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

rareinstances wherethe glandenlarges substantially, it can cause significant compression of the airway and important cervical vessels. **Case Presentation**: A49-year-oldwomanwitha10-yearhistoryofaprogressivelyenlarging neck mass presented with symptoms of airway obstruction and bilateral great vessel compression,includingdyspnea,facialswelling,andorthostaticdizziness.I magingrevealeda massively enlarged multinodular thyroid gland causing tracheal deviation and bilateral compressionofthecarotidarteriesandjugularveins,withoutextensionintoth ethoracicinlet. Thyroid function tests confirmed a euthyroid state. The patient underwent a successful total thyroidectomy. Histopathological examination showed a cystic adenomatous goiter. Postoperativerecoverywasuneventfulexceptfortransienthoarseness,whic hresolvedduring follow-up.**Discussion**: Agoiterisdefinedasanenlargementofthet1roidgland,typicallycharacteriz ed 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 safelyand effectivelywith appropriate surgical planning and multidisciplinarycare.

Introduction: Multinodular goiter (MNG) is a common thyroid condition that is usually asymptomatic.However, in

Introduction:

Goiteris an enlargement ofthethyroid gland.The incidenceof goiteris influenced by region,climate,geneticfactors,iodinedeficiency,oriodinesufficiency.Itisgenerallyaccepted thatiodinedeficiencyisthemostcommonenvironmentalfactorassociatedwithbenignthyroid tumors [1,2]. Iodine deficiency is considered a common cause of goiter in regions with low iodine.However,theprevalenceofthisdiseasein countries withsufficientiodineisstillquite high, from 13%to 45%[3]. Goiterismostoften foundin theagerangeof 35-50 years, with a ratio of women to men of 3:1 [4]

Multinodular goiter (MNG) is a common thyroid gland disease, which is estimated to affect around 1.5 billion people worldwide [3]. 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 [3].

Mostcasesaregenerallyasymptomaticandgrowslowly,butifleftuntreatedforalong time, it will be directlyproportional to the size ofthe 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 [3].

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 [3].

AccordingtotheEuropeanThyroidAssociation in2023,treatmentoptionsforthyroid 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 airwaycompression, 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 [2,5].

A rare complication of large multinodular goiter is ischemic stroke. This condition is caused by compression of blood vessels around the goiter, whichcauses mechanical obstructionoflargebloodvesselsintheneckthatfunctiontosupplyblood tothebrain;oneof these blood vessels is the carotid artery [6]. 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 [4,7,8]

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 breathforthepastyear,particularlyduringphysicalactivity,whichworsenedwhenlying down, Additionalcomplaintsincludeddizzinesswhentransitioningfromalyingtoastanding 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 measuring3.9x 3.4x 3.4 cmandtheleftlobemeasuring4.2 x 3.4x 3.4cm.Thelesionswere 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), whichcausedairwaynarrowingwiththesmallestlumendiameterbeingapproximately0.9cm 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.

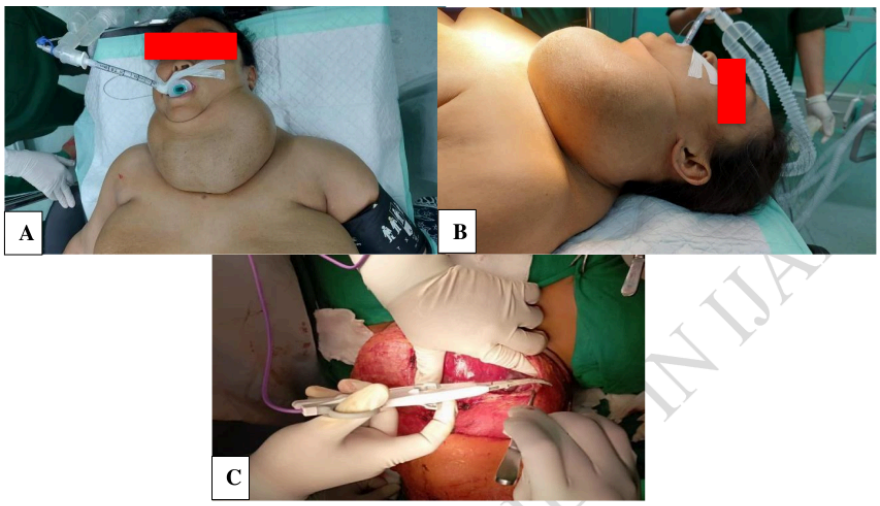

Figure1.(A)Preoperativeanteriorview;(B)Preoperativelateralview.Revealedanenlarged multinodular thyroid gland in the neck,non-tender mass, solid (+), well-defined, (C) Intraoperative

