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CASE REPORT

Acute thyroiditis triggered by dental abscess

Tireoidite aguda desencadeada por abscesso dentário

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ABSTRACT

Acute thyroiditis (AT) is a thyroid inflammation and is more common in children due to predisposing congenital anomalies. When it affects adults, it most often originates from an upper respiratory tract infection, especially when associated with previous structural alteration of the gland. In this report, we describe a 20-year-old patient who developed acute suppurative thyroiditis triggered by a dental abscess, which evolved with serious complications, requiring emergency tracheostomy. Imaging tests showed extensive purulent collection compromising the structures of the oral, cervical and thoracic regions, requiring broad-spectrum antibiotic therapy and a surgical approach to treat the abscess. During follow-up, signs and symptoms of thyrotoxicosis appeared, confirmed by serum TSH and free T4 levels, and methimazole was prescribed. However, within seven days, the clinical picture normalized and the free T4 level decreased significantly. In the following days, the infection and thyroid function resolved, without the need for further measures. Transient thyrotoxicosis caused by an AT is a condition that should be kept in mind, even in adults, and can be triggered by a dental abscess, avoiding inadvertent treatment of a primary thyroid disease.

Keywords: Acute thyroiditis; Dental abscess; Thyrotoxicosis.

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RESUMO

A tireoidite aguda (TA) é uma inflamação da tireoide, sendo mais comum em crianças devido às anomalias congênitas predisponentes. Quando acomete adultos, mais frequentemente se origina de uma infecção das vias aéreas superiores, sobretudo quando associada à alteração estrutural prévia da glândula. Neste relato, descrevemos um paciente de 20 anos que desenvolveu tireoidite supurativa aguda desencadeada por um abscesso dentário, que evoluiu com graves complicações, necessitando de traqueostomia de urgência. Os exames de imagem evidenciaram extensa coleção purulenta comprometendo as estruturas das regiões oral, cervical e torácica, sendo necessárias antibioticoterapia de amplo espectro e abordagem cirúrgica para tratamento do abscesso. No acompanhamento, surgiram sinais e sintomas de tireotoxicose confirmados por dosagens séricas de TSH e T4 livre, sendo prescrito o metimazol. Entretanto, dentro de sete dias, o quadro clínico se normalizou e a dosagem de T4 livre diminuiu significativamente. Nos dias subsequentes, houve a resolução do quadro infeccioso e da função tireoidiana, sem necessidade de outras medidas. Tireotoxicose transitória causada por uma TA é uma condição que deve ser lembrada, mesmo em adultos, podendo ser desencadeada por um abscesso dentário, evitando o tratamento inadvertido de uma doença tireoidiana primária.

Palavras-chave: Tireoidite aguda; Abscesso dentário; Tireotoxicose.

Introduction

The thyroid is usually resistant to infections due to the presence of a highly vascularized fibrous capsule with extensive lymphatic drainage and a high concentration of local iodine[1-3]. However, thyroiditis may have an acute, subacute or chronic clinical course, depending on the etiology.

Acute thyroiditis (AT), also called acute suppurative or infectious thyroiditis, is rare, affecting more immunocompromised individuals or those with congenital anomalies[3-5]. Therefore, it is more common in children than in adults, due to malformations such as persistent thyroglossal duct and pyriform sinus, which favor the infectious process of the gland[1,6].

People with previous thyroid diseases, including Hashimoto's thyroiditis, multinodular goiter and thyroid neoplasia, also have a greater chance of developing AT[1,3,7]. In adults, upper respiratory tract infection, through hematogenous or lymphatic dissemination, can lead to the development of AT, especially if there is an associated structural alteration[8]. Urinary tract and gastrointestinal infections and endocarditis are also described in the literature as possible primary causes that lead to AT[9].

Among the laboratory findings and clinical manifestations, it is worth noting that thyroid function may or may not be altered, and may present with hypothyroidism, hyperthyroidism and euthyroidism, and even change from one condition to another[10].

The etiology of the infection is bacterial in most cases, with the main causes being Gram-positive bacteria (*Staphylococcus aureus, Staphylococcus epidermides, Streptococcus pyogenes, Streptococcus pnuemoniae*). However, Gram-negative bacteria (*E. Coli, Pseudomonas aeruginosa*) can also lead to thyroiditis, and some cases related to mycobacteria (*Mycobacterium tuberculosis*) and fungi have also been described in the literature. Among the possible fungi, *Coccidioides immitis, Candida albicans* and *Aspergillus* stand out.[10].

