Case Report

Beyond the norm: A case report on the unfolding spectrum of acute suppurative thyroiditis leading to abscess formation

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ABSTRACT

The thyroid gland's robust defenses, including a rich blood supply, lymphatic drainage, high iodine content, and physical isolation, typically render it resistant to infections. However, acute suppurative thyroiditis (AST) leading to a primary thyroid abscess is an uncommon occurrence, especially among children, accounting for only 0.1–0.7% of thyroid disorders. This case report outlines the clinical presentation of a 12-year-old male with prolonged fever, neck pain, sore throat, and swallowing difficulties. *Staphylococcus aureus* was identified as the causative agent. Treatment involved a combination of intravenous antibiotics and incision and drainage, resulting in a successful recovery. Despite its rarity, AST requires prompt recognition and intervention to prevent complications. This case emphasizes the significance of including AST in the differential diagnosis of neck swelling and underscores the necessity for early identification and appropriate management to ensure optimal patient outcomes.

Key words: Abscess, Lymphatic drainage, Neck swelling, Pyriform sinus fistula, *Staphylococcus aureus*, Thyroiditis

A thyroid abscess resulting from acute suppurative thyroiditis (AST) is an infrequent clinical occurrence. AST accounts for merely 0.1–0.7% of thyroid disorders, and within surgically treated thyroid diseases, only a minimal percentage, ranging from 0.1% to 0.7%, manifests as thyroid abscess secondary to AST [1]. This condition primarily affects individuals with existing thyroid gland pathologies, including thyroid cancer or Hashimoto's thyroiditis, and is associated with localized anatomical abnormalities, particularly in the pediatric population. Although bacterial infections represent the predominant etiology of AST, alternative causes encompass fungal, mycobacterial, and parasitic infections. AST typically manifests with common indicators such as erythema, pain, and discomfort that can radiate to the jaw, occiput, or ear on the affected side [2]. The resultant abscess has the potential to exert pressure on the trachea, esophagus, or recurrent laryngeal nerve. Progressive deterioration of the condition is marked by systemic symptoms, including fever, chills, and malaise, in the majority of patients [3].

In this case report, we present a noteworthy instance of thyroid abscess resulting from AST in a 12-year-old male patient, shedding light on the clinical presentation, diagnostic considerations, and the successful management approach adopted. This case underscores the importance of recognizing and promptly addressing AST complications, particularly the formation of a thyroid abscess, to achieve favorable patient outcomes and prevent potential morbidity and mortality associated with this uncommon thyroid disorder.

Access this article online	
Received - 24 December 2023 Initial Review - 12 January 2024 Accepted - 26 February 2024	Quick Response code
DOI: 10.32677/ijcr.v10i4.4409	

CASE REPORT

A 12-year-old male presented with symptoms including fever, painful neck swelling, sore throat, and dysphagia persisting for 4–8 days. In addition, he had a preceding history of mild fever and sore throat for the past 10 days. Clinical examination revealed a tender, warm, diffuse midline swelling in the thyroid region, accompanied by erythema on the overlying skin.

His vitals are as temperature recorded at 99.9°F, heart rate 110 bpm, respiratory rate 18 breaths/min, and normal levels of blood pressure. The swelling exhibited movement with deglutition and associated findings included tachycardia and restricted neck movements. The patient had a positive history of Brucellosis, which had been reportedly fully treated 2 months prior.

Laboratory investigations showed a leukocyte count of 14,300 with 70% polymorphs, a hemoglobin level of 12.9 g/dL, and

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an elevated erythrocyte sedimentation rate (ESR) of 48 mm/h. Blood culture yielded sterile results. A neck ultrasound indicated an enlarged thyroid gland with decreased echogenicity and evidence of associated peri-cervical lymphadenopathy. Thyroid function tests revealed a normal thyroid-stimulating hormone level (1.4 μIU/mL) and a significantly increased T4 level (T4: 13.5 μg/dL). Barium esophagogram showed no abnormalities, ruling out fistulas of the pyriform sinus. Attempts to aspirate the varied mass with a needle were unsuccessful.

