When is Transthoracic Approach Indicated in Retrosternal Goiters?

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Purpose: It is critical to differentiate among pathologies of substernal thyroid gland diseases because surgical approaches (i.e., median sternotomy or thoracotomy) might also include a cervical incision. The aim of this study was to analyze the features of patients with goiter who underwent a thyroidectomy via a cervical incision and a median sternotomy or thoracotomy.

Methods: We reviewed 9 cases of thyroid disease in patients undergoing thoracic incisions with or without a cervical incision for varying indications between March 2003 and Jun 2009 were reviewed. Thyroidal masses were removed via a median sternotomy in six patients and thoracotomy in three patients. Split median sternotomy combining thoracotomy was performed in 1 patient. Cervical incision was added in all patients.

Results: Pathologic examination revealed multinodular goiter in 5 patients, thyroid carcinoma in 3, and reidel thyroiditis in 1. All patients were extubated in the early postoperative period. There was no postoperative mortality or morbidity. The mean hospital stay was 8.6 days (range, 4–11 days), and mean follow-up was 24.3 months (range, 4–39 months).

Conclusions: We recommend the use of transthoracic approaches, such as median sternotomy and thoracotomy for retrosternal goiter for surgical exposure, because they provide a wide exposure and facilitate removal of the mass. By using median sternotomy and thoracotomy, we can avoid catastrophic results, such as hemorrhage, as well as completely remove malignancies.

Key words: mediastinal mass, substernal goiter, intrathoracic goiter; median sternotomy, thoracotomy

Introduction

Goiter, which takes place in the thoracic cavity, is called an intrathoracic goiter. If it spreads behind the sternum towards the thorax then it became retrosternal goiter. Both diseases may cause an emergency such as acute respiratory insufficiency or vena cava superior syndrome by compressing the above-mentioned anatomic structures.

Although cervical incisions are enough for a good exposure in most of the retrosternal thyroid gland pathologies, an extended surgical approach with median sternotomy or thoracotomy may be necessary. Determining the most appropriate surgical technique is very important to
figure out and treat the complete pathology and prevent the patients from complications.

In this study we reviewed eight cases of thyroid pathologies of patients who underwent median sternotomy or thoracotomy and compared surgical techniques and postoperative follow-up data.

Materials and Methods

We reviewed the cases of 9 patients with thyroid disease (5 women and 4 men) who had undergone thoracic incisions with or without a cervical incision for varying indications between March 2003 and June 2009. The mean age was 52.9 years (range, 37–71 years). The diagnosis of 3 patients was thyroid carcinoma; 5, multinodular goitre (MNG); and 1, Riedel thyroiditis. Median sternotomy was the preferred approach in 6 patients; and thoracotomy, in 2 patients. Split median sternotomy with thoracotomy was performed in 1 patient. All of the patients required an additional servical incision for better exposure. Two of the patients underwent a total thyroidectomy, 11 and 9 years ago for the treatment of MNG.

The common symptoms were cervical tumescence in 5 patients; dyspnea in 3; and severe cough in 2. One patient was asymptomatic.

We used posterior-anterior and lateral chest X-ray, computed tomography and magnetic resonance imaging for preoperative evaluation of the lesions (Figs. 1 and 2).

Results

A thoracic approach was required in all patients because of deep anterior extension of the goiter. There was no mortality, blood transfusion requirement, tracheomalacia, need for tracheotomy, or wound infection. There were no intubation problems.

All of the patients were extubated during the early postoperative period. There were no intraoperative or hospital deaths or perioperative morbidity, including postoperative hoarseness. The mean hospital stay was 8.6 days (range, 4–11 days), and the mean follow-up was 24.3 months (range, 4–39 months). Only 1 death was reported, 4 months after surgery, that was caused by extensive lung metastasis of thyroid carcinoma (Table 1).

Discussion

Retrosternal and intrathoracic goiter can be examined in two groups. One of them is true or aberrant “ectopic” intrathoracic goiter, which is congenitally perfuse by intra-thoracic arteries and has no cervical elongations. The second one is acquired and much more frequently seen group that can be defined with a spreading thyroid gland from thoracic inlet to the mediastinum along the retrosternal fascia. Prevalence of retrosternal goiter firstly described by Haller and colleagues at 1947 is 13%–20%. Despite retrosternal goiters are mostly localized at the anterior of innominate artery and vein, some cases with posterior mediastinally (10%–15%) placed retro-tracheal component are reported. In the last decade, almost 1012 thyroid operations have been performed with various indications in our hospital while 54 (5%) of them were retrosternal localization. Eight of the 54 (7%) patients were necessitate median sternotomy or thoracotomy to remove the thyroid lesions. Also, three ectopic goiters were seen in our clinic.

Retrosternal goiter may cause dyspnea, hoarseness, vena cava superior syndrome and dysphagia while the growing thyroid mass directed to the right side, posterior or anterior mediasten and pushing the mediastinal structures. In our patients, the most common symptom was tumescence, 3 patients were suffering from dyspnea. Tracheal deviation was the most observed radiological sign. Katlie and colleagues observed trachea deviation and compression at the rate of 79% and Madjar and colleagues 77%. Sometimes this compression may cause dyspnea, which necessitates an emergency intervention. One of the patients was suffering from dyspnea while
lying in the supine position. Vena cava superior compression is not seen very often. It is often seen in malign lesions (75%).

