CASE REPORT

# Acute suppurative thyroiditis complicated by Klebsiella infection: A case report

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## SUMMARY

**Thyroid gland is naturally resistant to infection due to its unique anatomy and physiology. Acute suppurative thyroiditis (AST) is therefore a rare occurrence on its own, making this reported case occurring without any predisposing factors even more unusual. We present a case of AST with Klebsiella pneumoniae thyroid abscess in an elderly non diabetic Malay gentleman. This abscess was complicated with Klebsiella infection and was surgically treated with a hemithyroidectomy.**

## INTRODUCTION

The thyroid gland is typically resistant to infection due to its well-developed capsule, high iodine and hydrogen peroxide content, and extensive vascular and lymphatic systems.[1,2] Early detection and treatment of any thyroid infection are crucial to prevent severe complications and long-term effects. Other than that, distinguishing acute suppurative thyroiditis from subacute thyroiditis is essential, as the two conditions require entirely different management approaches. It is also important to identify the predisposing risk factors and treat them accordingly to prevent recurrent infection.

## CASE PRESENTATION

A 77-year-old Malay man with a history of benign prostatic hypertrophy presented to the Emergency Department with generalized lethargy, which led to a fall. Upon evaluation, the patient reported a sudden onset of painful swelling in the left anterior neck over the past 3 days which had gradually increased in size associated with hoarseness. He also experienced lethargy and reduced appetite but denied any dysphagia, odynophagia or aspiration symptoms. There were no restricted neck movement, stridor or shortness of breath. Additionally, he was non diabetic and showed no other symptoms of thyroid dysfunction, fever or constitutional symptoms. There was also no history of smoking or alcohol intake.

On examination, he appeared comfortable with stable vital signs and no signs of respiratory distress. Additionally, there were no signs indicative of chronic hyperthyroidism. A diffuse swelling measuring approximately 10 cm x 6 cm was noted on the left side of the neck, extending from midline to left lateral neck involving the sternocleidomastoid muscle. The swelling was tender and firm on palpation without overlying skin erythema or warmth. It was fixed, making it impossible to palpate beneath the mass. The trachea was slightly deviated to the right, and no other cervical lymph nodes were palpable. Hoarseness was also present and there was no restricted neck movement. Intraoral examination was normal while flexible nasopharyngolaryngoscopy showed left vocal cord palsy at paramedian position, partially compensated by the mobile right vocal cord. There was no pharyngeal wall medialization and no abnormalities seen at the pyriform sinus.

Both total white cell count and C-reactive protein (CRP) were raised at 18.9 10^9/L and 25 mg/l respectively and patient was started on intravenous amoxycillin-clavulanate 1.2g TDS. Sugar level was normal however thyroid function test showed hyperthyroidism where T4 was elevated at 20.78 pmol/L and thyroid stimulating hormone reduced at 0.342 mIU/L . Patient later underwent a contrast enhanced computed tomography (CT) scan of the neck which showed a well defined rounded hypodense lesion of HU 78, seen occupying the left thyroid lobe measuring 4.1x4.7x5.8cm with wall enhancement post contrast and focus calcification at the centre of the lesion. There was presence of significant surrounding perilesional fluid and streakiness at the superior aspect, with fluid tracking along the left carotid space, retropharyngeal space and left submandibular space. There was mass effect to the right onto adjacent hypopharynx, larynx, trachea and esophagus with minimal narrowing of the trachea at the region with narrowest diameter measuring 1.1cm. Left internal jugular vein was also partially compressed however still remain patent. These CT findings were suggestive of infected or hemorrhagic left thyroid nodule with mass effect and significant surrounding inflammatory changes.

