



# Submandibular Sialolithiasis: Multiverse Presentation of Four Cases

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## **Authors' contributions**

*This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.*

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**Case Study**

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## **ABSTRACT**

Sialolithiasis is caused by the development of a calculus in the salivary gland or duct, often observed in the oral region. This disease is most common in adults or young adults and rarely develops in children. Among reported all the cases of sialolithiasis, only 3% are seen in the pediatric population. The clinical presentation of sialolithiasis typically consists of a painful swelling of the involved salivary gland at meal times. These characteristic clinical signs often lead to an easy diagnosis. Most commonly affected is the submandibular gland 92%, followed by the parotid 6% and sublingual and minor salivary glands 2%. Here, we report the 4 cases of sialolithiasis of the submandibular gland with multiverse presentation.

*Keywords: Sialolithiasis; salivary glands; giant sialolith; recurrence.*

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## 1. INTRODUCTION

“Salivary gland diseases constitute a heterogeneous group of lesions of great morphological variations like neoplastic and nonneoplastic. Among Non-neoplastic lesions, sialolithiasis is 2<sup>nd</sup> most common. Sialoliths are calcified structures that develop within glandular tissue parenchyma of the major and minor salivary glands and in ducts. These are usually round or oval in shape of variable sizes leading to partial or complete obstruction of the salivary duct. Sialolithiasis may exhibit recurrence”. [1] “80-90% of the salivary gland and duct calculi are found in the submandibular gland, 5-10% in the parotid gland, and approximately 0-5% in the sublingual and other minor salivary glands” [2]. “Salivary stones are mainly composed of calcium phosphate with smaller amounts of carbonates in the form of hydroxyapatite, magnesium, potassium and traces of ammonium together with organic material mainly composed of carbohydrates and amino acids” [3].

“The incidence of sialolithiasis peaks in the third to sixth decade of life. Salivary calculi in the pediatric population comprise only 3% of cases and are rarely bilateral. Most calculi are relatively smaller (<1 cm, 93.1%) in children and located in the distal duct (62%)” [4].

Submandibular gland sialolithiasis is more common because of the following anatomical factors:

1. The Wharton's duct of the submandibular gland is the longest duct among all salivary gland ducts
2. The path of the duct going in an upward direction (antigravity flow).
3. Also, the main portion of the duct is wider than its orifice.

Along with these anatomical factors, the submandibular gland saliva is alkaline in nature and rich in mucin, which can promote the formation of a sialolith [5].

This article aims to report a series of 4 cases of sialolithiasis of the submandibular gland of multiverse presentation. Ethical consideration and patient written consent have been taken from all the cases. Two cases were of giant sialolith in which case one was sialolith in the posterior region of the oral cavity in a 12 year old child which was unusual considering the age of the patient, another case was 72 year old female having sialolith in the left submandibular salivary

duct. 3rd case was 62 year old female having sialolith at the orifice of the submandibular salivary duct. Another was a case of Wharton's duct sialolith which recurred within 2 months after surgical removal.

## 2. CASE STUDIES

### 2.1 Case 1

A 12-year-old female child reported to the Department of Oral and Maxillofacial Pathology at Government Dental College and Hospital, Aurangabad, Maharashtra on 16<sup>th</sup> December 2022 with chief complaints of pain in the lower left molar tooth, and swelling in the sublingual posterior region from the past 7 months. She complained of mild pain which increased during meal times with dryness of the mouth for 2 months. She had already taken antibiotic therapy. There was no improvement in the intensity of pain and size of the swelling. Extra oral examination revealed a swelling in the left submandibular region around 1.5 × 2 cm in size, which was soft on palpation and did not appear to be fixed to any underlying structures. Intraoral examination revealed a yellowish-white calcified mass in the left posterior sublingual region with fair oral hygiene. Surgical excision was done under local anesthesia and the specimen was sent for histopathological investigations.

