

## Cryptic Tonsils and Halitosis: An Overview of the Literature and a Clinical Image

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**Abstract:** Cryptic tonsils are the manifestation of repeated inflammation of the tonsils. In particular, the term is used to indicate the occupation of the space of the crypts present on the surface of the tonsillar glands, by infectious debris, deposits of calcific material or food residues. Cryptic tonsils are associated with the appearance of whitish plaques (tonsillolith) and bad breath (halitosis), ear pain, sore throat, hypertrophic tonsils and swallowing problems. A 25-year-old patient comes to the practice for oral hygiene when we notice his cryptic tonsils that cause him to form tonsilloliths and halitosis, creating embarrassment for the patient and limits in interpersonal relationships.

**Keywords:** Cryptic tonsils are the manifestation of repeated inflammation, (tonsillolith) and bad breath (halitosis).

### INTRODUCTION

The tonsils are lymph nodes located at the level of the mouth and pharynx. The term lymph gland means an organ with anti-infective and immune function, the task of the tonsils is to protect the body from pathogens that can invade the tissues around the orifices of the nasal and oral cavity [1].

Acute tonsillitis is an infection of the tonsils caused by bacteria or viruses and can result in peritonsillar abscesses. Chronic tonsillitis is a tenacious infection of the tonsils that can lead to the formation of tonsillar stones [2].

Chronic tonsillitis (CT) can be of two types: primary and secondary. Primary chronic tonsillitis where the lymphoreticular tissue does not have the reactive capacity and the infectious process is slowly established and secondary where the lymphatic tissue has hindered the virulent antigen, but not completely.

There is in both cases a relative inability of the lymphoreticular tissue to perform its normal functions and there is a continuous and irreversible damage, as a result of hypertrophy of the tonsils which thus try to return to the condition of physiological function, but their balance is now compromised.

Cryptic tonsils are the consequence of repeated inflammations. Anatomically, cryptic tonsils have cavities like caves where are deposited remains of food, fungi and bacteria that contribute to the formation of tonsillolith [3]. Calcification, which gives rise to tonsilloliths, occurs after the deposition of inorganic salts and the enlargement of the concretion occurs gradually. The tonsilloliths derive their phosphate and carbonate of lime and magnesium from the saliva secreted by the major and minor salivary glands [4]. The most frequent localizations is in the tonsillar fossa and the size is a few millimeters of hard consistency with oval, cylindrical, roundish and pyramidal shape.

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The color is yellowish, green and gray-black [5]. The tonsillolith is responsible for the halitosis of patients with cryptic tonsils due to its chemical composition.

### CASE PRESENTATION

A 25-year-old male patient went to our observation at the dental clinic. Medical anamnesis indicated that the patient was in excellent health, did not smoke and did not drink alcohol. There was no history of any systemic disease. No swellings or discomfort had ever been present in the head or neck areas. Clinically, no extraoral swellings were evident. Palpation of the face, with particular attention to the parotid areas, showed the tissues to be normal in tone and painless. There was no cervical lymphadenopathy. There was no trismus. It had a good state of dental and periodontal health, no caries. Genetically he was predisposed to

tonsillar problems because both parents suffer from tonsillar problems. The previous year suffered from 2 acute tonsillitis after one month and often tonsilloliths are formed that give him dysphagia and halitosis. During the inspection, hypertrophic and cryptic tonsils were observed.

Mandibles showed no abnormalities laterally or medially. The orientation of the Stenone's duct was patent and free. If there is evidence of chronic tonsillolith, tonsillectomy offers definitive therapy. In our patient, surgical excision was not performed because he refused it.

We suggested to the patient the use of mouthwashes and oro-soluble caps containing lactoferrin to oppose the formation of tonsillolith and bad breath.



**Figure 1: the clinical appearance of cryptic tonsils**

### DISCUSSION

Anatomically cryptic tonsils have angles and fissures where bacteria, together with food remnants, can nest and calcify, creating tonsillolith that can lead to chronic inflammation and discomfort.

