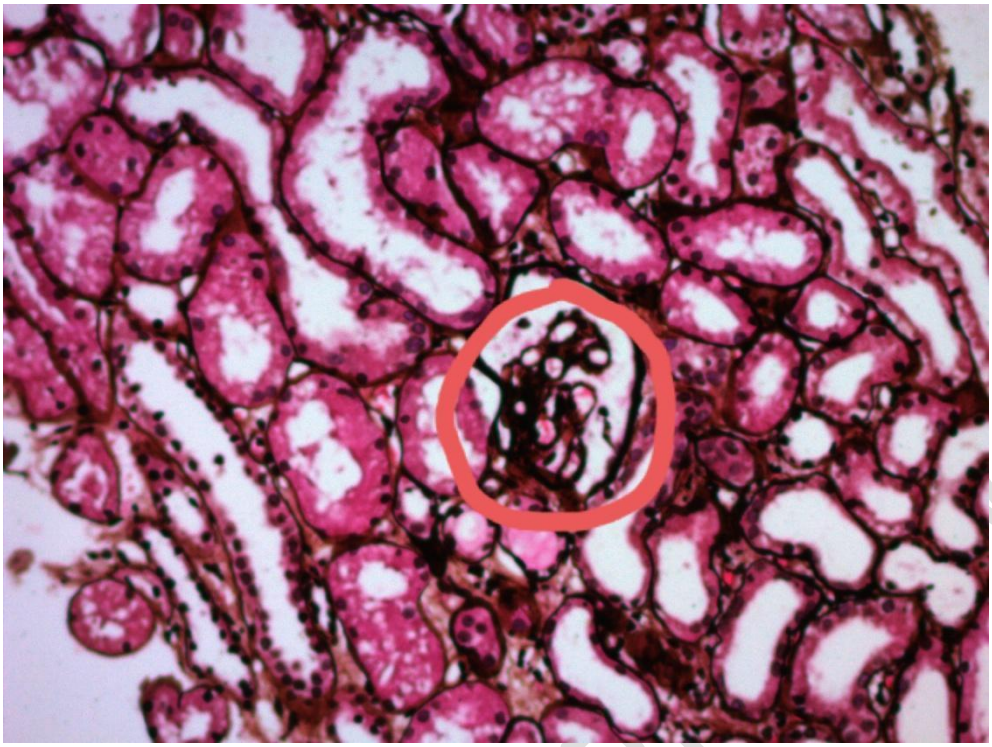

Fig. 3. Renal biopsy result showing focal and segmental glomerulosclerosis (FSGS) injury pattern

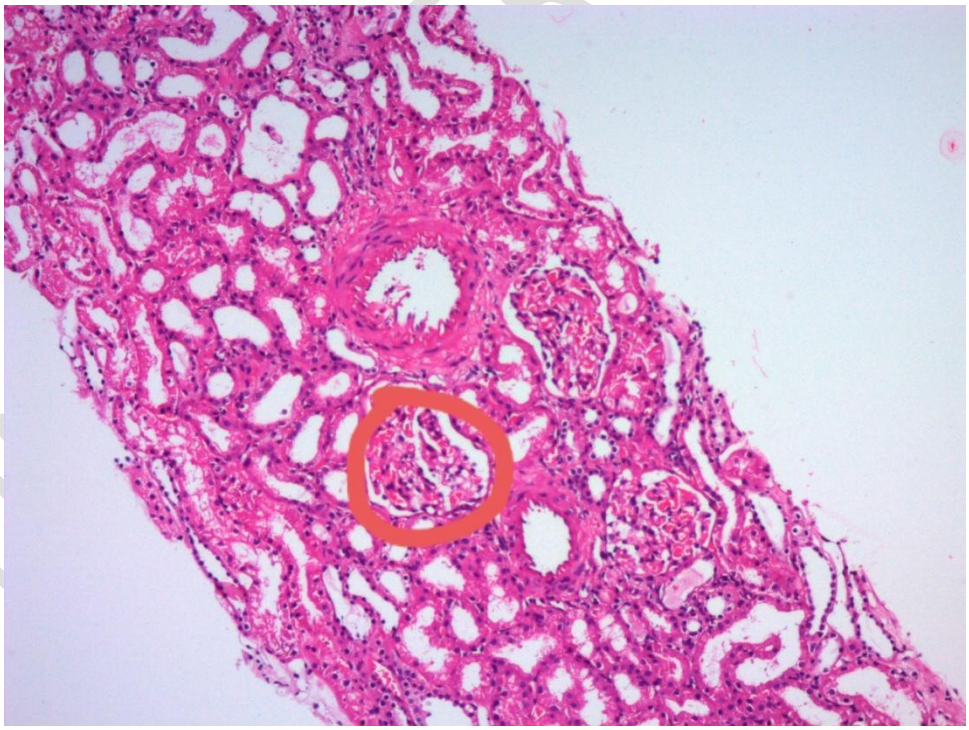

Fig. 4. Light microscopy image of the glomerulus showing focal and segmental glomerulosclerosis (FSGS) injury pattern

