

Antepartum Thyroidectomy for Retrosternal Thyroid Goiter

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Background	A female patient presented with a symptomatic, retrosternal thyroid goiter which necessitated antepartum thyroidectomy.
Summary	The patient, a 35-year-old female, presented to the endocrine surgery clinic with a large, retrosternal thyroid goiter. The goiter was found incidentally during a workup for sarcoidosis. She reported dysphagia, a globus sensation, and breathlessness which was aggravated by lying supine. She was clinically and biochemically euthyroid, and fine-needle aspiration of a dominant thyroid nodule was benign (Bethesda II). At the initial consultation, she had recently discovered that she was pregnant and currently at 10-weeks gestation. As a result, the decision was made to postpone surgery until after delivery. However, the patient returned at 25-weeks gestation with worsening respiratory and compressive symptoms. The decision was made to proceed with surgery. The patient was seen preoperatively by otolaryngology, anesthesia, and obstetrics to ensure maternal/fetal safety. A plan was coordinated between specialties, leading to a successful, complication-free thyroidectomy at 27-weeks gestation. While her follow-up appointment did not completely resolve the patient's respiratory symptoms, she had several notable comorbidities that contributed to her symptoms. This case highlights the need for multidisciplinary collaboration in the surgical management of thyroid goiters in pregnant women.
Conclusion	While the morbidity associated with thyroidectomy is low, performing a thyroidectomy during pregnancy increases the risk to both mother and fetus. To best manage these complicated patients, a multidisciplinary approach must be taken.
Key Words	thyroidectomy; thyroid goiter; pregnancy

DISCLOSURE STATEMENT:

The authors have no conflicts of interest to disclose.

FUNDING/SUPPORT:

The authors have no relevant financial relationships or in-kind support to disclose.

RECEIVED: August 4, 2020

REVISION RECEIVED: October 6, 2020

ACCEPTED FOR PUBLICATION: November 1, 2020

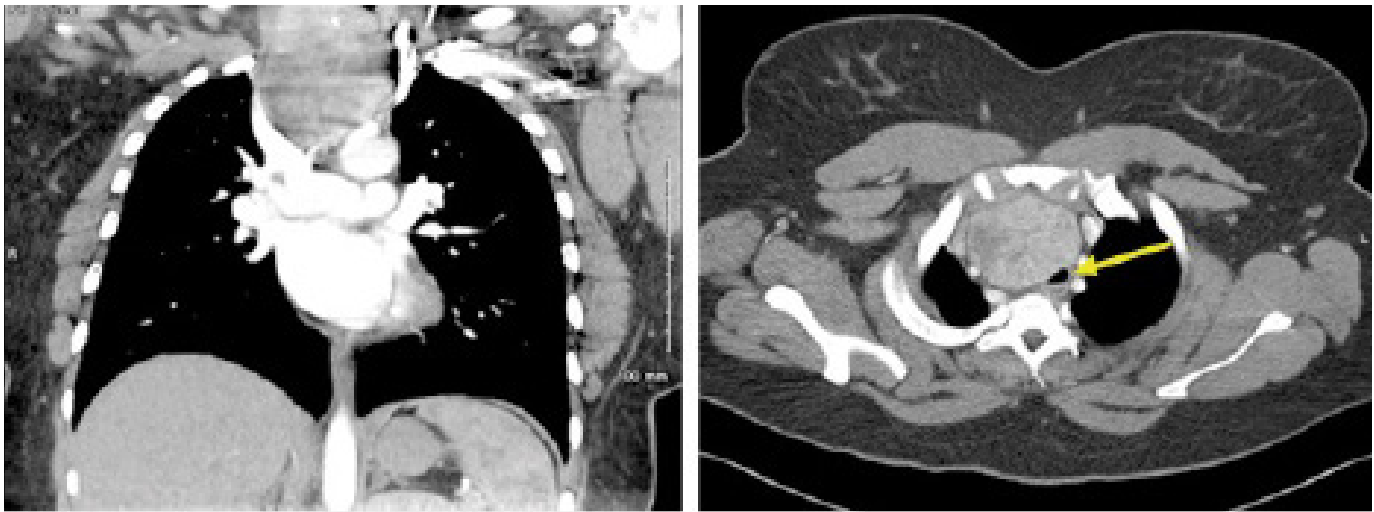
To Cite: Cimaroli S, Wang TS. Antepartum Thyroidectomy for Retrosternal Thyroid Goiter. *ACS Case Reviews in Surgery*. 2022;3(6):73-77.

