

# Thyroid Abscess: A Rare Endocrine Emergency: A Case Series and Literature Review

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## ABSTRACT

Thyroid abscess can become a life-threatening endocrine emergency. The incidence for thyroid abscess is less than 0.1% of all thyroid diseases and most are seen in immunocompromised patients. We present four cases of thyroid abscess that were admitted in our center between January 2000 to December 2019, highlighting the difficulties in diagnosing thyroid abscess as ultrasound or Computed Tomography (CT) could be inconclusive. We will also discuss on the management of our thyroid abscess cases. In conclusion, a high index of suspicion is needed to confidently diagnose a thyroid abscess, in order for prompt action to be taken, for example surgery to drain the abscess, to prevent further complications.

**Keywords:** Thyroid abscess; Acute suppurative thyroiditis; Emergency

## INTRODUCTION

Thyroid abscess can become a life-threatening endocrine emergency. If left untreated, it can result in 12% mortality [1]. However, thyroid abscess is very rare. The incidence for thyroid abscess is less than 0.1% [2]. The rarity of thyroid abscess is due to the anatomic and physiologic characteristic of the gland. Thyroid gland is very resistant to infection due to its high glandular content of bactericidal iodine. The separation of the thyroid gland from other structures of the neck by a capsule, facial planes in the neck, extensive blood supply and excellent lymphatics drainage prevents infection to penetrate [1-7]. Literature reviews report the risk factors for thyroid abscess can be due to pre-existent thyroid disease i.e: Hashimotos, anatomic gland anomalies i.e: thyroglossal duct remnant, piriform fistula, trauma, and immunocompromised patients [2-4,8]. Diagnosis made was based on clinical presentation, laboratory, and imaging findings. Four patients with this rare diagnosis are reported in this study.

## MATERIALS AND METHODS

A total of four cases of thyroid abscess were reviewed in this study. We defined thyroid abscess as a collection of pus that has built up within thyroid tissue. This information was obtained from the database of Breast and Endocrine Unit, Putrajaya Hospital, Malaysia, between January 2000 to December 2019.

## CASE DESCRIPTION

### Case 1

A 57-year-old Indian lady with underlying diabetes and hypertension presented with a history of progressive left neck pain, dysphagia, anterior neck swelling, and fever for one week. There were no other risk factors found for this patient. Neck examination revealed a left anterior neck swelling which moves with deglutination, measuring 17 x 7 cm, tender, warm, and hard in consistency. No cervical lymph nodes were palpable. Her total white blood count was surprisingly normal;  $6.5 \times 10^9 /L$  (normal range:  $4-11 \times 10^9 /L$ ). Thyroid function test showed a high T4 of 21.7 pmol/L (normal range: 7.9-14.4 pmol/L). Ultrasound neck done showed a left thyroid multiloculated abscess with pockets of air seen within. Contrast-Enhanced CT (CECT) neck and thorax revealed a deep left neck abscess compressing the trachea. A diagnosis of left thyroid abscess was made and IV Ampicillin/Sulbactam was commenced. Patient underwent surgical drainage which yielded 30 cc of pus. Intraoperatively, no normal left thyroid tissue was seen. Pus culture and sensitivity came back as *Klebsiella Pneumoniae* and histopathology reported a thyroid tissue with abscess wall. Post operatively, the wound was left open and daily normal saline dressing was done for total of one week, then changed to *aquacel* AG dressing every three days. The patient was discharged well and no recurrent abscess.

