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CASE REPORT

MASSIVE MULTINODULAR GOITER (MNG) CAUSING TRACHEAL AND BILATERAL GREAT CERVICAL VESSELS COMPRESSION TREATED WITH TOTAL THYROIDECTOMY: A CASE REPORT FROM RURAL HOSPITAL

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Abstract

Introduction: Multinodular goiter (MNG) is a common thyroid condition that is usually asymptomatic. However, in rare instances where the gland enlarges substantially, it can cause significant compression of the airway and important cervical vessels.

Case Presentation: A 49-year-old woman with a 10-year history of a progressively enlarging neck mass presented with symptoms of airway obstruction and bilateral great vessel compression, including dyspnea, facial swelling, and orthostatic dizziness. Imaging revealed a massively enlarged multinodular thyroid gland causing tracheal deviation and bilateral compression of the carotid arteries and jugular veins, without extension into the thoracic inlet. Thyroid function tests confirmed a euthyroid state. The patient underwent a successful total thyroidectomy. Histopathological examination showed a cystic adenomatous goiter. Postoperative recovery was uneventful except for transient hoarseness, which resolved during follow-up.

Discussion: A goiter is defined as an enlargement of the thyroid gland, typically characterized by swelling in the anterior neck. It can be classified as endemic or non-endemic, diffuse or nodular, and toxic or non-toxic. This rare presentation underscores the potential severity of untreated MNG.

Conclusions: Massive multinodular goiter (MNG) with tracheal and bilateral great vessel compression is a rare and challenging clinical scenario. This case highlights that it can be managed safely and effectively with appropriate surgical planning and multidisciplinary care.

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Introduction:-

Goiter is an enlargement of the thyroid gland. The incidence of goiter is influenced by region, climate, genetic factors, iodine deficiency, or iodine sufficiency. It is generally accepted that iodine deficiency is the most common environmental factor associated with benign thyroid tumors (Takamori et al., 2022; Unlu et al., 2022). Iodine deficiency is considered a common cause of goiter in regions with low iodine. However, the prevalence of this

disease in countries with sufficient iodine is still quite high, from 13% to 45% (Chen et al., 2022). Goiter is most often found in the age range of 35-50 years, with a ratio of women to men of 3:1 (Trinh et al., 2020).

Multinodular goiter (MNG) is a common thyroid gland disease, which is estimated to affect around 1.5 billion people worldwide (Chen et al., 2022). The latest available study states that a large goiter is defined as the gross size of the thyroid gland being more than 100 grams, while a massive goiter is if the gross size of the thyroid gland being more than 250 grams (Chen et al., 2022).

Most cases are generally asymptomatic and grow slowly, but if left untreated for a long time, it will be directly proportional to the size of the goiter. This causes the goiter to become massive. In massive goiter, there is a level of compressive symptoms such as dyspnea, dysphagia, and hoarseness that are more severe, so surgical intervention is needed, especially for patients with symptoms of compression, disability, and suspicion of malignancy. The severity of compression symptoms depends on the size and location of the goiter and may worsen due to rapid growth (Chen et al., 2022).

A retrospective study of patients with thyroidectomy as a treatment for goiter at West China Hospital, Sichuan University, from September 2009 - December 2019 showed that the level of compressive symptoms and retrosternal extension were more common in massive goiters, while the most common compressive symptoms were dyspnea, reaching 44.9%, followed by dysphagia, reaching 21.6%. Patients with massive goiters were more likely to come from rural areas with a longer duration of goiter than large goiters (Chen et al., 2022).

According to the European Thyroid Association in 2023, treatment options for thyroid nodules are divided into non-surgical approaches, such as radioiodine therapy and minimally invasive techniques like ethanol ablation, and surgical approaches. Surgical intervention is performed if the goiter is large, there are symptoms of airway compression, Pemberton's sign in venous obstruction, esophageal compression causing dysphagia, malignant or suspected malignant nodules, extension to the retroclavicle and mediastinum in substernal goiter, and cosmetic considerations (Unlu et al., 2022; Durante et al., 2023).