Clinical manifestations appear acutely, with fever, chills, pain and asymmetrical enlargement of the cervical region, with abscess formation, pain upon thyroid palpation, and possible progress to sepsis[11,12]. There is usually no change in thyroid function and symptoms of hyperthyroidism are rare, even if transient[10]. The mortality rate varies around 7.8% of cases[13].

The most commonly used treatments are abscess drainage and antibiotic therapy (culture-guided or empirical) and, in rarer cases, total or partial surgical removal of the gland[1,14].

This report aims to describe the case of a 20-year-old man who presented with AT triggered by a dental abscess,

in the absence of malformations or immunosuppression, emphasizing the clinical presentation, laboratory and radiological alterations, treatment and clinical evolution, aiming to assist in the management of possible similar cases.

Case Report

PHSM, a 20-year-old male student, was admitted at the Clinical Hospital of the Federal University of Triângulo Mineiro with a diagnosis of dental abscess. The patient reported that 2 days before admission he felt pain in the region of the lower right third molar, associated with high fever, odynophagia, and dysphagia, when he sought primary health care, and was prescribed antibiotic therapy with amoxicillin and clavulanate. After 24 hours of treatment, he noticed bilateral bulging of the cervical region and difficulty opening his mouth, returning to the emergency room. Given the worsening of his general condition, the antimicrobial regimen was changed to ceftriaxone and clindamycin, and he was referred to a tertiary hospital.

Upon admission, the patient was in good general condition. Laboratory tests showed leukocytosis with a left shift (9% rods), CRP 20.89 mg/dL (RV: <0.50), and no changes in renal function, electrolytes, or coagulation. Cervical computed tomography showed a hypodense collection with peripheral contrast enhancement containing gas bubbles in the right submandibular space, measuring 2.7 x 2.2 x 3.2 cm and with an estimated volume of 11ml; two other collections were seen in the right carotid space (6ml) and in the belly of the mylohyoid muscle on the left (10ml). Given these changes, the abscesses were drained by the attending team and the previously instituted antibiotic therapy was maintained.

In the following days, the patient's general condition improved, with no new episodes of fever and a decrease in cervical swelling. New laboratory tests showed normal blood count and unchanged thyroid function [TSH: 2.79 IU/mL (VR: 0.35 to 4.94), T4L=1.02ng/dL (VR: 0.70 to 1.48) and total T3: 1.22ng/dL (VR: 0.60 to 1.81)]. The culture of the drained collection showed growth of coagulase-negative gram-positive cocci. Due to clinical and laboratory improvement, the patient was discharged with instructions to finish the antibiotic therapy regimen.

However, the patient returned to the hospital two days after discharge with worsening general condition, reporting fever spikes, abundant purulent discharge from the surgical wound, hyperemia in the cervical and thoracic regions, as well as new cervical bulging. Given this condition, cervical and thoracic computed tomography scans were performed (images shown below), which showed a hypodense collection with peripheral enhancement, containing gas bubbles, in the left submandibular space (17ml), dissecting the entire floor of the mouth reaching the sublingual space (15ml); other collections with the same characteristics were observed in the right submandibular space (20ml) and right carotid space, with infiltration of the pericarotid space (22ml), as shown in figures A and B; between the mylohyoid muscle on the left (10ml), in the retropharyngeal region on the right (54ml) and a voluminous collection near the internal face of the sternocleidomastoid muscle (77ml), demonstrated in figure D. The thyroid gland presented multiple rounded images, with low contrast capture, with up to 1.7 cm in diameter, which can be seen in figure C. The chest images showed homogeneous content forming a level on the posterior wall of the distal trachea, signs of anterior mediastinitis and aspiration bronchopneumonia.

The patient was referred to the surgical block for drainage of the abscesses, but due to technical difficulties in orotracheal intubation, tracheostomy was necessary. During the intraoperative period, as there was diffuse infiltration of the tissues of the cervical region, with abundant purulent secretion, it was decided a cervical drain be placed. The patient was referred to the Intensive Care Unit (ICU), hemodynamically stable, without the need for vasoactive drugs. Piperacillin and Tazobactam were introduced and an evaluation by the Dentistry team was requested, which subsequently performed the extraction of tooth 48, the probable primary infectious focus.

During the ICU stay, the patient was on mechanical ventilation without sedation, remained hypertensive (blood pressure 160x70mmHg) and tachycardic (heart rate between 105-118bpm). New thyroid function tests showed TSH 0.008IU/mL and T4L >5.0 ng/dL, and an evaluation by the Endocrinology and Metabolism team was requested. Due to hormonal changes and clinical signs suggestive of thyrotoxicosis, methimazole 60 mg/day was prescribed. Subsequent tests showed that antithyroid autoantibodies (antithyroid peroxidase, antithyroglobulin, and anti-TSH receptor) were negative. Thyroid ultrasound could not be performed at this time due to the tracheostomy.

