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RESEARCH

Clinicopathological profile, airway management, and postoperative complications in huge goiters: a retrospective analysis of 33 cases

Dev guatrların klinik ve patolojik profili, hava yolu yönetimi ve postoperatif komplikasyonları: 33 olgunun retrospektif analizi

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Abstract

Purpose: The aim of this study was to identify the clinical and pathological features of patients with huge goiters and to investigate the relationship between tumor size, retrosternal extension, and the incidence of postoperative complications.

Materials and Methods: All patients with huge goiters in the 5 years from 2018 to 2023 were reviewed in retrospect. The patients' clinicopathological and demographic details were recorded. Data from computed tomography scans were used to select the study patients. The study covered patients whose thyroid gland size was greater than 10 cm.

Results: The study comprised 33 patients who met the inclusion criteria. Dyspnea was the most frequent symptom of compression (75.7%). Tracheal compression was observed in 15 cases (45.4%). Nineteen patients (57.5%) had retrosternal extension. Two patients experienced permanent recurrent laryngeal nerve paralysis postoperatively, while eleven patients exhibited transient hypocalcemia. No significant differences were found between male and female patients regarding clinicopathological characteristics and complications. Furthermore, there was no evidence indicating that retrosternal extension or increased goiter size elevated the risk of complications.

Conclusion: Surgery remains the most effective way to quickly relieve compression symptoms in patients with huge goiters. Our experience indicates that thyroidectomy via a cervical incision can be safely conducted in nearly all patients with huge goiters, regardless of the presence of retrosternal extension, without elevating the risk of complications.

Keywords: Huge goiter, compression symptoms, retrosternal extension, thyroid surgery

Öz

Amaç: Bu çalışmada, büyük guatrlı hastaların klinik ve patolojik özelliklerini belirlemeyi ve tümör boyutu ve retrosternal yayılım ile postoperatif komplikasyon sıklığı arasındaki ilişkiyi araştırmayı amaçladık.

Gereç ve Yöntem: 2018'den 2023'e kadar olan beş yılda büyük guatrı olan tüm hastalar geriye dönük olarak incelendi. Hastaların klinikopatolojik ve demografik bilgileri kaydedildi. Çalışma katılımcılarını seçmek için başvurudaki bilgisayarlı tomografi taraması bulguları kullanıldı. Çalışmaya tiroid bezi büyüklüğü 10 cm'den büyük olan hastalar dahil edildi.

Bulgular: Çalışmaya kriterleri karşılayan 33 hasta dahil edildi. Dispne en sık kompresyon semptomu (%75,7) idi. On beş olguda (%45,4) trakeal bası gözlendi. On dokuz hastada (%57,5) retrosternal yayılım saptandı. İki hastada ameliyat sonrası kalıcı rekürren laringeal sinir felci yaşanırken, on bir hastada geçici hipokalsemi görüldü. Erkek ve kadın hastalar arasında klinikopatolojik özellikler ve komplikasyonlar açısından anlamlı bir fark bulunmadı. Ayrıca, retrosternal uzanımın veya guatr boyutunun artmasının komplikasyon riskini artırdığına dair bir kanıt yoktu.

Sonuç: Cerrahi, büyük guatrı olan hastalarda kompresyon semptomlarını hızla gidermenin en etkili yolu olmaya devam etmektedir. Deneyimlerimiz, retrosternal uzanım olup olmadığına bakılmaksızın, büyük guatrlı hastaların hemen hemen hepsinde servikal insizyon yoluyla tiroidektominin komplikasyon riskini artırmadan güvenli bir şekilde gerçekleştirilebileceğini göstermektedir.

