

Combined approach thyroidectomy for intrathoracic goiter: endo catch retrieval

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ABSTRACT

Diving goiters can descend the cervical region and expand into the thoracic cavity. Therefore, thyroidectomy for intrathoracic goiters is not always possible through cervicotomy. Sometimes, a sternotomy, a video-accompanied thyroscopic surgery (VATS), or a thoracotomy is needed, which is a more invasive technique yielding the risk of major complications. In our hospital, we prefer a VATS whenever possible; however, the major drawback of this technique is the length of the thoracic incision, limiting the retrieval of large goiters through small incisions. We report the first case of an Endo Catch retrieval system through cervicotomy combined with the VATS technique for resection of a large intrathoracic goiter. The goiter was successfully resected without complications. A combined approach of thyroidectomy with cervicotomy and VATS is a safe technique as described in the literature. This approach is also possible with an Endo Catch retrieval system through cervicotomy in the case of massive goiters.

Keywords: Combined approach, intra-thoracic goiter, retrosternal goiter, thyroidectomy, VATS

Introduction

Nodular goiters can cause symptoms of thyroid dysfunction as well as those of compression of adjacent organs. In addition, a malignant transformation is possible. Therefore, nodular goiters often require surgical resection. In most cases, nodular goiters can be removed by a cervical approach (1). A total of 2-11% of cases require a thoracic approach, such as a sternotomy, thoracotomy, or mediastinotomy for complete resection (2-4). This mostly consists of goiters where $\geq 50\%$ of the thyroid mass is extended downward to the thoracic inlet, which are called intrathoracic or retrosternal goiters (5). The differentiation between a primary and a secondary retrosternal goiter is of great clinical importance owing to anatomical differences, which result in a different surgical approach. Primary retrosternal goiter consists of only 1% of all goiters and is defined as ectopic thyroid tissue in the mediastinum. The extension of the thyroid tissue toward the mediastinum is called a secondary retrosternal goiter. Primary retrosternal goiters receive their blood supply from the mediastinal vessels, whereas the neck vessels feed the secondary retrosternal goiters. Above all, there is a difference in surgical approach depending on the location of these mediastinal goiters.

Anterior mediastinal goiters are mostly approached by sternotomy or anterior thoracotomy, whereas posterior mediastinal goiters require a posterolateral thoracotomy (1, 6). A thoracic approach is known to have a higher risk of complications, such as hypoparathyroidism, recurrent laryngeal nerve injury, postoperative infection, bleeding and pain, prolonged hospitalization, and poorer esthetic result (5, 7). Still, in voluminous thyroids, this approach is advised for total resection of the retrosternal goiter. A computer-analyzed size of the goiter is already used to predict the need for an extracervical approach in retrosternal goiters (8). Apart from cervicotomy combined with sternotomy to remove retrosternal goiters, the video-accompanied thyroscopic surgery (VATS) technique is known to be safe with fewer complications (9-11). In addition to a minimal incision, this technique also benefits from less postoperative pain, less blood loss, lower risk of infection, better aesthetic results (smaller incisions/scars), and a shorter hospital stay. Total resection of diving goiters with a faster recovery is achieved in all cases. We present the first case of combined approach of cervicotomy and VATS with the use of an Endo Catch (Medtronic, Watford, UK) retrieval system through cervicotomy without complications.

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Case Presentation

A 73-year-old female presented to her general practitioner with dyspnoea in the supine position for several months. Chest X-ray showed a mediastinal mass, possibly a goiter (Figure 1). Contrast-enhanced computed tomography (CT) confirmed the presence of an extensive thyroid gland enlargement cranially and caudally with a secondary displacement of the glottis, trachea, oesophagus, the two carotid arteries, and the jugular veins (Figure 2a and 2b). The lesion was inhomogeneous, with a right thyroid lobe of 13x5x4.5 cm and a left thyroid lobe of 9.5x4x4.5 cm and with a large component in the anterior upper mediastinum. The patient was referred to the ear-nose-throat (ENT) department for thyroidectomy with sternotomy. Medical history included cholecystectomy, oesophagitis, hypercholesterolemia, arterial hypertension, and a total knee prosthesis. During a physical examination, a massive goiter was palpable, and fiber endoscopy showed bilaterally mobile vocal cords. After detailed preoperative evaluation by the ENT surgeon and the cardiothoracic surgeon, the patient underwent thyroid surgery with a combined approach: a cervical incision and a right VATS access. After induction of general anesthesia, single-lumen intubation was per-



