Journal of Cardiovascular Disease Research

ISSN:0975 -3583,0976-2833 VOL14, ISSUE 05, 2023

**Original research article**

# Surgical management of retrosternal goitre in a tertiary care Centre of South India

**[1]Dr. Shubhranshu Jena, [2]Dr. M Mallikarjun Rao, [3]Dr. Rajshekar Shantappa, [4]Dr. Kumar S Vashist, [5]Dr. G Suryanarayana Raju**

[1]Associate Professor, Department of Surgical Oncology, Nizams Institute of Medical Sciences, Hyderabad, Telangana, India

[2]Fellowship Resident, Department of Surgical Oncology, Nizams Institute of Medical Sciences Hyderabad, Telangana, India

[3]Additional Professor, Department of Surgical Oncology, Nizams Institute of Medical Sciences Hyderabad, Telangana, India

[4]DNB Resident, Department of Surgical Oncology, Nizams Institute of Medical Sciences Hyderabad, Telangana, India

[5]Senior Professor (Retd.), Department of Surgical Oncology, Nizams Institute of Medical Sciences Hyderabad, Telangana, India

**Corresponding Author:**
Dr. Shubhranshu Jena (sjena678@gmail.com)

**Abstract**

**Introduction:** Retrosternal goitre was first described by Albrecht von Haller in 1749, as the extension of the thyroid tissue below the upper opening of the chest. Retrosternal goitre is most commonly defined as one that either descends below the thoracic inlet, or has more than 50% of its volume below this level. Retrosternal Goitres can be classified as either primary or secondary. Most retrosternal goitres can be removed through a cervical approach, while a partial or total sternotomy should be performed only in a minority of patients, ranging between 1-11%.

**Aims & Objectives:** Retrosternal goiter may cause symptoms of airway obstruction and dysphagia, but often it is asymptomatic and is increasingly detected incidentally with imaging investigations. Consensus has been reached that sternotomy is not necessary in most cases, as a collar incision normally suffices. Our retrospective study was to analyse personal experience in the surgical management of retrosternal goitres, defining, in particular, the features requiring sternotomy.

**Materials and Methods:** This is a Retrospective study comprising of 45 patients who underwent thyroidectomies between period of 2015-2022 in department of surgical oncology NIMS HYD. The patients with were analyzed further, with regard to demographics, presentation, indications, and outcome of surgical treatment and HPE reports.

**Results:** A total of 45 patients with 11 male & 34 female patients with Mean age 50 yrs (Age range 22-75). Most common presentation was neck swelling 68%, followed by respiratory symptoms. Surgical procedure predominantly done was near total thyroidectomy. Tracheostomy was done in 7 cases. In all cases recurrent laryngeal nerve identified and preserved. In 43 cases retrosternal goitre was removed by transcervical approach & sternotomy was needed in only 2 cases. Final histological diagnosis revealed malignancy in 6 cases (4 Papillary & 2 follicular ca). No intra or perioperative deaths occurred.

**Discussion:** All patients who presented to department of surgical oncology NIMS Hyd. with thyroid swelling were clinically examined and patients in whom lower border of swelling was not palpable were considered to have retrosternal extension and were further evaluated using CXR, HRUS AND CT.

**Conclusion:** In our experience surgical approach for retrosternal goitre should be determined by type of retrosternal extension (ectopic) and cytomorphology. Transcervical approach is gold standard in exploring the retrosternal extent of goitre. meticulous digital dissection should be carried out by the experienced surgeon. In cases where goitre extension in to thoracic cavity is bilateral and in malignancies sternotomy should be considered for excellent exposure and for reducing complications.

**Keywords:** Retrosternal goiter, Surgical management, histological diagnosis

## Introduction

Retrosternal goiter (RG) was first described by Albrecht von Haller in 1749, as the extension of the thyroid tissue below the upper opening of the chest. Retrosternal goitre is most commonly defined as one

ISSN:0975 -3583,0976-2833 VOL14, ISSUE 05, 2023

that either descends below the thoracic inlet, or has more than 50% of its volume below this level. Retrosternal goitres can be classified as either primary or secondary. Primary intra-thoracic goitres arise from aberrant thyroid tissue which is ectopically located in the mediastinum, receive their blood supply from mediastinal vessels and are not connected to the cervical thyroid. They are rare, representing less than 1% of all retrosternal goitres.

