

# Assessing The Impact of Giant Goiter on Intra-operative and Post-Operative Complications

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**Keywords:** Giant goiter; Normal goiter; Surgical complications; South Asian population; Comparative study

## Abstract

**Objective:** This case-control study aimed to compare surgical complexities and postoperative outcomes between giant goiters and normal goiters in a South Asian population. The primary goal was to classify and quantify complications based on size, focusing on variables like operative time and postoperative complications. **Study Design:** Conducted at Jinnah Post Graduate Medical Centre, Karachi, over six months, from June 2022 to March 2023. Ethical approval was obtained, and the study involved 30 diagnosed giant goiter patients and 30 cases of normal goiters as controls.

**Place and Duration of Study:** Jinnah Post Graduate Medical Centre, Karachi, within a twelve-month period from June 2022 to March 2023. **Materials and Methods:** Patients of all ages undergoing goiter surgery were included, with non-giant goiters as controls. Data collection used non-probability

consecutive sampling. Surgeons performed preoperative workup, and intra/postoperative variables were analyzed using SPSS version 25.0.

**Results:** Detailed findings included giant goiters presenting with a mean length of over 15cm, female dominance in both groups, and a higher mean age in giant goiters. Surgical indications were mainly compressive symptoms, with prevalent dyspnea. Few giant goiter cases had permanent hoarseness and transient hypocalcemia. Operative time, ICU stay, and hospital stay were notably higher in giant goiter cases. **Conclusion:** This study, unique in its South Asian focus, highlights the surgical intricacies of giant goiters. Findings underscore a scarcity of literature and provide a foundation for future comparative studies, potentially guiding specific management guidelines

## **INTRODUCTION:**

Goiter is enlargement of the thyroid gland that may increase from about 20 grams to hundreds of grams in human adults. Goiter may be congenital or acquired, sporadic or endemic.[1] Goiter can cause a variety of symptoms for a patient ranging from being an asymptomatic neck swelling to the features of advance malignancy, including dysphagia, distant metastasis and voice changes. Giant goiters, previously defined in literature as thyroid swellings with a diameter of greater than 10 cm or a weight of more than 10gm of thyroid per body weight in kg, are associated with more intra and post operative complications, especially in low volume setups.[2]

Thyroid surgery, specifically for the treatment of giant thyroid gland enlargements, poses a significant risk of complications due to the prolonged duration of the disease and resulting changes to surrounding anatomical structures. As a result, the incidence of intra- and postoperative complications is likely to be higher compared to cases involving normal thyroid nodules. Thyroidectomy, the surgical removal of the thyroid gland, is a common procedure for patients with giant thyroid gland tumors, especially those diagnosed with thyroid cancer.[3] Some of the complications that are associated include high risk of nerve injury, accidental removal of parathyroid gland and post operative hypocalcemia and tracheal complications.[4]

There have been numerous case reports and case studies outlining the difficulties in managing surgical complications of giant goiters.[5] One of the largest studies done was a retrospective cohort done which was done on intraoperative and post operative complications following giant goiter surgery.[4] Apart from that, there is a scarcity of studies, especially comparative ones regarding giant goiter. There have been no studies done in Pakistan regarding giant goiters. Keeping the lack of literature and the important

relationships of the thyroid gland which may be challenging to the inexperienced surgeon, we seek to find out the rate of complications between giant and other types of goiters. Majority of cases reported as giant goiter are as case reports. [6,7,8,9,10,11,12]. Notable focus is drawn to airway difficulties as a result of the goiter size as well as syncope. [11,12,13,14,15,16,17,18,19, 20, 21,22]

This study was done to classify and quantify the rate of complications between different sizes of goiter based on dimension and weight. We also aim to compare operative time and other intraoperative challenges. In this study, we present our experience with several complications of surgical treatment of giant thyroid gland tumors to increase the awareness and aid the prevention of these complications.

The aim of our study was to evaluate sizes of goiter, and it's impact on intra and post-operative complications. Goiter is a common problem reported every day at outpatient department of our tertiary care center, based mostly on history and physical examination. The main symptom in all cases is neck swelling. These patients are managed surgically if needed, and the type of intervention can vary depending upon multiple factors. However, after the intervention, its effects may be long-lived and can affect patients' quality of living. For the above-said reason, a correlation between size of goiter and its post-surgical complications was assessed and how it impacted in the perioperative and immediate post-operative period.

## **Materials and Methods**

This case-control study was conducted in the General Surgery wards surgery of Jinnah Post Graduate Medical Centre, Karachi. The duration of the study was twelve months from June 2022 to March 2023. Ethical approval was obtained. For the study, a total of approximately 30 diagnosed

giant goiter patients were enrolled of all ages for both genders and 30 cases of non-giant goiter were taken as the control group. These patient with non-giant goiter will be referred as normal goiter. Non-probability consecutive sampling techniques were used to collect the data.

