An investigation into symptoms, diagnosis, treatment, and treatment complications in patients with retrosternal goiter

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Abstract

Introduction: Retrosternal goiter refers to any thyroid enlargement in which over 50% of the thyroid permanently located under the thoracic inlet or the lower pole of thyroid is not palpable with the neck in hyperextended position. Due to the increasing number of surgical procedures of retrosternal goiter, the present study was carried out to examine the symptoms, diagnosis, treatment, and treatment complications in retrosternal goiter patients. Materials and Methods: Data related to demographic data (age and gender), clinical symptoms (dyspnea, dysphagia, dysphonia, lumps in neck, and hoarseness), methods of diagnosis (computed tomography [CT], chest X-ray [CXR], ultrasonography, and magnetic resonance imaging), and postoperative complications (bleeding, early and late dysphonia, early and late dyspnea, transient and permanent hypocalcemia, transient, and permanent recurrent laryngeal nerve paralysis) were collected. Results: According to the results, 71.4% of patients were women and most of the participants (67.1%) aged 45–60 years. Mass in the neck was the most frequent symptoms before surgery (88.6%). The most common incision for thyroidectomy (95.7%) was neck Collar incision. Diagnosis method in 82.9% and 17.1% of cases was, respectively, based on CT scans with CXR and CT scans with CXR and ultrasound. According to the postoperative pathologic findings, 58.5% of the cases were multinodular goiter, 22.9% were papillary cell carcinoma, 7.1% were medullary carcinoma, 5.7% were anaplastic carcinoma, 5.7% were thyroid lymphoma, and only 1.4% were thyroid adenoma. Postoperative complications occurred in 47.14% of patients. Most common complication was early transient dysphonia. Conclusion: This study recommends that retrosternal goiter should be operated early under suitable conditions, and the best diagnosis tool and best surgery methods are CT scan and surgery with collar incision, respectively.

Keywords: Complications, goiter, retrosternal goiter, surgery

Introduction

Goiter is considered mediastinal if the lower pole of thyroid is not palpable with the neck in hyperextended position.¹,² Epidemiologically, it is difficult to have access to the prevalence of retrosternal goiter. According to the reports, however, thyroid goiter develops into thorax in 2%–21% of cases. In 7% of cases, retrosternal goiter appears as mediastinal tumor. Etiologically, 85%–95% of retrosternal thyroid masses emerge as benign goiter. Histologically, goiter is created as a result of iodine deficiency. This problem is nowadays observed in developing countries. Goiter can also be due to consumption of goitrogenic substances which are substances that cause disruption in the production of thyroid hormones. Malignity happens in 5%–15% of retrosternal goiters.³,⁴

Retrosternal goiters are more common among women. They develop slowly, their symptoms appear mostly in the fifth and
sixth decades of life, and they usually put pressure on mediastinal structures.[6,9] The most common symptoms of retrosternal goiter are dyspnea, respiratory problems, choking, and hoarseness.[9]

Diagnosis is according to clinical symptoms and diagnostic methods such as chest X-ray (CXR) and computed tomography (CT), and sometimes, ultrasound also helps with diagnosis, but CT has high sensitivity.[12,13] Surgery is the only effective method for retrosternal goiter. In most cases, suppressive therapies with levothyroxine are effective in reducing the size of multinodular goiter. Radioactive iodine is generally ineffective in decreasing goiter size and may cause acute inflammation, swelling of the glands, and an increase in the potential of airway obstruction.[6,9]

In most cases, surgery is carried out using a collar incision.[6-13] Only 2% of patients who are considered for retrosternal goiter surgery may need another type of incision such as manubriotomy, sternotomy, or thoracotomy.[14-18]

Among the complications of retrosternal goiter surgery are hematoma, recurrent laryngeal nerve palsy, tracheomalacia, dysphonia, laryngeal edema, hypocalcemia, nausea, vomiting and wound complications after surgery,[19-22] deep vein thrombosis, the need for transfusion after surgery due to the severity of bleeding, and mortality.[23,24] In their study entitled, “Diagnosis, treatment, and surgery of retrosternal thyroid masses,” Zhang and Cui (2002) examined 64 patients with retrosternal goiter.[94]

These researchers reported that the best method to diagnose retrosternal goiter is using CXR and CT, and the most common surgery for this type of goiter is collar incision which is associated with minimum morbidity and recurrence rate.[90]

By taking into account the surgery of 334 patients over 1993–2002, Aghajanzadeh et al. (2006) stated that 32 patients had intrathoracic thyroid and were examined in a retrospective method in terms of diagnosis symptoms, treatment, and complications of the surgery. The results of that study showed that the most appropriate diagnosis tool is CXR and the best tool is CT scan. Iodine thyroid scan was helpful in five cases. These researchers concluded that patients with retrosternal goiter need to undergo surgery during their treatment because they sometimes experience bleeding inside the goiter and malignant transformation, which is a serious threat.[31]

An ever increase in the number of retrosternal goiter surgery on the one hand, and given the advances in new medical knowledge and diagnostic facilities on the other hand, it is expected that patient with retrosternal goiter are diagnosed more precisely and rapidly to reduce the complications caused by late diagnosis and delayed surgery and the financial costs imposed on society. The present study was carried out to precisely examine the records of the patients with retrosternal goiter who underwent surgery over 2007–2013, their symptoms, diagnosis method, and complications caused by the surgery.