Anahtar kelimeler: Dev guatr, bası semptomları, retrosternal uzanım, tiroid cerrahisi

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INTRODUCTION

The natural development of goiter is characterized by progressive thyroid enlargement[1]. Although there is no clear definition for a huge goiter, it can be defined as a goiter whose average weight is more than 500 g, whose diameter is more than 10 cm, whose upper border extends to the mandible, whose lower border extends to the sternum or progresses retrosternally, and whose posterior border exceeds the posterior border of the sternocleidomastoid muscle[2]. The enlarged thyroid gland may be asymptomatic or create compression symptoms, which could pose a threat to these structures because of their proximity to important organs[3]. Dyspnea, orthopnea, and dysphagia are common compression symptoms. The primary determinants of the duration and intensity of the compression symptom are the goiter's size and growth velocity. The presence of compression symptoms, particularly respiratory tract-related ones like dyspnea, may point to different levels of respiratory issues both prior to and during surgery[4].

Retrosternal extension of the thyroid gland frequently occurs in huge goiters. The thyroid gland descending to the level beneath the sternal notch when the patient is in the supine position is the definition of this condition. The primary symptoms associated with retrosternal goiter arise from the compression of adjacent anatomical structures. However, patients generally tend to remain asymptomatic until compression affects the more rigid anatomical structures near the thoracic inlet. In asymptomatic individuals, diagnosis is usually made through computed tomography (CT) scans conducted for other purposes. The therapeutic strategy for retrosternal goiter may present unique challenges. The cervical approach is adequate for the majority of cases, while sternotomy is infrequently necessary[5]. The relationship between retrosternal extension and the occurrence of complications is controversial[6].

Surgical treatment is recommended for huge thyroid goiters, especially in cases with compression symptoms and/or retrosternal extension. However, because of the lengthy nature of the disorder and the anatomical alterations in the surrounding area, surgery to treat huge goiters carries some risk[2]. A huge goiter may alter the usual anatomy of the neck, making it more challenging to identify parathyroid glands and recurrent nerves. This increases the likelihood of nearby structures being damaged during surgery. This patient may be more susceptible to consequences including hematoma, permanent recurrent laryngeal nerve (RLN) paralysis, and hypoparathyroidism[7]. However, there is no conclusive evidence demonstrating a correlation between elevated complication rates and huge goiters.

Huge goiters remain among the most challenging clinical conditions for surgeons to manage. The existing literature lacks definitive evidence regarding the malignant potential of huge goiters and their role in the development of complications, as indicated by the limited number of studies conducted on this topic. In this controversial subject, according to the literature, we aimed to determine the clinical and pathological features of patients with giant goiters and to examine the relationship between tumor size, retrosternal extension and the occurrence of postoperative complications in our study, which included a relatively large number of patients.

MATERIALS AND METHODS

Sample

From 2018 to 2023, a retrospective study was conducted on the medical records of all patients diagnosed with goiter at the Department of Otolaryngology, Faculty of Medicine, Cukurova University, a tertiary referral institution. Cukurova University Medical Faculty Hospital is situated in the southern part of Türkiye and has long been recognized as a reference center for managing complex and challenging cases in this region of the country. Every patient involved in the study underwent surgery at this center, and their medical records were retrieved from the hospital archives. The operative procedures of the patients included in the study were performed by the 5th, 6th, and 7th authors, who are highly competent and experienced in thyroid surgery. (MD, OS, SO).

Procedure

In accordance with the Declaration of Helsinki, the study was approved by the Cukurova University Medical Faculty of Medicine Non-Invasive Clinical Research Ethics Committee (Meeting number: 145, Decision number: 52, Date: 14.6.2024). Written informed consent was given by each study participant.

Ultrasonography and computed tomography imaging were evaluated in all patients. The study included patients with a thyroid gland size of 10 cm or bigger. Patients under 18 years of age, those with a prior history of thyroid surgery, and individuals who had radiation or radioactive iodine treatment for any reason were excluded from the study. The study assessed the first operation results of patients with multiple medical records due to recurrent surgeries.

A total of 237 patient records related to goiter treatment were examined over a five-year duration. One hundred ninety-four patients were excluded from the study because their goiter size was less than 10 cm. In addition, 5 patients were excluded because they had previously undergone thyroid surgery, 2 patients because they had received neck radiotherapy, and 3 patients because they had received radioactive iodine ablation treatment. A total of 33 patients who met the criteria were included in the study.