Chest X-Ray as well as computed tomography scan (CT) and magnetic resonance imaging (MRI) have important roles in radiological diagnosis. MRI has a critical tool in the visualization of tissue and local invasion of vascular structures by the tumor (Figs. 1 and 2). As an imaging technique, transesophageal echocardiography (TEE) was recommended for mediastinal paracardiac lesions because it provides additional anatomic data. TEE may be relevant for posterior mediastinal goiters, if there were a suspected, invasive lesion. Although fine needle aspiration biopsy is quite successful for the histological diagnosis of thyroid nodule, the success of this technique for intra-thoracic goiter is low because of its heterogeneity, being large and difficult to reach. In our cases, the borders of the surgery were identified by frozen biopsy. Total thyroidectomy was applied to the patients with malignant tumor. It was shown that intrathoracic goiter is 80% benign. The most common histopathological sub-type is a multi-nodular goiter (51%–80%), and a less common one is follicular adenoma (40%). It was also shown that follicular carcinoma (4.5%), papillary carcinoma (2.5%–6.6%), in malign group, the rate of which was 20%.

### Table 1  Clinical characteristics of patients

<table>
<thead>
<tr>
<th>No</th>
<th>Age</th>
<th>Sex</th>
<th>Histopathological Type</th>
<th>Surgical approaches</th>
<th>Operation Type</th>
<th>Lesion diameter (cm)</th>
<th>Follow-up (month)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>37</td>
<td>F</td>
<td>MNG Recurrence</td>
<td>Parsiyel MS + CI</td>
<td>Sub-total thyroidectomy</td>
<td>20</td>
<td>33</td>
</tr>
<tr>
<td>2</td>
<td>45</td>
<td>F</td>
<td>Thyroid Follicular Cell Ca</td>
<td>MS + CI</td>
<td>Total thyroidectomy</td>
<td>12</td>
<td>25</td>
</tr>
<tr>
<td>3</td>
<td>45</td>
<td>M</td>
<td>Riedel Tiroidit</td>
<td>MS + CI</td>
<td>Sub-total thyroidectomy</td>
<td>13</td>
<td>16</td>
</tr>
<tr>
<td>4</td>
<td>54</td>
<td>F</td>
<td>MNG Recurrence</td>
<td>Right T + CI</td>
<td>Sub-total thyroidectomy</td>
<td>17</td>
<td>32</td>
</tr>
<tr>
<td>5</td>
<td>62</td>
<td>M</td>
<td>Tiroid Hurle Cell Ca</td>
<td>Full MS + CI</td>
<td>Total thyroidectomy</td>
<td>15</td>
<td>20</td>
</tr>
<tr>
<td>6</td>
<td>62</td>
<td>M</td>
<td>Thyroid Anaplastic Cell Ca and lung metastasis</td>
<td>Right Anterior T + CI</td>
<td>Total thyroidectomy and right upper lobectomy</td>
<td>8 and 6</td>
<td>4</td>
</tr>
<tr>
<td>7</td>
<td>65</td>
<td>F</td>
<td>MNG</td>
<td>Right T + CI</td>
<td>Sub-Total thyroidectomy</td>
<td>12</td>
<td>24</td>
</tr>
<tr>
<td>8</td>
<td>71</td>
<td>M</td>
<td>MNG</td>
<td>MS + CI</td>
<td>Sub-Total thyroidectomy</td>
<td>16</td>
<td>39</td>
</tr>
<tr>
<td>9</td>
<td>78</td>
<td>F</td>
<td>MNG</td>
<td>Right T + CI + MS</td>
<td>Sub_Total thyroidectomy</td>
<td>15</td>
<td>11</td>
</tr>
</tbody>
</table>

MNG, multi nodular goiter; CI, cervical incision; MS, median sternotomy; T, thoracotomy.
had Riedel thyroiditis, a rare, chronic, inflammatory disease of the thyroid gland, characterized by dense fibrosis that replaces normal thyroid parenchyma. The fibrotic process invades adjacent structures of the neck and extends beyond the thyroid capsule. Because of the encroachment beyond the thyroid capsule, other problems care with Riedel thyroiditis, including hypoparathyroidism, hoarseness due to recurrent laryngeal involvement, and stridor due to tracheal compression.

Median sternotomy must be indicated, in patients with a retrosternal extension. We evaluate the pathology, radiologically and clinically, because then we can make a cervical incision that is appropriately large enough for the size of the lesion. Thoracotomy can be exactly necessary, if thyroid pathologies localization is in one hemithorax.3, 4, 12 In fact 80% of retrosternal goiter can be removed by means of cervical incision. In a study by; Ahmed and colleagues, 9 of 40 retrosternal goiters were required sternotomy.3 It is urgent in cases, which radiologically go down to arcus aorta and even lower levels and are mediastinal located and suspected of malignancy that operation should be started with median sternotomy because of dissection disorder and bleeding possibility. Especially in patients with goiter, we should not approach lower vascular structures because of they are large. A partial sternotomy can be added to cervical incision. In our series, a right thoracotomy with a split “partial” median sternotomy was needed for one patient because the lesion extended the thoracic in let to the posterior mediastinum (Fig. 3). In retro-esophageal and recurrence goiters, a trans-thoracic approach may be necessary. In one of our cases, a right thoracotomy was applied because of a recurrent goiter and dyspnea. In addition, it must be kept in mind that tracheostomy may be necessary because of the possible development of tracheomalacia.

In conclusion; intrathoracic goiters must be removed as soon as possible to reduce the risk of tracheomalacia, invasion to the adjacent structures, and distal organ metastasis due to the possibility of malignancy. Surgical treatment also provides an accurate diagnosis. Malignant thyroid masses may spread intra-thoracically to the distal arcus aorta. Transthoracic approaches must be preferred, especially when the tumor might invade mediastinal vascular structures, which would make mediastinal dissection and thyroidectomy difficult.

References


Fig. 3 Computed tomographic scans showing the mass extending toward the posterior mediastinal space (b) from the thoracic inlet (a).