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Tonsillolith (Tonsil Stones) - Overview

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Abstract

Tonsil stone is calcified cemented layer formed in the tonsil region. Many small tonsil stones (tonsoliths) do not cause much of noticeable symptoms. Even when they are large some tonsil stones are only discovered incidentally on the X-rays or CT scans. Some larger tonsoliths however may have quiet amount of multiple symptoms including bad breath, swelling, and sore throat. There is a microbial biofilm being created in the tonsil region.

Keywords: *Tonsil stone, (tonsoliths), multiple symptoms, swelling, sore throat microbial biofilm*

INTRODUCTION

Tonsillolith is delineated as concretion of calcified materials in the crypt of palatine tonsil. Small tonsillolith is relatively common and can occur up to 10-11% of the population but due to the asymptomatic nature of this condition, most cases go unreported. The Symptomatic patients can present with foreign body sensation, halitosis, sore throat, the odynophagia and in certain cases even dysphagia or referred ear pain. Large or the giant tonsillolith are fairly uncommon. Calculi found in the peritonsillar space or also known as the peritonsillolith are even rarer. Peritonsillolith was first delineated in 1975 and since then there are only few literatures describing this entity. A giant peritonsillolith that is properly concealed by the tonsil substance or the mucosa may present as oropharyngeal mass that mimics tumor. We report an extremely rare case of giant peritonsillolith that underwent the diagnostic tonsillectomy and surgical excision (Caldas et al., 2007).

SYMPTOMS

- Tonsil swelling
- Ear pain
- Difficulty swallowing
- White debris
- Bad breath
- Cough
- Difficulty swallowing.
- Feeling that something's stuck in your throat.
- Small white patches on your tonsils.

CAUSES: Materials and the debris can get trapped in the tonsillar crypts. The material can harden or calcify, forming stones.

TRAPPED MATERIAL COULD INCLUDE

- Minerals such as calcium.
- The Food or debris.
- By Bacteria or fungi.
- Chronic inflammation of the tonsils.
- Trapping of the bacteria, the dead cells and mucus in the tonsil crypts.
- Repeated bouts of tonsillitis.

POST NASAL DRIP

- The excess mucus trapped in the tonsil crypts.
- Allergies
- Sinus infections
- Autoimmune disorders
- The Environmental toxins

Few symptoms of having tonsil stones are (Lee et al., 2019)

- **Bad breath:** One of the prime indicators of the tonsil stone is exceedingly bad breath or halitosis that accompanies a tonsil infection. One study of the patients with a form of chronic tonsillitis availed a special test to see if volatile sulfur compounds were contained in the subjects' breath. The presence of these main foul-smelling compounds provides objective evidence of bad breath. The researchers found that 76% of the people who had abnormally high concentrations of these compounds also had the possibilities of tonsil stones. Other researchers have suggested that the tonsil stones be considered in situations when the cause of bad breath is in question.
- **Sore throat:** When a tonsil stone and the tonsillitis occur together it can be difficult to determine whether the pain in the throat is caused by your infection or the tonsil stone. The presence of a tonsil stone itself though may cause one to feel pain or discomfort in the area where it is lodged.
- **White debris:** Some tonsil stones are mainly visible in the back of the throat as a lump of solid white material. This is not always the case. Often they are quiet hidden in the folds of the tonsils. In these instances they may only be detectable with the aid of non-invasive scanning techniques such as CT scans or in the magnetic resonance imaging.
- **Difficulty swallowing:** Depending on the location or the size of the tonsil stone it may be difficult or painful to swallow foods or liquids.
- **Ear pain:** Tonsil stones can develop anywhere in the tonsils. Because of shared nerve pathways they may cause a person to feel referred pain in the ear even though the specific stone itself is not touching the ear.
- **Tonsil swelling:** When collected the debris hardens and a tonsil stone forms inflammation from infection (if present) and the tonsil stone itself may cause a tonsil to swell or inflammation or become larger.

How Are Tonsil Stones Treated?

The appropriate treatment for the tonsil stone depends on the size of the tonsoliths and its potential to cause discomfort or mainly harm. Various options include (Lee et al., 2019):

- **No treatment:** Many tonsil stones especially ones that have no symptoms precisely require no special treatment.
- **At-Home Removal:** Some people choose to dislodge the tonsil stones at home with the use of picks or swabs.