On establishing the diagnosis of AST, parenteral antibiotic therapy was initiated on the 2nd day of admission. A surgical procedure was performed, revealing 3 cc of thick yellow pus during surgical drainage. A small tube was inserted to drain the pus for 72 h, and *Staphylococcus aureus* was identified from the pus culture. The patient's fever subsided 2 days after surgical drainage and post-procedure, dysphagia improved, allowing him to comfortably swallow solid food. His treatment regimen included intravenous antibiotics with broad-spectrum coverage, primarily ceftriaxone 1 g IV every 24 h, clindamycin 600 mg IV every 8 h and he had been treated with acetaminophen 500 mg orally every 6 h as needed for fever and pain followed by incision and drainage, resulting in an uncomplicated recovery.

The patient and family have been educated on the importance of completing the full course of antibiotics and attending scheduled follow-up visits. They are aware of the signs and symptoms that require prompt medical attention. Overall, the patient's progress is promising, and close monitoring will be continued to ensure a complete recovery from the AST.

DISCUSSION

Thyroid abscess resulting from AST is a rare but serious condition that demands a thorough understanding of its clinical features, diagnostic challenges, and effective management strategies. The presented case of a 12-year-old male experiencing fever, painful neck swelling, sore throat, and dysphagia illustrates the complexities associated with this uncommon manifestation.

The clinical presentation of a tender, warm, diffuse midline swelling in the thyroid region, along with erythema on the overlying skin, aligns with typical features of AST. The dynamic movement of the swelling with deglutition, coupled with associated symptoms such as tachycardia and restricted neck movements, underscores the severity of the infection. The patient's positive history of brucellosis adds a layer of complexity, potentially influencing the course of the disease and its response to treatment.

The syndrome is associated with the persistence of a canal originating from the 3rd or 4th bronchial pouch, potentially leading to recurring thyroid abscesses. Pyriform sinus fistulas, in many instances, facilitate the advancement of infection toward the thyroid gland, with a predilection for affecting the left lobe [4]. Untreated AST poses a significant risk, with a mortality rate exceeding 12%. The combination of a congenital sinus and AST was initially documented in the Japanese literature [5].

The elevated incidence of AST may be attributed to the numerous mechanisms employed by the thyroid gland to prevent suppuration [6]. These mechanisms include the generation of hydrogen peroxide, a rich blood and lymphatic supply, a high concentration of iodine, and distinct physical isolation due to the separation by fascial planes and encapsulation by a fibrous capsule. However, in some cases, the presence of a pyriform sinus fistula can lead to abscess formation in children, particularly affecting the left lobe [7]. Alternative pathways for infection involve cervical trauma, direct extension of abscess, hematogenous or lymphatic dissemination, and direct inoculation of the thyroid or surrounding anatomy. Nevertheless, the majority of infections occur without an identified pathway. Anatomically altered thyroid glands, such as goiter, adenoma, and malignancy, represent examples that can predispose individuals to AST [8].

S. aureus, Streptococcus pyogenes, Staphylococcus epidermidis, and *Streptococcus pneumoniae* are the most commonly identified organisms in cases of AST. Precise identification of the pathogen can assist in choosing the most appropriate antibiotic treatment following initial broad-spectrum antibiotic therapy [9]. In some situations, such as the persistence of pyriform sinus fistula, the thyroid gland becomes susceptible to infection and abscess formation which is more commonly seen in children and young adults between 20 and 40 years of age [10]. Approximately, 92% of the affected patients are children and there is no gender preference in acquiring the disease [11]. A preceding history of respiratory tract infection may also be present. The left lobe involvement is more prevalent than the right, and tachycardia, leukocytosis, and increased ESR are common with typically normal thyroid function tests. The same investigations were revealed in our patient. However, exceptions have also been reported. In one study, 12% of patients were reported to have thyrotoxicosis, and 17% were reported with hypothyroidism. When bacteria invade the thyroid gland and destroy it, thyroid hormone is released, which can lead to thyrotoxicosis symptoms [12].

