

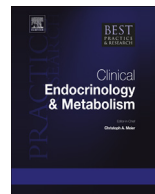


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# The impact of goitre and its treatment on the trachea, airflow, oesophagus and swallowing function. A systematic review



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In this systematic review, we investigated the effects of goitre and its treatment on the trachea and the oesophagus. A total of 6355 papers were screened in scientific databases, which disclosed 40 original studies (nine descriptive and 31 interventional). Although most studies are hampered by a number of methodological shortcomings, it is uncontested that goitre affects the trachea as well as the oesophagus in a large proportion of people. This leads to upper airway obstruction, swallowing dysfunction, or both, which may remain undisclosed unless specifically investigated for. Assessment of the tracheal dimensions should be done by magnetic resonance imaging or computed tomography, and detection of upper airway obstruction by flow volume loops, with focus on the inspiratory component. A clinical evaluation of the oesophageal function is difficult to implement and could be replaced by

*Abbreviations:* <sup>131</sup>I, radioactive iodine; TSH, thyrotropin; rhTSH, recombinant human thyrotropin; MRrhTSH, modified release recombinant human thyrotropin; CXR, chest- or tracheal-inlet X-ray; MRI, magnetic resonance imaging; SCAT, smallest cross-sectional area of the trachea; UAO, upper airway obstruction; FVL, flow volume loop; FIF<sub>50%</sub>, forced inspiratory flow at 50% of vital capacity; FEF<sub>50%</sub>, forced expiratory flow at 50% of vital capacity; PEF, peak expiratory flow.

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available and validated questionnaires on swallowing. Although radioiodine therapy and thyroidectomy relieve the negative effect of goitre on the trachea and the oesophagus, many issues remain unexplored.

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## Introduction

Benign non-toxic goitre affects about 10% of the Danish population [1,2]. The cause is multifactorial and dependent on genetic susceptibility interacting, in a complex way, with major environmental triggers, such as iodine deficiency, cigarette smoking, and potentially less well-characterized factors such as emotional stress, various drugs, and infections [3–8]. Questionnaire studies have demonstrated pronounced regional and inter-speciality differences in preferred treatment [9–11]. Even current guidelines demonstrate some incongruence in recommendations [12]. The options include suppression of serum thyrotropin (TSH) with thyroid hormone, radioactive iodine ( $^{131}\text{I}$ ) therapy (with or without prestimulation with recombinant human [rh] TSH), various types of thyroidectomy, and less well established (to some extent experimental) treatments, as for example ethanol, laser or radiofrequency [3,13–16].

The proximity to vital structures in the neck and thoracic cavity, such as the trachea, oesophagus, nerves and blood vessels, combined with a history of gradual increase in size and nodularity, may although rarely lead to a variety and potentially severe manifestations of goitre. Voice alterations, respiratory distress, cough, choking sensation, dysphagia, globus sensation, and cosmetic complaints are all potential manifestations of goitre [17–21]. A correlation between goitre size and clinical symptoms is, however, not straight-forward. The complexity of the issue of compression, cosmetic complaints, or both, is also illustrated by the difficulties in measuring quality of life, and demonstrating any effect on this crucial variable of any medical or surgical intervention [22,23].

Research on how goitre and its treatment affects adjacent organs, such as the trachea and the oesophagus, are scarce, fragmented, and multi-directional. Comparison of extremely inhomogeneous studies is nearly impossible, which makes it challenging to give patients evidence-based information on treatment.

Much to our surprise, in view of its clinical relevance, no systematic reviews have been conducted on how goitre affects the surrounding organs. In view of the enormous difficulties in evaluating the symptoms of patients with goitre, and as symptoms are the leading cause of surgery in thousands of patients every year, it is incomprehensible that so little evidence of the beneficial effects of any treatment exists [3].

Despite the above shortcomings and challenges, we aim here to investigate how goitre affects the trachea and airflow, as well as the potential negative repercussions for the oesophagus and the swallowing function. We also aim to provide data on effect, if any, of goitre treatment on these variables.

## Methods

### *Search strategy and study selection*

We identified all available English-language publications on the relationship between goitre and the trachea, oesophagus, or both. The search terms used in the scientific databases PubMed, EMBASE, and The Cochrane Library were variants of the terms for goitre/goiter, oesophagus, swallowing, trachea, airflow, and pulmonary function. We limited the search to a period from 1 January 1975 to the 14 August 2013.

### *Quality evaluation and data extraction*

First, we screened publication titles and then selected abstracts of relevance. Each identified paper was screened according to the following inclusion criteria: data in man, any age, any intervention, and

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