


Giant Thyroid Gland Abscess Causing Upper Airway Obstruction: A Case Report

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Background: Thyroid gland abscess is a rare pathology with life-threatening complications when there is a delay in diagnosis. However, physicians should be aware of and consider this differential in patients with anterior neck swelling having acute onset compressive symptoms to ensure early diagnosis and management.

Case Presentation: A 62-year-old female patient presenting with worsening of painful anterior neck swelling with associated fever, shortness of breath, and difficulty swallowing. The patient was found to have a thyroid abscess causing upper airway obstruction, against a background of follicular nodular disease found on clinical examination, cytology and fluid analysis from aspirate, biopsy, ultrasonography, and computed tomography. The patient was managed with endotracheal intubation and was subsequently discharged after recovery with antibiotic therapy, incision and drainage, and thyroid lobectomy.

Conclusion: Thyroid abscess is an uncommon, critical clinical condition with high morbidity and mortality. Thyroid gland abscess should be considered while evaluating patients presenting with acute onset anterior neck swelling. Satisfactory clinical outcomes could be achieved with early diagnosis and proper management.

Keywords: thyroid abscess, thyroid emergency, upper airway obstruction, anterior neck mass, incision and drainage, thyroidectomy

Introduction

The thyroid gland is considered to be less prone to develop infection due to its abundant blood supply, extensive lymphatic drainage, high iodine content, well-developed capsule, and because it is separated from other neck structures by fascial planes.¹⁻³ Besides the anatomic and physiologic protective mechanisms, better access and advancement of antibiotics make the incidence of thyroid abscesses uncommon in current practice. Suppurative thyroid infections account for 0.7% of thyroid gland pathology.¹ However, its occurrence will lead to serious complications including systemic sepsis, thyroid storm, upper airway obstruction, tracheal or oesophageal perforation, descending necrotizing mediastinitis, and internal jugular vein thrombosis.⁴⁻⁸ In order to make an early diagnosis and institute proper management, physicians should consider a thyroid gland abscess as a differential in patients who present with rapid onset anterior neck swelling.

We describe the clinical presentation, treatment options, and outcome of a patient with a large thyroid abscess causing upper airway obstruction and respiratory failure.

Case Presentation

A 62-year-old female was referred to our hospital as a case of upper airway obstruction secondary to possible advanced thyroid cancer + Grade 5 dysphagia after five days of stay. She presented with anterior neck swelling of 12 years' duration, which increased in size rapidly over five days with associated fever, shortness of breath, a hoarse voice, difficulty swallowing both solids and a fluid diet, and vomiting of ingested matter. She had long-standing intolerance of heat and irritability, and was easily fatigued, and had experienced unquantified weight loss despite having a good appetite along with anterior neck

swelling. Otherwise, she had no history of cough, orthopnea, body swelling, previous neck surgery or trauma, treatment for tuberculosis, or chronic medical illnesses like diabetes, asthma, hypertension, cardiac or renal disease. For the above complaint, she was treated at the referring hospital with oxygen supplementation, ceftriaxone, and dexamethasone for a week but did not show improvement.

Upon presentation, the patient was acutely sick looking, in severe respiratory distress and had a stridor with oxygen saturation (SPO₂) of 77% on a 15-liter per minute face mask. She had a respiratory rate of 40–44 breaths per minute, pulse rate of 118 beats per minute, blood pressure of 145/90 mm Hg, and temperature of 37.8 °C. Examination of the neck revealed a large mass more on the right side of the anterior neck, which was shiny without ulceration or discharge. The mass was non-tender and warm to the touch, with a firm-to-hard consistency. It measured 15×13 centimeters, extending from the sternum to the submental area, but had no retrosternal extension on either palpation or percussion (Figure 1). Upon oropharyngeal assessment, the patient had a Mallampati score of III.⁹ Otherwise, there were no oropharyngeal lesions or cervical lymphadenopathy, and no pertinent findings on other systems.

Laryngoscopic glottis visualization showed complete obstruction of the glottis, class 4 according to the Cormack–Lehane scale, but no visible mucosal infiltration, thickening, or bleeding.⁹ With the above history and following physical examination, mixed type 1 and 2 respiratory failure, secondary to upper airway obstruction, anterior neck mass compression, and hospital-acquired pneumonia was considered. With this, a difficult airway was anticipated and prepared for double setup airway management but there was no place for a surgical airway. Adequate preparation was made to increase the success rate of endotracheal intubation with a bronchoscope. A rigid bronchoscope with a size of 7 mm was used to visualize the airway and possible intubation; however, we could not advance the scope beyond the glottis area due to the compression effect of the mass causing resistance. No visible infiltrative mass was noted to the level of the airway evaluated (Figure 2). The patient was then intubated with a 6 mm endotracheal tube secured at a depth of 18 cm and put on a mechanical ventilator: AC/VCV mode, FiO₂ of 100%, positive end-expiratory pressure of 5 cm of H₂O, SPO₂ ranging from 96–98%, tidal volume of 360 mL, and rate of 14.