### 2.2 Case 2

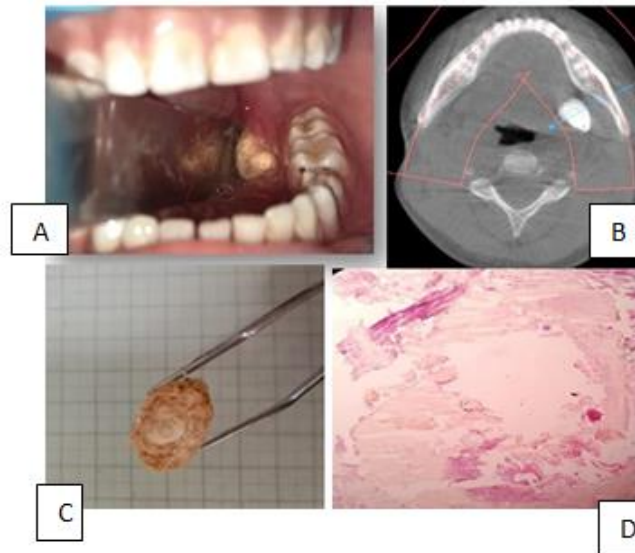
A 72-year-old female reported to the Department of Oral and Maxillofacial Pathology at Government Dental College and Hospital, Aurangabad, Maharashtra on 7<sup>th</sup> august 2022 with chief complaints of pain in the lower left region of jaw, and swelling in the submandibular region from the past 4 months. She complained of mild pain which was increased during meal times since 15 days. On Intraoral examination revealed a swelling in lower left front region of floor of mouth, that was tender on palpation and did not appear to be fixed to any underlying structures. Her medical history was insignificant. Surgical excision was done under local anesthesia and the specimen was sent for histopathological investigations.

### 2.3 Case 3

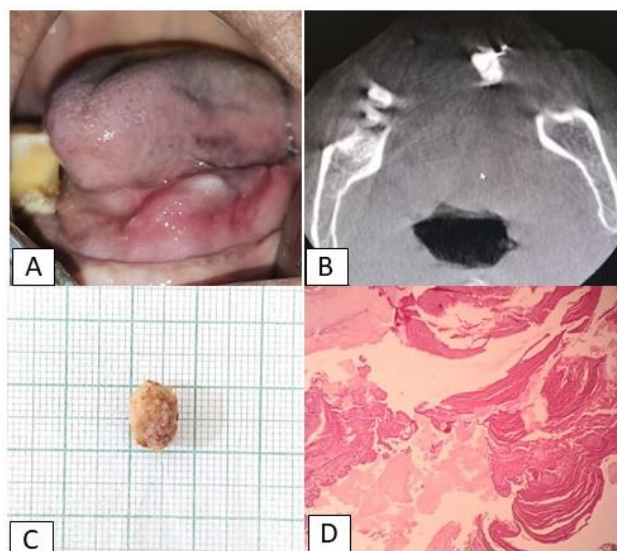
A 62-year-old female visited the to the Department of Oral and Maxillofacial Pathology at Government Dental College And Hospital, Aurangabad, Maharashtra on 27<sup>th</sup> December 2022 with the chief complaint of swelling

underneath the tongue. The swelling was painful on palpation. The medical history was unremarkable. On clinical examination, a yellowish mass about 3×3 mm in size was observed near the submandibular duct orifice on the right side of the oral cavity. On mandibular occlusal radiograph, a radiopaque mass was

seen in the right anterolingual region. Surgical sialolithotomy was planned because removal by manual manipulation of the sialolith seems impossible. Under local anesthesia, the sialolith was removed through a minimal incision in the mucosa of the duct in which it was located, and suturing of the incision site was not performed.



**Fig. 1A-D. 1A) Intraoral examination: yellowish-white calcified mass in left posterior sublingual region and fair oral hygiene. 1B) The CBCT showed well-defined radiopacity which was 20×16.5 mm ze. 1C) Gross examination yellowish white calcified mass approx. 16x 20 mm size. 1D) Histopathological Features 1. Numerous concentric areas of calcification of varying densities & small cavitational areas. 2.Scattered necrotic tissue areas surrounded by eosinophilic amorphous material**



**Fig.2A-D. 2A) Intraoral examination: a swelling in lower left front region of floor of mouth. 2B) CBCT showed well-defined radiopacity which was 20×17 mm size. 2C) Gross examination yellowish white calcified mass approx. 17x 20 mm size. 2D) ) Histopathological features 1.Numerous concentric areas of calcification of varying densities & small cavitational areas. 2.Scattered necrotic tissue areas surrounded by eosinophilic amorphous material**

## 2.4 Case 4

A 31 year old female reported to the Department of Oral and Maxillofacial Pathology at Government Dental College And Hospital, Aurangabad, Maharashtra on 18<sup>th</sup> August 2022 for the management of pain in the floor of the mouth which aggravated during food intake. Intraoral palpation revealed that the presence of hard structure within the Wharton's duct closer to the orifice. There was no purulent discharge from the duct. There was no lymphadenopathy. The occlusal radiograph (Fig. 3B) confirmed the presence of small calculus in right submandibular duct.

