

## Case Report

# Intrathoracic Goiter Visualized on iodine-123 and technetium-99m Single-Photon Emission Computed Tomography/Computed Tomography

## ABSTRACT

Goiter with an intrathoracic component is relatively common; however, it is less common to see extent outside the anterior or posterior mediastinum. We present a case of intrathoracic goiter of significant size and abnormal placement which is examined using both  $^{99m}\text{Tc}$ -pertechnetate and iodine-123 single-photon emission computed tomography/computed tomography.

**Keywords:** Iodine-123, single-photon emission computed tomography/computed tomography, substernal goiter,  $^{99m}\text{Tc}$ -pertechnetate, thyroid scintigraphy

## INTRODUCTION

Thyroid tissue outside the normal position in the anterior part of the neck is not uncommon. Often the thyroid tissue can be located in the anterior or posterior mediastinum. We present here a case with unusually located thyroid tissue.

## CASE REPORT

Twenty years ago, a 66-year-old woman underwent thyroidectomy due to pressure symptoms. Over the next decade she developed thyrotoxicosis and an intrathoracic goiter measuring 5 cm × 8 cm × 8.5 cm was identified and later verified thyroid tissue through computed tomography (CT)-guided biopsy. Thyrotoxicosis was successfully managed with antithyroid therapy. However, moderate thoracic discomfort arose leading to further investigation of the goiter using  $^{123}\text{I}$  single-photon emission computed tomography (SPECT) combined with CT to estimate the efficacy of potential radioiodine therapy. This treatment was, however, refrained from because of spontaneous relief from pressure symptoms. Nine years later, the patient was re-examined using  $^{99m}\text{Tc}$ -pertechnetate SPECT/CT due to return of the pressure symptoms.

Images show  $^{123}\text{I}$  iodine on SPECT/CT [Figure 1], and Tc-99m pertechnetate on SPECT/CT acquisitions [Figure 2]. Uptake of both tracers is similar corresponding to activated sodium-iodine transporters in a state of thyrotoxicosis.

## DISCUSSION

Goiter with an intrathoracic component is relatively common.<sup>[1]</sup> However, it is less common to see extent outside the anterior or posterior mediastinum.<sup>[2]</sup> When

**MATTIAS HEDEGAARD KRISTENSEN, JAN ABRAHAMSEN, HENRIK HOLM THOMSEN<sup>1,2</sup>**

Department of Clinical Physiology, Viborg Regional Hospital, <sup>1</sup>Department of Internal Medicine, Clinic for Endocrinology and Diabetes, Viborg Regional Hospital, <sup>2</sup>Research Unit for Multimorbidity, Viborg Regional Hospital, Viborg, Denmark


**Address for correspondence:** Dr. Mattias Hedegaard Kristensen, Department of Clinical Physiology, Viborg Regional Hospital, Banevejen 7C, DK-8800 Viborg, Denmark.  
E-mail: mattkr@rm.dk

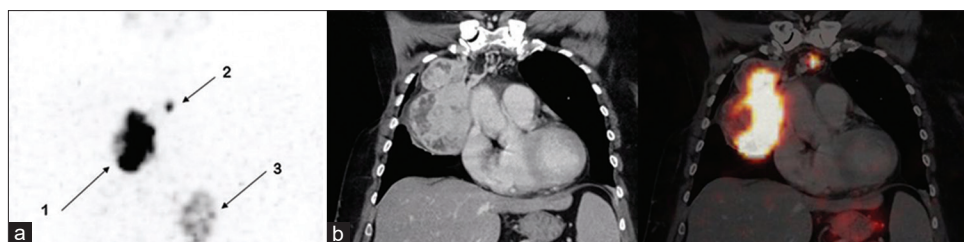
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**Figure 1:** Images using 37 MBq (1 mCi)  $^{123}\text{I}$ . (a) Maximum intensity projection visualizes accumulated activity in the intrathoracic thyroid tissue (arrow 1), in the smaller left-sided intrathoracic goiter (arrow 2) and in the stomach (arrow 3). (b) Computed tomography with intravenous contrast and fused images demonstrating significant tracer accumulation in the intrathoracic thyroid tissue



**Figure 2:** Images using 83 MBq (2.2 mCi)  $^{99\text{m}}\text{Tc}$  sodium pertechnetate. (a) Maximum intensity projection visualizes accumulated activity in the intrathoracic thyroid tissue (arrow 1), in the salivary glands (arrow 2) and in the stomach (arrow 3). (b) Computed tomography with intravenous contrast and fused images as in Figure 1

the goiter extends further into the thorax the path of least resistance is towards the right.<sup>[3]</sup> Thyroid masses found after thyroidectomies are not common, and are most often the result of incomplete removal of a descending goiter or, more rarely, isolated congenital mediastinal thyroid tissue unconnected to the cervical portion that becomes hypertrophic after removal of functioning cervical thyroid tissue.<sup>[4]</sup> Such a condition is suspected when Thyroid Stimulating Hormone remains suppressed after surgery.<sup>[5]</sup> When presenting with obstructive symptoms, surgery is the first-choice treatment. Alternatively, radioiodine ablation can be used.<sup>[6]</sup> It has been reported that intrathoracic goiter does not always show on planar imaging.<sup>[7-9]</sup> Our images show strong consistency between activity distribution of both radiotracers in the intrathoracic thyroid tissue in as well SPECT imaging and planar imaging (image not shown). Considerations regarding the choice of the radiotracer have also been made and the  $^{123}\text{I}$  has been preferred over  $^{99\text{m}}\text{Tc}$  for intrathoracic goiter due to its higher target-to-background activity, greater tissue specificity, and lower blood pool activity.<sup>[10]</sup> The  $^{123}\text{I}$  imaging is, however, often unavailable and more costly, and therefore not performed. Furthermore, as presented here,  $^{99\text{m}}\text{Tc}$  imaging is usually sufficient, particularly in patients presenting with thyrotoxicosis.

#### Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients

understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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#### Conflicts of interest

There are no conflicts of interest.

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