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Original Research Article

Endoscopic management of retrosternal goitres through cervical approach: a single centre experience

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ABSTRACT

Background: Retrosternal extension of thyroid poses a significant challenge due to its size and high vascularity. The objective of this study was to assess the outcomes of endoscopic approach via cervical approach for retrosternal thyroid removal.
Methods: This was a hospital based retrospective cross-sectional study, conducted among 12 patients of goitres with retrosternal extension who fulfilled the inclusion criteria for endoscopic excision via cervical approach from January 2016 to December 2020. The data was collected using patient record sheet. STATA 15.0 was used to analyse the data.
Results: The median age of the participants was 62 (18.5) years. Approximately 66.7% (N=8) and 33.3% (N=4) of the patient's respectively presented with the complaint of unilateral and bilateral swelling in the neck. The majority of the patients reported due to cosmetic reasons (58.3%), breathlessness (33.3%), hoarseness and dysphagia (8.3%). Among the patients all were euthyroid. There was no incidence of haemorrhage, tracheal and esophageal injury in the patients intraoperatively. Postoperative histopathology showed benign multinodular goiter (41.7%) and colloid formation (58.3%).
Conclusions: The traditional thyroidectomy is widely accepted by the surgeons for retrosternal goitres however the results of our study suggest that the endoscopic technique is minimally invasive and safe procedure that offers excellent cosmetic satisfaction. With the careful selection of cases and surgeon expertise endoscopic thyroidectomy can yield results similar with the traditional approach however, with less complication rates and morbidity.

Keywords: Substernal goiter, Retrosternal thyroid, Thyroid gland, Thyroid nodule, Thyroidectomy, Sternotomy

INTRODUCTION

Retrosternal goiters (or intrathoracic or substernal or mediastinal) are thyroid goiters, that are positioned more than 5O % below the thoracic inlet into the mediastinum. The majority of the substernal thyroid masses remain asymptomatic for years because of slow expansion, due to which they are often diagnosed incidentally on imaging. However, there is a possibility of sudden change either due to haemorrhage, cystic degeneration, malignancy or asphyxiation.[1,2] A blend of clinical history, physical examination, and radiological investigations are required to diagnose substernal goitres.[3] Though there are different treatment options available like suppressive therapy with thyroxine or radioactive iodine ablation therapy, surgery is still considered as the gold standard procedure for retrosternal goitre management. The other treatment options have been reported inefficient in reducing the size of multinodular goitres or generally in large goiters. There have been some incidences where it induces acute inflammation and swelling of the thyroid

gland with potential of airway obstruction.[4] Open surgery is the preferred treatment option as of now, but it is associated with certain risks and aesthetic concerns. The peculiar high vascular supply of the thyroid region puts the surgeons' expertise to test. Further associated pathologies such as malignancy, multinodularity, toxicity, and retrosternal extension complicate this vascular component of surgery, thereby leading to more blood loss and prolonged duration of surgery.[5] Open surgery leads to a noticeable surgical scar, which appears aesthetically unattractive to a patient.[6]

Hence, the focus has shifted to minimise the visible scarring, reducing the length of hospital stay and enhancing patient satisfaction by using latest techniques like endoscopic- and video- assisted thyroidectomy.[7] The approaches of endoscopic thyroidectomy include cervical, anterior chest wall, breast and axillary approaches which tend to cause less scarring; providing better aesthetic results.[8] The small incision length (3 cm) in the cervical approach along with incision line far from the neck as compared to the conventional approach makes it more acceptable to the patients.[9] Despite its benefits, endoscopic thyroidectomy has been considered experimental due to certain limitations like risk of infection, nerve damage, limited 2-D view and rigid instrumentation involvement.[6]

A few systematic reviews have reported various benefits of endoscopic thyroidectomy, not just limited to enhanced cosmetic results or the scar less surgery but better clinical outcomes in terms of absence of keloid formation, less pain, less bleeding, a faster recovery period and high patient satisfaction.[10,11] The endoscopic thyroidectomy procedure discussed in this study has already been published, successfully refined and hence yielded few complications and similar clinical results when compared to the traditional open surgery.[8,16] Traditional thyroid operations are standardised methods for retrosternal extension because of low complication rates, but other approaches that provide better results should be explored not only for the excellent cosmetic results but also for high patient safety. This study was designed to assess the outcomes of the endoscopic excision of the retrosternal thyroid through cervical approach.