Seven days after the introduction of the antithyroid drug, the patient presented no signs or symptoms of thyrotoxicosis, the free T4 dosage had fallen to 1.71ng/dL and the hepatic transaminases and canalicular enzymes increased, which led to the suspension of methimazole and corroborated the diagnostic hypothesis of thyrotoxicosis due to acute thyroid injury. The patient progressed to extubation and improved general condition; vital signs remained within normal limits and without other signs of thyroid dysfunction.

After completing 12 days of hospitalization, he was discharged without a cervical drain and without a prescription for continuous use medications. After 2 weeks, he attended the Endocrinology outpatient clinic and was asymptomatic and with complete normalization of thyroid function (TSH 2.795IU/mL, free T4 1.02ng/dL and total T3 1.22mg/mL) and liver enzymes.

Discussion

Acute thyroid infection is a rare condition. We reported the case of an adult in which the initial focus was an infectious process in the lower right third molar, which by contiguity and hematogenous dissemination, reached the cervical region and the thyroid gland.

Typically, the main pathogens involved are gram-positive bacteria such as Staphylococcus aureus, Streptococcus pyogenes, *Staphylococcus epidermides* and *Streptococcus pneumoniae*[15,16]. The pathogen isolated in the reported case was a coagulase-negative *Staphyloccocus* spp.

The most common symptoms in acute thyroiditis are neck pain, asymmetric increase in thyroid volume, fever, chills, and in some cases, compressive symptoms[3,12,17]. In the acute phase, the patient may remain euthyroid when the glandular involvement is minor[18,19]. Normal thyroid function is the most common scenario[10], however, more rarely, the patient may present symptoms of thyrotoxicosis, and the intensity of these manifestations correlates with the extent of glandular destruction and the release of hormones into the bloodstream[3,19]. Markers of thyroid autoimmunity are usually negative. The case described here presented signs and symptoms as described in the literature referenced above, and antithyroid autoantibodies were also negative.

Computerized tomography of the neck and chest is currently considered the best diagnostic test, but Doppler ultrasound is also considered first-line. In cases of AT, ultrasound can reveal poorly defined hypoechoic foci that may correspond to the area of intraparenchymal abscess formation[20]. In addition, ultrasound also allows differentiation between cervical or thyroid abscess, as well as the aspiration of fluids or collections that can corroborate the identification of the pathogens involved[3,11,12]. It is worth remembering that abscesses can affect not only the thyroid, but also the parathyroid, causing thrombophlebitis, vocal cord paralysis, and paratracheal fistulas[21]. In this case, the initial imaging test was computed tomography of the neck and chest, which revealed a cervical abscess of dental origin that, by contiguity, reached the thyroid. Due to the rapid and unfavorable progression, it was not possible to perform a thyroid ultrasound at this time and, subsequently, its performance was hampered by the tracheostomy. The patient presented several complications such as mediastinitis, tracheal involvement, sepsis and compression of adjacent structures, which are complications of AT described in the literature[22].

Initially, empirical antibiotic therapy was introduced to cover the most common pathogens in dental infections, which needed to be escalated after 48 hours due to worsening of the general clinical picture. In most mild cases, empirical oral antibiotic therapy is commonly used as the first choice of medication, due to knowledge of the pathogens present in the teeth, gums and mucous membranes, and it is not always necessary to perform culture and sensitivity testing[23-25]. In immunocompetent patients, with an indication for intravenous therapy, the antibiotics of choice are ampicillin and sulbactam. Second- or third-generation penicillins can be used, such as ceftriaxone at a dose of 2 grams daily; however, penicillin should be associated with another antimicrobial. Metronidazole is a good choice to be combined with penicillin, but it cannot be used as monotherapy due to its low coverage against aerobic germs such as *Streptococcus*, although it is highly active against