Fine needle aspiration cytology (FNAC) of the neck swelling was done under aseptic technique and yielded approximately 45cc of purulent, hemoserous fluid. Cytological examination revealed a hemorrhagic cystic content with numerous inflammatory cells, predominantly neutrophils and lymphocytes. After 5 days of IV antibiotics , he was discharged home with oral antibiotics amoxicillin clavulonic acid but returned to Emergency Department with worsening neck swelling after 4 days at home. An ultrasound guided drainage was arranged and 40cc hemopurulent fluid was drained, however the swelling recurred within days and hence a left hemithyroidectomy was performed on day 4 of admission. Intraoperative findings showed there was presence of left thyroid cystic mass containing hemopurulent

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**Fig. 1:** Left neck swelling

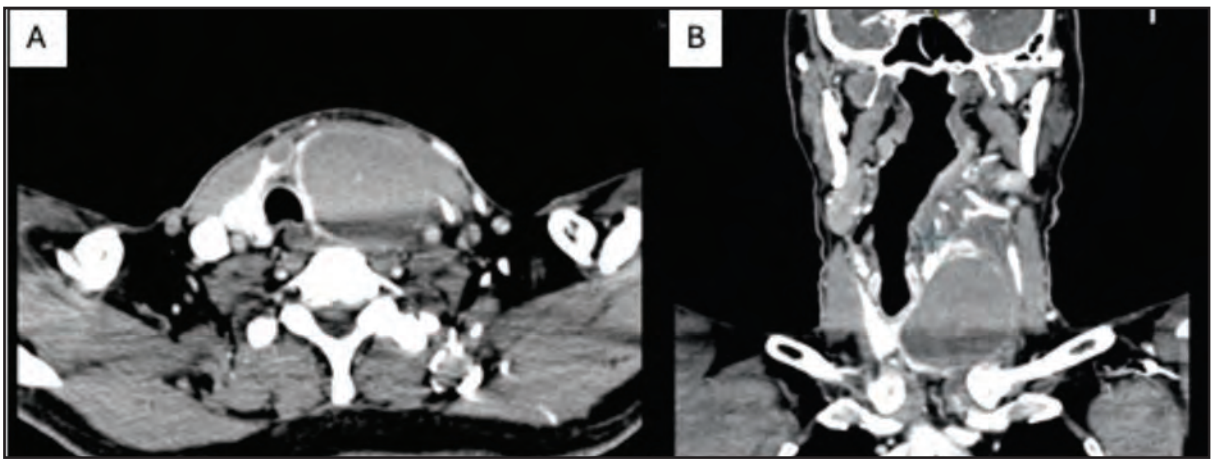


**Fig. 2:** CT scan (A : axial) and (B : coronal) images of left thyroid mass

fluid, strongly adhered to strap muscles and carotid sheath. The left recurrent laryngeal nerve was identified and preserved, while parathyroid gland were not identified. Histopathological examination showed predominantly neutrophilic abscesses with surrounding granulation tissue suggestive of acute suppurative thyroiditis. Culture and sensitivity came back as Klebsiella pneumoniae sensitive to amoxycillin clavulonic acid.

Post operatively, he recovered well, discharged home on day 4 and completed total course of 10 days of antibiotics. His thyroid function taken at 3 weeks post operative eventually normalised. There were no recurrent neck swelling however his left vocal cord palsy persisted. He required nasogastric tube feeding postoperatively. A swallowing assessment at two months showed no signs of aspiration, allowing him to resume oral feeding. A repeat CT scan in view of persistent vocal cord palsy was done after 3 months which showed no evidence of tumour recurrence. He was offered injection laryngoplasty which he was not keen and subsequently defaulted.