Secondary RGs develop from the thyroid located in its normal cervical site. Downward migration of the thyroid into the mediastinum is facilitated by negative intra-thoracic pressure, gravity, traction forces during swallowing and the presence of anatomical barriers preventing the enlargement in other directions (thyroidcartilage, vertebral bodies, strap muscles, especially in patients with a short, large neck).

These secondary retrosternal goitres are, characteristically, in continuity with the cervical portion of the gland and receive their blood supply, depending on cervical vessels, almost always through branches of the inferior thyroid artery.

Most retrosternal goitres can be removed through a cervical approach, while a partial or total sternotomy should be performed only in a minority of patients, ranging between 1-11%.

**Aims & objectives**

Retrosternal goiter may cause symptoms of airway obstruction and dysphagia, but often it is asymptomatic and is increasingly detected incidentally with imaging investigations. Consensus has been reached that sternotomy is not necessary in most cases, as a collar incision normally suffices.

Our retrospective study was to analyse personal experience in the surgical management of retrosternal goitres, defining, in particular, the features requiring sternotomy.

**Materials and Methods**

This is a retrospective study comprising of 45 patients with retrosternal goitres who underwent thyroidectomies between period of 2015-2022 in department of surgical oncology Nizams Institute of Medical Sciences Punjagutta, Hyderabad.

Data from existing Medical Records of patients in the Dept. of Surgical oncology, Nizam Institutes of Medical Sciences will be recruited for the study, as this is a retrospective study, designed for the patients who had undergone surgery with retrosternal goiters in Surgical oncology NIMS from 1st April 2015 to 30 September 2022 considering eligibility criteria.

**Inclusion criteria**

1. Age group of 18- 82 years
2. Patients with thyroid nodules with retrosternal extension unilateral or bilateral
3. Patients with either benign or malignant thyroid nodules
4. Patients with clinical finding: lower pole of thyroid nodule not palpable

**Exclusion criteria**

- Patients who underwent previous thyroid surgery
- Patients of Thyroid carcinoma with neck metastasis

This study was started after approval from the institutional ethics committee. Data of these patients were collected and recorded from the medical database of the Department of surgical oncology NIMS, Hyderabad.

**Precise description of methodology of the proposed research:**

- **Sample size:** 45.
- **Type of study design:** Single Centre, Retrospective Study of last 7 years (1st Apr 2015 to 30 Sep 2022).

**Methodology**

The following data will be collected from existing medical record in department of Surgical oncology of Patients who had undergone surgery in Surgical oncology, NIMS in the above-mentioned period (As this is a retrospective study).

- Demographic parameters including age, gender.
- History of diabetes, hypertension, Hypo or Hyperthyroidism.
- History of dyspnea, dysphagia, change in voice.
- Any personal history of Malignancy.
- Family history of thyroid tumors.
- CT scan or HRUS Neck
- Fnac report.
- Finally Post-Operative Histo-pathological report.

ISSN:0975 -3583,0976-2833 VOL14, ISSUE 05, 2023

**Results**

Out of total 45 patients 11 were male and 34 were female with mean age of 50 yrs (age range 22-75y). Most common presentation was neck swelling (multinodular goitre) 68%, followed by respiratory symptoms. Surgical procedure predominantly done was near total thyroidectomy. 3 patients had fibreoptic intubation due to tracheal lumen compromise. Tracheostomy was done in 7 cases. In all cases recurrent laryngeal nerve identified and preserved. In 43 cases retrosternal goitre was removed by transcervical approach [10] & sternotomy was needed in only 2 cases as the tumour was adherent to major vessels in anterior mediastenum and both required intraop 2 units blood transfusions. Only two patients required one-unit blood transfusions intraoperative when managed with transcervical incision. Final histological diagnosis revealed malignancy in 6 cases (4 Papillary carcinomas & 2 Follicular Carcinomas). No intra or post-operative deaths occurred. 4 patients had transient hypocalcemia. No patient had required long term iv calcium infusions.