Laboratory investigations played a crucial role in establishing the diagnosis and assessing the systemic impact of the infection. Leukocytosis with a predominance of polymorphs, an elevated ESR, and abnormal hemoglobin levels collectively indicated the inflammatory nature of the condition. Neck ultrasound provided valuable insights into the anatomical changes in the thyroid gland, including enlargement and decreased echogenicity, while thyroid function tests highlighted the impact of the infection on thyroid hormone levels. The diagnostic journey included ruling out potential complications such as pyriform sinus fistulas through a barium esophagogram and attempting, although unsuccessfully, to aspirate the mass with a needle. These efforts illustrate the challenges in obtaining diagnostic material from the affected area, often encountered in cases of AST.

Once the diagnosis was established, the treatment approach was comprehensive and involved a combination of parenteral antibiotic therapy and surgical drainage. The initiation of antibiotic therapy, notably with ceftriaxone, on the 2nd day of admission aimed at controlling the infection systemically. The subsequent surgical drainage revealed the presence of thick yellow pus, and the

isolation of *S. aureus* through culture emphasized the importance of tailored antibiotic therapy based on accurate pathogen identification. The positive response to treatment, as evidenced by the rapid subsidence of fever within 2-day post-surgery and the improvement in dysphagia, indicates the effectiveness of the chosen therapeutic interventions. The insertion of a small drainage tube facilitated the evacuation of the purulent collection, contributing to the overall resolution of symptoms.

In rare conditions, thyroid abscess may be an unusual presentation of acute tonsillitis. Abscess formation after fine needle aspiration has been observed in immunocompromised patients [13]. Organisms identified in pediatric AST are part of the normal oropharyngeal flora. Indigenous flora in the upper respiratory tract spreads through a communicating fistula to the perithyroid space and thyroid gland [14]. Hence, the predisposition to AST may be due to the presence of the embryologic remnant of the third or fourth pharyngeal pouch, for instance. In some patients, thyroiditis can result in thyroid gland destruction and it may be severe enough to cause permanent hypothyroidism [15]. Thus, follow-up thyroid function studies are recommended, especially in cases of more diffuse thyroiditis. For our patient's situation, there is no such case as thyroid gland destruction.

CONCLUSION

This case emphasizes the diagnostic challenges posed by AST and its potential complication of abscess formation. Prompt identification and intervention are crucial in managing this rare condition, especially when presenting with atypical symptoms such as dysphagia and neck swelling. Timely initiation of appropriate antibiotic therapy and surgical drainage proved effective in achieving a favorable outcome, resolving the abscess, and alleviating associated symptoms. This case underscores the importance of considering AST in the differential diagnosis of neck swelling, particularly in individuals with a history of recent infections or underlying predisposing conditions.

ACKNOWLEDGMENTS

We extend our sincere gratitude to Dr. Pavan Kumar Yanamadala for his invaluable contribution as the corresponding author of this case report. His dedication to overseeing the manuscript, coordinating communication among the co-authors, and providing valuable insights greatly enhanced the quality of this work. We appreciate his commitment to excellence and effective collaboration, which played a crucial role in the successful completion of this case report.

AUTHOR'S CONTRIBUTIONS

- Dr. Pavan Kumar Yanamadala provided guidance on the clinical aspects of the case, contributed to the critical revision of the manuscript, and gave final approval for publication.
- Keerthana Gopidalai contributed to the conception and design of the study, acquisition of data, and drafting of the manuscript.
- Jessica Akumarthi and Arijit Goswami equally performed a critical review of the literature and provided substantial intellectual input during the drafting of the manuscript.
- K. L. N. S. Srisurya and Chetan Priyanka Angati were involved in the clinical management of the patient, collected relevant clinical data, and equally contributed to the writing and revision of the case report.

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Funding: Nil; Conflicts of interest: Nil.

How to cite this article: Gopidalai K, Srisurya KLNS, Akumarthi J, Goswami A, Midathada SJ, Angati CP, Yanamadala PK. Beyond the norm: A case report on the unfolding spectrum of acute suppurative thyroiditis leading to abscess formation. Indian J Case Reports. 2024; 10(4):98-100.