Clinicopathological features, such as age, gender, history, symptoms, type of procedure, and pathological diagnosis, were examined in the patient charts. At the time of admission, all patients had their serum calcium levels and thyroid stimulating hormone (TSH) tested. Postoperative calcium levels were recorded for all patients who underwent surgery. All patients underwent vocal cord evaluation before and after surgery.

Every patient underwent a comprehensive examination of the head and neck, thyroid ultrasonography, and mediastinum and neck CT scans (Figure 1). Computer tomography was used to assess the size of the thyroid gland as well as retrosternal extension, tracheal compression, and extension into the aortic arch. Post-operative complications recorded in patients who had surgery included unilateral or bilateral recurrent laryngeal nerve paralysis, transient or chronic hypoparathyroidism, hemorrhage, and wound infections.

Operative procedure

A lower collar incision is made along the skin fold. Following the excision of the skin and subcutaneous adipose tissue, the skin flaps are lifted laterally. Strap muscles are separated along the midline. Especially in cases where the thyroid size is very large, the strap muscles can be cut and stitched at the end of the operation to obtain a better exposure. After the upper and middle thyroid vessels are closely ligated to the thyroid capsule, the upper pole is mobilized. The superior parathyroid gland is identified and preserved. The RLN is identified in Simon's triangle and separated from the thyroid tissue by following its course with blunt dissection. The retrosternal portion of the thyroid gland is mobilized with blunt finger dissection and removed via cervical manipulation. The tumor is gradually removed from the mediastinum, and the lower vascular structures are ligated. The lower parathyroid glands are preserved as much as possible. Because of the proximity of the part of the thyroid gland attached to the trachea via the berry ligament to the nerve, sharp dissection was performed when necessary. After complete removal of the thyroid gland, the wound was irrigated, suction drains were placed, and the incision was sutured.

Figure 1. Computer tomography image of a massive thyroid nodule in the neck that is exerting significant compression on the trachea and has shifted the carotid communis laterally.

Statistical analysis

The normality of distribution for continuous variables was confirmed with the Shapiro-Wilk test. Categorical variables were expressed as numbers and percentages, whereas continuous variables were summarized as mean and standard deviation and median and minimum-maximum. A chi-square test was used to compare categorical variables between groups. For comparison of continuous variables between groups, the Student's t-test or Mann-Whitney U test was used depending on whether the statistical hypotheses were fulfilled or not.

RESULTS

The study enrolled 33 patients diagnosed with huge goiter, encompassing both benign and malignant

thyroid disorders, during the period from 2018 to 2023. Thirty of these patients underwent thyroid surgery, while three cases were deemed unsuitable for such procedures. Patients comprised the median age group of 56.0 years (range: 21-88 years). Eleven (36.7%) of the operated-up patients were male, while nineteen (63.3%) were female. No significant differences were found between male and female patients regarding age, goiter size, retrosternal extension, tracheal compression, preoperative RLN paralysis, newly developed postoperative RLN paralysis, postoperative transient hypocalcemia, and postoperative histopathological results (Table 1).

Table 1. Comparison of demographic and clinicopathological features between male and female patients

	Gender		p
	Male (n=11)	**Female (n=19)**	
Age(year)	50.0±15.2 55.0(14.0-67.0)	52.8±14.7 56.0(21.0-77.0)	0.617*
Size(cm)	11.7±1.8 11.0(10.0-15.0)	11.8±1.8 12.0(9.0-14.0)	0.966#
Retrosternal extension, n(%)	7(63.6)	9(47.7)	0.631α
Tracheal compression and deviation, n(%)	6(54.5)	7(36.8)	0.454α
Pre-operative RLN paralysis, n(%)	1(9.1)	1(5.3)	>0.999α
Newly developed RLN paralysis, n(%)	1(10.0)	1(5.3)	>0.999α
Transient hypocalcemia, n(%)	4(36.4)	7(36.8)	>0.999α
Histopathology result, n(%) Benign Malign	 8(72.7) 3(27.3)	 15(78.9) 4(21.1)	>0.999α

Unless otherwise specified data was expressed as mean±standard deviation, median(min-max).
* Student's t-test, #Mann-Whitney U test, αChi-square test
RLN, recurrent laryngeal nerve

