



## Navigating Submandibular Gland Sialolithiasis: A Clinical Case Report and Management Insights

Anand Krishnan<sup>1\*</sup>, Zahida Parveen<sup>2</sup>, Lisa Elizabeth Jacob<sup>3</sup>, Senthil Kumar Ganapathy<sup>4</sup>, Anubhava Vardhan Sharma<sup>5</sup> and Pramod Machani<sup>6</sup>

<sup>1</sup>Department of Oral Medicine, Radiology and Surgery, Faculty of Dentistry, Lincoln University College, Selangor Darul Ehsan, Malaysia

<sup>2</sup>Paediatric Dentistry, Faculty of Dentistry, Manipal University College Malaysia, Malaysia

<sup>3</sup>Department of Oral Medicine and Radiology, Pushpagiri College of Dental Sciences, Thiruvalla, Kerala, India

<sup>4</sup>Department of Oral Surgery, Faculty of Dentistry, Lincoln University College, Selangor Darul Ehsan, Malaysia

<sup>5</sup>Department of Periodontology, Faculty of Dentistry, Lincoln University College, Selangor Darul Ehsan, Malaysia

<sup>6</sup>Department of Prosthodontics, Faculty of Dentistry, Manipal University College Malaysia, Malaysia

\*Corresponding Author: Anand Krishnan Department of Oral Medicine, Radiology and Surgery, Faculty of Dentistry, Lincoln University College, Selangor Darul Ehsan, Malaysia.

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### Abstract

Sialolithiasis, the formation of calculi within the salivary glands, is a prevalent condition that can lead to significant pain, swelling, and functional impairment. This case report presents the diagnosis, management, and clinical outcomes of a patient with sialolithiasis involving the submandibular gland. Additionally, a comprehensive review of the etiology, clinical presentation, diagnostic methods, and treatment modalities for sialolithiasis is provided. This report underscores the importance of early detection and appropriate treatment to alleviate symptoms and prevent complications associated with sialolithiasis.

**Keywords:** Case Report; Diagnostic Imaging; Salivary Gland Calculi; Sialadenitis; Sialolithiasis; Submandibular Gland; Surgical Management

### Introduction

Sialolithiasis is a disease process involving the formation of conglomerates of calcifications in the ductal system or the parenchyma of the salivary gland<sup>1</sup>. It often leads to obstructive symptoms, including pain, swelling, and infection, resulting in impaired salivary gland function. Submandibular gland involvement is particularly prevalent due to its salivary composition and anatomical features of its duct [1]. Occurring in 1.2% of the adult population, sialolithiasis affects adults more than in children, and more males than females in the third to sixth decades of life. Sialolithiasis

mainly appears in the submandibular gland (80%), parotid gland (5-20%), and 1-2% in sublingual and minor salivary glands. Submandibular stones are usually seen in Wharton's duct, whereas parotid stones are mostly located in the gland parenchyma.

The exact etiology is unknown, but it is associated with salivary stasis and ductal inflammation resulting in ductal injury with mucus plugs and eventual calcification [2]. The propensity towards occurrence in the submandibular gland has been attributed to the larger caliber and antigravity angulation of Wharton's duct [3]. Other causes include foreign bodies and ductal metaplasia [4].

The sialolith may appear round, ovoid, or elongated, and the surface of the calculi is rough, which may cause the duct lining to undergo squamous metaplasia. They are usually yellow and occasionally white or yellowish-brown in color. They are formed by the deposition of calcium salts around a central nidus which may consist of altered salivary mucins, desquamated epithelial cells, bacteria, foreign bodies, or products of bacterial decomposition. It is the most common cause of salivary gland obstruction. It consists mainly of calcium phosphates and smaller amounts of calcium carbonates, organic materials, and water. It may measure just a few millimeters or 2 cm or more in diameter. The involved duct may contain a single stone or many stones. Submandibular stones tend to be larger than those of the parotid or other minor glands. The etiology is unclear, and it can be complete or partial and may show recurrence [5]. The submandibular gland and duct are commonly involved due to the tenacity of the submandibular saliva, due to its high mucin content, adheres to any foreign particle. The submandibular duct is also long and irregular in its course.

This case report aims to present a clinical case of sialolithiasis in the submandibular gland, while also providing a comprehensive review of the etiology, clinical presentation, diagnostic methods, and treatment options for this condition.

### Case Presentation

A 20-year-old male presented to the Department of Oral Medicine and Radiology with a complaint of episodic pain localized to the right submandibular region for 1 month. The pain was sudden on onset, pricking, intermittent, severe, and non-radiating. The patient reported that his symptoms were aggravated during meal-times. No changes were noted on the extraoral examination.

Insignificant medical, dental, or social history. The patient did not consult anyone regarding this problem previously.

