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Giant benign multinodular goiter with significant tracheal outline distortion, rare case report

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Case Report

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Abstract

Background

Giant goitre is a rare occurrence and is defined by an enlargement of the thyroid gland of at least 10 g/kg body weight or goiter weighing more than 500 grams or a thyroid tumour larger than 10 cm in diameter.

Case presentation

A 65 years old female patient who presented with anterior neck swelling with progressive size increment of about 30 years duration. She developed hot intolerance, palpitation and slight voice change for about 3 years. She has no remarkable medical, surgical history. On examination, she was tachycardic and had about 32*22cm very huge anterior neck swelling with visible multiple nodules grown more anterior to the sternum. On investigation, she had low TSH and high free T3 levels. Neck ultrasound shown multinodular thyroid enlargement with cystic and calcified components. Fine needle aspiration cytology was suggestive of benign colloid goiter. Lateral neck x ray shown significant anteriorly pulled trachea. She was put on antithyroid medication for about 3 years until the TFT was corrected and surgery was decided. Intraoperatively, there was about 34*22*7cm sized well encapsulated multinodular thyroid mass with anteriorly displaced trachea, esophagus, both recurrent laryngeal nerves and parthyroid glands. We did total thyroidectomy, preserved both recurrent laryngeal nerves and parathyroid glands. The mass weighed about **2350 grams**, sent for histopathology later suggestive of benign colloid goiter.

Conclusion

Thyroidectomy for giant goiters needs patience to preserve important structures with the assumption that a tired surgical team can have relief with rest but for the purpose of shortening surgery time, injuring recurrent laryngeal nerves or parathyroid glands do have lifelong sequela for the patient which never shouldn’t be the choice.

Introduction

The normal adult thyroid gland weighs 10 to 25 grams. Goiter is an enlargement of thyroid gland due to compensatory hyperplasia and hypertrophy of the follicular epithelium which occurs sporadically [2]. Nodular goiter is rare before middle age and female preponderance has been established [2]. Giant goitre is a rare occurrence and is defined by an enlargement of the thyroid gland of at least 10 g/kg body weight or a thyroid tumour larger than 10 cm in diameter [1]. Occurrence of goitre in African settings has been widely reported and in Nigeria, some regions are described as goitrous zones or thyroid belt [1].

Toxic multinodular goiter (TMNG) usually occurs in older individuals, who often have a lengthy history of nontoxic multinodular goiter [3]. Over several years, enough thyroid nodules become autonomous to cause hyperthyroidism [2]. The development of multinodular goiter is thought to be due to persistent growth stimulation of the thyroid gland by thyroid-stimulating hormone during a period of inadequate production of thyroid hormones [4]. This stimulation leads to epithelial hyperplasia and then a diffuse

goiter [4]. As a result of fluctuating stimulation, mixed areas that consist of active more hyperplastic and inactive focus ensue and nodular goiter usually occurs as an end stage of diffuse goiter [4].

Giant goiter weighing more than 500 grams can cause compression symptoms affecting the trachea, esophagus, and recurrent laryngeal nerve [1, 3]. Nowadays, with the advent of daily use of iodized salt and increased awareness about the deficiency of iodine, the occurrence of large colloid goiters has become a rarity [5]. The clinical picture usually presents a slow evolution of an insidious character as the patient remains asymptomatic for a long period. When symptomatic, there may be dyspnea, dysphagia, dysphonia, hyperthyroidism, superior vena cava syndrome or any malignant transformation causing both local and distant symptoms and signs [6].

Patients should be investigated thoroughly for preoperative hormone assays to assess thyroid function and serum calcium to establish a reference value in the management of postoperative hypocalcemia. Imaging such as radiography, CT scan and magnetic resonance imaging (MRI) are useful for confirmation of thyroid location and extension (topography) of a goiter, and for detecting signs of compression or invasion of adjacent structures [7, 8]. In advanced countries, virtual bronchoscopy using CT reconstruction is still important for preoperative evaluation and for planning the intubation approach and surgical strategy for the management of a potential stenosis or tracheal deviation [7].

Though several treatment modalities exist, surgical excision is preferred in patients with giant euthyroid goiters. This leads to immediate resolution of obstructive symptoms and restores the aesthetics of the patient's neck [9]. Total thyroidectomy is the best treatment modality for giant goiters [2, 3, 9, 10].

Methods

The work has been reported in line with the SCARE criteria [11].