Case Description

The patient, a 35-year-old female, presented to the endocrine surgery clinic with a large, retrosternal thyroid goiter. Her medical history was significant for obesity (BMI 43.52 kg/m²), asthma, and gastroesophageal reflux (GERD). As part of an evaluation for possible sarcoidosis, a computed tomography (CT) scan was performed and revealed a large, retrosternal thyroid goiter (Figure 1), prompting a referral to an endocrine surgeon for evaluation.

size, a fine needle aspiration (FNA) biopsy was performed. Cytology was consistent with a benign nodule (Bethesda II).² It was discussed that, given the extensive mediastinal extension of the goiter and the fact that the base was wider than the area at the thoracic inlet, it was possible that a sternotomy would be required at the time of thyroidectomy. Based on risks (likelihood of necessary sternotomy) and benefits, the decision was made to postpone surgery until after the patient gave birth.

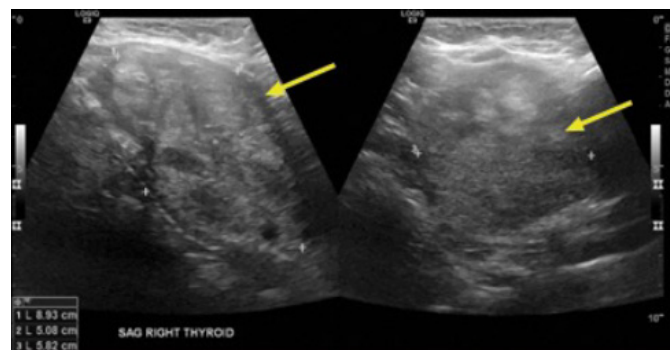
Figure 1. CT Image Demonstrating Substernal Involvement of Thyroid Goiter and Moderate Tracheal Compression. Published with Permission



At the time of presentation to the endocrine surgery clinic, she was recently discovered to be pregnant at 10-weeks gestation. Symptoms from her large, retrosternal thyroid goiter included occasional dysphagia, a globus sensation, and breathlessness which was worsened by lying supine. She denied any vocal changes. She was clinically and biochemically euthyroid (TSH 0.665ulU/mL).

Cervical ultrasonography revealed a 5.6 cm left lobe and an enlarged right thyroid lobe measuring 9.4 cm at its largest dimension with an 8.9 cm nodule (Figure 2). On CT imaging, the right thyroid lobe measured 6.0 × 7.0 × 8.0 cm, with 6 cm of retrosternal extension reported. The trachea was deviated to the left and compressed to 9 mm in diameter. The thyroid imaging reporting and data system (TI-RADS) score for the nodule was three, based on composition and echogenicity.¹ Combined with its large

Figure 2. Cervical Ultrasound. Published with Permission



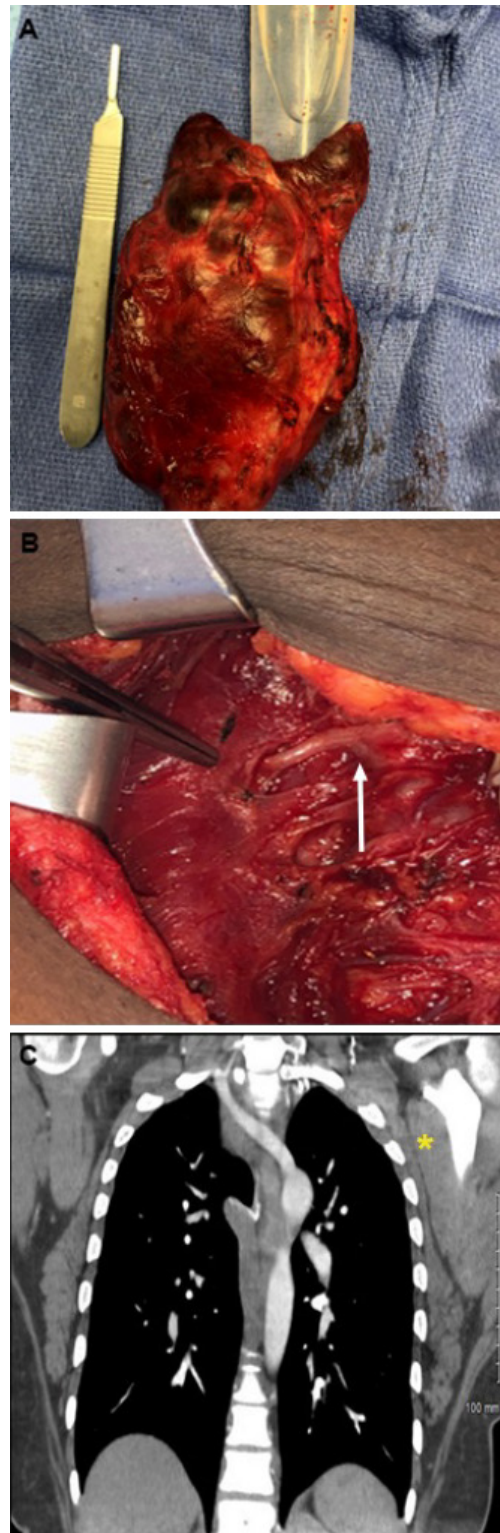
Imaging shows 5.6 × 1.3 × 1.1 cm left lobe and enlarged right thyroid lobe measuring 9.4 × 6.0 × 4.4 cm with 8.9 × 5.1 × 5.8 cm solid, isoechoic nodule. TI-RADS score of 3 based on composition and echogenicity.