METHODS

This hospital based retrospective case series analysed data over the period of five years from January 2016 to December 2020. During this period, all the patients who presented with the chief complaint of unilateral or bilateral swelling of the neck along with any associated symptom like breathlessness, hoarseness or dysphagia formed the study population. The next step was to enrol the patients with retrosternal goitres who could be treated by endoscopic surgery through cervical approach. Physical examination was done to make sure that the swelling was not tender on touch, and it moved on swallowing to rule out any other type of lesion. We included patients with benign growth, those undergoing thyroidectomy for cosmetic reasons and those with symptoms of retrosternal extension viz. dyphagia and breathlessness in this study. The patients with tumour of more than 10 cm size or malignant origin or with a previous history of neck surgery were excluded from the study.

The laboratory investigations like Thyroid Function Tests (TFTs), ultrasonography, CT scan of neck and chest along with Fine Needle Aspiration Cytology were performed pre-operatively to confirm the diagnosis, and plan the surgery. We used hospital records to capture patients' information on socio-demographic markers, chief complaints, history of lesion, past medical history, findings of physical examination, various laboratory investigations, duration of surgery, histological findings, length of hospital stay and post-operative complications. Following the inclusion and exclusion criteria, we are presenting the findings of 12 eligible patients of retrosternal goitre who were treated in our hospital by endoscopic thyroidectomy. The written consent was taken from the participants both for surgery as well as participation in this study. It was assured that patient information will be kept confidential, and findings will be used for research purpose only.

Statistical analysis

All the quantitative data were entered in Excel and manual checks were placed to ensure the data quality. Quantitative analysis was done using STATA 15.0. Continuous variables were reported as median with interquartile range and categorical variables were presented as numbers and their percentages.

RESULTS

The median age of the participants was 62 (18.5) years, ranging from 20-67 years. Majority 58.3% (N=7) were females. In our study, 58% (N=7) of the participants presented to the OPD due to the cosmetic reasons, 33% (N=4) due to breathlessness and 8% (N=1) had a chief complaint of hoarseness of voice, and dysphagia. The median duration of the swelling was found to be 10 years ranging from one to 20 years.

Majority of the patients came with the swelling on the right side (41.7%, N=5) followed by bilateral swelling in 33.3% (N=4) and the remaining 25% with swelling on the left side of the neck. The average size of the lesion was 8.4×5.7×3.8 (±2.0×1.6×1.4) cm. Based on the findings of TFT, all the patients were euthyroid. None of the patients were found to have enlarged lymph nodes or malignancy. All the patients underwent retrosternal thyroidectomy through cervical approach. Depending upon the location of the lesions, we performed eight hemi-thyroidectomies and four total thyroidectomies, in an average duration of 73.7±16.4 minutes.

Table 1: Characteristics of patients (n=12).

Patient characteristics		Attributes	N	%
Clinical features	Age (years)	Median (SD)	62 (18.5)	
	Sex	Male	5	41.7
		Female	7	58.3
	Duration of swelling (years)	Median (SD)	10 (7)	
	Symptoms	Cosmetic	7	58.3
		Breathlessness	4	33.3
		Hoarseness	1	8.4
	Laterality	Bilateral	4	33.3
		Right	5	41.7
		Left	3	25
Intraoperative findings	Duration of surgery (minutes)	Mean (SD)	73.7 (6.4)	
	Blood Loss (ml)	Less than 10	6	50
		≥10- 30	6	50
Post-operative findings	Oral feeding started post operatively	Day 1	12	100
	Change in voice post operatively	Transient hoarseness	2	16.7
		No change	10	83.3
	Histological findings	Colloid nodular	7	58.3
		Multinodular	5	41.7
	Follow up	Seroma	2	16.7
		Hypocalcemia	1	8.3
		Asymptomatic	9	75

There were no intra- or post- operative complications. Two patients developed transient hoarseness after the surgery, and recovered within a month. The final histopathological reports revealed that 58.3% (N=7) had nodular colloid goitre whereas 41.7% (N=5) had benign multinodular goitre. Oral feeding was started from the post-operative day one and the follow up was done with all the patients at regular intervals (one week, 1, 3 and 6 months). The majority of the patients remained asymptomatic (75%) after the surgery. Only 16.7% (N=2) reported to develop seroma, and 8.3% (N=1) patient developed hypocalcaemia. Hypocalcaemia was managed with calcium supplements for 2 months postoperatively.