The most common symptom (and often the only symptom experienced by patients) is halitosis. If untreated, bacteria continue to multiply and increase inflammation of the tonsillar tissue giving symptoms of severe sore throat and discomfort during swallowing and even ear pain due to swelling of the tonsils. By studying the bacteria that cause inflammation of the tonsils, researchers found both aerobic and anaerobic bacteria. Anaerobic bacteria produce volatile sulfur compounds such as hydrogen sulphide and methyl mercaptan. Volatile sulphur (VSC) has been involved in halitosis [6].

There are many causes of halitosis but most of them are related to the oral cavity, while others are related to otolaryngology and respiratory diseases, gastrointestinal diseases, liver/renal impairment and other metabolic syndromes are minor causes [7].

Intraloral cause of halitosis include oral disease (acute necrotizing ulcerative gingivitis, acute gingivitis, pericoronitis, xerostomia, oral ulceration etc) and nasopharyngeal conditions (sinusitis, rhinitis, tonsillitis, tonsilloliths, laryngitis, pharyngitis, etc) [8]. Extraoral causes of halitosis include the use of some medicines (antidepressants, antipsychotics, antihistamines, diuretics, nitrates, muscle relaxants etc) and gastrointestinal disorders (liver cirrhosis, hepatic diseases, hepatic failure etc), metabolic diseases (diabetes mellitus, diabetic ketoacidosis, trimethylaminuria etc), respiratory pathologies (respiratory tract infections, pulmonary abscess, tuberculosis, bronchitis, chronic obstructive pulmonary disease (COPD), bronchiectasis etc) and general systemic conditions (menstruation and malignancy etc) [9].

The Interscan Halimeter® is one of the most common devices used to perform volatile sulphur compound (VSC) halitometry. It contains an electrochemical voltammetric sensor, which generates a signal when exposed to sulphur compounds, and a

digital display which records the quantity of VSC present in expired air in parts per billion (ppb). Hydrogen sulfide, methylmercaptans and dimethylsulfides are substances that have an offensive odour and are mainly responsible for breath malodour. The halimeter allows an objective measurement of halitosis.

Other subjective methods such as organoleptic tests depend on olfaction examination accuracy, which may change due to viral respiratory infection, environment humidity, etc.

An objective measurement of VSC is important for the diagnosis, treatment and follow-up of halitosis [10-11]. Therefore, patients who are prone to tonsil stones should avoid rinses and drinks, such as wines, that contain sulfur.

Patients who have allergies or colds are more prone to the formation of tonsillar stones because of the mucus in the back of the throat. Applying a natural nasal spray containing xylitol two or three times a day can help eliminate mucus and prevent progression and formation of tonsillar stones. The active ingredient of xylitol acts to reduce the amount of bacteria by increasing the salivary flow to create a moist, oxygen-rich environment. The oxygen-rich environment inhibits bacteria. This can lead to the prevention and elimination of the progression of tonsil stones [12]. Reducing the amount of bacteria in the mouth helps to prevent the formation of tonsil stones. Dentists and dental hygienists can advise patients to have meticulous home care with electric or manual toothbrushes, flossing and rinsing with sulphate-free products. Avoiding drinks with carbonation, sulfur or dairy products reduces the risk and growth of tonsil stones [13].

In addition, the dentist may recommend the use of lactoferrin products such as toothpastes or tablets. Lactoferrin (Lf) is a monomer glycoprotein of 80 kDa molecular weight with intramolecular disulfide bridges, bent into two regions known as terminal lobes N and C which, in turn, are organized into two domains: N1 and N2, C1 and C2. In each N2 and C2 lobe resides a place where the ferric ion ( $Fe^{3+}$ ) synergistically binds with the carbonate ion ( $CO_3^{2-}$ ). Because of its ability to bind  $Fe^{3+}$  reversibly, Lf can exist as holo Lf (associated with  $Fe^{3+}$ ) or apo Lf (free of  $Fe^{3+}$ ). Lf is a strongly cationic molecule with an isoelectric point between 8.5-9. and Lf begins to release  $Fe^{3+}$  ions at pH values as low as 3.5-4.0. [14]. The bacteriostatic effect of Lf in its apo-Lf form has been attributed to its ability to capture the  $Fe^{3+}$  ion and thus limit its use by pathogenic bacteria that require like an essential factor for their growth and expression of virulence factor [15].