- **Salt Water Gargles:** Gargling with warm salty water may aid alleviate the discomfort of tonsillitis which often accompanies tonsil stones.
- **Antibiotics:** Various antibiotics can be used to treat tonsil stones. While they may be quiet helpful for some people they cannot correct the fundamental problem that is causing tonsoliths. Also antibiotics can have side effects.
- **Surgical Removal:** When tonsil stones are exceedingly large and symptomatic it may be necessary for a surgeon to remove them.

WAYS FOR AVOIDING TONSILS

There are certain things one can do to prevent tonsil stones from developing in the first place or coming back once they get removed. Some of these things encompasses (Ferguson et al., 2014):

- Removing a bacterium that builds up at the back of once tongue once you get done brushing your teeth. The best way to do this is to utilize a tongue scraper each night before one go to bed each night.

- Brush the teeth regularly so that you can get rid of food debris that gets trapped in between your teeth. Brush the teeth and tongue at least 2 times every day.

- Combine 1 tablespoons of salt and 1 cup of water and gargle it. Gargling saline water will help disinfect your mouth and help remove the bacteria that could cause tonsil stones. Do this a few times every day.

- Increasing the water intake is a good way to prevent this problem as it will help keep your mouth moisturized. Stay away from the sugared drinks likes sodas and a diet high in simple sugars because they are known to contribute to the development of the tonsil stones.

- Try to cease smoking and drinking alcohol as much. Drinks with alcohol in it can leave your mouth dry which isn't good if one often experience tonsil stones. Smoking won't help your situation either.

Tonsilloliths or tonsil stones are calcified bodies that are packed with bacteria and also organic debris. Chronic inflammation of the tonsils results in the dystrophic calcification in the crypts of the palatine tonsils. They are usually single and also unilateral, but occasionally they may be multiple or bilateral. They are composed of saliva or the inflammatory exudate derived calcium salts such as hydroxyapatite or calcium carbonate apatite, magnesium salts, oxalates and occasionally ammonium radicals (Kanotra et al., 2012).

They are usually small in size, measuring a few millimetres. The Large tonsilloliths are usually discovered in the routine panoramic radiographs, where they may appear as radiopaque masses that overlap the mandibular ramus. However, the large tonsilloliths measuring more than 3.1cm have also been reported. However, the definitive diagnosis of a tonsillolith is made by computed tomography (CT), as ghost images of the unilateral tonsilloliths may appear on panoramic radiographs owing to the natural rotation of the panoramic radiographs. In this case, a CBCT garnered hyperdense images in the oropharyngeal space and precisely located the tonsillolith. The tonsilloliths was dislodged from the tonsil and no further treatments was carried out as the tonsil remained asymptomatic. Differential diagnoses that must be considered in case of the tonsillolith may be prominent pterygoidhamulus, large maxillary tuberosity, the intraosseous abnormalities of the mandibular ramus, phleboliths, lymph node calcifications, the foreign bodies, displaced tooth, osteoma, calcified granulomas, calcified malignancies scrofulas, tuberculosis, isolated bone/cartilage derived from embryonic rests and an elongated styloid process (Cortez et al.,1979).

The exact pathogenesis of the tonsilloliths is not clear. It has been proposed that they originate as a result repeated tonsillitis which paves to fibrosis of ducts of crypts followed by retention of epithelial debris. This epithelial debris forms the ideal media for the growth and culture of microbes such as bacteria, actinomyces and fungi . Finally, dystrophic calcification results from the deposition of inorganic salts from the saliva secreted in the mouth by major and minor salivary glands.

In about 4% of cases, tonsilloliths are associated with kidney stones, gall stones and wharton's duct stones, suggesting that tonsillolithiasis could be a precise part of the lithogenic diathesis

(Harley,2002). In this case ultrasound of the kidney, gall bladder and submandibular salivary glands ruled out the possibility of the lithogenic diathesis.

Tonsilloliths have much potential to cause worrisome oral halitosis. Foul smelling compounds such as the volatile sulfur compounds and sulfur derived gases are produced as a result of bacterial metabolism within the tonsillolith biofilms. In this case, halitosis was one of the reasons to seek oral healthcare. The halitosis promptly disappeared after removal of the tonsillolith and restoration of teeth.

A literature review on the recurrence rate of treated tonsilloliths revealed only one case of the recurrent palatine tonsillolith, although the cause for recurrence was not clear. Our case did not have a recurrence probably due to the maintenance of oral hygiene through the daily warm saline mouthwash and quarterly oral prophylaxis regimens. Such a strategy must be part of the post operative care in such cases considering the bacterial aetiology in the causation of tonsilloliths(Kimura et al.,1993).

DEFINITION

Usually, the treatment aims to manage tonsil stone symptoms. There isn't a specific treatment method for stones.