## DISCUSSION

Acute suppurative thyroiditis (AST) leading to thyroid abscess, is exceptionally rare because the anatomy and physiology of the thyroid gland make it naturally resistant to infection. The well encapsulated gland with rich blood supply, extensive lymphatic drainage and high iodine concentration inhibiting bacterial proliferation all contribute to this1. In addition , thyroid gland's resistance to infection is also partly due to its continuous production of hydrogen peroxide ($H_2O_2$), which is essential for thyroid hormone synthesis and also possesses antimicrobial properties. $H_2O_2$ creates a locally oxidative environment that inhibits microbial growth, contributing to the gland's natural sterility.[2] In some cases of thyroid infection, there may be identifiable predisposing factors such as congenital anomalies like a thyroglossal duct or pyriform sinus fistula, disseminated infection via hematogenous or lymphatic spread or less commonly, trauma that breaches the thyroid capsule, such as biopsy, FNAC or a retained foreign body from prior surgery.[1,3] Nevertheless in many instances, the source of the thyroid infection is not clear and it may be

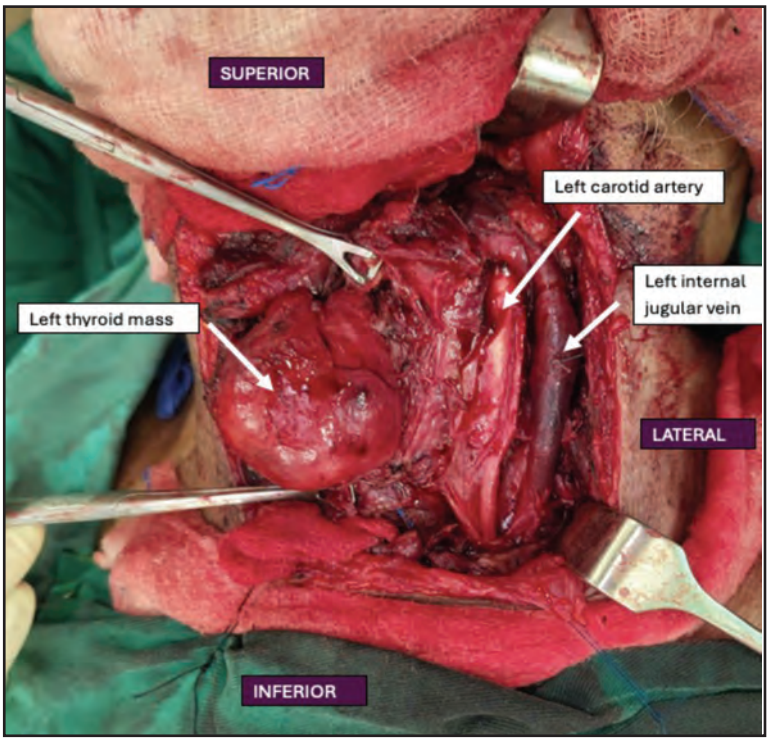


**Fig. 3:** Intraoperative image , left thyroid mass reflected medially

attributed to the overall immunosuppressive state of the patient e.g. poorly controlled diabetes or other immunosuppressive diseases e.g HIV, although this was not seen in our case.[4]

Mortality rate from AST reported in a systematic review by Lafontaine et al (2020) was said to be around 7.9%, where it is highest with fungal infection.[5] Common presenting symptoms and signs were neck pain, fever, dysphagia, raised white cell count or C-reactive protein with or without hyperthyroidism.[5] Another condition that can present in a similar fashion is subacute thyroiditis or also known as de Quervain's or granulomatous thyroiditis. It is important to differentiate these two as subacute thyroiditis is usually self-limiting and the treatment approach differ where anti-inflammatory and glucocorticoids are first line. In contrast, patients with AST typically present in a more severe, septic state with significantly elevated white cell counts and inflammatory markers. Unlike subacute thyroiditis, they do not respond to glucocorticoids.[5]

In immunocompetent patients, approximately 75% of AST cases are reportedly caused by bacteria, with gram positive organisms being the most common, followed by tuberculosis and fungal infections.[5] Organisms commonly found to be associated with thyroid infection are Staphylococci and Streptococci spp. This is followed by rarer cases of infection by Klebsiella pneumoniae like in our case here or Salmonella spp in other incidents.[6] Klebsiella pneumoniae is a gram negative, rod-shaped organism found as commensals in certain parts of the body like mouth, skin and GI tract where they do not cause any illnesses. In certain cases, these infections can progress to a severe form, with reports highlighting a rise in virulence that results in widespread abscesses. Frequently affected areas include the liver, kidneys, lungs, muscles, thyroid, cerebrospinal fluid and eyes.[7]