After 2 months again on 29<sup>th</sup> November 2022, she came with the same complaints of pain in the floor of her mouth at the same site also aggravated during meal time. her medical history was insignificant.

## 3. DISCUSSION

"Sialolithiasis is calcified accumulations that occur in the glandular tissue parenchyma of the major and minor salivary glands and in ducts" [1]. The central part of a sialolith consists of materials such as bacteria, foreign substances, and exfoliated epithelial cells that act as nidus on which a calcium salt is deposited concentrically to form a lamellar structure specifically in the case of giant sialolith [6].

"The etiology of sialolithiasis formation is still unknown. However, there are several contributing factors for the formation of sialolith are considered such as Inflammation, irregularities in the duct system, local irritants, some neurohormonal disturbances that affect calcium homeostasis, and anti-cholinergic medications may cause the pooling of saliva within the duct which is thought to promote stone formation" [4]. "Clinically, it presents as an acute, painful, and intermittent swelling of the gland, especially at mealtime, when the saliva flow is increased. The degree of symptoms is dependent on the extent of salivary ductal obstruction and the presence of secondary infection" [3]. "The lith may totally or, partially block the flow of saliva, causing salivary pooling within the duct and gland body. The enlargement of the gland resulting into pain. The involved gland is usually enlarged and tender, pus may be seen draining from the duct and signs of systemic infection may be present. Stasis of the saliva may lead to infection, fibrosis, and

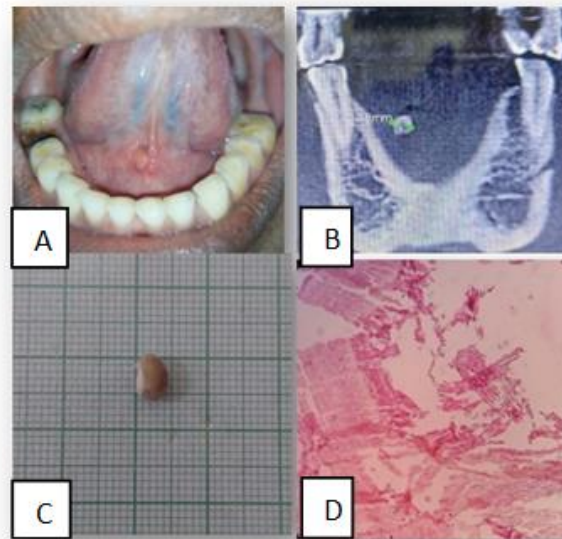
glandular atrophy. Sialolithiasis is considered the most frequent cause of acute and chronic sialoadenitis. Sialolithiasis must be differentiated from other diseases that cause swelling in salivary glands, such as acute or chronic bacterial sialadenitis, viral sialadenitis, radiation, and systemic diseases such as, sarcoidosis, and sjögren's syndrome"[7]. "The complications of sialolithiasis include secondary infections, abscess, salivary duct stenoses, mucocele, Kuttner's tumor and glandular parenchyma atrophy in chronic states" [6].

"Sialolithiasis occurs mainly in middle-aged adults and are rare in pediatric patients. The prevalence of sialolithiasis in children is low because the condition requires a considerable amount of time to develop, and cross-sections of the salivary glands are very small, making invasion by foreign substances difficult".[1] "In addition, concentrations of calcium and phosphorus in the saliva increase with age, facilitating sialolith formation in adults"[8]. "In children, saliva flow is rapid; thus, most sialoliths are located distally. Controversy in the incidence rates in males and females has been presented. Shinohara et al.described that sialolithiasis occurs more commonly in girls than in boys, with a rate of 1:1.6 in children younger than 10 years. However, Nahlieli et al. published a higher incidence of sialolithiasis in boys than in girls. generally, the size of sialolith measures from 1 to less than 10 mm, with a mean size reported as 6-9 mm. Giant sialoliths are rare and classified as those measuring >15 mm in one dimension"[9]. Out of four cases, case 1 and case 2 represented a giant sialolith as size of sialolith approx. 18x20 mm.