A rare complication of large multinodular goiter is ischemic stroke. This condition is caused by compression of blood vessels around the goiter, which causes mechanical obstruction of large blood vessels in the neck that function to supply blood to the brain; one of these blood vessels is the carotid artery (Camacho et al., 2022). According to Ovchinnikov *et al.*, an enlargement of the thyroid gland volume of 1.4 times the normal size can cause stenosis of the common carotid artery and dilation of the jugular vein with symptoms of dizziness, fatigue, weakness of the limbs, cyanosis, edema of the face, neck, and upper limbs (Trinh et al., 2020; Ovchinnikov et al., 2014; McBain et al., 2018).

Case Presentation:

A 49-year-old woman presented with a complaint of a lump in the front of her neck, accompanied by symptoms of airway and major blood vessel compression in the neck. The patient reported the lump had been present for 10 years. She also experienced shortness of breath for the past year, particularly during physical activity, which worsened when lying down. Additional complaints included dizziness when transitioning from a lying to a standing position, as well as facial swelling, which was more aggravated when lying down.

Physical examination revealed an enlarged multinodular thyroid gland in the neck, which was non-tender, solid (+), well-defined, and moved with swallowing.

Thyroid ultrasound showed thickening of the isthmus to 4 cm, with the right lobe measuring 3.9 x 3.4 x 3.4 cm and the left lobe measuring 4.2 x 3.4 x 3.4 cm. The lesions were observed to compress both the right and left common carotid arteries as well as the right and left jugular veins. Cervical AP/lateral X-rays revealed a soft tissue mass in the right and left neck regions measuring 20.5 x 15.3 x 11 cm, displacing the trachea anteriorly. MSCT (Multislice CT) imaging of the head and neck, both with and without contrast, showed an enlarged right thyroid lobe (10.5 x 7 x 10.3 cm) and left thyroid lobe (9.8 x 12.3 x 11.4 cm), which caused airway narrowing with the smallest lumen diameter being approximately 0.9 cm at the level of the sixth cervical vertebra. No extension into the thoracic inlet or mediastinum was observed. Thyroid function tests showed euthyroid status.

The patient underwent total thyroidectomy. Histopathological results indicated a diagnosis of cystic adenomatous goiter. Postoperatively, the patient experienced hoarseness, which gradually improved during follow-ups at 1 week and 1 month after surgery.