Imaging are helpful and some studies suggest that ultrasound is the best in looking at early abscess formation. However, CT is a better modality to delineate the anatomy, extension especially in cases involving deeper and retrosternal space and also pyriform sinus fistula if present.[5] In our case, CT was selected as the imaging modality due to the presence of a complication - vocal cord palsy -which raised concern for deeper extension of the underlying pathology. Needle aspiration is the most conclusive method to confirm AST.[5]

AST carry the risk of complications both from the disease itself and also its management. These include extension of the abscess to cause descending necrotising mediastinitis, pericarditis, deep neck abscesses leading to airway obstruction or dysphagia and also trachea or oesophageal involvement / fistula.[5,6] Some of the patients can also have recurrent laryngeal nerve palsy which will be elaborated later, or persistent thyroid dysfunction as a sequelae of AST.[5]

First line of managing AST is source control and this is moving away from surgical intervention towards less invasive method. Needle aspiration along with intensive antibiotic therapy has become the preferred minimally invasive intervention. However in certain cases like ours, there is still a need for the more conventional method like incision and drainage or hemithyroidectomy especially in very ill deteriorating patients or where there is presence of recurrent laryngeal nerve palsy. This is to alleviate pressure,

reduce the degree of injury with the aim to preserve the integrity of the nerve.[8]

Vocal cord palsy is much more commonly encountered in cases of thyroid malignancy rather than benign ones8. The pathogenesis of vocal cord palsy in benign cases is said to be mainly due to direct compression of the recurrent laryngeal nerve and/or its blood supply by the massive thyroid mass against cervical spine or trachea.[8,9] This can cause neuropraxia and surrounding inflammation leading to recurrent laryngeal nerve dysfunction.[9] Therefore, hemithyroidectomy is recommended for certain benign thyroid tumours associated with vocal cord palsy to alleviate compression and potentially restore nerve function. In our case, the decision to proceed with hemithyroidectomy instead of incision and drainage was made due to persistent vocal cord palsy and the lack of improvement despite two times aspiration, which heightened the suspicion of malignancy, apart from the other indication highlighted earlier.

Vocal cord palsy in benign cases is reported to resolve after thyroidectomy in approximately 89% of cases, some as early as day 3 post operative and others up to 12-18months.[8] However, this was not observed in our case. The reason for this is not clear, as the histopathological examination excluded malignancy and post op CT scan did not show any other abnormalities along the nerve course. The most likely explanation for the persistent vocal cord palsy is probably inflammation.

Following resolution of an acute infection, it is recommended to assess for presence of a pyriform sinus fistula using a barium swallow or contrast enhanced CT with the trumpet manoeuvre, along with microlaryngoscopy5. Evaluation for a pyriform sinus fistula is strongly recommended, particularly in the pediatric population as it is a congenital anomaly. Assessment is also advised in cases of recurrent thyroid abscesses and those affecting the left thyroid lobe, given the higher prevalence reported in previous studies—an observation thought to be linked to embryological development.[10] If present, this is then managed with fistula ablation or excision of fistula tract with or without hemithyroidectomy5. In our case, no fistula or other risk factors were identified. Patient showed good recovery at follow-up, except for the persistent vocal cord palsy, which he was not keen for intervention.

## CONCLUSION

Though rare, thyroid abscess or AST poses a significant risk of complications and long-term effects if not identified and treated promptly. It can often be mistaken for subacute thyroiditis; therefore, in more severely ill and septic patients, the possibility of a thyroid abscess should always be considered.

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