However, the patient returned at the start of her third trimester (25-weeks gestation) with worsening compressive symptoms. She reported feelings of increased breathlessness at baseline and with exertion. Evaluation by her pulmonologist resulted in a recommendation to proceed with surgery due to concern for progressive airway narrowing in the third trimester. Of note, she had gained an additional 25 pounds since her last visit and now had a positive Pemberton's sign. A repeat chest CT showed no change from her previous scan with respect to the size of her goiter. There was ongoing concern that the presence of the goiter would worsen her pulmonary status for the remainder of her pregnancy. After extensive discussion with pulmonology, obstetrics, and endocrine surgery and the patient regarding the risks of surgery for benign disease, with unknown improvement in her respiratory symptoms, particularly in light of the possible need for sternotomy, and the possibility of preterm labor, given the timing of surgery, the decision was made to proceed with surgery. After a discussion with the patient and the multidisciplinary team regarding the optimal extent of surgery, the patient elected to undergo a total thyroidectomy.

Preoperatively, the patient met with the anesthesia team, who made the determination to do an awake intubation, and otolaryngology, who performed a laryngoscopy in light of the size and substernal extension of the goiter (normal vocal cord motion bilaterally was noted). The high-risk maternal-fetal medicine team was also involved with perioperative care, including continuous fetal heart rate monitoring and the presence of a labor and delivery nurse throughout the procedure. Thoracic surgery also was consulted and available on the day of surgery, if needed.

A total thyroidectomy was successfully performed at 27-weeks gestation. The patient was placed in a beach-chair position, and the chest was included in the sterile field if sternotomy were to be warranted. The procedure was completed without patient/fetal complications or need for sternotomy; the total operative time was 2 hours and 14 minutes (Figure 3A). Recurrent laryngeal nerve monitoring was performed intermittently throughout the case. Microscopic examination of the specimen revealed that the nodule was composed of multinodular hyperplasia with regressive changes. Interestingly, we found that the patient had a nonrecurrent laryngeal nerve and an aberrant right subclavian artery that branched directly off of the ascending aorta (Figure 3B and Figure 3C).

Figure 3. Intraoperative and CT Images. Published with Permission



A) Gross image of thyroid specimen, which weighed in at 189 g and measured $12 \times 8 \times 4$ cm; B) image of nonrecurrent laryngeal nerve, which went directly from its origin at vagus nerve to larynx without looping around subclavian artery (arrow pointing to nonrecurrent laryngeal nerve); and C) CT image of aberrant origin of right subclavian artery branching off of ascending aorta (asterisk (*) indicating anomalous origin).

Her postoperative course was uneventful. A four-hour postoperative PTH level was drawn, which was normal (60 pg/mL), and calcium supplementation was not initiated, as per our institutional protocol for patients after total thyroidectomy.^{3,4} Fetal monitoring was performed daily throughout her stay. She had respiratory therapy with albuterol treatments to treat her chronic asthma symptoms. On postoperative day 1, she was discharged on 150 mcg of levothyroxine daily without calcium supplementation.

At her follow-up ten days later, her incision had healed well with no evidence of seroma or infection. Her voice was normal, and she denied symptoms of hypocalcemia. She did not report having significant changes in her preoperative respiratory symptoms.