**Discussion**

Substernal goitres typically grow slowly therefore, symptoms are generally not clinically apparent until the goitre compresses the aerodigestive tract or other adjacent structures. Majority of our patients presented with palpable neck mass (68%).

The majority of mediastinal goitres are diagnosed in the sixth decade of life with a female to male ratio of 3:1. Amongst them, 20% to 30% are barely palpable in the neck, whereas approximately 40% are diagnosed incidentally. If symptoms are present, these are related to compression of the airways or oesophagus. Dyspnoea, sleep disturbance, dysphagia and hoarseness are the most common symptoms described in the literature. Most patients tend to have normal thyroid function, although there have been cases of hyper-or hypothyroidism, which can be detected on the basis of laboratory testing. Recently, a retrospective study examining 140 patients with retrosternal goitre revealed 112 (80%) euthyroid patients, while only 28 (20%) exhibited hyperthyroidism [12]. Similarly, about the same percentage of hyperthyroidism (18.5%) was noticed in another cohort of patients diagnosed with intrathoracic goitre, while the rest had normal thyroid function [13]. Computed tomography (CT) scanning of the neck and chest is the standard tool of investigation to ascertain diagnosis [14, 15, 16].

In our experience, chest radiograph and sonography provided us with initial radiologic evidence of the goitre extending into the superior mediastinum. Subsequent CT imaging was conducted when chest radiograph showed a soft tissue mass at the superior mediastinum inducing tracheal compression as evidenced by luminal narrowing or deviation, or when the lower margin of the mass extended beyond the level of the clavicle.

Even in asymptomatic cases, it is generally agreed that surgical treatment is required given the potential airway compromise and ineffectiveness of non-operative treatment. In their systematic review, White *et al*. revealed that the incidence of malignancy in substernal goitres is similar to the one found in cervical goitres (3% to 21%) [11]. Previous radiotherapy, presence of cervical adenopathy, recurrent goitre and family history of thyroid pathology have been described as risk factors for malignancy.

The presence of retrosternal goiter should be suspected when the inferior edge of the thyroid gland is not palpable and extends beyond the sternal notch on clinical examination with the neck in extension. In patients with obesity, a short neck, kyphoscoliosis or inability to extend the neck fully it can be difficult to palpate the lower extent of the thyroid gland and these patients require cross sectional imaging to determine if inferior extension is present. The presence of retrosternal goiters can sometimes be elicited via Pemberton's test. This test is positive if a patient hyperextend the neck whilst swallowing and raising both hands above their head and flushing of the skin, dilation of the external jugular veins or airway compromise occurs. This position results in narrowing of the thoracic outlet and a large goiter will inhibit venous return, causing the patient's face to flush, which resolves when the arms are lowered. Some patients with superior vena cava syndrome will have obvious venous collaterals in the upper chest and neck. Other clinical findings may include tracheal deviation and occasionally Horner's syndrome.

The most important pre-operative radiological investigation in the evaluation
of Retrosternal goitre is Computed Tomography. Preoperative CT scan can visualize the relations between the goitre and mediastinal component, the level of extension, and the presence or absence of tracheal or esophageal compression. patients who were preoperatively examined by CT. Chest X-ray and ultrasound provides us with preliminary radiological evidence of the progression of the goiter to the superior mediastinum.

Retrosternal goitre calcifications-Page *et al*., reported that 66% of their benign goiter cases had calcifications on CT and therefore cannot be considered a sign of malignancy.

Most retrosternal goiters can be resected safely via a Kocher cervical approach with the incidence of sternotomy in Retrosternal goitres ranging from 0% to 11% (1,2,3). This wide range may be attributable to the variation in the definitions of Retrosternal goitres. surgery is the optimal therapeutic option for surgically fit patients with compressive symptoms secondary to Retrosternal goiters [4].