Figure 1. Chest X-ray showing a mediastinal mass

Main Points:

- VATS thyroidectomy is a safe but not always possible surgery technique, such as in case of large thyroid masses extending into the posterior mediastinum.
- A combined approach consisting of VATS thyroidectomy and cervical incision is a safe and less invasive surgery for retrosternal/intrathoracic goiters.
- We report the first case with a safe removal of a massive intrathoracic goiter through combined-approach VATS using the Endo Catch retrieval system.
- Multidisciplinary collaboration during the preoperative assessment and treatment strategy in case of extracervical goiters is recommended to reduce morbidity to a minimum.

formed with a glide scope, and the patient was placed in hyperextension. A horizontal incision was made approximately one finger above the sternal notch. The platysma was divided; the linea alba was visualized, and the strap muscles were retracted laterally. The thyroid veins and arteries were ligated. The recurrent laryngeal nerves were bilaterally identified, and the cervical thyroid was mobilized and removed. Knowing from preoperative CT imaging that there was an accompanying large retrosternal thyroid component, VATS was performed by the cardiothoracic surgeon. Three carbon dioxide (CO₂)-sealed ports of 5 mm were inserted in the lateral axillary line at the second, third, and fourth intercostal area. Insufflation of CO₂ in the thoracic cavity was performed, reaching an intrathoracic pressure of 8 mm Hg. Thyroscopy showed the intrathoracic thyroid mass, dissected from surrounding structures by electrocauterization and the use of Ligasure (Medtronic) by the cardiothoracic surgeon. After mobilization, the intrathoracic thyroid mass was placed in an Endo Catch retrieval system (Medtronic) and completely delivered through the cervical incision (Figure 3 and 4). The surgery was

