3 Anterior Neck Swelling, Fever, and Hypertension in a 3-Year-Old Boy

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CASE PRESENTATION

A previously healthy 3-year-old boy presents to the emergency department with a 5-day history of fever, sore throat, and progressive neck swelling despite treatment with antibiotics. Two days ago, he had presented to a community hospital emergency department for these symptoms and was prescribed azithromycin for presumed bacterial pharyngitis (no throat culture was obtained). Despite treatment, he now experiences a choking sensation and worsening pain in his neck.

His vital signs are notable for a temperature of 98.2°F (36.8°C), blood pressure of 140/103 mm Hg, heart rate of 170 beats per minute, and respiratory rate of 20 breaths per minute. His physical examination reveals a teary boy because of pain with normal work of breathing. His oropharynx has no erythema, and the tonsils are normal in appearance. He has marked erythema of the anterior lower neck with an exquisitely tender, indurated area that measures 6 cm in diameter and extends laterally from midline to the left. There is no fluctuation. Respiratory examination reveals a hoarse voice without stridor and clear lung fields on auscultation. Cardiovascular examination findings are notable for moderate tachycardia. The remainder of the examination findings are unremarkable.

Laboratory evaluation reveals a leukocyte count of 36,700/μL ($36.7 \times 10^9/L$) with 93% segmented neutrophils, 3% lymphocytes, 1% bands, and 3% monocytes; a platelet count of $421 \times 10^3/\mu L$ ($421 \times 10^9/L$); and a C-reactive protein level of 10.4 mg/L (99.1 nmol/L) (reference range, 0–4 mg/L [0–38.1 nmol/L]). Further laboratory analyses and imaging help reveal the diagnosis.

CASE DISCUSSION

Neck computed tomography with contrast enhancement identified an infrahyoid, multiloculated, 4 × 3 × 5-cm left neck abscess. Inflammatory changes extended proximally to the sublingual space and distally to the sternal notch. Deviation of the trachea and esophagus to the right and internal jugular vein and carotid artery deviation to the left were noted. During surgery there was gross purulent drainage that extended into the lateral border of the thyroid. Thyrotropin level was 0.01 mIU/L (reference range, 0.27–4.20 mIU/L), and free thyroxine level was 4.36 ng/dL (56 pmol/L) (reference range, 0.93–1.70 ng/mL [12–22 pmol/L]). In

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addition, the results of tests for thyroid stimulating antibodies, thyrotropin receptor antibodies, thyroid peroxidase antibodies, and thyroglobulin antibodies were all negative.

Differential Diagnosis

The differential diagnosis of neck masses in children with fever and pain includes subacute thyroiditis, acute suppurative thyroiditis (AST), autoimmune thyroiditis, brachial cleft cyst infection, soft tissue abscess, and lymphadenitis. These last 3 conditions, which are nonthyroid in origin, are much more common. In this case, the patient had signs and symptoms of thyrotoxicosis, which narrowed the differential diagnosis considerably.

The Condition

AST is an abrupt, usually bacterial, infection localized to the thyroid gland. This infection typically arises from mouth flora, including α -hemolytic streptococcus, or skin flora, such as *Staphylococcus aureus*, *Staphylococcus epidermidis*, and *Streptococcus pneumoniae*. It is rather uncommon for fungal or anaerobic pathogens to cause AST. In addition, this condition is relatively rare in children, but a pyriform sinus fistula can predispose a patient to thyroid gland infection. This pyriform sinus fistula arises from abnormal branchial arch development in utero and connects the thyroid gland to the pharynx, increasing the risk of AST, especially recurrent infection.

AST is rarely associated with thyroid dysfunction. More than 90% of patients with AST remain euthyroid. Nonetheless, thyrotoxicosis can develop and is more frequent than hypothyroidism.

Management and Prognosis

The infectious component of AST must be treated with appropriate antibiotics. It is necessary to administer broad-spectrum antibiotics covering the most typical aerobic and anaerobic pathogens. Ideally, a wound culture and blood culture should be performed to identify the infecting organisms and antibacterial sensitivity of those organisms. Typically, clindamycin or a penicillin with a β -lactamase inhibitor is a good choice for empiric treatment. Because of potential airway compromise, it is important to provide parenteral therapy until the patient is stable. If airway compromise is significant, parenteral corticosteroids may help with reducing inflammation surrounding the larynx. Fluid collection (abscess), if present, should be drained.

In addition to potential airway compromise, thyrotoxicosis is another serious complication of AST. Elevated heart rate and blood pressure should prompt a physician to evaluate the thyroid function. If thyrotoxicosis is detected,

it must be treated promptly. β -Blockers should be used to treat both hypertension and tachycardia; the dose is titrated for effect. Because thyrotoxicosis is typically transient, supportive management is usually necessary and antithyroid therapy is not indicated.