Complications arising from cervical thyroidectomy are low. In our study no patient had any recurrent laryngeal nerve. 4 patients had transient hypocalcemia requiring iv calcium supplimentation. A

ISSN:0975 -3583,0976-2833 VOL14, ISSUE 05, 2023

multicentre analysis of 14,934 patients reported a 1.7% rate of hypoparathyroidism, permanent palsy of the Recurrent Laryngeal Nerve (RLN) occurred in 1%, superior laryngeal nerve was damaged in 3.7%, dysphagia occurred in 1.4%, hemorrhage in 1.2% and wound infection in 0.3% 5. Randolph's series had a 1% sternotomy rate.6 Resection of the medial one third of the clavicle can also be used to increase the thoracic inlet space.

The decision as to whether to perform a sternotomy depends on various factors, obviously most particularly the amount of the intrathoracic thyroid. Other factors which might predispose to recommending a sternotomy would be known or suspected malignancy [7] (and the malignancy in otherwise appearing multinodular goiters is 5%). Posterior mediastinal goiter [7] with contralateral extension (type 2B), Superior vena cava syndrome, recurrent retrosternal goiter, or isolated Type III mediastinal goitre with no cervical attachment. previous thyroid surgery could be a factor increasing the likelihood of sternotomy, due to the frequent finding of adherences with surrounding tissues [8, 9].

The possible correlation between the presence of malignancy [11] and the need of sternotomy does not appear to be confirmed by our results, since the 6 (4 Papillary carcinomas,2 Follicular Carcinomas) in whom a thyroid carcinoma was found, at histological examination, 5 patients were successfully operated through a cervical incision. Nevertheless, we still consider malignant neoplasms as a high risk of sternotomy procedure due to the chance of extra-thyroidal extension of the tumour and/or the need to perform dissection of mediastinal lymph nodes.

