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Successful total thyroidectomy of a giant 2.55 kg toxic multinodular goiter: Challenges and management

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Abstract
A goiter is an abnormal enlargement of the thyroid gland, located in the anterior midline part of neck. Toxic multinodular goiter (TMNG) usually occurs in older individuals, who often have a lengthy history of nontoxic multinodular goiter when it is accompanied by obstructive symptoms like dyspnoea and dysphagia carries the need for surgical intervention.
Discussion: Toxic large MNG is most effectively treated by total thyroidectomy, which achieves complete diminution from toxic and compressive symptoms.
Conclusion: Surgery for huge goiter is challenging and one should be careful about difficult intubation, altered anatomy and adhesions to the surrounding structures. Recognizing and treating this kind of cases are important, as they constitute a preventable cause of mortality and morbidity if timely diagnosed and treated.

Keywords: Toxic multinodular goiter, thyroidectomy, dyspnoea, dysphagia, tracheal compression, difficult intubation, embolization, video laryngoscopy, surgical management

Introduction
Thyroid diseases are common, especially in India estimated that about 32% are suffering in India [1]. Toxic Multinodular Goiter (TMNG) usually occurs in older individuals, females more than males [2]. An enlarged thyroid is called a goiter, which can be diffuse or nodular and may be euthyroid, hyperthyroid, or hypothyroid. Causes include aging, iodine deficiency, and irradiation, with women more affected.
Multinodular goiters (MNG) develop gradually, but large goiters can cause dysphagia and dyspnea on compression over trachea and esophagus. Toxic nodular goiter can be a single toxic adenoma (single hyper-functioning nodule) within a multinodular thyroid or multiple hyperfunctioning nodules in the multinodular gland [4]. Surgical intervention or radioiodine treatment is strongly recommended for patients with toxic MNG [3]. Total thyroidectomy is the treatment for toxic or compressive MNG, but it requires lifelong thyroid hormone replacement and carries risks like hypoparathyroidism and nerve injury, requiring careful planning and counseling.

Case Report Patient details
This work has been reported in line with the SCARE 2020 criteria [5]
The patient is a 58 year old female, Hindu and housewife. Presented with complaints of anterior neck swelling for 20 years that was insidious in onset gradually progressive in size but worsened over the last 6 months to surgical OPD. She also had complaints of difficulty swallowing initially to solids which progressed to liquids. With shortness of breath on lying down supine.
The patient was diagnosed with hyperthyroidism and started on carbimazole and propranolol. She also has hypertension and type 2 diabetes for 5 years and bronchial asthma controlled with SABA MDI. Surgery was recommended, but she declined due to fear and anxiety.

Clinical findings
On physical examination, the PR of 74 beats per minute and 25×24 cm measuring anterior neck mass in its largest dimensions representing a multidirectional enlargement with nodular surface covering the entire anterior and left lateral part of the neck. The swelling was firm and non-tender with no palpable neck nodes.

Pemberton and Kocher's sign were positive

Fig 1: Left lateral view of neck

Fig 2: Anterio posterior view of neck

Diagnostic Assessment

The thyroid function test showed low TSH with normal free T_4 and T_3. FNAC and neck ultrasound were determined with the result of the colloid goiter (Bethesda category II) feature and TIRADS 2 (benign goiter) respectively.

Contrast-enhanced computed tomography on the neck was done suggestive of gross enlargement of thyroid gland. Both lobes and isthmus appear bulky and lobulated, right measures 12x9.1x13.4 cm and left measures 11.2x9.2x14.6 cm (AP x ML X SI) with areas of necrosis, chalky and punctate calcifications with in both lobes show retrosternal extension up to superior endplate of T_2 vertebra.

Therapeutic Intervention

With a working diagnosis of giant toxic multinodular goiter on antithyroid drugs in a known case of DM, HTN and Bronchial ashtma. Endocrine, chest medicine and internal medicine consultation taken for optimisation before surgery. Patient was started on lugol's Iodine 10 days prior surgery.

Patient underwent difficult intubation during induction of anaesthesia for surgery. The preoperative video laryngoscopy showed supraglottic edema and tracheal compression from the goiter.

Total thyroidectomy was done under general anaesthesia. A horizontal neck incision made extending bilaterally up to posterior borders of bilateral sternocleidomastoid muscle. Strap muscles and sternocleidomastoid muscles were thinned out and were adhered with the thyroid. Strap muscles and Sternocleidomastoid muscles were cut for better exposure at the upper one third part. Bilateral Internal jugular vein (IJV) and Carotid vessels were displaced posterolaterally and both IJV were compressed. Both side IJV and carotid vessels were identified, dissected out from the specimen and preserved. Both the superior laryngeal nerve (SLN) could not be preserved and sacrificed. Bilateral recurrent laryngeal nerve (RLN) were identified in Beahr's triangle and dissected out from the specimen and preserved. BIlateral inferior parathyroid were identified and preserved.

Fig 3 and 4: Measurements of excised specimen SI and ML respectively

Fig 5: Jackson Pratt drain was kept below the strap muscles

Fig 6: Weight of specimen 2.55 kg

The patient was extubated on next day and started on sips and liquid diet. Postoperatively no voice change noted and serum calcium were normal. The patient was discharged on the 4th postoperative day. Subsequent follow-up was unevetful.

Discussion

TMNG, particularly when presenting with compressive symptoms like airway and oesophageal compression, necessitates prompt surgical intervention. This case involved several challenges, including difficult intubation and anatomical distortions caused by the giant goiter. Multiple intubation methods were attempted, and it was ultimately successful with video laryngoscopy under direct vision.

Total thyroidectomy was completed without any interventional embolization, with careful preservation of critical structures. The case highlights the importance of preoperative airway management planning and a multidisciplinary approach that includes anaesthesiologist, surgeons, and endocrinologists to optimize outcomes

Conclusion

Surgical intervention for a large goiter presents several challenges. Careful attention is required to manage potential difficulties with intubation, altered anatomical structures, supraglottic edema, and adhesions to surrounding tissues.Identifying and managing such cases early is crucial, as they represent a preventable cause of mortality. With careful preoperative assessment and the use of meticulous thyroidectomy techniques, these risks can be significantly reduced.

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