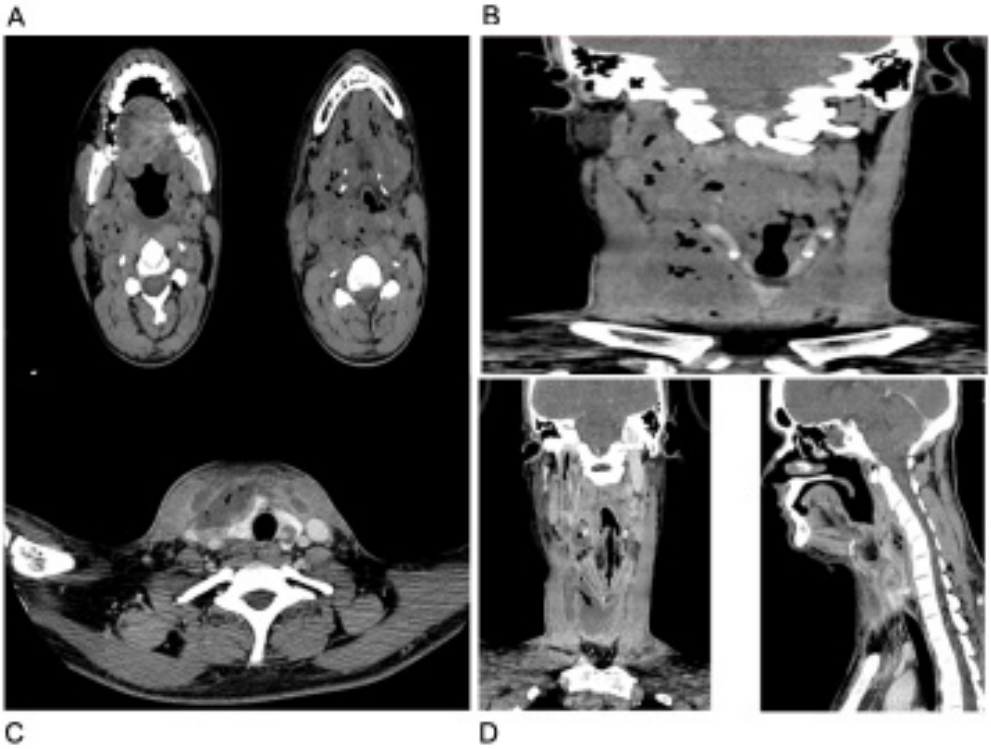

Figure 1. A: Tomography at levels 1 and 2 in axial section showing submandibular collections on the left and right with the presence of gas foci; **B.** Tomography of the cervical region in coronal section showing collections with gas foci; **C.** Axial section with contrast demonstrating the presence of a collection in the thyroid topography; **D.** Coronal and sagittal sections with contrast allowing the visualization of collections near the sternocleidomastoid muscle; collection dissects the facial and myoadipose planes up to the sternal notch.

anaerobic gram-negative bacilli. In case of intolerance to penicillin, the use of metronidazole and levofloxacin is a plausible option. Macrolides are not recommended, as they do not provide good coverage against anaerobic germs and increasing resistance has been observed on the part of some types of *Streptococcus*[22,26]. In the literature, rarer cases of infections caused by fungi and parasites are described.10

The surgical approach may consist of placing a drain or, more rarely, partial or total resection of the thyroid[3,18]. It is important that drainage be performed at the correct time, since if it occurs prematurely, the infection may spread; prior antibiotic therapy is a way to reduce the chances of hematogenous dissemination of the infectious process[22]. If the airways are compromised, surgical intervention is mandatory and must be performed immediately[15,27]. In the case described, antibiotic therapy had already been previously instituted and drainage was performed on the side contralateral to the affected tooth, due to the large abscess that occupied a large part of the cervical region. Subsequently, the abscess evolved with tracheal compromise and desaturation during a new surgical approach, hence it was decided the airways be protected through emergency tracheostomy during the operation.

According to the literature, after infection control, patients with AT most commonly return to normal thyroid function within one to three months[3,28]. The case described here presented a significant elevation of serum thyroid hormones, with suppression of TSH, which led to the introduction of methimazole, but normalization of thyroxine concentrations was observed within seven days, unlike what is seen in cases of autoimmune thyrotoxicosis. This fact led the team to suspect the release of thyroid hormones due to follicular destruction caused by ED; a hypothesis that was corroborated by the absence of autoimmune markers. During the evolution, the patient remained euthyroid and the thyroid ultrasound performed during outpatient follow-up showed normal parenchyma.

This report describes a case of transient thyrotoxicosis in an adult patient who presented with an infection in the lower third molar, which complicated with extensive cervical and thoracic involvement. After adequate clinical and surgical treatment of the infectious process, there was full recovery of thyroid function, ruling out the hypothesis of a primary thyroid disease.

Authors' contributions

We describe contributions to the papers using the taxanomy (CRediT) provided above:

Study design and construction: IS Neves; BHJ Lara. *Manuscript writing*: IS Neves; BHJ Lara. *Final manuscript review*: MF Borges.

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