



# Radioiodine Therapy for Hyperthyroidism in a Patient with End-Stage Renal Disease on Hemodialysis: Case Report

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## ÖZET

*Hemodiyalize giren son dönem böbrek hastalığı olan hipertiroidili bir olguda radyoaktif iyot ile tedavi: Olgu sunumu*

Toksik nodüler guatr son dönem böbrek yetmezliği hastalığında nadir görülen bir durumdur. Son dönem böbrek yetmezliği olan hastalarda, genellikle hipotiroidizm görülürken hipertiroidi nadirdir. Hemodiyaliz ile tedavi edilen son dönem böbrek hastalığı olan hipertiroidi hastalarında radyoaktif iyot (RAI) tedavisi gerekli olabilir. RAI, özellikle böbrek fonksiyonu normal olan hastalarda böbrekler tarafından temizlendiğinden, hemodiyaliz hastası olup RAI tedavisi alanlarda çeşitli problemler ortaya çıkabilmektedir. Hipertiroidi hastalığı radyoaktif iyot tedavisi ile tedavi edilen ve hemodiyalize giren son dönem böbrek yetmezliği hastası sunulmuştur.

**Anahtar kelimeler:** Hipertiroidi, hemodiyaliz, radyoaktif iyot tedavisi

## ABSTRACT

*Radioiodine therapy for hyperthyroidism in a patient with end-stage renal disease on hemodialysis: case report*

Toxic nodular goiter is a rare entity in end-stage renal disease (ESRD) patients. In ESRD patients, hypothyroidism is generally seen, whereas hyperthyroidism is rare. Treatment with radioactive iodine (RAI) may be necessary for hyperthyroidism in patients with end-stage renal disease who require haemodialysis. Because RAI is cleared mainly by the kidneys in patients with normal renal function, many problems may (issues) arise in patients who are on hemodialysis but require RAI treatment. We present an ESRD patient with hyperthyroidism who is receiving hemodialysis treated with radioiodine therapy.

**Key words:** Hyperthyroidism, hemodialysis, radioiodine therapy

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## INTRODUCTION

End-stage renal disease (ESRD) is characterized by irreversible loss of renal function that affects multiple systems. Renal failure affects thyroid function by decreasing circulating thyroid hormone concentration, disturbing the binding of the hormone the carrier protein, and increasing iodine storage in thyroid gland (1).

In ESRD patients, hypothyroidism is generally seen, whereas hyperthyroidism is rare (2). The incidence of hyperthyroidism in haemodialysis patients is similar to

that of the general population but treating the patient with  $^{131}\text{I}$  while on dialysis is quite rare (3). The physician must bear in mind the possibility of toxic nodular goiter (TNG) in ESRD patients on haemodialysis.

The medical treatment choices of hyperthyroidism in haemodialysis patients with ESRD, are antithyroid drugs and radioiodine therapy (RAI). Because RAI is cleared mainly by the kidneys, the radioiodine dose given and the timing of haemodialysis sessions must be taken into consideration (4).

## CASE REPORT

A 56-year-old woman with ESRD and undergoing maintenance haemodialysis for four years was admitted to our hospital complaining of palpitations and fever. In her clinical examination a right thyroid lobe mass was

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discovered. Her laboratory findings were as follows: thyroid-stimulating hormone (TSH): 0.012 uIU/ml, serum free T4: 0.9 ng/dl (0.6-4.1 µIU/ml), serum free T3: 3.58 pg/dl (0.9-1.6 ng/dl), Na: 129mmol/L, K: 4.3mmol/L, WBC: 5000, Htc: 34%, Ca: 9.7mg/dl, P: 6.6 mg/dl, serum ure: 95 mg/dl (10-50), serum creatinine: 6.69mg/dl (0.5-0.9), uric acid: 4.8 mg/dl (2.6-8). Thyroid USG showed 24x30x23 mm diameter heterogenic hypoechogenic cystic nodular lesion with calcifications. Thyroid scintigraphy demonstrated hyperactive nodule in right lobe with moderate suppression of remaining thyroid. Cytopathological findings of fine needle aspiration biopsy revealed cystic nodular goiter.

The patient received haemodialysis before RAI therapy. The radioiodine dose given was 10 mCi (370mBq). She was hospitalized for 3 days for follow up with Geiger counter measurement twice daily. The dose rate was measured at 1 m from the neck of the patient, Geiger counter measurements revealed levels less than 3 mR/hr, allowing safe discharge. Geiger counter measurement after the second hemodialysis revealed a decline in dose rate (<1mR/hr). After 3 months follow up the patient was euthyroid without using any antithyroid drugs.

## DISCUSSION

The kidney has an important role in the metabolism, degradation and excretion of thyroid hormones. End-

stage renal disease (ESRD) is characterized by irreversible loss of renal function and has effect on multiple systems, including endocrine system (1).

Hyperthyroidism is an entity that is rarely seen in ESRD. Despite extensive studies, thyroid status in uremia is still inconclusive due to the complexity of the system studied (1). In ESRD patients, radioiodine excretion is primarily by dialysis, as residual renal function is minimal or absent (4). In this case, we present an ESRD patient with hyperthyroidism who is receiving haemodialysis treated with radioiodine therapy. The experience in managing patients with RAI on dialysis is limited (5). To avoid from excessive radiation exposure, dosage of RAI should be appropriately calculated. In the literature, the calculation of treatment dose in ESRD patients is generally done with empiric methods. Several studies recommend reduction of RAI dose to less than 40% in chronic renal failure patients with thyroid carcinoma (6-13). Holst et al suggested that the treatment dose of (131)I for a patient with thyroid cancer on hemodialysis would be approximately 13%-28% of a typical empiric dose of (131)I for a patient with normal renal function (6). In our case, the dose of RAI was 50% of a typical empiric dose of RAI for a patient with normal renal function.

In conclusion; RAI therapy can be performed safely and effectively in patients suffering from end-stage renal disease undergoing dialysis with special precautions.

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