Once the patient was stabilized, she was investigated with a complete blood count showing leucocytosis of 25.47×10^3 , with left-shift and moderate anemia. Her thyroid function test result was within the normal range. Fluid analysis from the aspirate of swelling was chocolate-colored thick pus with a cell count of $108,000/\text{mm}^3$, a neutrophil of 85%, and a low glucose level (Table 1). Gram stain from aspirate revealed gram-positive cocci in pairs; however, culture and sensitivity tests were not done due to their unavailability in our setup. Cytology results from the aspirate demonstrated intense suppurative inflammation along with necrotic material, which raised suspicion of malignancy. Neck ultrasound showed a homogeneously hypoechoic avascular midline ovoid mass more on the right, with posterior acoustic enhancement measuring 13×10.7 cm, and a significant mass effect on the cervical esophagus and trachea



Figure 1 Anterior (A) and lateral (B) neck view of the patient with thyroid gland abscess.

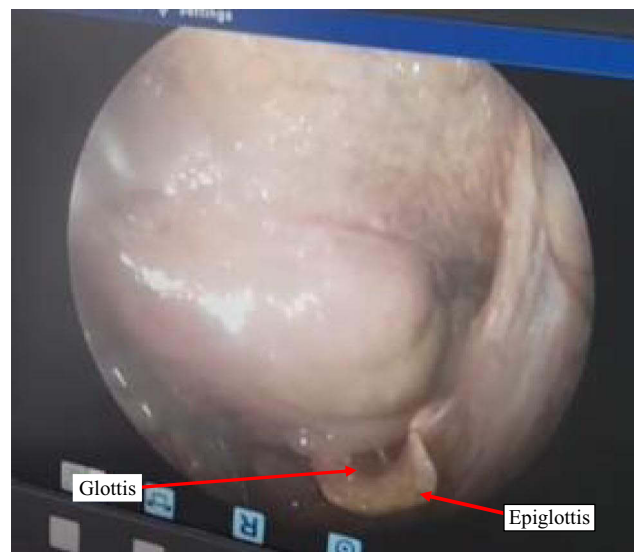


Figure 2 Rigid bronchoscopy of the patient showing nearly closed glottis before intubation.

(Figure 3). Head and neck computed tomography (CT) performed two days prior to her presentation revealed a well-defined lesion, with water attenuation at the right neck region extending from the clavicle inferiorly to the hyoid bone level, craniocaudally measuring $11 \times 10.5 \times 10.8$ cm (craniocaudal, transverse, anterior–posterior). The lesion had enhancing soft tissue foci, likely thyroid tissue. The lesion displaced right-side vascular structures postero-laterally and midline structures (larynx, trachea, and esophagus) on the left lateral side, suggesting a large cystic mass originating from thyroid tissue (Figure 4).

Table I Laboratory Results of the Patient Upon Initial Presentation and at Discharge

| Complete Blood Count | Presentation | Discharge | Reference range |
|---------------------------------------|---------------------|--------------------|-------------------------------------|
| White blood cell | 25.47×10^3 | 11.1×10^3 | $3.9-10.1 \times 10^3 /\text{mm}^3$ |
| Neutrophil | 94.7% | 79.9% | 30.4–74.6% |
| Lymphocyte | 3.4% | 15.5% | 17.8–61.5% |
| Hemoglobin | 9.1 | 9.2 | 10.4–14.7 g/dl |
| Hematocrit | 26.3 | 27.6 | 34.4–48.3% |
| Mean cell volume | 79.9 | 81.6 | 74.3–98.3 fl |
| Mean cell hemoglobin | 27.5 | 27.1 | 25.7–33.6 pg |
| Platelet count | 685×10^3 | 345×10^3 | $100-300 \times 10^3 /\mu\text{L}$ |
| C-reactive protein | 89 | – | 0–10 mg/dl |
| Erythrocyte sedimentation rate | 42 | – | 0–20 mm/hr |
| PICT for HIV | Non–reactive | | |
| Prothrombin time | 15.2 | – | 13–16.1/sec |
| Activated partial thromboplastin time | 30.8 | – | 36.3–44.8/sec |
| International normalized ratio | 1.34 | – | 1–1.35 |
| Creatinine | 0.5 | 0.6 | 0.5–0.9 mg/dl |
| Urea | 10 | 12 | 10–50 mg/dl |
| Aspartate amino-transferase (AST) | 12 | 14 | < 37 U/L |
| Alanine amino-transferase (ALT) | 13 | 16 | < 42 U/L |
| Alkaline phosphatase (ALP) | 204 | 193 | 64–306 U/L |