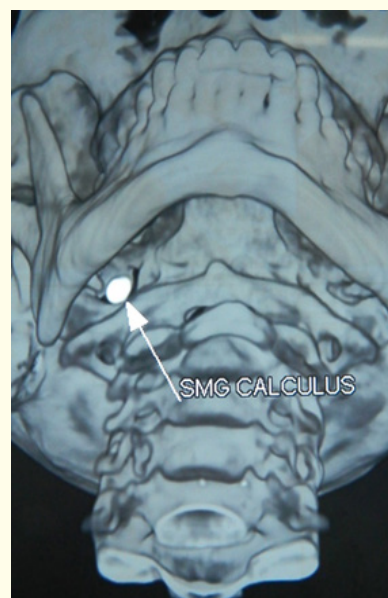
Clinical Examination of the patient during Bimanual palpation of the right submandibular salivary gland at the level of the mandibular third molar region, revealed a mass measuring 1x2cm, round with well-defined borders. The mass was hard in consistency and tender on palpation. The mass was nonadherent to the underlying structure. Based on the clinical findings, the patient was diagnosed with Sialolithiasis of the right submandibular gland.

Radiographic investigations were ordered, and the mandibular occlusal radiograph (Figure 1) revealed the presence of a radio-opaque mass at the submandibular fossa, measuring around 1 x 2 cm in size, oval extending distally.



**Figure 1:** Preliminary radiographic investigation - Occlusal Radiograph demonstrating the presence of a sialolith along the mandibular posterior region.

Further imaging studies (Figure 2) were done to locate the sialolith's anatomic location accurately as it was imperative to decide the course of the treatment. MRI (Figure 3) of the right submandibular gland revealed an enlarged and edematous submandibular gland with mild dilation of intra-gland ducts. An 8x5mm calculus visualized in the right submandibular gland appeared to be located at the hilum of the gland.



**Figure 2:** Computed Tomography demonstrating the exact location and the dimensions of the Sialolith.



**Figure 3:** Magnetic Resonance Imaging was performed to rule out any adhesions.

Findings on the blood and serum biochemistry were within normal limits. Investigations included the following blood results: hemoglobin, 9.8g/dl; packed cell volume, 52%; white blood cell count,  $3.2 \times 10^9 / l$  (comprising lymphocytes, 22%; monocytes, 4.0%; neutrophils, 72.0%; eosinophils, 1%; and basophils, 0.5%); and platelets  $254 \times 10^9 / L$ . Urinalysis was unremarkable.

Based on the clinical presentation and radiographic findings, a diagnosis of sialolithiasis involving the right submandibular gland was established. The patient was educated about the condition, available treatment options, and potential complications. Surgical intervention was recommended to alleviate symptoms.

Excision of the submandibular gland was considered. Conservative or minimally invasive treatment may not provide relief, or the condition may recur and seriously affect the patient’s quality of life. In this patient, chronic inflammation of the submandibular gland was an indication for excision. In some cases, the presence of a stone can lead to recurrent infections, and excision may be necessary to address the underlying cause.

Complete excision of the right submandibular salivary gland was done under general anesthesia. An incision was made in the submandibular region, carefully avoiding important structures. The gland was exposed, and critical structures like nerves and blood vessels were identified and preserved. The submandibular gland was excised while taking care not to damage surrounding structures. Meticulous surgical technique is crucial to minimize postoperative complications. After gland removal, the incision was closed

with sutures, and a drain was placed to prevent postoperative hematoma or fluid collection.

On gross examination, the mass appeared round, and yellow in color (Figure 4). Microscopically, the mass showed concentric laminations around a central nidus of amorphous debris. The above features were suggestive of sialolithiasis - right submandibular salivary gland.



**Figure 4:** Biopsy Specimen of the Sub-mandibular Salivary gland and Sialolith.

Follow-up revealed that the patient experienced immediate relief from pain and swelling following the surgical procedure. Subsequent follow-up visits revealed improved salivary flow and resolution of clinical symptoms. A panoramic radiograph conducted three months postoperatively showed no evidence of residual or recurrent calculi. The patient remained asymptomatic during the one-year follow-up period, with preserved salivary gland function.

### Discussion

This case underscores the importance of timely intervention in submandibular sialolithiasis, with surgical excision providing immediate relief and sustained improvement. Clinicians should prioritize comprehensive diagnostic workups and individualized treatment plans for optimal outcomes.

The strengths lie in the detailed diagnostic process, successful surgical intervention, and comprehensive follow-up, contributing valuable insights to the management of submandibular sialolithiasis. Limitations include inaccessibility to advanced diagnostic and therapeutic modalities such as Sialendoscopy which could have

created a possibility to explore further for non-surgical intervention. Sialendoscopy has proved to be of significant benefit in the treatment of Obstructive sialadenitis [6]. Sialendoscopy-assisted surgical extraction of parotid and submandibular sialoliths is found to be safe and efficacious [7].