Materials and Methods

In this retrospective cross-sectional descriptive study, between 2007 and 2013, in Razi and Arya Hospitals, Rasht, Iran, from 777 patients that operated with thyroidectomy, 70 patients (9%) had retrosternal goiter.

The study’s variables included the frequency of the medication and the underlying diseases before hospitalization, symptoms before surgery, the conducted therapeutic methods, diagnosis methods (CXR, CT, ultrasonography, and magnetic resonance imaging [MRI]), the postoperative pathologic findings, frequency distribution of the complications after the surgery according to the patients’ sex, and the percentage of the complications based on the age groups.

The measuring tool in the present study was a checklist that was based on individual information including age, sex, underlying diseases and the section of symptoms, diagnosis-treatment methods, and the complications mentioned in the table of the variables. The patients’ records were examined over the specified time, and there were no specific exclusion and inclusion criteria in the present study.

Data collection instruments and method

The records of all of the patients who were hospitalized for retrosternal goiter thyroidectomy were used in the present study. Then, a questionnaire consisting of 2 sections of demographic information (age, sex, medication consumption, underlying disease, etc.), and clinical symptoms (bleeding, dyspnea, dysphagia, dysphonia, mass in the neck, hoarseness, and asymptomatic), diagnosis method (CT, CXR, ultrasound, and MRI), and complications (early and late dysphonia, early and late dyspnea, transient and permanent recurrent laryngeal nerve injury, temporary and permanent hypocalcemia, and hoarseness) were completed for each patient.

Data analysis method

After the required data were collected, they were fed into SPSS 21.0, frequency and confidence interval 95% were used to determine the symptoms, treatment-diagnosis method, and complications, and Chi-square test was run to compare the data in terms of sex, age groups, and underlying diseases. The significance level was set at 5% for all tests.

Ethical considerations

Ethics and confidentiality were taken into account in extracting and recording the required data, and ethical consent letter was received from the patients to participate in the study.

Results

The results of the present study showed that out of 777 patients who had undergone thyroidectomy in Arya and Razi hospitals over 2007–2013, 70 patients had retrosternal goiter and out of whom 71.4% were women.
According to the results, most of the participants (46 people, 65.7%) did not take any thyroid medication, 20.3% took levothyroxine, and 14% took methimazole. Examining underlying diseases before hospitalization showed that 46 patients (65.7%) had euthyroid, 14 patients (20.3%) had hypothyroid, and ten patients (14%) had hyperthyroid.

Mass in the neck was the most frequent symptoms before surgery (88.6%). Total thyroidectomy and collar incision were the mostly used surgeries with, respectively, 74.3% and 95.7%.

None of the participants received iodine therapy alone, and all of them underwent surgery. Diagnosis methods were CT scan along with CXR in 82.9% of the cases and CT scan along with CXR and ultrasonography in 17.1% of the cases.

The comparative examination of frequency of postoperative complications according to the type of data presented in Table 1 shows that 60% of the men (12 patients) and 42% of the women (21 patients) experienced postoperative complications; however, this difference was not significant although there was a difference of 18% based on Chi-square test. In comparative examining the percentage of the complications based on the age groups presented in Table 2, it was shown that the percentage of the complications among individuals under 45 years was 38.5%, among those between 45 and 60 years was 44.7%, and among those over 60 years was 70%. Although the difference between the age groups was over 30%, this difference was not significant due to lack of participants in the age group of over 60 years [Table 2].

In examining the postoperative pathologic findings, most of the participants (41 patients, 58.5%) were reported to have multi-nodular goiter, 22.9% (16 patients) papillary cell carcinoma, 7.1% (five patients) medullary carcinoma, 5.7% (four patients) anaplastic carcinoma, 5.7% (four patients) thyroid lymphoma, and only 1.4% (one patient) thyroid adenoma [Table 3].

### Discussion

Retrosternal goiter was first described by Haller in 1794. It prevalence varies 3%–20% among patients who undergo thyroid surgery. Its extensive prevalence is due to different definitions of this type of goiter.\(^\text{32-39}\) In the present study, the prevalence of retrosternal goiter was 9%.