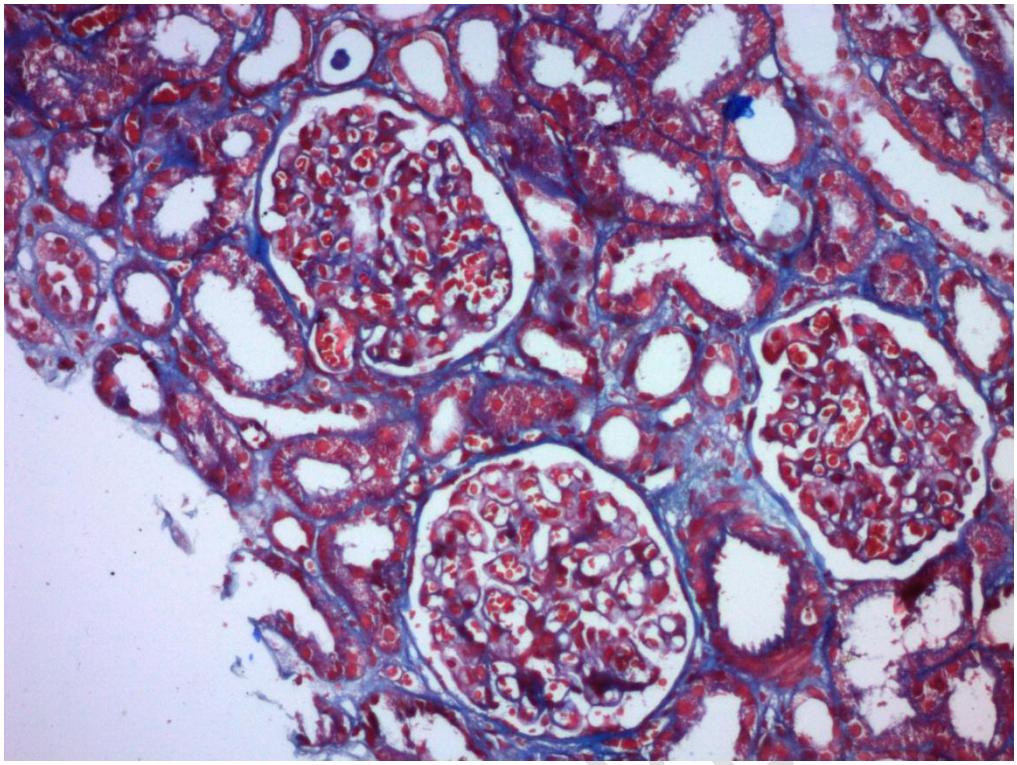

Fig. 5. Renal biopsy result showing focal and segmental glomerulosclerosis (FSGS) injury pattern

3. DISCUSSION

This case report presents an intriguing clinical scenario in which a patient with well-controlled hypothyroidism deteriorated their condition due to recently discovered nephrotic syndrome. The impact of nephrotic syndrome on thyroid function is a crucial factor to consider while managing patients because it is known to produce a variety of metabolic and endocrine problems [2].

Nephrotic syndrome and hypothyroidism are linked by complex pathogenesis. One potential mechanism is the urine loss of thyroxine-binding globulin (TBG) brought on by increased proteinuria. The loss of TBG, a protein that transports thyroid hormones, can cause decreased binding and higher clearance of thyroid hormones, resulting in a condition known as relative hypothyroidism. Additionally, edema, a sign of nephrotic syndrome, might interfere with levothyroxine distribution and absorption, resulting in inadequate thyroid hormone levels [5].

Fatigue, weight gain, and a cold intolerance were among the clinical signs of increasing hypothyroidism that the patient, in this case, displayed [6]. Laboratory testing confirmed the progression of hypothyroidism by revealing increased TSH levels and low free thyroxine (FT4) levels. Based on the clinical presentation and laboratory results, the dose of levothyroxine was increased. The patient's symptoms subsided after the dose change, and further thyroid function tests revealed lower TSH levels, indicating improved treatment of hypothyroidism. Optimizing patient care depends on understanding how nephrotic syndrome may affect thyroid function [7].

It is crucial to monitor a patient's thyroid function while they have nephrotic syndrome, especially if they take levothyroxine. To maintain euthyroidism, routine evaluation of TSH

and FT4 levels can help spot changes in thyroid function and direct the proper dosage modifications [8].

Management of patients with hypothyroidism and nephrotic syndrome requires close cooperation between endocrinologists and nephrologists. The management plan should put equal emphasis on treating the underlying renal disease as well as optimizing thyroid hormone replacement [9]. The patient in this case had nephrotic syndrome treatment, which included high-dose prednisolone therapy, a common method for treating glomerular disorders such as focal and segmental glomerulosclerosis (FSGS).