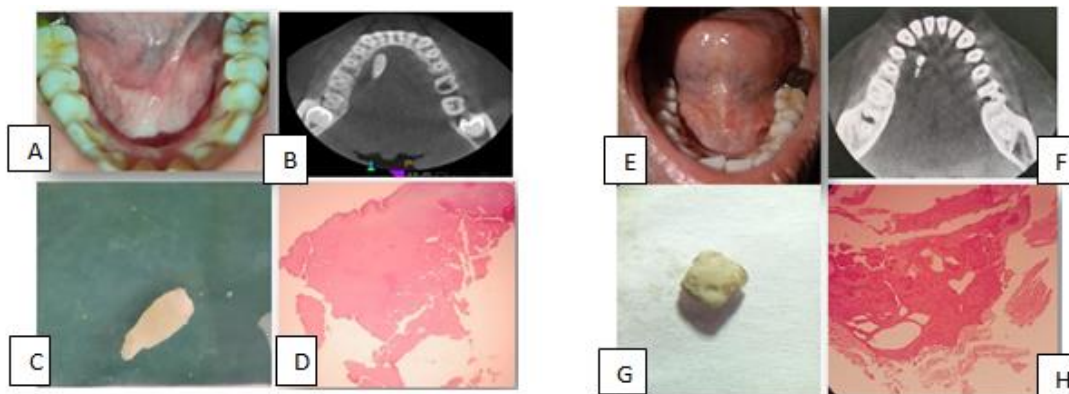
"Basic imaging methods of sialolithiasis are X-ray images, X-ray sialography, ultrasonography (US), computed tomography (CT), and magnetic resonance imaging (MRI). Sialoendoscopy, which is also a therapeutic method, is becoming increasingly popular. A major role in sialolithiasis diagnostics is played by unenhanced computed tomography, ultrasonography and digital subtraction sialography. Also, MRI sialography is gaining on popularity. Intraoral and extraoral X-ray images allow for opaque calculi visualisation. Approximately 80–90% of the stones are opaque on a standard X-ray. However, up to 20% of the calculi cannot be revealed with a review X-ray. It was observed that the stone of the submandibular gland produces opacity only in 80–90% of the cases, while the salivary duct stone of the parotid gland only in 60%" [10].

“Sialolithiasis structure can be seen histopathologically in concentric and irregular patterns, with high and low mineralization. In H&E staining, it shows as alternating eosinophilic and basophilic zones or globular calcified zones, formed by organic and inorganic materials. Basophilic zone indicates a highly mineralized

area. Whereas the eosinophilic zone indicates less mineralization. Often, the core of sialolith is predominated by organic materials while inorganic materials form the concentric pattern. In many studies described, the core is globular and highly mineralized or only composed of mineral/inorganic materials” [11].



**Fig.3A-D. 3A) Intraoral photograph. Swelling on the right side of the mouth floor. 3B) Occlusal radiograph. A radiopaque mass was observed on the right side of the mandible. 3C) sialolith retrieved approx. 7x4 mm in size. Decalcified H&E stained sections shows multiple small scattered necrotic tissues areas surrounded by eosinophilic amorphous material**



**Fig. 4A-D. 1st occurrence of sialolith. 4A) Intraoral photograph. swelling on the right side of the mouth floor. 4B) Occlusal radiograph. A radiopaque mass on the right side of the mandible. 4C) sialolith retrieved approx. 10x6 mm in size. 4D) Decalcified H&E stained section showed multiple small scattered necrotic tissues areas surrounded by eosinophilic amorphous material. Recurrence after 2 months 4E) After 2 month followup. 4F) Occlusal radiograph on 2nd recurrence. 4G) Sialolith retrieved approx. 6x4 mm in size. 4H) Decalcified H&E stained section showed multiple small scattered**

“In the reported cases, (FIG.1D) Histopathological features: 1. Numerous concentric areas of calcification of varying densities & small cavitational areas. 2. Scattered necrotic tissue areas surrounded by eosinophilic amorphous material (Fig. 2D, 3D, 4D & 4H).