Patients of all ages with who underwent surgery for goiter were included in the study, however, those who have any underlying immunodeficiency syndrome were excluded from the study. Further, for the analysis, the history, examination findings, and other questions regarding the onset of symptoms and the prognosis of the disease were sought from the patients to support our present study.

All patients went preoperative workup including ultrasound of neck, thyroid function tests indirect laryngoscopy and CT scan of neck in case of retrosternal extension and giant goiters. All cases were operated by surgeons experienced in thyroid surgery. Intra and post-operative variable data was collected including operative time, blood loss, length of stay, and post-operative complications. All incisions were centered 2-3 cm above the sternal notch. Recurrent laryngeal nerve and at least two parathyroid glands were identified in all cases. Redivac drains were placed in the subcutaneous plane. Patients were monitored in either the ICU or ward depending on if they were extubated or not as per anesthesia team.

For statistical analysis, data was analyzed using SPSS version 25.0. Quantitative variables are presented as percentages and frequencies in the tables. We obtained informed consent from all participants, and ensured protection of their privacy and confidentiality. We designed the study to ensure equity and fairness for all participants.

## RESULTS

We found out that Giant Goiter research provides a detailed overview of 30 cases of Giant Goiter and that 30 cases of normal goiter, including pre- and

postoperative details, examination findings, and patient outcomes.

The proforma for our research included patient details such as name, age, gender, and ethnicity. The chief complaints of the patients of giant goiter reported was swelling for an average of approx. 10 years, and those with normal goiter reported on average approx. 2 years of swelling. The patient population with giant goiter reported with a 16.7% comorbidity of diabetes mellitus while the normal goiter had 13.3% cases that had diabetes Mellitus. The comorbidity of hypertension was also often found more in the giant goiter group.

In normal goiter cases, fine needle aspiration cytology (FNAC) was not done and in patients. Those with giant goiter had FNAC was done in 23.3% cases and they were reported as BETHESDA

2. Amongst the giant goiter group, hyperthyroid symptoms were present in 13.3% of the cases, and 46.7% had subclinical hyperthyroidism. While in the normal goiter group only 10% hyperthyroid symptoms were found. Obstructive symptoms were present in 63.3% of the cases of giant goiter, with dyspnea being the most common symptom. There were no such obstructive symptoms reported amongst those with normal goiter.

All cases of hyperthyroidism were treated with carbimazole 5 to 10mg thrice daily and propranolol 10mg thrice daily. In patients with giant goiter, the examination findings included nodular swelling with a length of more than 15 CM and amongst normal goiter the swelling was of more than 10cm on average.

T3, T4, and TSH levels were normal, and 46.7% of the cases that reported subclinical hyperthyroidism had a lower TSH than normal TSH. Calcium levels were 9.1, and ultrasound findings were coherent with the examination. CT findings showed multinodular goiter of more than 15 CM with a compressive effect on the trachea

and surrounding vessels in both groups. This size and compression effects were the indications for surgery amongst giant goiter group while normal goiter was usually operated due to size and not due to compressive symptoms.

Among intra operative variables, the estimated blood loss in the normal goiter group was 102ml while an average value of 185 ml was reported amongst giant goiter patients. The duration of surgery was also 3 hours 18 minutes on average for normal goiter patients while those with giant goiter had approx. 5 hours 24 minutes duration of surgery.

The nerves that were identified and saved during these surgeries included right recurrent laryngeal nerve, right superior laryngeal never, left recurrent laryngeal nerve and left superior laryngeal nerve. In all cases bilateral recurrent laryngeal nerve was identified and saved. In 10% of cases both superior laryngeal nerve were not saved.

In all thyroidectomies irrespective of normal or giant goiter -at least 2 parathyroid glands were identified and saved. In 40% cases ,3 of the parathyroid glands was saved. The stratified analysis of both groups showed same observations.

The postoperative course of the patients included calcium supplementation, hours on ventilatory support, and hospital stay.

Within the patient group with giant goiter, calcium supplementation was needed in 16 cases, and the hours on ventilatory support were on average between 17 hours for 25% of the cases. The mean hospital stay was 3.3 days. Drain output 1 was 123ml, and drain output 2 was 127ml. The discharge medication included antibiotics, analgesics, and calcium supplements in 6 cases. The histopathology of the cases was benign nodular hyperplasia.

