Current technique for resection of mediastinal goiter

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Abstract
We have developed a combined surgical technique involving traction sutures, the harmonic scalpel, and laryngeal nerve monitoring for the removal of mediastinal goiters. This technique is safe, expeditious, and effective; it minimizes the risk of blood loss or nerve injury; and it obviates the need for sternotomy. During a 4-year period, we performed this operation on 21 patients. We observed only two complications: one patient developed postoperative seroma 1 week after surgery and another experienced vocal fold paralysis after intentional sacrifice of the recurrent laryngeal nerve, which was encompassed by cancer. No other recurrent laryngeal nerve was injured. Operative blood loss was negligible, no systemic infection or permanent hypoparathyroidism was observed, and no patient required a chest tube or chest incision. Almost all patients were discharged home on postoperative day 1.

Patrons and methods
Surgical technique. Contrast-enhanced computed tomography (CT) of the neck and mediastinum should be obtained whenever the inferior margin of a goiter cannot be palpated in the neck. Fiberoptic laryngoscopy and tracheoscopy should also be performed to rule out any tracheal compression, deviation, or invasion.

The anesthesiologist and cardiothoracic surgeon are advised of the patient’s mediastinal mass and the degree of tracheal obstruction or deviation. At the time of surgery, an endotracheal tube with incorporated electrodes or a recurrent laryngeal nerve surface electrode plate is placed. If the latter is used, an anode tube is placed first. Reference electrodes are placed below the xiphoid process and in the shoulder and taped into position. A short-acting muscle relaxant (e.g., succinylcholine) is administered by the anesthesiologist to facilitate intubation, and a nerve-twitch monitor may be placed in the temporal area.

The skin incision is carried down across the strap muscles, if necessary, through the medial portion of the sternocleidomastoid muscle. The anterior communicating (anterior jugular) veins are coagulated and divided with the harmonic scalpel. A subplatysmal elevation is performed without the need for sternotomy.

In recent years, we have incorporated into our technique of mediastinal thyroidectomy the use of the harmonic scalpel and intraoperative laryngeal nerve monitoring. These modifications have facilitated the dissection of mediastinal goiters, goiters wrapped around the larynx, trachea, and esophagus, and they have improved thyroid reoperations. Finally, they have eliminated or reduced the incidence of complications such as hemorrhage and inadvertent recurrent laryngeal nerve injury.

In this article, we describe our surgical technique and our experience with 21 operations.

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retracted, mobilized, and brought into the cervical field (figure 1). If a total thyroidectomy is planned, a Penrose drain may be placed around the isthmus to augment the cephalad retraction. Any large feeding vessels or draining veins can be easily identified, coagulated, and divided with the harmonic scalpel. If the recurrent laryngeal nerve is stretched by the traction during delivery into the cervical field, the electrical discharge on the recording will make this situation obvious. If the nerve is attached to the capsule, a subcapsular identification can be made with the stimulator probe, and the nerve can be peeled off the gland prior to delivery into the cervical field.

Finally, any parathyroid glands attached to the mediastinal component can be easily removed, diced, and replanted into the sternocleidomastoid muscle. Soft suction drains are oftentimes placed.

Patient series. From January 2000 through December 2003, the lead author (L.S.) operated on 21 patients with mediastinal goiter (a goiter is considered mediastinal if at least half of the thyroid mass is inferior to the suprasternal notch). These operations accounted for 7.4% of all thyroidectomies performed by the lead author during this period. These operations were performed on 13 women (mean age: 55.8 yr) and 8 men (mean age: 75.5).

Results
Almost all patients had presented with dyspnea, dysphagia, or choking. Three women had presented to the emergency room with progressive airway obstruction (figure 2). Of the 21 patients, 19 (90.5%) underwent a total or completion thyroidectomy. Only 2 patients, both women, did not have benign disease. One had a papillary cancer and the other a follicular variant of papillary cancer. The weight of the thyroid glands ranged from 160 to 575 grams in the men and 140 to 425 grams in the women.

We observed only two complications: One patient experienced a seroma 1 week postoperatively and another experienced vocal fold paralysis following the intentional sacrifice of the recurrent laryngeal nerve, which was encompassed by cancer. The latter patient was rehabilitated with speech therapy and did not require thyroplasty.

Figure 1. Intraoperative photographs show specimens being delivered into the cervical field in two different patients.

Figure 2. CTs show the mediastinal goiter of a woman who presented to the emergency room with stridor.
other recurrent laryngeal nerve was injured. Operative blood loss was negligible; so mediastinal drains may not be necessary. No systemic infection or permanent hypoparathyroidism was observed, and no patient required a chest tube or chest incision. Almost all patients were discharged home on postoperative day 1.

Discussion

The advantage of using this combined technique is that it facilitates surgery without compromising safety. The only drawback of the suture technique is the risk of some spillage of the liquid contents of a cyst if one is encountered within the thyroid. Otherwise, the surgeon may wish to avoid placing the retraction stitch in a hard mass within the goiter if it is suspect for cancer. In such a situation, the stitch can be placed adjacent to the cyst or tumor, or a large Penrose drain can be placed around the isthmus once it is completely freed.

This technique can be useful for removing tumors that are wrapped around the trachea and/or esophagus and those that have invaded the larynx. With traction on the stitch, the thyroid can be easily unwrapped, and the recurrent laryngeal nerve can be easily identified and traced into the larynx. The electrical identification of the nerve will also be beneficial in this situation.

The incidence of cancer among the mediastinal goiters in this series (9.5%) was similar to that seen in other series. This underscores the necessity of performing a thyroidectomy for mediastinal goiters rather than following them clinically.

The well-established techniques for resection of a mediastinal goiter are median sternotomy and lateral thoracotomy. However, these approaches should be reserved for cases of life-threatening superior or mediastinal compression, recurrent mediastinal goiter, or extracapsular extension of a malignancy. Other authors have resected all mediastinal goiters in their series through a cervical incision.

The limitation of this technique is encountered when the surgeon is dealing with a cancer that has invaded muscle or surrounding structures or has massively extended within the thoracic cavity. In these cases, sternotomy and lateral thoracotomy are the only approaches that will permit sufficient exposure to eradicate the disease.

Several other techniques are used to resect a substernal goiter via a cervical approach. Some authors advocate using a 30-ml Foley catheter, which is introduced blindly beyond the goiter and inflated. It is then retracted, along with traction on the thyroid, into the cervical field. This may be particularly useful if the retrosternal component is cystic. Other techniques include the use of clamps and spoons. Morcellation should be avoided because it allows tumor particles to seed the mediastinum.

Mediastinal goiters must be resected because all of them ultimately cause respiratory compromise. They cannot be satisfactorily controlled with thyroxine administration, nor can their progression or regression be easily monitored.

As indicated by our series and others, patients may harbor a malignancy that cannot be otherwise biopsied. Finally, a patient with a large mediastinal goiter who experiences chest trauma (e.g., in an auto accident) may develop bleeding into the goiter and rapid deterioration of the airway. Unlike an acute bleed in a cervical goiter, an acute bleed in the chest cannot be evacuated with needle aspiration.

In conclusion, this technique is safe, expeditious, and effective, and it carries only a minimal risk of blood loss or nerve injury.

References