The initial symptoms are outlined in Table 2. Each patient presented with euthyroidism. The calcium levels in the serum were normal. A CT evaluation revealed the presence of retrosternal goiter in nineteen patients (57.5%). It was present in sixteen of the patients who underwent thyroid surgery. In two cases of retrosternal goiter (6.1%), we observed the lower pole of the tumor extending beyond the aortic arch (Figure 2). Due to a huge goiter, fifteen patients (45.4%) experienced tracheal compression (Figure 3a, 3b). It was present in thirteen of the patients who underwent thyroid surgery. Just one patient had tracheomalacia. Upon palpating this patient's soft and floppy trachea after the anesthetist carefully removed the endotracheal tube following the thyroidectomy, a tracheotomy was performed.

Table 2. The manifestation of clinical symptoms

	Patients (*n*)	**Clinical symptoms**	**Patients (*n*)**
Symptomatic	32 (97%)	Dyspnea	25 (75.7%)
		Neck swelling	24 (72.7%)
		Dysphagia	12 (36.3%)
		Hoarseness	6 (18.2%)
		Sore throat	6 (18.2%)
Asymptomatic	1 (3%)		

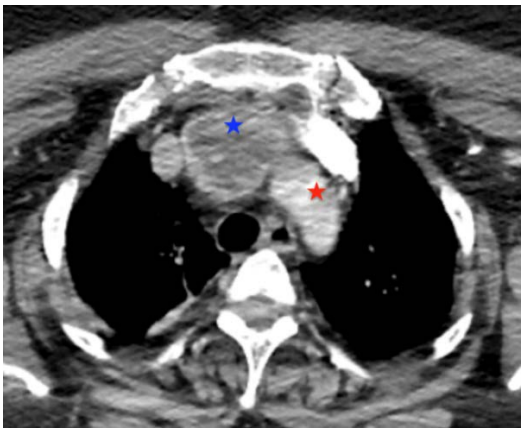

Figure 2. Huge goiter with significant retrosternal extension, advanced to the arcus aorta (axial plane CT image). Red star: aortic arch; blue star: thyroid gland.

A total thyroidectomy was performed on 22 patients, while thyroid lobectomy was deemed sufficient in eight cases. Two patients underwent a sternotomy due to substantial retrosternal extension. Thyroidectomy was not performed in three patients: one with Riedel thyroiditis (Figure 3a), one with thyroid-derived leiomyosarcoma, and one with thyroid anaplastic carcinoma (Figure 3b). These undiagnosed patients presented to our clinic complaining of severe dyspnea and a tremendous goiter. The respiratory tracts of these patients were secured through tracheotomy and incisional biopsy. Table 3 summarizes the incisional biopsy results of these three patients, along with the histopathology results of all patients.

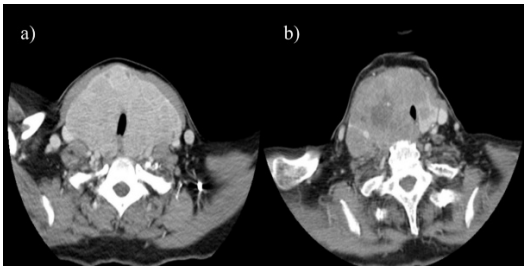

Figure 3. Axial CT scans of patients with huge goiter. a) Riedel's thyroiditis compressing the trachea; b) Anaplastic thyroid carcinoma causing tracheal compression.

Table 3. Histopathology results of all patients

Pathology		**Patients (*n*)**	**Percentage**
Benign	Nodular colloidal hyperplasia	18	54.5
	Follicular adenoma	5	15.1
	Riedel thyroiditis	1	3
Malignant	Papillary carcinoma	6	18.2
	Medullary carcinoma	1	3
	Anaplastic carcinoma	1	3
	Thyroid leiomyosarcoma	1	3

One patient exhibited bilateral RLN paralysis, and one patient displayed unilateral RLN paralysis during the preoperative examination of the vocal cords. Postoperatively, unilateral RLN paralysis developed in another two patients. Signs of transient hypocalcemia were observed in 11 patients. There were no cases of permanent hypocalcemia reported among the patients. One of our patients had a hematoma early in the postoperative period. Subsequently, the hematoma was evacuated.