Case presentation

A 65 years old female patient presented with anterior neck swelling with progressive size increment of about thirty (30) years duration. She developed hot intolerance, palpitation and slight voice change about three (3) years before her current presentation. Otherwise, she had no history of any known chronic medical illnesses, previous surgical history, breathing or swallowing difficulty and swelling to other sites. During physical examination at her initial presentation, her pulse rate was 96 beats per minute and all other vital signs were in normal range. She had about 32*22cm very huge anterior neck swelling with visible multiple nodules which grown more anterior to the sternum. The mass moves up with swallowing and the thyroid cartilage was palpable at the midline [Figure 1]. There were no significantly engorged veins and Kocher's manuever, Pemberton's and Berry's sign were all negative. Other physical examination findings were unremarkable.

She was then investigated with CBC, LFT and RFT which were all in normal range and her blood group was AB positive. Thyroid function test (TFT) shown low TSH and high free T3 levels. Neck ultrasound

was suggestive of multinodular thyroid enlargement with cystic and calcified components with low suspicion for malignancy. Fine needle aspiration cytology (FNAC) taken from multiple nodules was suggestive of benign colloid goiter. ECG and echocardioggraphy were normal. Lateral neck x ray shown significant anteriorly pulled trachea with multiple calcifications seen within the mass [Figure 2].

She was put on antithyroid medication (Propylthiouracil) and betablocker (Propranolol) for about three (3) years until the TFT was corrected. Otherwise, she claimed that the symptoms subsided in six months after initiation of therapy.

After three years of follow up, her pulse rate was 76 beats per minute and the other physical examination findings were the same. CBC, RFT, LFT, TFT and ECG were all normal. Neck Ultrasound, neck x-ray and FNAC were also repeated and have similar findings as the initial one. Then, surgery was decided after informed and written consent was taken following thorough discussion about possible risks of recurrent laryngeal nerve injury, inadvertent injury or removal of parathyroid glands and its symptoms and possibility of tracheomalacia and tracheostomy in a way that the patient could understand.

Intraoperatively, there was some difficulty of intubation due to anteriorly displaced trachea but it was successful with the help of video laryngoscope. The intraoperative finding was redundant skin and pretracheal fascia, atrophied strap muscles, about 34*22*7cm sized well encapsulated multinodular thyroid mass with anteriorly displaced trachea, esophagus, both recurrent laryngeal nerves and parthyroid glands. We did total thyroidectomy [Figure 3] and the surgery took about five (5) hours with all efforts expended to successfully preserve both recurrent laryngeal nerves and two grossly visible parathyroid glands. The tracheal cartilages were normal with no softening. The mass weighed about 2350 grams and it was sent for histopathology later suggestive of benign colloid goiter. The estimated blood loss was about 700ml and there was no need to transfuse her. Her post operative hematocrit determined after 10 hour after surgery was 33.2%.

Postoperatively, she had normal voice with no signs of hypocalcemia or choking. She was discharged to home on the third day after surgery and appointed after a week, a month, three months and six months after surgery. She is on Levothyroxine supplementation and developed none of the possible surgical complications during her six months follow up.

Discussion

The challenges of managing giant goitre are magnified when seen in patients with significant socioeconomic concerns (indigent patients). These challenges are multi-directional, including some strain on the caregivers and drainage of resources from the health system administrators'

perspective [1]. Our patient had similar challenges as poor socioeconomic support and inadequate awareness and preferred to hide her condition for all those years than seeking medical care early.

Worldwide, the most common cause of goiter is iodine deficiency. In fact, it has been estimated that goiters affect as many as 200 million of the 800 million people who have a diet deficient in iodine [1, 3, 4, 9]. Our patient is a farmer who lives in a highland area which could predispose her for iodine deficiency at her earlier age due to washed out iodine content of the soil making the crops grown there to be iodine deficient.

Giant thyroid tumor is rare and defined as any thyroid tumor with an average weight greater than 500 g or 10 g/kg body weight or diameter greater than 100 mm [1, 4]. Most patients present with huge goiter with compressive symptoms like dyspnea and dysphagia associated with symptoms and signs of hyperthyroidism but extrathyroidal manifestations are absent unlike Graves' disease [3]. Because of its location, a massive goiter is unsightly and could severely affect the patency of the trachea and esophagus, which can be a potentially life-threatening condition [4]. This case is one of the the few extremely large goiters but without any of the compressive symptoms other than the hyperthyroidism and minimal voice changes likely due to anteriorly pulled recurrent laryngeal nerves together with the trachea and esophagus.

Those patients with goiter should undergo TFT (T3, T4, TSH) measurement, ultrasound of the neck and FNAC as a diagnostic modality. A neck x-ray and CT scan can be done when the patient is diagnosed with a giant goiter [2, 3, 5, 6]. We investigated our patient with CBC, TFT, LFT, RFT, ECG, neck ultrasound and neck x-ray but she was not able to afford contrast enhanced neck CT scan.