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## Case 2

A healthy 41-year-old Malay lady presented with anterior neck swelling for three months duration associated with recurrent fever, night sweats, and weight loss. She denied hypothyroid or hyperthyroid symptoms nor obstructive symptoms. Clinically noted right anterior neck swelling measuring 5 x 4 cm, erythematous, firm, tender, with right cervical lymph nodes palpable. Laboratory evaluation demonstrated a normal leucocyte count of  $7.7 \times 10^9$  /L (normal range  $4-11 \times 10^9$  /L), high ESR of 57 mm/h (normal range: 4-7 mm/h) and CRP of 20.2 mg/L (normal range: <10 mg/L). Thyroid function test showed normal free T4 of 10.2 pmol/L (normal range: 7.9-14.4 pmol/L). The findings from ultrasound neck revealed an anterior neck collection in keeping with infection and a solitary right thyroid nodule. CECT neck and thorax reported appearances with differential diagnosis of infective granuloma. Fine Needle Aspiration Cytology (FNAC) of the thyroid gland only showed an acute suppurative inflammatory process. A repeated FNAC showed nodular goitre with cystic degeneration. Patient underwent incision and drainage with a total of 16 cc of thick pus drained. Pus was sent for AFB culture and yielded *Mycobacterium Tuberculosis* (TB) complex. Mantoux test was positive: 18 mm. A diagnosis of TB thyroid was made and patient was treated successfully with anti-tuberculous medications by our medical counterparts for a total of four months.

## Case 3

A 7-year-old Malay boy with no comorbidity presented with gradually increasing anterior neck swelling for five days associated with pain and intermittent fever. Clinical examination noted left anterior neck swelling measuring 6 x 4 cm, tender upon palpation, moving with deglutination, no punctum, not fluctuant, and no skin changes. No cervical lymph node was palpable. His leucocyte count was raised,  $21.6 \times 10^9$  /L (normal range:  $4-11 \times 10^9$  /L). Thyroid function test showed high free T4 of 18.3 pmol/L (normal range 7.9-14.4 pmol/L). Anti-thyroglobulin was high 997.9 u/ml (normal range <155 U/ml). He was initially treated for left thyroiditis and started on IV co-amoxiclav. We proceeded with ultrasound neck which revealed a heterogeneous vascular solid lesion within the left thyroid lobe with bilateral cervical lymphadenopathy. CECT neck noted a large heterogeneously enhancing lesion occupying the whole of left thyroid lobe measuring 4.5 x 5.2 x 5.7 cm with extension to the suprasternal region. However, no obvious communication with the pyriform sinus was seen. The CECT neck concluded that there was a large partially liquefied abscess in the left thyroid gland. Patient then underwent drainage of the left thyroid abscess. Intra-operative findings noted necrotic tissue involving the strap muscles extending into the left thyroid gland. Patient was discharged well on day one post operatively. Culture sent showed no growth for organism and histopathology was consistent with abscess with fibrosis granulation tissue formation. Wound dressing was done with *aquacel* Ag every three days. On follow up, wound was well healed after one month and no recurrence noted. CT scan confirmed that there was no congenital anomaly of piriform fistula.

## Case 4

A 55-year-old Malay man with underlying hypertension and dyslipidaemia, presented with one week history of anterior neck swelling that gradually increased in size, associated with fever. Clinical examination revealed a left anterior neck swelling measuring 5 x 3 cm, not fluctuant, firm, tender on palpation, with no cervical

lymph node palpable. Initially, he was treated for subcutaneous neck abscess and was on IV antibiotics for six days. Blood investigations revealed leucocytosis with high C-reactive protein. T4 was mildly raised 14.8 pmol/L (normal range 7.9-14.4 pmol/L). Ultrasound neck showed features suggestive of haemorrhagic or infected cyst. CECT neck and thorax reported a large well defined multiloculated cystic lesion collection in the left thyroid lobe with retrosternal extension and local mass effect, complicated with right tracheal deviation. Multiple attempts of ultrasound guided aspirations proved to be futile. He finally underwent wound debridement and drainage of the thyroid abscess. Intraoperatively, 20 cc of frank pus was drained, and dense adhesions made it difficult to delineate anatomical structures surrounding the affected area. Daily dressing with *dermasyn* solution was done at first, then changed to every-other-day dressing with *aquacel* and secondary suturing was done after three weeks. His tissue culture came back as *Staphylococcus Aureus* and histopathology interpretation of the thyroid tissue is consistent with an abscess wall.