The median value of goiter size of the patients included in the study was 11.1 cm. In our analysis of goiter size, we made a distinction between below and above this value. There was no significant difference between groups with goiter sizes below 11.1 cm and above 11.1 cm in terms of RLN paralysis and transient hypocalcemia (Table 4). There was no significant difference in the development of RLN paralysis and transient hypocalcemia between the groups with and without retrosternal extension (Table 5). No significant relationship was found between goiter size, retrosternal extension, and histopathologic results (Tables 4-5).

Table 4. Comparison of complications and histopathology results among patients according to goiter size

	Goiter size		p
	<11.1 (n=15)	≥11.1 (n=15)	
Newly developed RLN paralysis, n(%)	1(7.1)	1(6.7)	>0.999[α]
Transient hypocalcemia, n(%)	6(40.0)	5(33.3)	0.705[α]
Histopathology result, n(%)			>0.999[α]
Benign	11(73.3)	12(80.0)	
Malign	4(26.7)	3(20.0)	

Unless otherwise specified data was expressed as mean±standard deviation, median(min-max).
[α]Chi-square test ; RLN, recurrent laryngeal nerve

Table 5. Comparison of complications and histopathology results between patients with and without retrosternal extension

	Retrosternal extension		p
	No (n=14)	Yes (n=16)	
Newly developed RLN paralysis, n(%)	-	2(13.3)	0.483[α]
Transient hypocalcemia, n(%)	5(35.7)	6(37.5)	>0.999[α]
Histopathology result, n(%)			>0.999[α]
Benign	11(78.6)	12(75.0)	
Malign	3(21.4)	4(25.0)	

Unless otherwise specified data was expressed as mean±standard deviation, median(min-max).
[α]Chi-square test; RLN, recurrent laryngeal nerve

DISCUSSION

Thyroid nodules detected with the assistance of advanced imaging techniques have become more common in recent years. Thanks to the early detection of these nodules, 50% of them are less than 2 cm in diameter at diagnosis[2]. Huge thyroid gland nodules have become less common overall, particularly those that are more than 10 cm in diameter. Even though they are less prevalent now, surgeons have long been concerned about huge goiters because they could compress adjacent vital structures, particularly the airway. Challenges in the surgery of these patients include changes in cervical architecture that make it difficult to identify and preserve critical structures such as the parathyroid glands and recurrent laryngeal nerves.

Patients manifest an increase in symptoms as the size of the goiter increases[8]. Patients might demonstrate either asymptomatic or clinical signs that could lead to serious respiratory failure[9]. Up to compression on the more rigid anatomical components at the thoracic inlet, patients usually show no symptoms. Two studies on individuals with substernal huge goiter revealed frequencies of asymptomatic patients of 8 and 34%[5,6]. Just one patient (3%), in our series, was asymptomatic. The reasons behind this variation could be distinct local conditions and thyroid nodule growth patterns in the areas where the research was carried out.

The most often reported symptoms of a huge goiter include cough, dysphagia, dyspnea, orthopnea, and globus feeling. In a research study, most instances (77-90%) had a palpable neck mass[10]. In our investigation, the rate was 72.7% as well. Airway compression is another of the most typical compression symptoms; it can be severe and result in sudden respiratory failure or even death[11]. In a 22-year patient series, 57.5% of substernal massive goiter cases were found to have complaints of dyspnea[5]. Rios et al.'s study[12] revealed a tracheal compression rate of 55%, whereas another investigation reported that respiratory tract compression was present in 62.2% of the patients. Unlike previous studies in the literature, Agarwal et al. found a significant incidence of tracheomalacia (35.6%) after thyroidectomy in patients with long-standing large goiter[4,3,13]. In the same study, no emergency airway intervention was required except for one patient. Tracheal compression was observed in 45.4% of the individuals in our study. Out of the group, only one individual experienced tracheomalacia, which led to the performing of a tracheotomy immediately following a thyroidectomy. In our experience, the