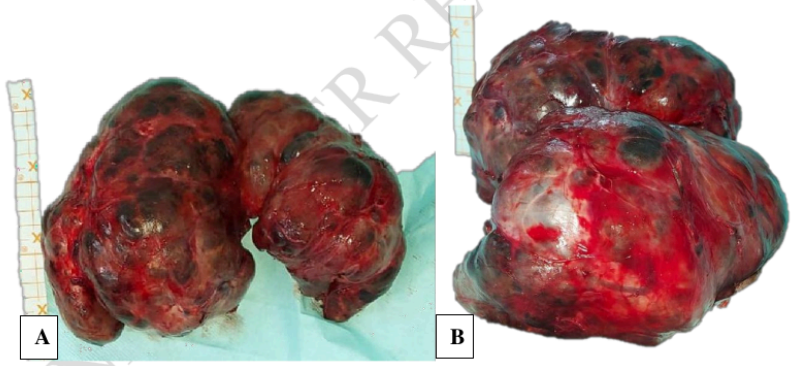

Figure2.(A)Anteriorview;(B)Lateralview.Enlargedthyroidglandmeasuringaround17x 23 x 10 cm

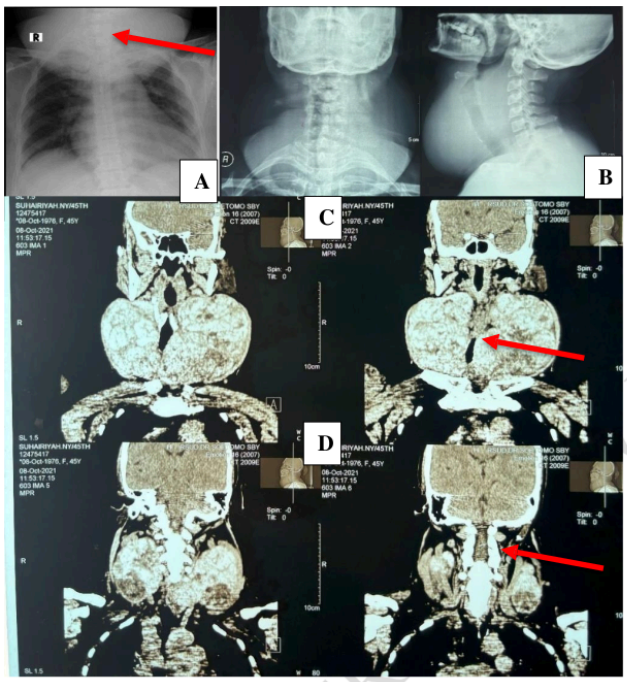

Figure 3.(A)Chest x-rayshowed deviation ofthetrachea., (B)Cervical AP/lateral revealed a softtissuemasscompressingthetracheaanteriorly, (C,D)HeadandneckCTscanrevealedan enlarged thyroid compressing the trachea and great cervical vessels.

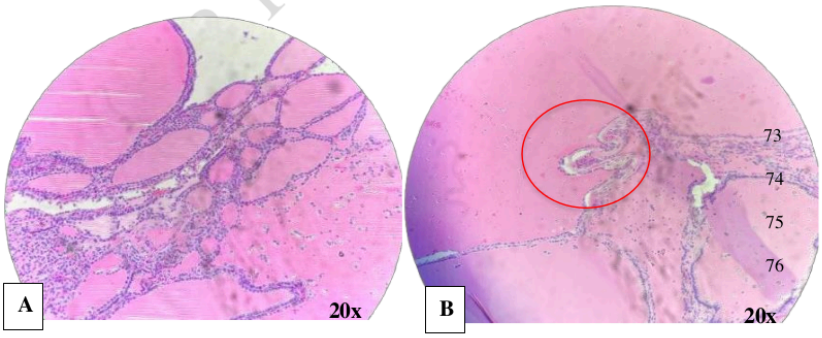

Figure4.Strumaadenomatosacystica histopathology

(A) Proliferationoffolliclesofvarioussizesandwithcysticfiberslinedwithalayerof cuboidal epithelium with ovoid round nuclei without signs of atypia, (B)Itisa*Sandersonpolster*pattern