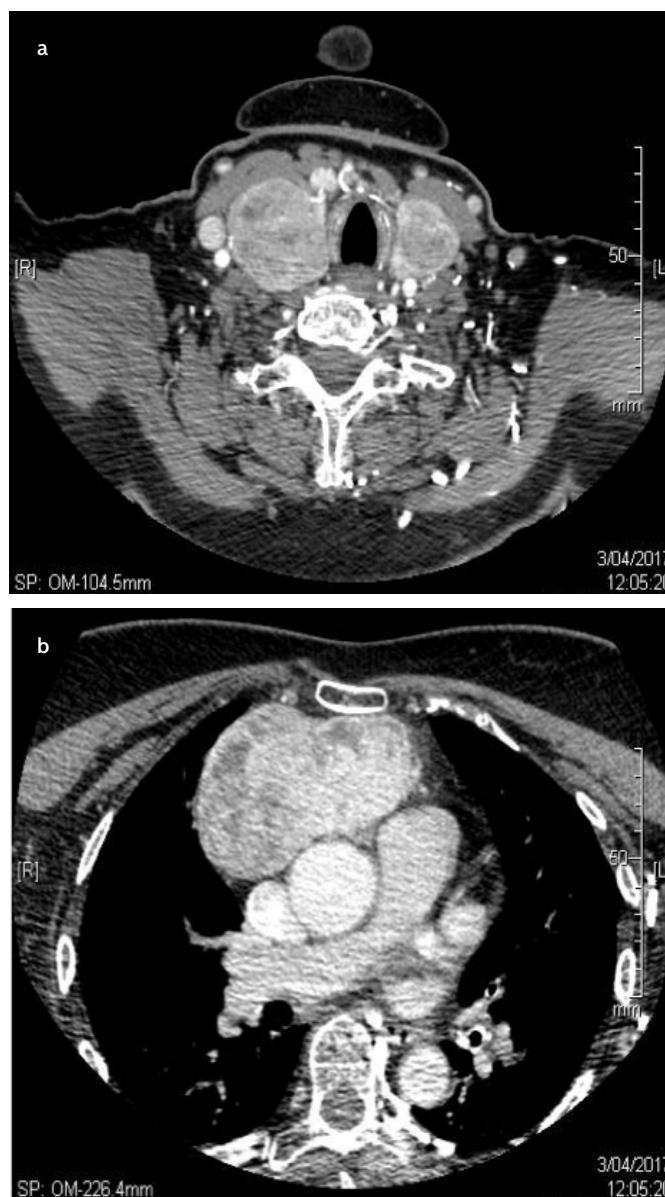


Figure 2. a, b. CT of the neck showing a massive diving goiter in the anterior mediastinum. CT, computed tomography

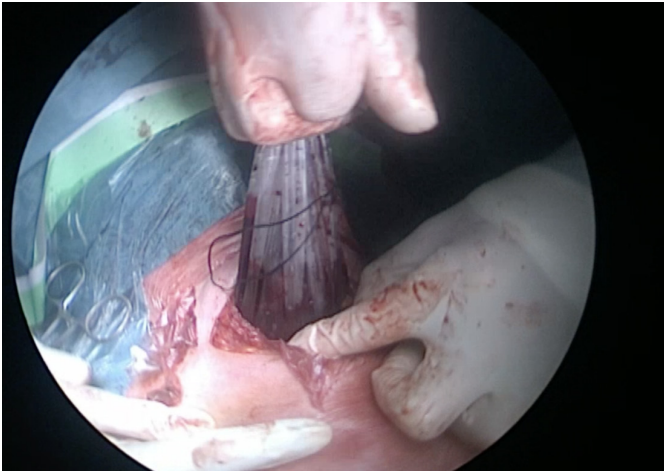


Figure 3. Removal of the thoracic component of the thyroid with Endo Catch retrieval system through the cervical incision

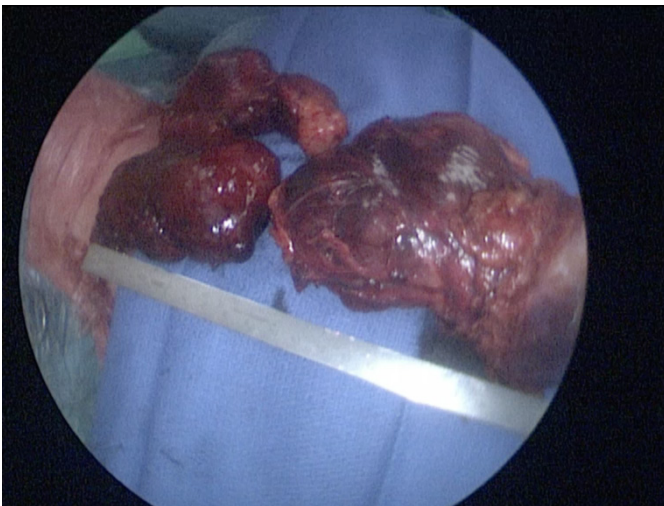


Figure 5. Removed thyroid mass: the upper part was removed with standard thyroidectomy through a cervical incision, and the lower part was dissected with VATS and removed with an Endo Catch retrieval system through cervicotomy. VATS, video-accompanied thyrscopic surgery

completed leaving a small intrathoracic chest tube. The patient stayed in the intensive care unit for observation for one night and in the ENT ward for two more nights. A left recurrent nerve paresis was noted postoperatively. At six weeks follow-up, the paresis was completely restored. Furthermore, the postoperative course of the patient was uncomplicated, and the dyspnoea symptoms resolved. Histopathological investigation showed multinodular hyperplasia without signs of malignancy. The mass weighed 596 g in total. Substitution therapy with 100 mg L-thyroxine was started. An endocrinological follow-up appointment was made six weeks after surgery to evaluate the thyroid function with the current substitution therapy. Verbal informed consent was obtained from the patients who agreed to take part in the study.