The bactericidal capacity of Lf is attributed to the direct interaction of the molecule, or part of it, with bacterial surfaces; this interaction has been observed in both Gram positive and Gram negative bacteria [16].

Human lactoferrins display a broad antimicrobial spectrum, acting against Gram-positive and Gram-negative bacteria and against some viruses and fungi. Initially it was thought that this antimicrobial activity was due solely to its ability to sequester iron. With regard to Gram-positive species, there is a direct action through interaction with the lipoteic acids of the bacterial wall and bactericidal activity has been demonstrated against numerous pathogens, including streptococci, staphylococci and *Vibrio cholerae*. In Gram negative the interaction of Lf with the bacterial surface has been detected, followed by the liberation of lipopolysaccharide (LPS), the increase in membrane permeability and the liberation of the cytoplasmic content of the bacteria (15,16). LPS is the endotoxic component of the cell wall of Gram-negative bacteria, which attaches to receptors of the host cell, as one of the first steps to infection. Hence, one of the main strategies to prevent the binding of LPS to eukaryotic cells is the search for compounds with the capacity to alter this structure. This is the case of several antibacterial cationic or polykationic peptides, such as polymyxin B, defensins, magainins, cecropins, and indolicidine. When these agents interact with the anionic region of the LPS, they destabilize the union of this molecule with cations present on the bacterial surface, causing its release. There are also alterations in the conformation and permeability of the bacterial cytoplasmic membrane. This increase in permeability also facilitates the attack of other defense proteins against the bacteria; lysozyme and immunoglobulins are molecules that have been shown to have a synergistic effect with lactoferrin [17].

It has been shown that lactoferrin has an adjuvant action aimed at treating various *Candida* infections and in patients with viral infections, including the HIV virus. The antiviral activity of lactoferrin is most likely due to a double effect: the first concerns the ability to bind glycosaminoglycans located on the membranes of eukaryotic cells, thus preventing the penetration of viral particles and therefore infection at birth, the second is related to the ability to bind receptors present on the viral surface altering their interactions with host cells. The antiviral activity is carried out both on viruses equipped with pericapsides and on those that do not have them, such as rotaviruses or polioviruses. Obviously, the final antiviral effect is also mediated in vivo by the immunomodulating action. Finally, there is evidence of a possible role of lactoferrin as an antitumor agent, demonstrated on chemically induced tumors in laboratory rats. It has also been shown that lactoferrin reduces the development of cancer cells in patients with leukemia and inhibits the formation of metastases in breast cancer. These results may suggest an important involvement of this protein in protecting the development of tumours, providing new approaches to cancer therapies [18-19].

Lactoferrin is able to influence the systemic immune response in different ways. One is the regulation of macrophage activity and lymphocyte proliferation. However, their most important action is related to polymorphonuclear neutrophils; these cells, in addition to acting as phagocytes, are capable of discharging lactoferrin granules into the blood plasma, putting them in contact with invading microorganisms. Various immunomodulatory effects have been reported in the mucosal immune system in animal and human models, supplemented with Lf orally [20].