Figure5.(A-C)Oneweekpostoperative.(D-F) Onemonthpostoperative; (A)Leftsideview, (B)Anteriorview, (C)Rightsideview

Discussion:

Goiterisdefined as an enlargementofthethyroidgland, usuallyindicated byswelling in the anterior neck, which can be classified as endemic or non-endemic, diffuse or nodular, and toxic or non-toxic [14]. 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 [8,15].

Inourcasereport,a49-year-oldfemalepatientwasdiagnosedwithmultinodulargoiter in 2016 at Dr. Soetomo Hospital, Surabaya. This is supported by Trinh et al, who stated that goiterismostoftenfoundintheagerangeof35-50years,witharatioofwomentomenof3:1 [4]

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 withthesizeofthegoiterandcausecompressioneffectssuchasshortnessofbreath,dysphagia, andhoarseness.Theseverityofthesecompressionsymptomsdependsonthesizeandlocation of the goiter [3].

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.Alargegoitercanalsopresstheveinsintheneck,causingcongestionintheface, andifpressingonthecommoncarotidarterycan causedizziness,weakness,andhypomnesia. Pain is rare, while systemic symptoms such as symptoms of hyperthyroidism and hypothyroidismwillnotbefoundinnontoxicmultinodulardisease[2,4,7,8,13].Chen*etal*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 2019showeddataonthelevelofcompressivesymptomsandretrosternalextensionweremore 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 [3].

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 [1]. However, it is in contrast to Chen *et al,* who reported that a cohort study conducted by observing227patientsbasedonweight,namelylargeandmassivegoiter,showedthatmassive goitertendstoexpandtotheretrosternalorsubsternalwhichischaracterizedbytheexpansion of the goiter to the thoracic inlet based on a CT scan [3].

Inourcasereport,thepatientunderwentasurgicalapproachinhertreatment,asurgical 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'ssign,dysphagia)[9].AccordingtotheEuropeanThyroidAssociationin2023, lobectomy/hemithyroidectomytypesurgeryisrecommendedifthethyroid gland enlargement is limited to one lobe; if the thyroid gland enlargement is nodular goiter, then near-total thyroidectomymaybeconsidered[5].Thechoiceofsurgeryinourcasereportiscorroborated byaprospectivestudybyBeatrizetalreportedthatapproximately15%ofpatients(394/2,675) with multinodular goitre required total thyroidectomy to resolve recurrence in a 14.5-year follow-up [10]. 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%requiredre-operation,andthere-operationratewassignificantlyhigherinthesubtotal thyroidectomy group compared to total thyroidectomy (3.14% vs. 0.8%) with a significance value of p<0.001, respectively [11].

The results of postoperative histopathological evaluation showed macroscopically a two-lobethyroidtissueandisthmusweighing1.775grams.Thesizeofthedextralobewas15 x 10x 9 cm, the size of the sinistra lobe was 18 x 12 x 10 cm, and the sizeof 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,partiallydilatedcysticcoatedwithalayerofcuboidalepitheliumwithovoidroundnuclei 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 [3]. Pathologically,adenomatousgoitreisoftendefinedasahyperplasticorcolloidnodule,which is a benign lesion of the thyroid gland [4]. Sanderson polster is a picture of increased colloid secretioninthefollicle,whichcausesprotrusionalongthefolliclewall,whichisenlargedand dilated [16].

Postoperatively, the patient experienced complaints of hoarseness. Accordingto Chen et al reported that, the surgical procedureof the total thyroidectomymethod in massive goiter conditionsischallenging,becauseitisassociatedwithahighriskoflaryngeal nerve damage. In his study, about 11.2% of nerve damage occurred due to the procedure [3]. Lin et al also 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 [12].

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 compressionisarareandchallengingclinicalscenario.Thiscasehighlightsthat,eveninarural tertiary care setting, such complex thyroid pathology can be managed safely and effectively with appropriate surgical planning and multidisciplinary care.

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