(Continued)

Table 1 (Continued).

| Complete Blood Count | Presentation | Discharge | Reference range |
|-----------------------------------|-------------------------|-----------|-------------------------|
| Sodium | 143 | 138 | 136–145 mmol/l |
| Potassium | 2.81 | 3.65 | 3.5–5.5 mmol/l |
| Calcium (ionized) | 1.23 | 1.25 | 1.05–1.35 mmol/l |
| Magnesium | 1.4 | 2.01 | 1.9–2.5 mg/dl |
| Thyroid-stimulating hormone (TSH) | 0.456 | – | 0.274–4.256 μ IU/mL |
| Free triiodothyronine (FT3) | 3.644 | – | 3.058–6.764 pmol/l |
| Free tetraiodotyronine (FT4) | 20.88 | – | 10.53–21.16 pmol/l |
| Thyroid fluid analysis | | | |
| Cell count | 108,000/mm ³ | | |
| Neutrophil | 85% | | |
| Lymphocyte | 15% | | |
| Protein | 6.3 g/dl | | |
| Glucose | 45 mg/dl | | |
| Random blood sugar | 150 mg/dl | | |

Abbreviations: PICT, Provider Initiated Counseling and Testing; HIV, Human Immunodeficiency Virus.

Subsequently, after stabilization and initial investigation, incision and drainage (I & D) of the thyroid abscess was done, draining a total of 900 mL thin pus with the initial aspirate (Figure 5). Antibiotics were initiated and wound care was done on a daily basis. The patient was extubated after four days of intubation with improvement. Subsequently, the patient had persistent discharge from the wound and neck swelling increased. A right-side thyroid lobectomy with cystic mass excision was then performed, and a 6×6 cm smooth cystic mass on the right thyroid lobe on an elective base was found interoperatively. The patient was discharged in a better condition after 10 days of stay in the hospital. The biopsy result turned out to be follicular nodular disease.

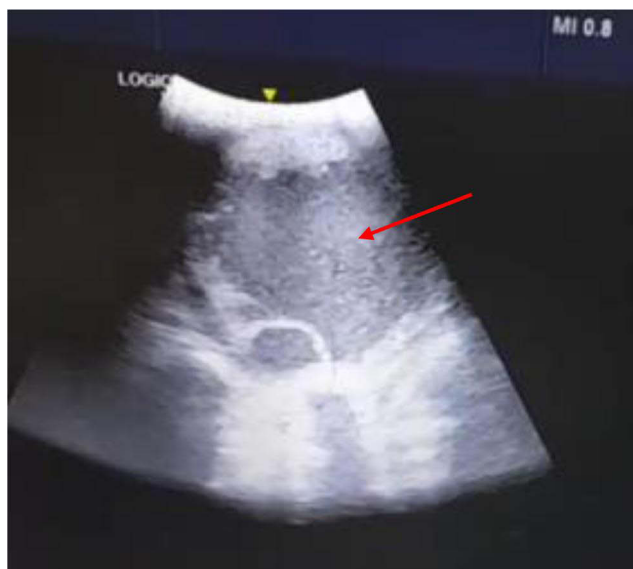


Figure 3 Bedside neck ultrasound of the patient showing hypoechoic lesion in the right lobe of the thyroid gland as depicted by the arrow.

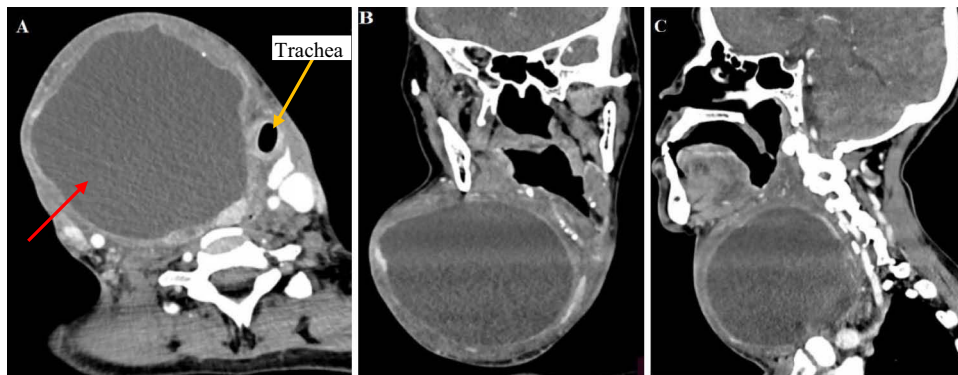


Figure 4 Head and neck post-contrast CT scan of the patient. (A) axial view of a huge thyroid abscess more on the right side as depicted by the red arrow; (B) coronal view of the same lesion causing lateral compression of the trachea and esophagus; (C) sagittal view of the same lesion.