DISCUSSION

The current study discusses the endoscopic management of retrosternal goitres with the cervical approach in a single centre over the course of five years, and finds that it is comparable to open thyroid surgery which is generally considered as the usual mode of management. Retrosternal goitre is one of the thyroid gland's more uncommon abnormalities. Different research, however, attribute different reasons for the low occurrence. In our study only twelve participants were included over a period of five years. The huge discrepancies in the available definitions of the retrosternal goitre and the lack of a consistent definition are one of the most commonly claimed reasons for the low incidence.[3] It has been discussed that the growth of the lesion is slow and often diagnosed incidentally on radiological imaging. The presenting symptoms in our patients were dyspnea and dysphagia, which were consistent with other studies.[2,3] Hoarseness of the voice and stridor was seen only in 2 patients. All of the patients were euthyroid. Retrosternal goitres are considered as a contraindication for minimal access techniques. They are managed either by open cervical approaches, thoracotomy or sternotomy. There is considerable morbidity associated with thoracotomy. Since the blood supply to the retrosternal goitres does not come from the mediastinum, a lot of these can be managed through cervical incision. Additionally, pretracheal fascia merges with the adventititia of the aortic arch, thereby preventing the goitre from extending beyond the superior mediastinum. The key is not to damage the recurrent laryngeal nerve, which is invariably pushed medially. If the retrosternal goitres are tackled from lateral to medial approach, it does not cause any damage to the nerve. Our study demonstrates the feasibility of performing RSG by minimal access surgery. The limitation is usually the size, but hyperextension of neck helped us reach the lower pole. Majority of the retrosternal goitres are right sided and surgeons are right-handed too which allows the laparoscopic instrument to be used similarly as the finger of the surgeon for blunt dissection.

Current study finding suggests that patients who underwent endoscopic thyroidectomy had minimal blood loss and almost negligible post-operative complications which is in contrast with few studies.[8,14] According to Chong et al the endoscopic thyroidectomy required more time in the operating room and a lengthier stay in the hospital. Although the endoscopic method provides excellent cosmetic outcomes, post-operative pain and persistent chest wall paraesthesia were significantly

higher in those individuals, posing a risk to the patient's recovery.[14] It is important to have careful patient selection and a good technique to avoid intra-operative and post-operative complications. In our study, the average time of endoscopic procedure is 73.7±16.4 mins, which is similar to the average operative time of 98.5±28.97 mins.[8] The average operative time for the conventional thyroidectomy in the same study was 13 minutes longer than the endoscopic thyroidectomy.[15]

Total thyroidectomy was performed in four patients who presented with bilateral goitre and hemi-thyroidectomy was done in the remaining eight patients with unilateral goitre. Recurrent laryngeal nerve injury was also of concern even during the endoscopic procedure, which was successfully avoided in all the patients due to better operative methods and 3D optical system. In our study, only one patient (8.3%) had developed hypocalcaemia, while others had uneventful post operative period. The follow up of all patients were planned at regular intervals i.e., at one week, 1, 3 and 6 months. Patients were also followed up after a year to observe the reoccurrence rates or malignancy in the post-operative cases. Similar post-operative complications were observed in other studies(1, 2). Benign multinodular goitre (41.7%) and colloid goitre (58.3%) was found in final histopathological report. Other studies report similar results and malignant cases too. Our findings are also similar to our previous study.[8]

While endoscopic thyroidectomy is a decade old procedure, numerous institutions are still beginning to perform their first endoscopic thyroidectomy. The study's strength is that it sheds light on the existing standard operative guidelines, which include a well-defined set of inclusion and exclusion criteria. This is probably the first study that looks at the endoscopic thyroidectomy procedure for retrosternal goitres through cervical approach. We have published our data with goitres upto 8 cm in our previous article.[16] This study goes to show an expanded indication of our already published data. The limitation in the present study is the relatively small sample size.

The future research studies can focus to conduct the study on a larger sample size which is needed to define the postoperative results. The study can focus on the classification of the goitre and accordingly plan and document the best treatment plan for patients as various published studies has reported lack of information available for endoscopic thyroidectomy. The other minimally invasive approaches like Robot assisted thyroidectomy have reportedly provided better cosmetic results that can be compared with the endoscopic thyroidectomy.

Based on the results and literature available we recommend that with the continuous improvement in the Endoscopic thyroidectomy techniques and surgeons' growing expertise the Endoscopic thyroidectomy can achieve similar efficacy as the conventional open thyroidectomy. The overall goal of the surgery should always be patient's wellbeing and cosmetic results should lag behind the quality of the intervention.

CONCLUSION

The traditional open thyroidectomy is still the preferred option amongst surgeons for retrosternal goiters due to many reasons. However, as our results suggest, the endoscopic thyroidectomy using cervical approach provides results comparable to the traditional open thyroidectomy. Endoscopic Thyroidectomy offers not only great cosmetic results and enhances the patient satisfaction but also has certain benefits being a minimal invasive surgery like minimal post-operative complications, better quality of life when performed in the patients selected carefully by the trained endoscopic thyroid surgeons.

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