The elimination of tonsillolith can be completed by an air/water syringe or a tongue depressor. Gently use the air/water syringe to spray the stones from the tonsil folds while using suction to remove debris. The back of a tongue depressor can also be used to gently push the tissue around the stone and then lift the stone up and out. Good screening of the patient for abnormalities through an examination of the head and neck will allow the doctor to identify the presence of tonsillar inflammation and stones. If untreated, tonsils can cause severe throat and ear pain. If the tonsillar crypts are large, it is possible to remove the case material from the tonsillar crypts with the so-called "squeezing"; this manoeuvre is performed by the specialist usually with a tongue-lower, exerting a slight pressure below the crypt, sufficient to release the contents. Chronic tonsils can lead to the removal of tonsils called tonsillectomy, which are a vital part of the immune system.

Another solution to the tonsillar problem is tonsillectomy. The first tonsillectomy was described by Celsius in 30 B.C [21]. Tonsillectomy continues to be one of the most common surgical procedures. Although most patients with tonsillectomy are healthy, there remains a small risk of post-operative bleeding in all patients. More recent studies have found a risk of between 2% and 4%.

The coagulation studies have been used as a screening test to predict post-operative bleeding. There are conflicting reports about the usefulness of preoperative coagulation studies in predicting postoperative bleeding. The effectiveness of prothrombin time (PT) and activated partial thromboplastin time (aPTT) in predicting postoperative hemorrhage is unknown [22].

Traditionally, post-operative bleeding can be of two types: immediate (< 24 hours) and delayed (> 24 hours), this is because the tonsillar region is characterized by rich vascular spraying from the external carotid artery. The arterial branches that directly support the lateral wall of the oropharynx are the ascending pharynx artery and the ascending palatine artery.

The clinical manifestations are represented by the emission of blood from the mouth and hematemesis. In addition, the patient may have pain in the area of surgery, fever, oral lesions, effective and rare complications such as subcutaneous emphysema or Grisel syndrome (atlanto-axial subluxation) [23]. Recently, a less invasive therapy, tonsillary cryptolysis using a CO<sub>2</sub> laser, has been proposed. The utilisation of CO<sub>2</sub> laser ablation can reduce crypt depth and decrease the retention of a tonsillolith, preserving the immunological function of the tonsils [24].

## CONCLUSION

Halitosis is the main problem of cryptic tonsils that give rise to tonsillolith. The patient refused surgical excision of the tonsils and laser therapy so it is advisable to follow some general practices that can be adopted to try to avoid the formation of tonsillolith and halitosis: do not smoke; to Drink plenty of water during the day (2 liters ) to prevent the accumulation of bacteria. Water naturally helps to eliminate bacteria and prevents dry mouth ,that can promote the development of tonsillar stones. To exchange drinks, supplements, energy drinks with water. Drinks like these are often packed with sugar and other additives that can make mouth dryer and increase the risk of bacterial growth. To follow a healthy diet without sugar, preservatives and processed foods. Foods containing sugar, additives and preservatives can upset the natural pH balance of the mouth and make things worse ; to manage symptoms of nose allergies that can promote mucus deposition in the back of the throat. Mucus increases exposure to oral bacteria and can cause the development of tonsillar stones and the patient is advised to use a lactoferrin-based mouthwash twice a day, morning and evening, for 30 days. Lactoferrin is a glycoprotein capable of chelating iron even in an acidic environment by removing it from the metabolism of some anaerobic bacterial species Gram negative.

We administered to the patient twice a day, in addition to the mouth rinse, oro-soluble tablets containing 50 mg of lactoferrin to be taken after about 15 minutes from teeth brushing, in the morning and evening before going to bed, with the advice to dissolve them slowly and completely and then distribute with the tongue throughout the mouth the solution formed, avoiding the intake of liquids for the next 20 minutes.

After one month of treatment the patient had solved the annoying problem and continued her lactoferrin therapy for another 30 days in order to prevent the development of a pathogenic bacterial flora and contribute to the well-being of the oral cavity.

The results obtained with the administration of lactoferrin, a determining factor for the non-specific immune defense of the body, show the importance of maintaining in the saliva its physiological concentration in order to restore its antimicrobial activity, so as to

safeguard the health of the oral cavity through the use of an innovative solution without side effects and thus avoid the formation of tonsillolith and halitosis.

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