Discussion

Owing to compressive effects on surrounding tissues and the potential risks of malignant transformation, a surgical approach is preferred in the management of goiters. Most studies report that 90% of thyroid masses are successfully removed

by cervicotomy (3, 12). In the case of retrosternal goiters, an extracervical approach may be needed for complete removal. Sternotomy or thoracotomy often offers a better surgical field but still leads to more major complications, such as postoperative infection, bleeding and pain, prolonged hospitalization, and poorer esthetic result (5, 7). The use of an extracervical approach varies in the literature from 2% to 11% (1, 3). This is due to differences in the definitions of a retrosternal or intrathoracic goiter and different classifications of goiters. Cohen et al. (3) made a differentiation into four grades according to the percentage of thyroid mass located in the mediastinum, whereas Huins et al. (2) proposed a classification on the basis of the anatomical connection with different mediastinal structures. The following predictive factors for an extracervical approach were identified: diving goiters descending below the aortic arch, previous cervical thyroidectomy, a malignancy, posterior mediastinal location, extension into or below the tracheal carina, and the presence of ectopic thyroid mass (2, 13, 14, 15). In addition, a computer-analyzed size of the goiter can be used to predict the need for an extracervical approach in retrosternal goiters (8). The study by Sormaz et al. showed that an extracervical approach was needed when the cranio-caudal length of the thyroid mass below the thoracic inlet was ≥ 66 mm or when the volume of the mediastinal portion was at least 162 cm^3 (8). Therefore, preoperative assessment with CT is important, and therefore, it is included as a routine preoperative assessment in cases of retrosternal goiters in our center, followed by a multidisciplinary evaluation and treatment strategy team, which consists of an ENT surgeon, a cardiothoracic surgeon, and an endocrinologist. Because custom-made specialized thyroid size measurements related to specific extracervical thyroids are not yet implemented in our hospital, the team actually schedules all extracervical approaches with the cardiothoracic surgeon who is available, if needed. In 2-16% of cases of retrosternal/intrathoracic goiters removal, there is a thyroid tissue left after initial thyroidectomy (14, 15). This confirms the need for preoperative assessment and decision making with the help of CT. Thoracoscopic dissection ensures the visualization of the retrosternal goiter and surrounding structures, without the risk of leaving thyroid tissue and bleeding or damaging vital structures, such as the phrenic nerve, azygos vein, and others. From an anatomical perspective, the thyroid gland extends deep behind the great vessels in the pretracheal fascia. Therefore, this anterior approach is not always ideal for an optimal exposure (9). Thus, VATS is a safe technique for a better visualization with less complications. Still, VATS is not always possible, such as in case of large thyroid masses extending into the posterior mediastinum (6). In this case, the visualization of the thoracic component is not completely possible with a small incision and a posterior visualization field. These potential limitations emphasize the need for a multidisciplinary approach with an otorhinolaryngologists and a cardiothoracic surgeon with good preoperative assessment and acknowledging perioperative limitations. The preoperative diagnosis of retrosternal goiters is essential and is based on CT. Goiters can be resected using a single cervicotomy or a combined approach with sternotomy, thoracotomy, or VATS. A combined approach consisting of cervical incision and VATS thyroidectomy is a safe and less invasive surgery for retrosternal/intrathoracic goiters. This technique benefits from less postoperative pain, less blood loss, lower risk of infection,

better aesthetic results, and a shorter period of hospital stay. Patients are able to have total resection of diving goiters with a faster recovery. In this paper, we report the first case with a safe removal of a massive intrathoracic goiter through combined-approach VATS using the Endo Catch retrieval system. Preoperative CT size measurement protocols of goiters need to be further developed, and a better uniformization of goiter classification is needed. The authors highly recommend multidisciplinary collaboration during the preoperative assessment and treatment strategy in case of extracervical goiters to reduce morbidity to a minimum.

Informed Consent: Verbal informed consent was obtained from the patients who agreed to take part in the study.

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