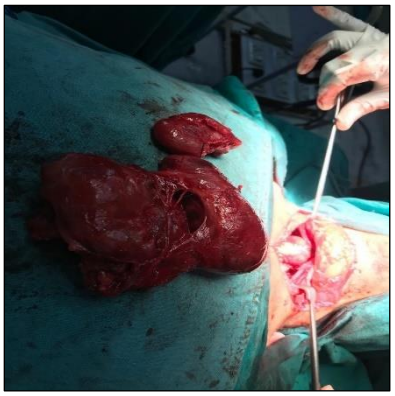


**Image 1**

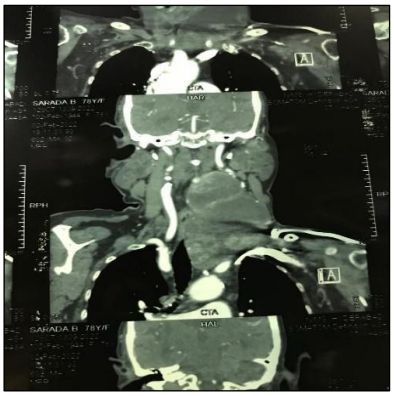


**Image 2**

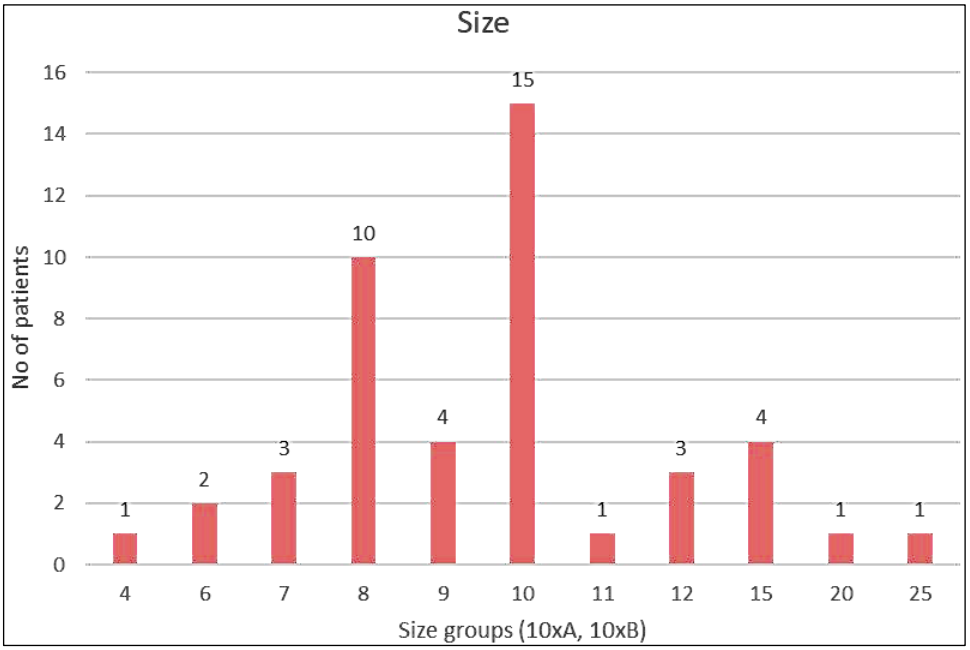
**Image 3**

**Image 4**

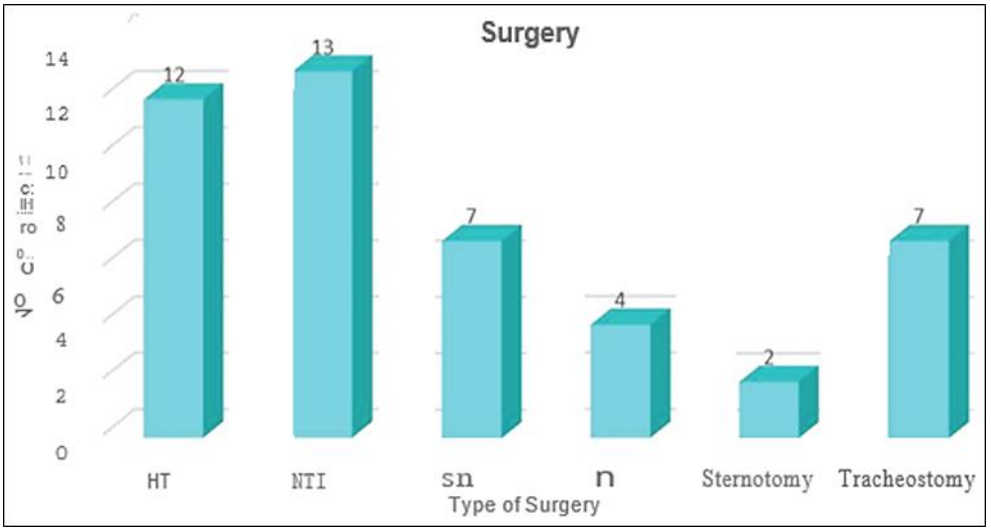
**Image 5**

ISSN:0975 -3583,0976-2833 VOL14, ISSUE 05, 2023

**Graph 1:** Size in CM




**Graph 2:** Type of Surgery: Hemithyroidectomy (HT), Neartotal thyroidectomy (NTT), Subtotal thyroidectomy (STT), Total thyroidectomy (TT)




**Conclusion**

In our experience surgical approach for retrosternal goitre should be determined by type of retrosternal extension (ectopic), and cytomorphology. Trans cervical approach is gold standard in exploring the retrosternal extent of goitre. meticulous digital dissection should be carried out by the experienced surgeon. In cases where goitre extension in to thoracic cavity is bilateral and in malignancies sternotomy should be considered for excellent exposure and reducing complications.