In spite of the technical challenge, surgery continues to be the best option particularly in experienced hands due to its distinct advantage of immediate effect and complete resolution of compressive symptoms [8]. For a long while, many surgeons practice Sub-total thyroidectomy, which involves removal of both thyroid lobes and isthmus, leaving behind only about 8g on both sides [9]. This preserves some thyroid tissue just enough to sustain the adequate hormone levels and not too much to prevent recurrence [1, 2, 4, 5]. With total thyroidectomy, there are no chances of recurrence with this technique, however, the risk of loss of the parathyroids, the need for lifelong L-thyroxine, and the risk of damage to both recurrent laryngeal nerves makes some surgeons to prefer sub-total thyroidectomy instead [9, 10]. The identification of recurrent laryngeal nerve (RLN) and parathyroid glands is accepted by most authors [2, 3, 4, 6]. Special surgical techniques, for example, capsular dissection technique and neuromonitoring, may further improve the results of surgery and avoid complications [5]. After we achieved an euthyroid state for our patient, we decided to do total thyroidectomy after detail explanation of possible risks surgery to the patient and her attendants. Intraoperatively, despite the absence of neuromonitoring in our setup, we took time to identify and not to injure both recurrent laryngeal nerves and not to remove or devascularize the identified parathyroid glands. **The significant challenge was the anteriorly curved trachea and esophagus together with the recurrent nerves and parathyroid glands.**

In postoperative period, each practitioner needs to assess predisposing risk for occurrence of post thyroidectomy tracheomalacia include large goiters of long duration older than five years and large size as in our case, malignancy goiters or re-do thyroidectomy, preoperative recurrent laryngeal nerve

paralysis, significant narrowing and/or deviation of the trachea, retrosternal or retrotracheal extension and difficult tracheal intubation [7]. We were lucky enough that non of the possible complications (nerve injury, hypocalcemia and tracheomalacia) didn't happened except the lifelong thyroxine supplementation for we couldn' find any healthy thyroid tissue to be preserved.

Conclusion

Even if the surgical techniques used could be routine, the operative difficulty is the large size of the gland and distortion of anatomical landmarks. To perform an effective and safe surgery, careful preoperative preparation, teamwork and appropriate evaluation of the extent of the goiter and airway status are important. Thyroidectomy for such giant goiters needs patience for careful dissection and preserve important structures with the assumption that **a tired surgical team can have relief with rest but for the purpose of shortening surgery time, injuring recurrent laryngeal nerves or parathyroid glands do have lifelong sequela for the patient which should never be the choice.**

Abbreviations

CBC
Complete blood count
cm
Centimeter
CT
Computerized Tomography
ECG
Electrocardiography
FNAC
Fine needle aspiration cytology
g
grams
kg
Kilograms
LFT
Liver function test
MRI
Magnetic resonance imaging
RFT
Renal function test
RLN
Recurrent laryngeal nerve
SCARE
Surgical case reports

T3:Triiodothyronine
T4
Tetra iodothyronine
TFT
Thyroid function test
TMNG
Toxic multinodular goiter
TSH
Thyroid stimulating hormone
WMA
World medical association

Declarations

Ethical approval

All procedures performed in this study involving human participants were in accordance with the declaration of Helsinki developed by The World Medical Association (WMA) and the ethical standards of the institutional and national research committee.

Consent for publication

Informed consent was obtained from the patient and her attendants for this study.

Competing interests

Authors declare that they have no competing interests.

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Author Contribution

Conceptualization: YT. Data collection and Methodology development: YT. Data analysis: YT, FA, WA, SL, YK. Manuscript Draft: YT, AF. Manuscript review and editing; YT, AF, FA, WA, SL, YK. All authors have read and approved the manuscript.

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Data Availability

The datasets used and/or analyzed during the current study are available from corresponding authors on reasonable request.