Figure 5 (A) Needle aspiration of thyroid abscess; (B) after draining 450 mL of pus; (C) drained pus.

Discussion

The thyroid gland is inherently resistant to infection; however, infectious pathogens can advance into it through either a direct spread or the hematogenous or lymphatic route. Anatomic defects like pyriform sinus fistula or thyroglossal duct cysts, penetrating trauma, and fine needle aspiration cytology (FNAC) of the thyroid gland are considered sources of direct infectious spread. Immunosuppression like diabetes, HIV, chronic steroid use, chemotherapy, transplant recipients, older or debilitated patients, Hashimoto's disease, and huge goiter or thyroid malignancy are other predisposing factors to developing suppurative thyroid infections. Reports have shown that thyroid gland abscess is more common in women as compared to men.^{10–12} Our case did have a similar risk of developing thyroid abscess by having a long-standing goiter and being female in her 7th decade of life.

Patients with thyroid abscess usually present with neck swelling, fever, neck pain, difficulty breathing, and dysphagia occurring over a short period. Laboratory findings include leukocytosis, raised CRP, and erythrocyte sedimentation rate. Thyroid function tests are usually normal. Fine needle aspiration (FNA) for gram stain, culture, and cytology will confirm the diagnosis of thyroid abscess.¹² A recommended imaging study for confirming the diagnosis of suppurative thyroiditis and/or an abscess is ultrasound. Ultrasound is crucial not only for diagnosis but also for image-guided thyroid abscess drainage, and planning surgical exploration by assessing the extent of abscess involvement in adjacent neck structures. A CT scan is recommended in cases of inconclusive ultrasound evidence or when local anatomic defects are suspected.^{13,14} For our patient, both ultrasound and CT scan studies showed the possibility of a thyroid abscess. Using FNAC, we were able to confirm the diagnosis of thyroid abscess along with her clinical presentation.

The differential diagnosis for a rapidly enlarging anterior neck mass is quite broad, with neoplastic causes being the most common. However, a thyroid gland abscess is rare and usually not considered as a possibility until it results in

a life-threatening complication. The diagnosis of thyroid abscess was delayed in our case and was almost about to cost the life of the patient by causing upper airway obstruction and subsequently respiratory failure. A high degree of suspicion is needed to make a diagnosis of such a rare disease, especially in patients who present to the emergency department with a life-threatening condition.

The treatment of thyroid abscess should consist of culture and sensitivity-based parenteral antibiotics covering both gram-negatives and anaerobes, incision and drainage, and sometimes surgery to the extent of total thyroidectomy. Thyroidectomy could be necessary for patients who do not respond to adequate antibiotic treatment and drainage or for those patients who have underlying anatomic defects that could predispose them to recurrence.^{15–18}

The definitive thyroid abscess management should be instituted after the initial stabilization of the airway, breathing, and circulation in patients who present to the emergency department with life-threatening compressive symptoms.⁹ In our case, we did stabilize the airway with intubation as the patient was in respiratory failure upon presentation; we then reinitiated antibiotics and carried out ultrasound-guided aspiration followed by incision and drainage. Finally, we performed a thyroidectomy.

Complications of thyroid abscesses are usually fatal and have a poor prognosis. Complications include systemic sepsis, upper airway obstruction, descending necrotizing mediastinitis, tracheal or oesophageal perforation, jugular vein thrombosis, sympathetic trunk paralysis, laryngeal chondritis or perichondritis, and death.^{12,19}

Conclusion

Thyroid gland abscess is a rare diagnosis with significant morbidity and even mortality if not managed in a timely manner. In our case, the patient had an upper airway obstruction which subsequently led to respiratory failure. Therefore, clinicians should apply a high level of suspicion in terms of diagnosis in order to initiate early aggressive management.

Ethical Approval

Ethical approval is deemed unnecessary by St. Paul's Hospital Millennium Medical College Institutional Review Board as this is a single rare case faced during clinical practice and it does not involve experiments on humans or animals.

Consent for Publication

Written informed consent was obtained from the patient for publication and use of images. The written consent is available for review by the Editor-in-Chief of this journal upon inquiry.

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Disclosure

The authors declare no conflicts of interest in this work.

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