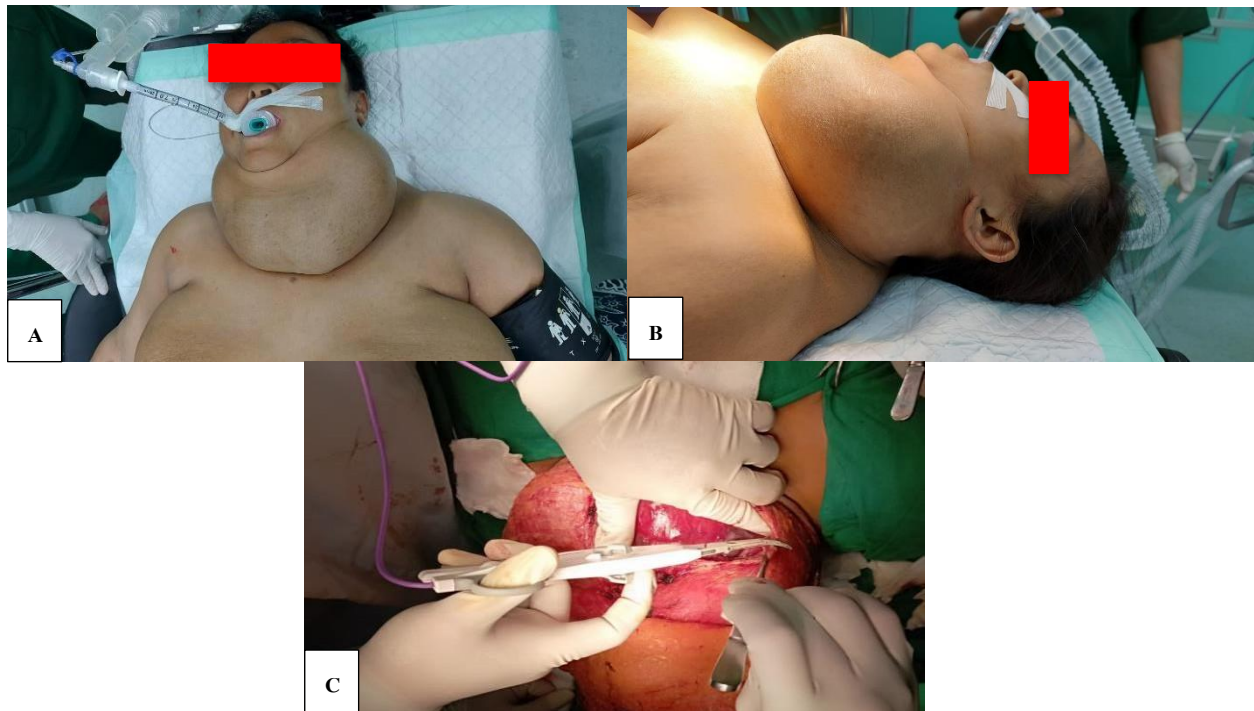


Figure 1. (A) Preoperative anterior view; (B) Preoperative lateral view. Revealed an enlarged multinodular thyroid gland in the neck, non-tender mass, solid (+), well-defined, (C) Intraoperative

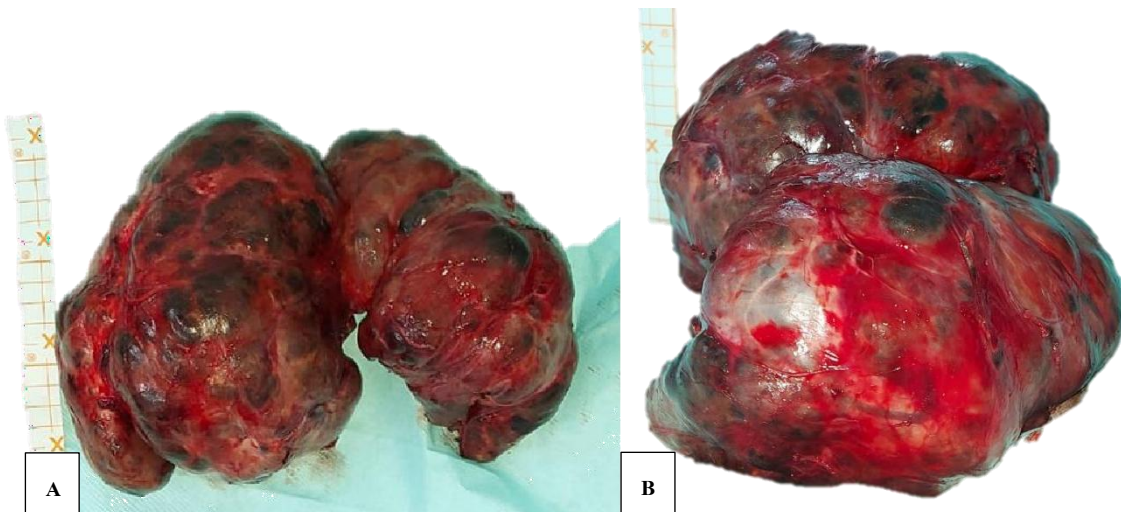


Figure 2. (A) Anterior view; (B) Lateral view. Enlarged thyroid gland measuring around 17 x 23 x 10 cm