**Conflict of Interest:** None.

**References**

1. Cho HT, Cohen JP, Som ML. Management of substernal and intrathoracic goiters. Otolaryngol Head Neck Surg. 1986;94(3):282-7.
2. Polistena A, Sanguinetti A, Lucchini R, Galasse S, Monacelli M, Avenia S, *et al.*, Surgical approach to mediastinal goiter: An update based on a retrospective cohort study. Int J Surg. 2016;28(1):S42-6.
3. Liu YJ, Qian LX, Liu D, Zhao JF. Ultrasound-guided microwave ablation in the treatment of benign thyroid nodules in 435 patients. Exp Biol Med (Maywood). 2017;242(15):1515-23.
4. Chen AY, Bernet VJ, Carty SE, Davies TF, Ganly I, Inabnet WB, 3rd, *et al.*, American Thyroid Association statement on optimal surgical management of goiter. Thyroid. 2014;24(2):181-9.
5. Rosato L, Avenia N, Bernante P, De Palma M, Gulino G, Nasi PG, *et al.*, Complications of thyroid

ISSN:0975 -3583,0976-2833 VOL14, ISSUE 05, 2023

surgery: Analysis of a multicentric study on 14,934 patients operated on in Italy over 5 years. World J Surg. 2004;28(3):271-6.
6. Randolph GW. Surgery of the Thyroid and Parathyroid Glands. 2nd ed. 2013 Elsevier: 736 Cohen JP. Substernal goiters and sternotomy. Laryngoscope 2009;119:683-8.
7. Mussi A, Ambrogi MC, Iacconi P, Spinelli C, Miccoli P, Angeletti CA. Mediastinal goitres: when the transthoracic approach? Acta Chir Belg. 2000;100:259-63.
8. Erbil Y, Bozbora A, Barbaros U, Ozarmaˇg an S, Azezli A, Molvalilar S. Surgical management of substernal goiters: clinical experience of 170 cases. Surg Today. 2004;34:732-6.
9. Rugiu MG, Piemonte M. Surgical approach to retrosternal goitre: do we still need sternotomy? Acta Otorhinolaryngol Ital. 2009 Dec;29(6):331-8. PMID: 20463839; PMCID: PMC2868211.
10. White ML, Doherty GM, Gauger PG. Evidence-based surgical management of substernal goiter. World J Surg. 2008;32:1285-300.
11. Lin YS, Wu HY, Lee CW, *et al*., Surgical management of substernal goitres at a tertiary referral centre: A retrospective cohort study of 2,104 patients. Int J Surg. 2016;27:46-52.
12. Di Crescenzo V, Vitale M, Valvano L, *et al*., Surgical management of cervico-mediastinal goiters: Our experience and review of the literature. Int J Surg. 2016;28(1):S47-53.
13. Mercante G, Gabrielli E, Pedroni C, *et al*., CT cross-sectional imaging classification system for substernal goiter based on risk factors for an extra-cervical surgical approach Head. Neck. 2011;33(6):792-799.
14. Riffat F, Del Pero MM, Fish B, *et al*., Radiologically predicting when a sternotomy may be required in the management of retrosternal goiters Ann. Otol. Rhinol. Laryngol. 2013;122(1):15-19.
15. Ben Nun A, M Soudack LA. Best Retrosternal thyroid goiter: 15 year's experience Isr. Med. Assoc. J. 2006;8(2):106-109.
16. Donnellan KA, Pitman KT, Cannon CR, *et al*., Intraoperative laryngeal nerve monitoring during thyroidectomy Arch. Otolaryngol. Head. Neck Surg. 2009;135(12):1196-1198.
17. Sanders LE, Rossi RL, Shahian DM, *et al*., Mediastinal goiters: the need for an aggressive approach Arch. Surg. 1992;127:609-613.
18. Netterville JL, Coleman SC, Smith JC, *et al*., Management of substernal goiter Laryngoscope. 1998;108:1611-1617.
19. Hardy RG, Bliss RD, Lennard TJ. Retrosternal goiter: the case for operation in all patients Ann. R. Coll. Surg. Engl. 2009;91:8-9.
20. Landerholm K, Järhult J. Should asymptomatic retrosternal goiter be left untreated? a prospective single-center study Scand. J Surg. 2014;104:92-95.