The management of sialolithiasis is decided based on the topography of the gland, the size and number of stones, the functional state of the gland, the degree of superinfection, and the surgeon’s technical skill. Selection of treatment mode also depends on the preservation of gland function, discomfort to the patient and low level of complications” [3].

The Conservative approach, includes analgesia, hydration, local heat therapy, and milking of the gland to expel the stone and maintain salivary flow. Discontinuation of anticholinergic medications can also be recommended and in case of gland superinfection antibiotics covering oral flora are suggested. Gland massage after every meal with daily intake of at least 1.5 L of water and sialagogues administration are also conservative methods of management [6].

“The recurrence rate of sialolithiasis is 1-10%. Koch et al. Reported In a study of patients with persistent, residual or recurrent sialolithiasis, a range of 2–11 stones in 16 patients, with a single patient reported to have 11 stones. These patients had failed initial treatment with extended transoral duct surgery, 49% due to recurrent disease, and were referred to a tertiary referral center for salivary gland disease” [3]. “One of the case similarly failed initial therapy with a ductal incision and had a symptomatic recurrence. This suggests that certain patients are predisposed to the formation of a greater number of stones, though the risk factors remain unclear, and that gland excision and ductal clearance early on may preclude continued symptoms” [3]. Invasive management of sialolithiasis includes extracorporeal lithotripsy, sialendoscopy and surgery.

#### 4. CONCLUSION

Sialolithiasis is not commonly observed in children but should be considered in the differential diagnosis in patients who present with submandibular swelling and pain. Establishing a diagnosis of sialolithiasis requires a thorough history and physical examination along with routine radiographs. The primary objective of the treatment in case of giant sialolith should be the

restoration of normal salivary secretions. At any time if feasible, one should choose the most conservative method or the treatment most suitable to the specific situation of the patient.

The analysis of the biochemical composition of saliva may play a role in recurrence which needs to be further investigated. Further research may help to prevent recurrence.

#### CONSENT

As per international standards or university standards, patients and parental written consent has been collected and preserved by the author(s).

#### ETHICAL APPROVAL

As per international standards or university standards are written ethical approval has been collected and preserved by the author(s).

#### COMPETING INTERESTS

The authors have declared that no competing interests exist.

#### REFERENCES

1. Cornell mccullom III, DDS Cameron YS. Lee DMD David I. Blaustein DDS, phdd. Sialolithiasis in an 8-year-old child: Case Report *Pediatr Dent.* 1991;13:231-33.
2. Tulasi Lakshmi D, Firoz Babu P, Negi LS, Nayyar AS. Recurrent sialadenitis with sialolithiasis of submandibular gland: A Case Report. *J Dent App.* 2016;3(4):358-360
3. Shamita Tiwari, et al. Multiple recurrent obstructive sialolithiasis of left wharton’s duct - a case report. *Acta Scientific Otolaryngology* 2021;3(12):26-30.
4. Sandeep Pachisia et al, Submandibular sialolithiasis: A Series of Three Case Reports with Review of Literature *Clinics and Practice.* 2019; 9:1119 DOI:10.4081/cp.2019.1119
5. Su-Young Park, Sang-Ho Lee, Nan-Young Lee, Myeong-Kwan Jih. Sialolithiasis in children: Three case reports *Oral Biol Res.* 2019;43(4):340-348.
6. Kraaij S, et al. Salivary stones: symptoms, aetiology, biochemical composition and treatment”. *British Dental Journal.* 2014; 217: E23.



7. Morcos Nakhla a et al, The gland that kept on giving: A case report of over 40 sialoliths from a single submandibular gland.  
Available:<https://doi.org/10.1016/j.xocr.2022.100464>
8. Constantino Ledesma-Montes, DDS, msc, phd,\*Giant Sialolith: Case report and review of the literature, J Oral Maxillofac Surg. 2007; 65:128-130.
9. Thong H, Othman I, Ramli R, et al. Painless giant submandibular gland sialolith: A Case Report. Cureus. 2021;13(11):e19429.  
DOI 10.7759/cureus.1942
10. Iwona Rzymyska-Grala1 et al. Salivary gland calculi – contemporary methods of imaging © Pol J Radiol. 2010;75(3):25-37
11. Kezia Rachellea Mustakim1,\*et al Histopathology and ultrastructural findings of pediatric sialolithiasis: A brief communication.  
Available:<https://doi.org/10.5125/jkaoms.2022.48.2.125>

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