The particular treatment for hypothyroidism made worse by nephrotic syndrome is not well understood [10]. To make up for the increased loss and altered distribution of thyroid hormones in such circumstances, it is appropriate to think about raising the levothyroxine dose. To ensure that thyroid hormone replacement therapy is effective, it is crucial to evaluate thyroid function and clinical symptoms closely [11].

One cohort study discovered that patients with high nonselective urine protein excretion (>1.75 g/day) had an elevated risk of hypothyroidism (TSH elevation above ten mIU/L), and this risk was twice in those with nephrotic range-proteinuria (>3.5 g/day) [12].

Our case study highlights the possible connection between hypothyroidism and nephrotic syndrome. It emphasizes how crucial it is to consider nephrotic syndrome as a potential factor in individuals using levothyroxine who are experiencing decreasing thyroid function. Patient outcomes can be improved by early detection and appropriate therapy of this interaction.

4. CONCLUSION

In its conclusion, this case report emphasizes the significance of taking hypothyroidism into account in patients with newly diagnosed nephrotic syndrome. When these two disorders coexist, the hypothyroidism may worsen, necessitating early detection and proper levothyroxine dose modifications to attain a euthyroid state.

To quickly identify individuals with underlying thyroid dysfunction in those with nephrotic syndrome, screening for hypothyroidism should be considered. Early detection and treatment can improve patient outcomes by halting the progression of hypothyroidism. Healthcare professionals can enhance the overall management and outcomes of patients with both illnesses by recognizing the potential for interactions between nephrotic syndrome and hypothyroidism and taking proactive steps to reach the euthyroid state.

Further research is warranted to explore the underlying mechanisms and develop standardized guidelines for screening, diagnosing, and managing hypothyroidism in patients with nephrotic syndrome. Increased awareness and early intervention in this patient population will contribute to better therapeutic strategies and improved quality of life.

Ethical approval: The study was approved by the Institutional Ethics Committee

Consent

As per international standard or university standard, patients' written consent has been collected and preserved by the author(s).

REFERENCES

1. Mario FD, Pofi R, Gigante A, Rivoli L, Rosato E, Isidori AM, Cianci R, Barbano B. Hypothyroidism and Nephrotic Syndrome: Why, When and How to Treat. CurrVascPharmacol. 2017;15(5):398-403. doi: 10.2174/1570161115999170207114706. PMID: 28176633.
2. Mattoo TK. Hypothyroidism in infants with nephrotic syndrome. PediatrNephrol. 1994 Dec;8(6):657-9. doi: 10.1007/BF00869078. PMID: 7696098.
3. Thewjitcharoen Y, Nakasatien S, Butadej S, Veerasomboonsin V, Himathongkam T. ODP500 Nephrotic syndrome as a cause of worsening hypothyroidism due to Hashimoto's thyroiditis. Journal of the Endocrine Society. 2022 Nov 11;6(Suppl 1):A774.
4. Fukata S, Ito M, Nishikawa M, Kasahara T, Nishihara E, Akamiuzu T, Miyauchi A. Hypothyroidism due to nephrotic syndrome: a notable clinical entity. Endocrine Journal. 2022;69(3):307-11.
5. Iqbal S, Wan W Y, Mitchell N E, It's Not Lupus This Time! A Case of Worsening Hypothyroidism in a Patient With Nephrotic Syndrome. Cureus2022, 14(5): e25355. doi:10.7759/cureus.25355
6. Cooper DS. Clinical practice. Subclinical hypothyroidism. N Engl J Med. 2001;345:260–265.
7. Benvenga S, Vita R, Di Bari F, Fallahi P, Antonelli A: Do not forget nephrotic syndrome as a cause of increased requirement of levothyroxine replacement therapy. Eur Thyroid J. 2015, 4:138-42. 10.1159/000381310
8. Basu G, Mohapatra A. Interactions between thyroid disorders and kidney disease. Indian J EndocrinolMetab. 2012;16:204–213.
9. Iglesias P, Díez JJ. Thyroid dysfunction and kidney disease. Eur J Endocrinol. 2009;160:503–515.
10. Mariani LH, Berns JS. The renal manifestations of thyroid disease. J Am SocNephrol. 2012;23:22–26.
11. Suher M, Koc E, Ata N, Ensari C. Relation of thyroid disfunction, thyroid autoantibodies, and renal function. Ren Fail. 2005;27:739–742.
12. Kwong N, Medici M, Marqusee E, Wassner AJ: Severity of proteinuria is directly associated with risk of hypothyroidism in adults. J ClinEndocrinolMetab. 2021, 106:e757-62. 10.1210/clinem/dgaa872