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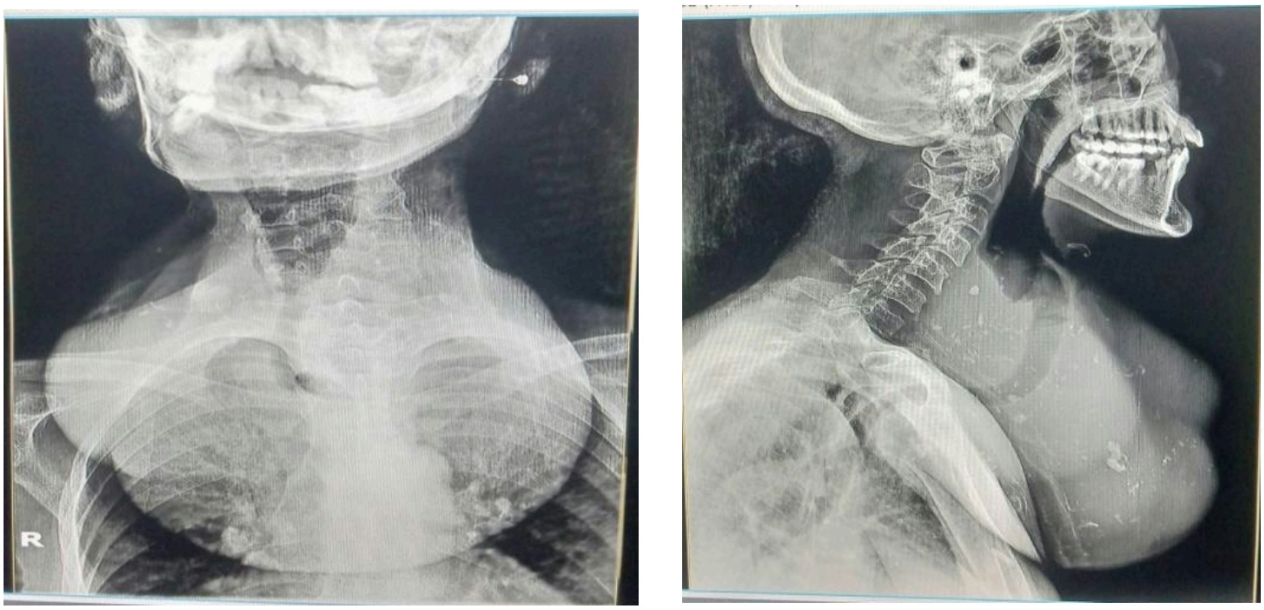
Figures



(A) (B) (C)

Figure 1

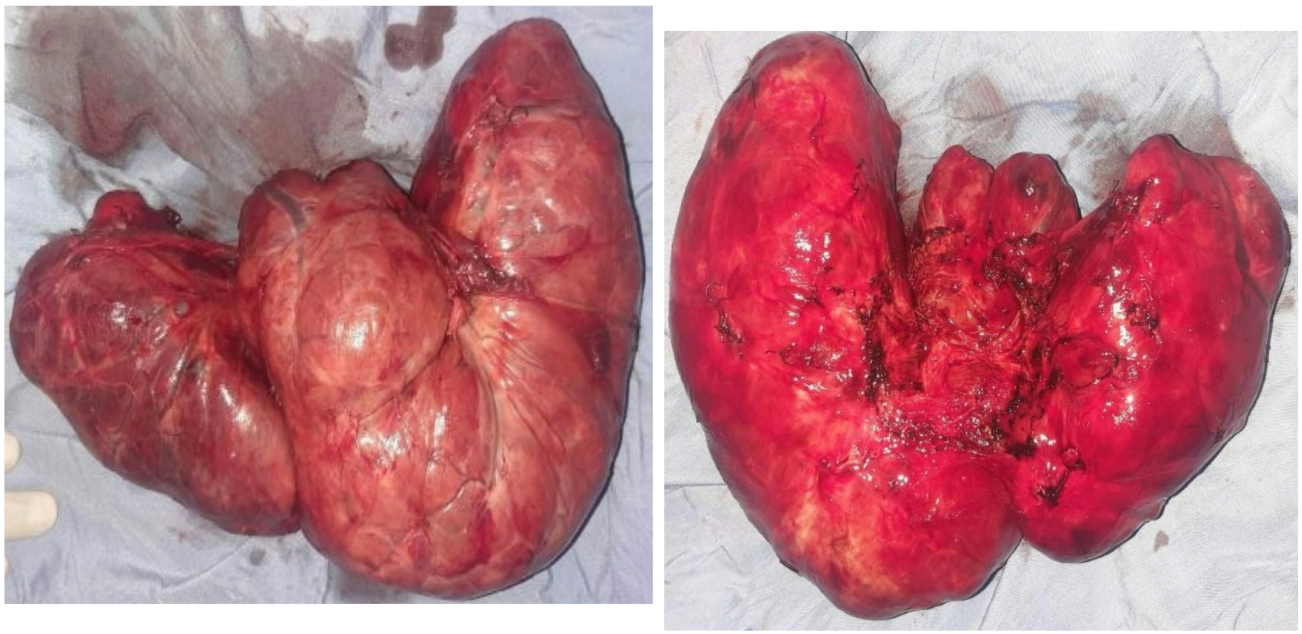
Pre - operative pictures of the anterior neck mass; Rt lateral view (A), Left lateral view (B) and Anterior view (C).



(A) (B)

Figure 2

Anterioposterior (A) and Lateral (B) neck X - rays



(A) (B)

Figure 3

Anterior (A) and Posterior (B) views of the excised thyroid tissue.



Figure 4

The wound on her neck 7 days after surgery.