Sialolithiasis is a prevalent disorder that significantly impacts patients' quality of life. Salivary gland obstruction is important to address, as it can significantly impact patient quality of life and can progress to extensive cellulitis and abscess formation if left untreated [8]. Early diagnosis and appropriate management are essential to alleviate symptoms and mitigate potential complications, such as sialadenitis or abscess formation. An intraoral approach under local anesthesia is the treatment choice for the removal of most of the intraductal submandibular, and parotid stones [9]. Sialoliths are usually 5-10 mm in size, and stones more than 10 mm are unusual sizes [10]. In cases of large stones, invasive techniques, such as extracorporeal shock-wave lithotripsy, endoscopic intracorporeal shock-wave lithotripsy, sialo-endoscopy, CO2 laser-guided removal, surgical removal under general anesthesia, or a combination of approaches are the treatment modalities of choice [11,12]. Surgical intervention remains the primary treatment modality for larger or symptomatic stones. This case underscores the importance of a comprehensive diagnostic workup, meticulous surgical technique, and vigilant postoperative monitoring to achieve successful outcomes in patients with sialolithiasis.

In our case, the patient experienced immediate relief from pain and swelling following the surgical procedure. Salivary fistula, neurological damage, facial scarring, and Frey's syndrome are some of the complications associated with surgical approaches [11]. Recurrence is found in 1-10% of patients [9]. No postoperative complications or recurrences were experienced by the patient. Subsequent follow-up visits revealed improved salivary flow and resolution of clinical symptoms. A panoramic radiograph conducted three months postoperatively showed no evidence of residual or recurrent calculi. The patient remained asymptomatic during the one-year follow-up period, with preserved salivary gland function.

Various imaging modalities play a crucial role in diagnosing sialolithiasis. Panoramic radiography is an easily accessible initial tool, but ultrasound and sialography offer more precise visualization of calculi. Sialendoscopy, is a minimally invasive technique which allows direct visualization and facilitates therapeutic interventions, provides a good visualization of the ductal system. It is advised in cases when the CT is unable to detect the calculus [13].

Treatment options range from conservative measures, such as hydration and gland massage, to surgical interventions. Modern techniques like Piezoelectric shockwave lithotripsy to fragment the salivary stones have been successfully used by investigators. The fragments pass through the duct, as the salivary flow is stimulated and enhanced using sialogogues. Extracorporeal shock wave lithotripsy (ESWL) has gained popularity for smaller stones, while endoscopic techniques, including sialendoscopy and minimally invasive stone retrieval, are effective for larger stones. Complete removal of the gland is becoming uncommon as a first-line treatment although still indispensable in chosen cases [14]. Surgical Diode Laser has been used for Sialolith removal in the submandibular region [15]. TransOral Robotic Surgery (TORS) combined with sialendoscopy for hilar submandibular gland sialolithiasis allows for improved visualization of critical anatomy, tissue manipulation, and operative flexibility [16]. Endoscopic submandibular sialoadenectomy using a 3-port supraclavicular approach has also been tried [17].

Surgical removal remains the definitive option for persistent or symptomatic cases. Surgical management should also be considered when stones are inaccessible or larger in size [8]. The transcervical procedure described above is the most utilized approach for submandibular gland removal. The approach involves a reasonably simple procedure, low risks for the nerve structure around the gland, permits wide resection margins for neoplasms, and incurs minor aesthetic damage. However, alternative approaches have been described, which include intra-oral/Transoral endoscopic-assisted or robot-assisted procedures [16]. The transoral approach has been used effectively and without complications for submandibular gland Excision [18]. In transcervical resection of the submandibular gland, only a limited risk of damage to neural structures can be accepted and a cosmetically satisfactory result is mandatory. Paresis of the marginal mandibular branch of the facial nerve, Lingual nerve paresis, and Damage to the Hypoglossal nerve are postoperative neurological complications associated with this procedure. Postoperative Xerostomia has also been reported. Problems with scarring are more common if there has been a postoperative infection [19].

## Conclusion

Sialolithiasis is a prevalent condition affecting salivary gland function and overall well-being. This case report highlighted the successful diagnosis and surgical management of submandibular sialolithiasis while providing a comprehensive review of the etiology, clinical presentation, diagnostic methods, and treatment modalities for this condition. Timely intervention, tailored to in-



dividual cases, can alleviate symptoms, and prevent potential complications. Clinicians should be adept at recognizing the signs and symptoms of sialolithiasis and considering appropriate treatment options for optimal patient outcomes.

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### Conflict of Interest

None declared.

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