In most patients, resolution of symptoms occurs in 1 to 2 weeks. A small number of patients are at risk for recurrence, particularly if a pyriform sinus tract is present. Because of this, once a patient has recovered from AST, a barium swallow should be obtained to evaluate for this anatomical variant. If this is present, surgical ligation is indicated.

After incision and drainage of his thyroid abscess, our patient was prescribed intravenous clindamycin. Final operative cultures revealed mixed oral flora (β -lactamase-negative *Fusobacterium species*, *Bacteroides fragilis*, and α -hemolytic streptococci). The blood culture results were negative. For his elevated blood pressure (peak of 165/98 mm Hg), he was initially treated with intermittent intravenous hydralazine, which lowered his blood pressure only moderately. Additional thyroid function studies on postoperative day 2 revealed negligible improvement, with a thyrotropin level of 0.007 mIU/L and a free thyroxine level of 3.55 ng/mL (45.7 pmol/L). Because of persistent thyrotoxicosis, he was prescribed propranolol, which controlled both his hypertension and tachycardia. His thyroid study results returned to normal by postoperative day 5, with a thyrotropin level of 0.362 mIU/L and a free thyroxine level of 1.36 ng/mL (17.5 pmol/L). At this time, he was weaned off propranolol and discharged home on postoperative day 7. The results of his thyroid studies, 4 months after this episode, were normal.

Lessons for the Clinician

- AST is relatively rare in children.
- Historically, patients with AST remain euthyroid. On rare occasions, thyrotoxicosis can occur with resulting hypertension and tachycardia.
- The hyperthyroidism seen with AST does not require antithyroid medication.
- All children with recurrent or left-sided AST should be evaluated for a possible pyriform sinus fistula.
- Clinicians must keep a high level of suspicion for prompt recognition and management of AST-related thyrotoxicosis.

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PubMed Central archive, an electronic version of the final, peer-reviewed manuscript to be made publicly available no later than 12 months after the official date of publication.

To view the Suggested Reading list for this case, visit <https://pedsinreview.aappublications.org> and click on the “Index of Suspicion” link.

Addendum: Mood and Affect Disorders

An insightful journal reader, Jon Matthew Farber, MD, submitted the following question regarding the February 2015 article, “Mood and Affect Disorders” (*Pediatrics in Review*. 2015;36(2):52–61, doi: 10.1542/pir.36-2-52):

“In the recent PIR article on Mood and Affect Disorders, it is stated that DMDD (disruptive mood dysregulation disorder) should not be diagnosed before age 6 years (Table 4). It is also stated that the 3-month prevalence for DMDD has been estimated at 3.3% in preschool samples. Given the definition of DMDD, why is the preschool prevalence not automatically 0%?”

Author Michael H. Tang, MD, responded with information the journal editors believe would be useful to all readers:

“Part of the controversy of the DMDD diagnosis is that it was not well studied prior to its inclusion in the DSM5 (released May 2013), including having had no prospective epidemiological samples explicitly for DMDD. Given the absence of prospective data, the cited Copeland et al study (from the *American Journal of Psychiatry* in 2013) claims to be the first study to retrospectively calculate prevalence rates in community samples using the proposed DMDD criteria. They used three previous studies that each used standardized psychiatric assessments, and based on the items reported in these evaluations and the proposed DMDD symptom criteria, the rates for the samples were 3.3% in the Duke Preschool Study (studying children ages 2 to 5 years), 1.1% in the Great Smoky Mountains Study (ages 9 to 16 years), and 0.8% in the Caring for Children in the Community Study (ages 9 to 17 years).

“As the authors state, “Criterion F requires a chronological age of at least 6 years for the diagnosis to be made. Of course, nearly all participants in the preschool sample would be excluded if this criterion were applied to them. In order to compare the potential presentation of disruptive mood dysregulation disorder in young children with that in older children, we ignored criterion F in the preschool sample.”

“In terms of our *Pediatrics in Review* article, it would have been more precise to state that the “The 3-month prevalence for meeting DMDD criteria (except the age cutoff) has been estimated at ... ,” Dr. Tang wrote.

The journal appreciates the feedback and Dr. Tang’s astute response, and encourages such ongoing dialogues.

Correction

An error appeared in the December 2014 Index of Suspicion column (*Pediatrics in Review*. 2014;35(12):531–537, doi: 10.1542/pir.35-12-531). On page 533, in the Case 2 Presentation, paragraph 2, the sentence should read: “...head circumference is 46.5 cm (>97th percentile).” The online version of the article was corrected. The journal regrets the error.

ANSWER KEY FOR APRIL 2015 PEDIATRICS IN REVIEW:

Body Fluid Composition: 1. E; 2. C; 3. D; 4. B; 5. E.

Urinary Tract Infections in Children: 1. D; 2. B; 3. B; 4. C; 5. B.

Escherichia coli Infections: 1. D; 2. B; 3. C; 4. D; 5. C.