In the present study, most of the participants (88.6%) had neck mass, 70% (49 patients) had dyspnea, 27.1% (19 patients) had dysphonia, 22.9% (16 patients) had dysphagia, 15.7% (11 patients) had hoarseness, and only eight patients (11.4%) had no symptoms before surgery. In a study carried out in 2006, dyspnea was reported as the most common functional symptom among young patients (39.3%) due to compression of the trachea by the goiter, and dysphagia (16.2%) and the second most common symptom that has no relationship with goiter development among this group of patients. In their study, Grainger \textit{et al.} (2005) reported that patients with large goiter glands can have no symptoms in 10%–35% of cases, which is similar to the present study. According to the results of the study carried out by Siderys, 17%–32% of the patients who undergo surgery are asymptomatic, and their goiter is accidentally diagnosed in their CXR. In these patients, due to consequent hazardous complications, it is better to treat goiter by prophylaxis method.\(^\text{40,41}\) In the present study, diagnosis methods were CT scan along with CXR in 82.9% of

| Table 1: Frequency of postoperative complications percentage according to sex groups |
| --- |
| Crosstab | Postoperative complications | Total | P |
| Sex | No | Yes |  |
| Male | Count | 8 | 12 | 20 | 0.173 |
| Percentage within sex | 40.0 | 60.0 | 100.0 |
| Female | Count | 29 | 21 | 50 |
| Percentage within sex | 58.0 | 42.0 | 100.0 |
| Total | Count | 37 | 33 | 70 |
| Percentage within sex | 52.9 | 47.1 | 100.0 |

| Table 2: Frequency of postoperative complications according to age groups among patients with retrosternal goiter |
| --- |
| Crosstab | Postoperative complications | Total | P |
| Age group | No | Yes |  |
| Below 45 years | Count | 8 | 5 | 13 | 0.272 |
| Percentage within age group | 61.5 | 38.5 | 100.0 |
| 45-60 years | Count | 26 | 21 | 47 |
| Percentage within age group | 55.3 | 44.7 | 100.0 |
| Over 60 years | Count | 3 | 7 | 10 |
| Percentage within age group | 30.0 | 70.0 | 100.0 |
| Total | Count | 37 | 33 | 70 |
| Percentage within age group | 52.9 | 47.1 | 100.0 |

| Table 3: Frequency of postoperative pathologic findings (lymphoma, anaplastic, medullary, etc.) among the patients with retrosternal goiter |
| --- |
| Postoperative pathologic findings (lymphoma, anaplastic, medullary, etc.) | Frequency (%) |
| MNG | 41 (58.5) |
| PTC | 16 (22.9) |
| Medullary | 5 (7.1) |
| Anaplastic | 4 (5.7) |
| Lymphoma | 4 (5.7) |
| Total | 70 (100.0) |

MNG: Malignant goiter; PTC: Papillary thyroid carcinoma
In retrosternal goiter, studies indicated that radiography can be seen. However, radionucleotide imaging is not reliable in two-thirds of follicular carcinoma are so iodine absorbent that they metastatic cancer well, and one-third of papillary carcinoma and metastasize. Moreover, using radioactive iodine to therapy before surgery, and none of them had iodine therapy alone. Radioisotope iodine 123 is often a choice that indicates metastatic cancer well, and one-third of papillary carcinoma and two-thirds of follicular carcinoma are so iodine absorbent that they can be seen. However, radionucleotide imaging is not reliable in approve or reject cancer. Moreover, using radioactive iodine to diagnose retrosternal goiter before surgery may lead to dyspnea, cause severe inflammation in airways, and make the disease an emergency condition which should be dealt with much care.

In the present study, about 47.14% of the participants experienced complications after the surgery, but 52.9% had no complications. Among the complications, 25.7% of the participants had early dysphonia, 12.9% had early dyspnea, 11.4% had transient hypocalcemia, 2.9% had late dyspnea, and 7.1% had postoperative bleeding. Permanent hypocalcemia was not seen in any of the patients. The results of a study carried out on 75 patients by Ben Nun et al. (2006) showed that transient recurrent nerve injury after surgery occurred in 7% of the patients, permanent nerve damage in 4% of the patients, transient hypocalcemia in 10% of them, and permanent hypocalcemia in 2.6% of them.

Examining the postoperative pathologic findings showed that 58.5% of the cases were multinodular goiter, 22.9% were papillary cell carcinoma, 7.1% were medullary carcinoma, 5.7% were anaplastic carcinoma, 5.7% were thyroid lymphoma, and only 1.4% were thyroid adenoma. In a study conducted in 2002, postoperative pathologic findings showed that most cases were multinodular goiter (54.7%), thyroid adenoma (21.9%), and thyroid carcinoma (15.6%). In a study, Aghajanzadeh (2006) reported that 68.8% of the patients had multinodular goiter, 21.9% had papillary cell carcinoma, 3.1% had medullary cell carcinoma, 3.12% had anaplastic carcinoma, and 3.1% had thyroid lymphoma. Retrosternal goiter patients' precaution is highly significant. Chest goiter along with papillary and medullary cancers had highly acceptable results and good survival rate. In retrosternal goiter, however, patients with anaplastic and lymphoma cancers had a survival rate of about 6 months to 1 year.

**Conclusion**

The results of the present study showed that incidence of retrosternal goiter is higher among women and most patients with retrosternal goiter in old ages. Their common symptoms are dyspnea and dysphonia. They do not respond to suppressive therapies, and their size does not decrease. Moreover, with the passage of time, the possibility of turning into cancer is high. Bleeding in goiter leads to high compression on the trachea and creation of an emergency condition; therefore, it is better for all patients to undergo surgery in appropriate conditions unless there are cardiovascular problems.

**Financial support and sponsorship**

Nil.

**Conflicts of interest**

There are no conflicts of interest.
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