occurrence of tracheomalacia caused by goiter is infrequent, in contrast to the aforementioned study. Nevertheless, three individuals presented to us with acute respiratory distress and underwent emergency tracheotomy procedures. Patients diagnosed with anaplastic carcinoma, thyroid leiomyosarcoma, and Riedel's thyroiditis comprised this group. Surgery was not appropriate for patients with anaplastic carcinoma and leiomyosarcoma. Consequently, the possibility of performing an emergency thyroidectomy for decompression was not considered. A tracheotomy was performed, followed by a biopsy to obtain tissue samples for histological investigation. There was no evidence of invasion into the tracheal lumen in these patients. The respiratory difficulty was caused by compression.

Patients who have huge goiters are more likely to experience challenging intubation because of the obstruction they cause in the airway. Furthermore, the presence of increased thyroid tissue located on the anterior of the trachea has made it challenging to access the trachea. Resection of thyroid tissue is frequently required. Executing this treatment in urgent circumstances necessitates a high level of surgical expertise. Riedel's thyroiditis cases can have a typical resemblance to anaplastic cancer. Despite being a benign disease, one should be aware that it has the potential to cause serious tracheal compression and necessitate urgent airway intervention.

The preferred treatment for giant goiter is surgery. Nevertheless, how to manage asymptomatic cases is still debated in the literature[14]. Surgical intervention is thought to mitigate the problems when compression signs are evident. However, surgery is frequently not feasible in cases of aggressive disease characterized by invasion into adjacent tissues, as is the case with anaplastic thyroid carcinoma. Additionally, when diffuse benign disease is the cause, as in the case of Riedel's thyroiditis, surgery is not the initial course of action.

Retrosternal extension is a possible consequence of huge goiters. The 57.5% retrosternal extension rate in our series is consistent with previous studies on patients with huge goiters[3,4].

A total thyroidectomy is deemed the suitable surgical procedure for this patient population. But some researchers claim that the thyroid gland's retrosternal extension is more typically unilateral and believe that, given the reduced risk of complications, lobectomy could be a viable alternative[15]. However, the risk of surgical morbidity will be much higher in cases requiring revision surgery due to retrosternal extension. As a result, efforts should be made to achieve maximum resection during the initial surgery in order to reduce the need for revision. We recommend total thyroidectomy as a safe and effective treatment in cases with retrosternal extension. Sixteen of the nineteen cases in our series with retrosternal extension were suitable for surgery. Out of these, fifteen had total thyroidectomy. Nevertheless, lobectomy should be thought of in patients whose contralateral lobe is essentially normal but they have no signal from the unilateral recurrent laryngeal nerve intraoperatively to prevent bilateral vocal cord paralysis.

A cervical approach can remove most huge goiters with retrosternal extension by retracting the thyroid tissue from the mediastinum to the neck. In a small percentage of cases, sternotomy is required. Several studies have looked at predictive criteria for the necessity of sternotomies. Preoperative indications for sternotomy include primary intrathoracic goiter, involvement of the posterior mediastinum, revision surgery, and presence of invasive cancer[9,10,16,17]. However, even within these indications, total resection may be possible in some cases with only a cervical approach. Although definitive markers for the indication of sternotomy are not available, the most important predictive factors appear to be the absence of a clear tissue plan around the gland within the mediastinum and failure to separate with the finger dissection from surrounding tissues. In our series, the neck approach is used to initiate the procedure in cases of retrosternal extension; intraoperatively, the decision to perform a sternotomy is taken in situations when the thyroid gland cannot be removed or when bleeding is uncontrollably severe. Two of the patients in our study needed sternotomies. First among these was a case of papillary cancer. The tumor's adhesion to the mediastinum's tissues prevented the cervical approach from dissecting it effectively. The other case was a medullary thyroid carcinoma located in the posterior mediastinum. The sternotomy procedure was chosen because of the great risk of vascular damage.