## RESULTS AND DISCUSSION

The gender distribution revealed an equal preference with male: female ratio of 1:1. The mean age at diagnosis was 40 years, SD (23.1). The racial distribution showed Malay race preponderance, Malay: Indian 3:1. Only one patient (25%) had underlying diabetes mellitus, hypertension, and ischaemic heart disease. Another patient had only hypertension and ischaemic heart disease, but not diabetes mellitus. Two patients had no previous comorbid. All of the cases came with fever and neck swelling at first presentation. Neck examination demonstrated various sizes of neck swelling, which were tender on palpation. WBC was raised in 50% of the cases. Imaging was done in all patients (neck ultrasounds and CT scans), however both were inconclusive of thyroid abscess.

All four patients were treated with IV antibiotics and drainage of the thyroid abscess. Second generation cephalosporin (cefuroxime) was used in case 2 and case 4 which has a good coverage both gram-positive and gram-negative organism as well as anaerobes. On the other hand, case 1 and case 3 were treated with penicillin group antibiotics. Unasyn, which is a combination of ampicillin and sulbactam, and Augmentin, which is a combination of amoxicillin and clavulanic acid, are both broad-spectrum antibiotics with excellent coverage of aerobes and anaerobes. Only three cases had positive cultures; *Klebsiella Pneumonia*, *Tuberculosis*, and *Staphylococcus Aureus* respectively. Literature review revealed that the most important causal organisms are from the gram-positive aerobic bacteria, namely *Staphylococcus Aureus*, *Hemolytic Streptococci*, and *Pneumococci* [4]. Antibiotics with good gram-positive cover were chosen to treat all four patients in our case series. However, there were no specific common organisms found in our studies.

Ioannis Strarakis et al. described a case of *Brucella Melitensis*, gram-negative bacteria, as one of the rare causal organisms for thyroid abscess [9]. The patient was treated with combination of three antibiotics namely Vancomycin, Rifampicin, and Doxycycline. Patient also underwent surgical removal of the right thyroid lobe and isthmus when her condition deteriorated. She then had an uneventful recovery.

Histopathological diagnoses were obtained in three cases which confirmed evidence of abscess wall. Fine needle aspiration and cytology of the TB thyroid patient only revealed nodular goitre with cystic degeneration. TB thyroid is extremely rare. In case 2, the

patient presented with subacute thyroid abscess. Contrast-enhanced CT may help localize the caseous necrotic lesion [10]. In our TB thyroid case, the CECT neck and thorax showed a hypoechoic area with enhancing wall in the anterior aspect of the neck, suggestive of a collection. However, no caseous necrotic lesion was detected (Figure 1).

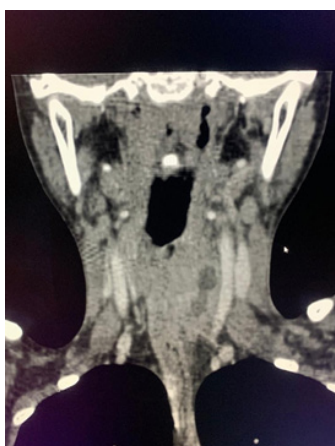


Figure 1: CECT in TB thyroid.

Fine needle aspiration of the thyroid gland done only showed an acute suppurative inflammatory process. A case report by uz-Zaman et al managed to diagnose TB thyroid by ultrasound guided FNAC which revealed extensive caseous necrosis suggestive of tuberculosis [11]. The case report also concluded that complete resolution usually follows an appropriate anti-tuberculous drug treatment. But in cases with large abscess, surgical drainage or resection followed by anti-tuberculous treatment is considered the optimal treatment choice [11].