The patient delivered at 36 weeks and six days via repeat classical cesarean section. Her infant was born weighing 6 lbs and 7 oz and had APGAR scores of eight and nine at one and five minutes, respectively. Of note, a TSH taken at the time of admission for delivery was elevated at 32.64 mIU/mL. The patient reported that she had not been taking her levothyroxine as prescribed. A follow-up with her endocrinologist was recommended.

Discussion

The frequency of incidental identification of thyroid abnormalities is estimated to be between 16 and 27%, dependent on imaging modality.⁵ The evaluation of an incidentally identified goiter is a systematic process that consists of evaluating patient symptoms, laboratory studies, imaging, and, if indicated, FNA biopsy of thyroid nodules. Based on these factors, optimal management can be discussed with the patient. In the case of benign thyroid goiters, clinical judgment and patient preference are relied upon. If it is possible to relieve compressive symptoms with thyroid lobectomy alone, that would be ideal, as the contralateral parathyroid glands and recurrent laryngeal nerve would be left undisturbed. There is a possibility that the patient will not require thyroid hormone postoperatively.⁶⁻⁸ However, the goal is the relief of compressive symptoms, so if that cannot be achieved through thyroid lobectomy, then a total thyroidectomy may be performed.⁸ While the morbidity of thyroidectomy is low, thyroid-specific complications of recurrent laryngeal nerve injury and hypoparathyroidism may significantly affect the patient's quality of life. They should be discussed, particularly in the setting of mediastinal goiters.^{6,7,10}

Specific to this patient was the risk of general anesthesia and the possible need for sternotomy in the setting of antepartum thyroidectomy for a benign goiter. Pregnant women who undergo general anesthesia are at increased risk for aspiration, thromboembolism, and preterm delivery, particularly after the second trimester.¹² To avoid risk to mother and fetus, surgery should be delayed until after delivery in most patients with benign thyroid disease.¹¹ However, if that is not possible, surgery during the second trimester is preferred.¹² Patients should be evaluated on a case-by-case basis by an anesthesiologist and in the context of a multidisciplinary team prior to surgery to determine the appropriate course of action.

Antepartum thyroidectomy has been shown to be a safe procedure for both expectant mothers and fetuses.¹³ However, following successful completion of the surgery, pregnant mothers and their fetuses are not free of risk. One sequela of thyroidectomy is hypothyroidism which can be managed by lifelong levothyroxine.⁴ Primary or secondary hypothyroidism that is inappropriately managed during pregnancy can have numerous adverse effects on the mother and developing fetus. Maternal effects of hypothyroidism are increased risk of gestation hypertension, postpartum hemorrhage, and abruptio placenta.¹⁴ Fetal effects of maternal hypothyroidism are preterm labor, low birth weight, and neonatal respiratory distress.¹⁴ One complication experienced by our patient who failed to comply with daily levothyroxine was preterm labor. It is imperative that physicians counsel patients on the importance of medication compliance to ensure maternal and fetal well-being following antepartum thyroidectomy.

The decision to perform an antepartum thyroidectomy on a patient in her second trimester was not taken lightly. However, an intervention was warranted considering the tremendous disruption she was experiencing in her quality of life due to dyspnea. Of note, the dyspnea experienced by this patient was multifactorial. Alone, pregnancy, asthma, redundant neck tissue, weight gain, and retrosternal goiters can cause dyspnea.^{15,16} Combined, they seemed to have an additive effect on this patient. Of all the factors contributing to the patient's dyspnea, her retrosternal goiter was the only readily modifiable one. While it has been shown that thyroidectomy for treatment of thyroid goiters leads to improved quality of life and fewer symptoms in non-pregnant females without respiratory comorbidities, it has not been studied in pregnant women with other respiratory ailments.¹⁶ Women with comorbidities who

choose to undergo antepartum thyroidectomy for relief of compressive symptoms should be counseled about the possibility of residual respiratory symptoms.

Conclusion

While the morbidity associated with thyroidectomy is low, performing a thyroidectomy during pregnancy increases the risk to both mother and fetus. To best manage these complicated patients, a multidisciplinary approach must be taken.

Lessons Learned

Additional care must be taken when performing a thyroidectomy on a patient who is pregnant such as awake intubation, fetal heart rate monitoring, and preparations for an emergency delivery. Close monitoring of maternal PTH is necessary after antepartum thyroidectomy to avoid fetal complications of maternal hypoparathyroidism.

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