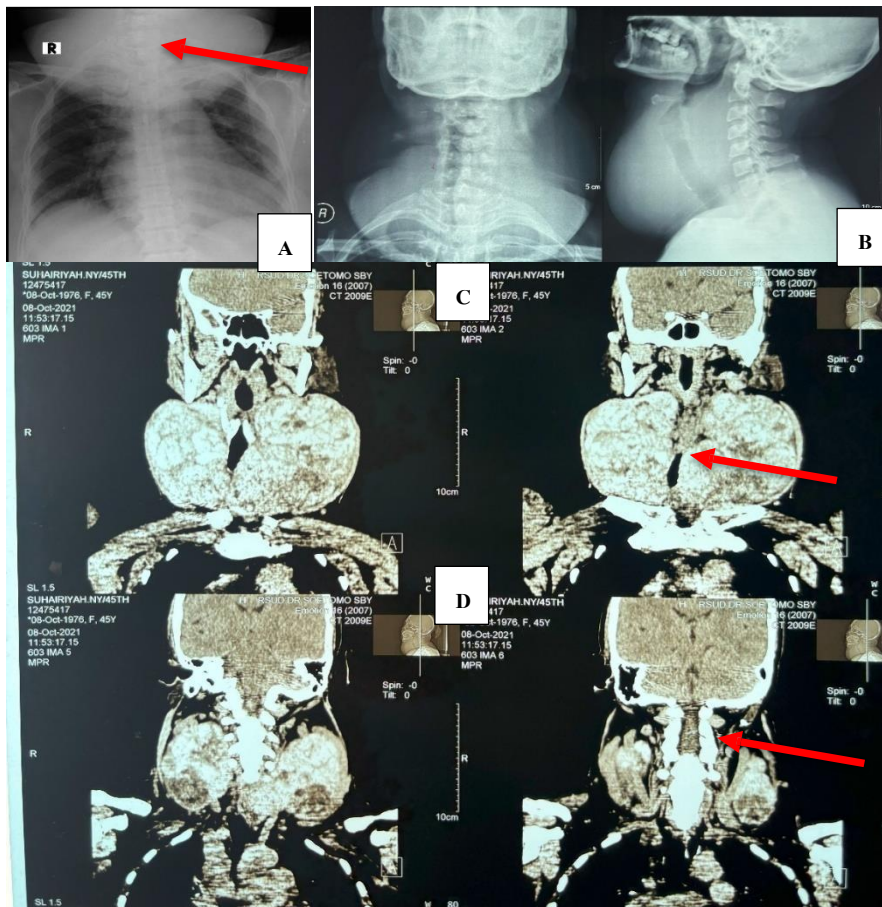


Figure 3. (A) Chest x-ray showed deviation of the trachea, (B) Cervical AP/lateral revealed a soft tissue mass compressing the trachea anteriorly, (C, D) Head and neck CT scan revealed an enlarged thyroid compressing the trachea and great cervical vessels.