- **At-Home Removal:** Some people choose to dislodge tonsil stones at home with the use of picks or by swabs. Brush teeth regularly
- **Antibiotics:** Different Antibiotics can also be used to treat tonsil stones.
- **Salt Water Gargles:** Gargling with lukewarm, salty water may help ease the trouble of tonsillitis, which often accompanies tonsil stones.
- **Coughing:** Some people also find that a strong cough can loosen the stones and bring them up. Quit smoking (Jones, 1996)

LIVING BIOFILM

Biofilm forms when bacteria adhere to the surface in moist environment by secreting a slimy, glue like substance. Biofilm held together by the molecules known as extracellular polymeric substance. The establishment of the biofilm is a key event in the formation of tonsillolith in tonsillar crypt. Polysaccharide intercellular adhesion protects bacteria against major components of the human innate immune systems. Cell to cell signaling (quorum sensing) and

communication with the different bacteria enhances the biofilm formation.7 Calcification of matrix may give further protection for the polymicrobial bacterial flora living in tonsillolith. Present study of tonsillolith by physical, chemical and microbiological analysis confirms that the tonsillolith is a polymicrobial biofilm. No recurrence was reported by maintaining good oral hygiene through oral prophylaxis and periodic once in every 2 months thorough irrigation of the tonsillar site with normal saline in the present case. Flattening of the crypts and crevices can be done by aiding scanned carbon dioxide laser to reduce the retention of tonsillolith were reported (Stoodley et al.,2009).Nanomicrobiology and advanced techniques can be used to understand the exact microbial flora(Dr.S.Sreeremya,2020), especially bacterial flora(S. Sreeremya,2017). Ayurveda is one among the medicine practices(S.Sreeremya,2022) which can be integrated with other modern medicines and also can integrate chiropractic technique(Dr. S. Sreeremya,2024a).Modern day pharmacology(S. Sreeremya,2018) and categories like paediatric pharmacology and geriatric pharmacology has to be deeply assessed(Dr. S. Sreeremya,2019b)

Tonsilloliths are the calcification that forms in the crypts of the palatal tonsils. These calculi are composed of the calcium salts either alone or in combination with other mineral salts. Chemical analysis of the present case of the tonsillolith indicated that tonsillolith is composed of calcification of calcium salts and presence of other chemical ingredients. Calcium carbonate ($CaCO_3$) was found to constitute the major portion and also the constitutes other chemical components like magnesium, the chloride, sodium, potassium, sulphates as SO_4, nitrates as NO_3, silica as SiO_2, iron, the fluoride and other unidentified components (Samant et al.,2003). Measurement of the turbidity indicated total solids present in tonsillolith whereas measurement of electrical conductivity indicated the concentration of salts and other chemical ions present in tonsillolith.

Microbiological analysis of the tonsillolith revealed presence of both aerobic and anaerobic microorganisms.Tsuneishi et al (2006) in their study established the presence of various wide spectrum of microorganisms such as the Eubacterium and Trannerella. In the present case of tonsillolith gram stain study and the carbohydrate fermentation test showed that bacterial flora are present in tonsillolith. On gram staining the surface of the tonsillolith showed gram-positive cocci, gram-positive bacilli and gram-negative bacilli where as deep inside the tonsillolith gram stain showed predominantly gram-negative bacilli. The Aerobic bacteria

present on surface of tonsillolith where as deep inside tonsillolith belongs to anaerobic bacteria flora (Mesolella et al., 2004).

Tonsillolith have the biopotential to cause oral halitosis. Foul smelling compounds such as volatile sulfur compounds and the sulfur derived gases were produced during bacterial metabolism. A characteristic smell of sulfur gives when production of gases reaches a certain concentration. In the present case of tonsillolith, the patient expressed irritation, discomfort and halitosis. Irritation and discomfort was due to presence of the tonsillolith in right pharynx at the tonsillar crypt and halitosis was due to the volatile sulfur compounds produced by bacteria in tonsillolith. This case report will help in aggrandizing awareness amongst pediatric dentist and clinicians about tonsillolith and its effects and modality of treatment (Pruet, 1987).

CONCLUSION

There is the enhanced growth or rather the surplus growth of bacteria, especially gram positive bacteria like Streptococci and Staphylococci, which makes the clacified layer in the tonsil area and it is clinically termed as tonsil stones or (tonsoliths). There are many symptoms for this disorder. The remedies are salt water gargle etc. The various clinical aspects of tonsil stone are discussed in this review.

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