However, in the patient group with normal goiter, calcium supplementation was needed in 6 cases, but no need of ventilatory support was there. The mean hospital stay was 2.1 days. Drain output 1 was 34ML, and drain output 2 was 27ML. The discharge medication shared same response as the other group. Although the histopathology of the cases was benign nodular hyperplasia, in 5 cases of giant goiter, we saw diagnosis of papillary cancer on final histopathology.

The average weight of specimen on biopsy was 385g with a length of 12 cm in those with a normal goiter. While those with giant goiter had average of 767g weight of biopsy, with a length of 18 cm. The follow-up schedule included the 3 post operative follow ups. There were no complications in the group with normal goiter. Those with giant goiter reported complications which included 5 cases of seroma, 1 case re-explored due to bleeding from strap muscle vein, 2 cases of hoarseness, and 6 cases of transient hypocalcemia were found. Voice changes were present in 2 cases with subsequent examination confirming unilateral vocal cord paralysis. In both groups, calcium levels were normal, and long-term supplementation was not needed.

Variables	Giant Goitre	Normal Goiter
Average Swelling duration(in Years)	10	2
Hypertension(%)	33.3	16.7
Ventilator support required(%)	50	0
Subclinical Hyperthyroid(%)	46.7	0
Estimated blood loss(ml)	185	102
Duration(hours)	5	3
Ventilator support required(%)	23.3	0
Hospital Stay(days)	3.3	2.1
Complication reported(%)	46.7	0

Pre-operative variables	Giant Goiter	Non-Giant Goiter
ASA score frequency(%)		
Grade 1	62	84
Grade 2	22	4
Grade 3	16	12
Malampati Score frequency(%)		
Class 1	88	100
Class 2	12	0

in our study giant goiters were found to present later, with a mean presentation of more than 15cm in length on examining the neck swelling in the giant goiter group. We noticed a female dominance in both groups which correlates with other similar studies (4). The giant goiter group was older with a mean age of 56.1 years old. It is likely that this contributed to this group having higher percentage of patients with co-morbid.

In our setting, we rarely go for fine needle aspiration cytology as part of pre-operative workup, FNAC was not done in the comparison group, and approximately 23.3% of patients in the giant goiter group had FNAC done and all were reported to be Bethesda 2. No evidence of malignancy was found in the control group. There were 5 cases of papillary carcinoma diagnosed on final histopathology in the giant goiter group.

Our mean weight of resected gland was 767g in the giant goiter group and 385 in the control group. Our mean weight was higher than a study comparing

weight of goiter on compressive symptoms. This could be due to the study quoted considering all cases of goiter whereas our study focused more on giant goiters.[23]

The most common indication of surgery in our study was due to compressive symptoms in the giant goiter group with 63.3% of cases in our study reporting dyspnea as the main symptom. This is more than the number quoted by another study in which 41.4% had obstructive dyspnea.[23]

Mean ICU stay was higher in the giant goiter group, this was due to concerns regarding early extubation by the anesthesia team due to concerns about tracheomalacia and bleeding. However, no cases of tracheomalacia were noted. Patients in the giant goiter were kept on post operative ventilator for 17 hours and extubated successfully in all cases. Length of stay was significantly more in the giant goiter group. 23.3% of patients in giant goiter group had difficult intubation as compared to 13.3% of patients having intubation complications in another study.[23].

In all our cases the Recurrent Laryngeal Nerve was identified bilaterally. External laryngeal nerve was identified in 80% of cases. 2 cases in the giant goiter group had permanent hoarseness with subsequent indirect laryngoscopy confirming one sided vocal paralysis. This is comparable to 2.9% of patients having vocal cord paralysis in a similar study, and two patients in another study. (4,24)

We identified at least two parathyroid in all cases, with some cases up to three. Transient hypocalcemia was 16.8% in one study whereas in our case it was 20% in the giant goiter group. (4) No cases of permanent hypocalcemia were reported in our study. All patients in our study were discharged with oral analgesic, antibiotics and calcium supplement. Operative time was significantly more in the giant goiter group with a mean of 198 minutes compared to another study it was 126.3 minutes in non-giant goiter total thyroidectomies.

Mean drain output was 250 ml in giant group compared to 61ml in the control group. This is more than another study which reported 45.8ml at 48 hours. [25]

## CONCLUSION

There isn't a specific study that describes these variables regarding giant goiter from South Asian population. There is scarcity of literature regarding giant goiter. The difference in both groups helps set up a framework of reporting more comparative studies regarding giant goiter and normal goiter so that giant goiter can be better understood, and specific guidelines can be established if needed.

## Acknowledgements

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**Conflict of Interest** There is no conflict of interest.

**Limitation:** Our study data was collected on patients who were operated, and not all patients of goiter as some patients may wish not to get

operated on. Further study is required to establish the prevalence of giant goiter and factors contributing to its delayed presentation.

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