Thyroid surgery is conducted in a setting characterized by complex anatomy and sensitive structures. Injury to these sensitive structures leads to three primary complications: hypoparathyroidism,

postoperative hemorrhage, and RLN paralysis[18]. The reported incidence of permanent RLN injury ranges from 0% to 5.3%[8,19-22]. In our series, the incidence of permanent RLN paralysis secondary to the operation was 6.6%. This rate appears to be somewhat elevated in comparison to other studies in the literature; however, it is not considered significant. The RLN and parathyroid glands may be at high risk of injury during the surgery for huge goiters. The incidence of RLN paralysis might have risen due to the fact that our case series comprised solely patients with huge goiters and/or the number of cases was relatively limited.

A comprehensive research study comprising a substantial patient cohort has demonstrated a significant association between retrosternal extension goiter surgery and an increased incidence of hypoparathyroidism and RLN palsy[23]. Chen et al.[8] conducted a study on postoperative complications associated with massive multinodular goiter, measuring the weights of thyroid specimens removed during surgery, with specimens exceeding 250 g classified as massive goiter. The comparison with the cohort weighing under 250 g demonstrated a significant increase in the incidence of transient hypocalcemia and transient RLN paralysis in cases of massive goiters. Nonetheless, there was no significant increase in permanent hypocalcemia or permanent recurrent laryngeal nerve paralysis. In our study, we did not categorize by weight but rather by median goiter size.

A multicenter study involving a large patient cohort compared goiter cases with and without retrosternal extension regarding the incidence of postoperative recurrent laryngeal nerve paralysis. The incidence of both temporary and permanent RLN paralysis was significantly higher in the retrosternal extension group[24]. In contrast, Raffaelli et al. suggest that surgical intervention can be performed in cases with retrosternal extension without increasing the risk of postoperative complications[16]. Our study revealed that there were no significant differences in RLN paralysis and transient hypocalcemia between the groups with and without retrosternal extension (Table 5). The presence of massive goiters might disrupt the normal interaction between the tracheoesophageal groove and the RLN. Despite the challenge of identifying nerves in this situation, it

can be overcome by performing meticulous dissection, understanding the RLN's association with Simon's triangle, the inferior thyroid artery, the superior parathyroid gland, and the cricothyroid joint, and using regular nerve monitoring. Our experience indicates that thyroidectomy is generally safe when performed via a cervical incision in the majority of patients with retrosternal goiter.

Transient hypoparathyroidism has minimal impact on quality of life; however, permanent hypoparathyroidism is a significant and severe consequence. In different studies, the incidence of transient hypocalcemia ranges from 6.9% to 46%, while rates of permanent hypoparathyroidism range from 0.4% to 33%[25,26]. Out of all the instances in our collection, while 36.6% experienced transient hypoparathyroidism, none of the patients developed permanent hypoparathyroidism. The rate of hypoparathyroidism in our series was not significantly different compared to other series in the literature[27,28]. While permanent hypoparathyroidism is a relatively uncommon consequence, it is crucial to implement certain technical measures to minimize its occurrence, given its significant impact on quality of life. The technical steps may include precisely and delicately dissecting the parathyroids, as well as removing and transplanting glands that exhibit substantial color changes when separated from the thyroid capsule.

This research presents multiple limitations. The study was conducted retrospectively. Since the study was conducted in a single tertiary care center, the findings are limited in their applicability to the general community. Patient selection and follow-up issues may have introduced bias into the results. The sample size of 33 patients may be inadequate to encompass all complications observed in thyroid surgeries.

While huge thyroid goiters are uncommon, a considerable proportion of affected individuals have symptoms of compression. The most frequent finding in patients with compression symptoms is airway involvement. In these patients, the most effective treatment for quick relief from compression symptoms is still surgery. In huge goiter surgery, evidence does not support that the size of the goiter or the presence of retrosternal extension elevates the risk of recurrent laryngeal nerve paralysis or transient hypocalcemia. With an experienced surgical team, meticulous dissection, accurate identification of anatomical landmarks and regular nerve monitoring, these cases can be successfully treated without morbidity. Nevertheless, the results from our study are preliminary, necessitating larger prospective

studies with a control group to further investigate this extensive topic.

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