E.J. Rich et al found that in the paediatric age, pre-existent thyroid disease, the persistence of a thyroglossal duct remnant, trauma, or a piriform sinus fistula predispose patients to thyroid infection [3]. However, there were no specific predisposing factors found in our paediatric thyroid abscess case. CT scan confirmed that there was no congenital anomaly of piriform fistula (Table 1). The mainstay treatment for thyroid abscess is parenteral antibiotics and drainage [5]. In case 4, ultrasound guided aspiration was done multiple times but the abscess recurred after one day. There have been reports of successful management with ultrasound guided aspiration [10-12] and intra-cavitary antibiotics [10]. However, most of the literature review stated that operative management is more effective and prevents recurrence [13-15]. Aspiration can be used only as a temporary measure to facilitate open drainage (Figures 2 and 3).

Table 1: A total of four cases of thyroid abscess were reviewed.

	Age	Gender	Ethnic	WBC (4-11)	T4 (7.9-14.4 pmol/L)	CT Scan Findings	Treatments	HPE	Culture
Case 1	57	Female	Indian	6.5	21.7	Deep left neck abscess compressing the trachea	1. IV Ampicillin+Sulbactam 2. Incision and drainage	Abscess wall	Klebsiella Pneumoniae
Case 2	41	Female	Malay	7.7	10.2	Collection in anterior neck	1. IV Cefuroxime (THENANTI-TB) 2. Besides incision and drainage	N/A	Tuberculosis
Case 3	7	Male	Malay	21.6	18.3	Large partially liquefied abscess in left lobe	1. IV Co-Amoxycylav 2. incision and drainage	Abscess with fibrosis	No growth
Case 4	55	Male	Malay	12.9	14.8	Hemorrhagic thyroid cyst	1. IV Cefuroxime 2. incision and drainage	Abscess wall	Staphylococcus Aureus

N/A: Not available.



Figure 2: Failed aspiration and bedside incision and drainage of case 4.

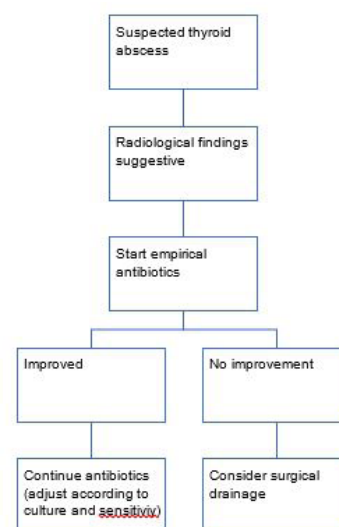


Figure 3: Algorithm for thyroid abscess management.

All our patients had incision and drainage done. Case 1, 3, and 4 had their surgeries done in operation theatre with incision of a standard thyroid surgery; skin collar incision with sub-platysmal flaps raised. The procedure was technically difficult due to the presence of acute inflammatory changes around the thyroid lobes, with dense adhesions, and no clear plane between muscle and abscess wall. The wound was then left open for daily dressing. All four patients eventually recovered without any voice changes due to recurrent laryngeal nerve injury, hypocalcaemia, or recurrence

of abscess.

Thyroid abscess is uncommon, but it usually occurs in patients with congenital anatomic defects. Our cases were more uncommon because no underlying thyroid pathology or anatomic anomaly were detected. Delayed diagnosis occurred because the presenting feature can be confused with acute pharyngitis with anterior neck pain, pyrexia, and odynophagia [1]. Shamir et al and Fonseca et al. reported cutaneous erythema as the presenting feature [3-15].

## CONCLUSION

We highlight the difficulties in diagnosing thyroid abscess as ultrasound or computed tomography could be inconclusive. This has resulted in delay in management. Fortunately, all four cases were successfully treated with intravenous antibiotics and drainage. In conclusion, a high index of suspicion is needed to confidently diagnose a thyroid abscess, in order for prompt actions to be taken, for example surgery to drain the abscess, to prevent further complications.

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## CONFLICT OF INTEREST

There is no conflict of interest to be reported by any of the authors.

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