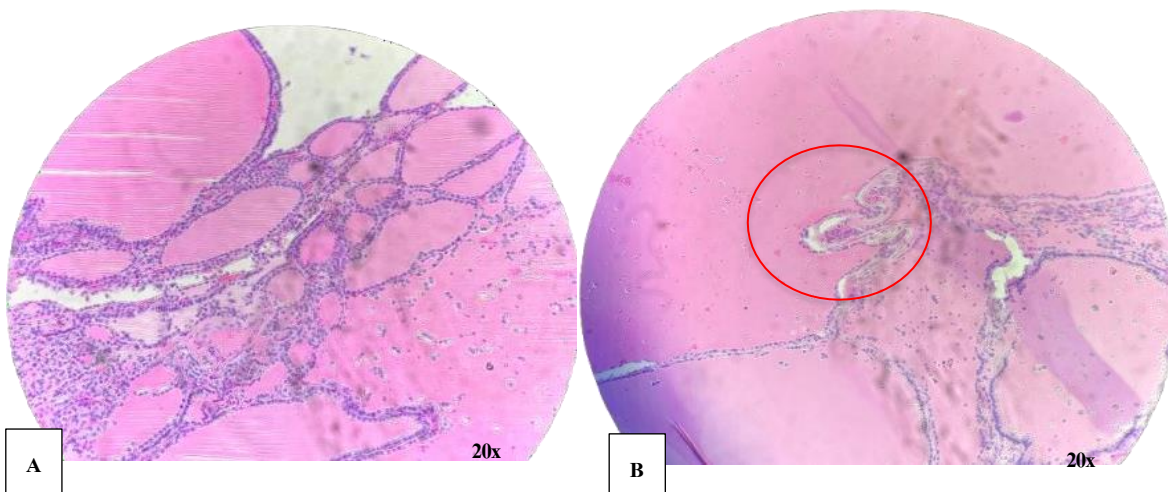


Figure 4. Struma adenomatosa cystica histopathology (A) Proliferation of follicles of various sizes and with cystic fibers lined with a layer of cuboidal epithelium with ovoid round nuclei without signs of atypia, (B) It is a Sanderson polster pattern



Figure 5. (A-C) One week postoperative. (D-F) One month postoperative; (A) Left side view, (B) Anterior view, (C) Right side view

Discussion:

Goiter is defined as an enlargement of the thyroid gland, usually indicated by swelling in the anterior neck, which can be classified as endemic or non-endemic, diffuse or nodular, and toxic or non-toxic (Patel et al., 2021). Multinodular goiter (MNG) is one of the most common benign findings during ultrasonographic evaluation of thyroid nodules and, in many cases, does not show growth within 5 years of observation (McBain et al., 2018; Durante et al., 2015).

In our case report, a 49-year-old female patient was diagnosed with multinodular goiter in 2016 at Dr. Soetomo Hospital, Surabaya. This is supported by Trinh et al, who stated that goiter is most often found in the age range of 35-50 years, with a ratio of women to men of 3:1 (Trinh et al., 2020).

Clinical manifestations in patients are initially asymptomatic. Complaints began to appear when the lump became larger and more massive, causing the patient to experience shortness of breath over the past year. The shortness of breath is intermittent and occurs especially during physical activities, worsening when lying down. This is supported by Chen et al., who stated that the clinical manifestations of goiter are generally asymptomatic and develop slowly. However, if left untreated for a long time, symptoms will correlate directly with the size of the goiter and cause

compression effects such as shortness of breath, dysphagia, and hoarseness. The severity of these compression symptoms depends on the size and location of the goiter (Chen et al., 2022).

Compression of the trachea will cause airway obstruction, causing symptoms of shortness of breath that worsen when lying down, stridor, whooping cough, and difficulty swallowing. A large goiter can also press the veins in the neck, causing congestion in the face, and if pressing on the common carotid artery can cause dizziness, weakness, and hypomnesia. Pain is rare, while systemic symptoms such as symptoms of hyperthyroidism and hypothyroidism will not be found in nontoxic multinodular disease (Unlu et al., 2022; Trinh et al., 2020; Ovchinnikov et al., 2014; McBain et al., 2013; Triantafyllou et al., 2024). Chen et al also reported a retrospective study of patients who underwent thyroidectomy as a treatment for goiter at the West China Hospital, Sichuan University, from September 2009 to December 2019 showed data on the level of compressive symptoms and retrosternal extension were more common in massive goiter, while the most common compressive symptoms were dyspnea reaching 44.9%, followed by dysphagia reaching 21.6%. Meanwhile, patients with massive goiter mostly come from rural areas with a longer duration of goiter than large goiter.

Based on the results of MSCT examination of the head and neck without and with contrast showed narrowing of the airway with no extension to the mediastinum and thoracic inlet, it is believed to cause complaints of shortness of breath in patients. Takamori et al also reported in their study that massive multinodular goiter (MNG) tends to expand to the mediastinum or paralarynx, which results in compression and deviation of the trachea (Takamori et al., 2022). However, it is in contrast to Chen *et al*, who reported that a cohort study conducted by observing 227 patients based on weight, namely large and massive goiter, showed that massive goiter tends to expand to the retrosternal or substernal which is characterized by the expansion of the goiter to the thoracic inlet based on a CT scan (Chen et al., 2022).

In our case report, the patient underwent a surgical approach in her treatment, a surgical approach with total thyroidectomy method, because there were complaints of compression of both the airway and large blood vessels in the neck. The main indications for surgery in non-toxic multinodular (MNG) patients are large goitre and compression complaints (dyspnea, Pemberton's sign, dysphagia) (Cirocchi et al., 2015). According to the European Thyroid Association in 2023, lobectomy/hemithyroidectomy type surgery is recommended if the thyroid gland enlargement is limited to one lobe; if the thyroid gland enlargement is nodular goiter, then near-total thyroidectomy may be considered (Durante et al., 2023). The choice of surgery in our case report is corroborated by a prospective study by Beatriz et al reported that approximately 15% of patients (394/2,675) with multinodular goitre required total thyroidectomy to resolve recurrence in a 14.5-year follow-up (de Rienzo-Madero et al., 2019). A retrospective cohort study by Barczynski et al reported that the recurrence rate of patients with bilateral subtotal thyroidectomy in patients was 6.99%. In addition, 45.33% required re-operation, and the re-operation rate was significantly higher in the subtotal thyroidectomy group compared to total thyroidectomy (3.14% vs. 0.8%) with a significance value of $p < 0.001$, respectively (Barczynski et al., 2011).

The results of postoperative histopathological evaluation showed macroscopically a two-lobe thyroid tissue and isthmus weighing 1.775 grams. The size of the dextra lobe was 15 x 10 x 9 cm, the size of the sinistra lobe was 18 x 12 x 10 cm, and the size of the isthmus was 6 x 3.5 x 2 cm, blackish brown in color. In the slices, multinodular gelatin filled the entire tissue. Microscopy showed that the tissue contained proliferating thyroid follicles of various sizes, partially dilated cystic coated with a layer of cuboidal epithelium with ovoid round nuclei without signs of atypia. The follicular lumen is filled with colloidal material. Sanderson Polster's picture was found. The histopathologic diagnosis was struma adenomatosa cystica. This patient was classified as a massive goitre as she weighed more than 250g (Chen et al., 2022). Pathologically, adenomatous goitre is often defined as a hyperplastic or colloid nodule, which is a benign lesion of the thyroid gland (Trinh et al., 2020). Sanderson polster is a picture of increased colloid secretion in the follicle, which causes protrusion along the follicle wall, which is enlarged and dilated (Pandlar et al., 2018).

Postoperatively, the patient experienced complaints of hoarseness. According to Chen et al reported that, the surgical procedure of the total thyroidectomy method in massive goiter conditions is challenging, because it is associated with a high risk of recurrent laryngeal nerve damage. In his study, about 11.2% of nerve damage occurred due to the procedure (Chen et al., 2022). Other study reported that the incidence of recurrent laryngeal nerve damage is the most common complication experienced by patients undergoing total thyroidectomy surgical procedures, especially the right nerve (Lin et al., 2016).

The limitation of this case report is the absence of a good post-operative evaluation process using laryngoscopy to evaluate nerve injury, and due to limited resources (PTH examination), this examination was not carried out after the operation to identification of postoperative hypoparathyroidism.

Conclusions:-

Massive multinodular goiter (MNG) with tracheal and bilateral great vessel compression is a rare and challenging clinical scenario. This case highlights that, even in a rural tertiary care setting, such complex thyroid clinical features can be managed safely and effectively with appropriate surgical planning and multidisciplinary care.

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