

**Minimally invasive surgery for management of sialolithiasis involving whorton’s duct- A case report**

<sup>1</sup>Dr.Bathini Dilip Chakravarthy, MDS, Assistant Professor, Department of Oral and Maxillofacial Surgery, Tirumala institute of Dental Sciences and Research Centre, Nizamabad, Telangana, India.

<sup>2</sup>Dr.Abhijeet Kakani, MDS, Reader, Department of Conservative Dentistry and Endodontics, Nanded Rural Dental college and Research Centre, Nanded, Maharashtra, India.

<sup>3</sup>Dr. Alekhya Yeso, MDS, Assistant Professor, Department of Oral Medicine and Radiology, Tirumala Institute of Dental Sciences and Research Centre, Nizamabad, Telangana, India

<sup>4</sup>Dr.Aella Balakrishna, MDS, Consultant Oral and Maxillofacial Surgeon, Care and Cure Hospital, Anantapur, Andhra Pradesh, India

**Corresponding Author:** Dr. Bathini Dilip Chakravarthy, MDS, Assistant Professor, Department of Oral and Maxillofacial Surgery, Tirumala institute of Dental Sciences and Research Centre, Nizamabad, Telangana, India.

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**Abstract**

Sialolithiasis is a common salivary gland disorder characterized by presence of calculus within the salivary gland duct or its excretory system leading to an obstructive phenomenon. Sialolithiasis is the main cause of obstructive salivary diseases, being involved in 66% of cases and accounting for about 50% of major salivary gland diseases. Most salivary calculi occur in the submandibular gland, because the secretions are highly viscous. Recent advances in minimally-invasive treatment for salivary calculi have all but eliminated the need for submandibular adenectomy. There are various conservative treatment options for removal of Sialolith.

This case report presents a minimally invasive surgery for removal of sialolith involving the anterior portion of the submandibular gland duct.

**Keywords:** Sialolithiasis; salivary gland obstruction, calculi; submandibular salivary gland

**Introduction**

Sialolithiasis are calcium concretions within the salivary gland or the ductal system causing the obstruction to the salivary flow. Approximately 83% of salivary calculi are found in the Submandibular salivary gland <sup>[1]</sup>The higher incidence of submandibular sialolithiasis can be explained by alkaline pH of saliva, mucincontent, and high calcium concentration in the glands. The length and route around

the mylohyoid muscle and secretions against the gravity may also contribute to the predilection<sup>[2]</sup>. Sialolithiasis causes pain and swelling of the involved salivary gland by obstructing the salivary flow. They may cause stasis of saliva, leading to bacterial ascent into the parenchyma of the gland, and therefore infection, pain and swelling of the gland. Bimanual palpation of the floor of the mouth, in a posterior to anterior direction, reveals a palpable stone in a large number of cases of submandibular Sialolithiasis<sup>[3]</sup>. Sialography may be useful in patients showing signs of sialadenitis related to radiolucent stones or deep submandibular stones. Due to use of contrast medium this technique is not suitable and is contraindicated in acute conditions of salivary glands<sup>[4]</sup>. Ultrasound examination of salivary glands with a high resolution transducer is found to be a highly sensitive, a non-invasive method for salivary gland evaluation<sup>[5]</sup>. Computed tomography remains the gold standard to assess the location, the volume and the number of existing salivary stones<sup>[6]</sup>. Various parameters are considered before planning for the removal of the sialolith such as size, location, number, positional relationship of the stone to surrounding tissue. In recent times surgeons have focused on various conservative options for removal of salivary gland calculi rather surgical removal of the gland. Techniques like shock wave lithotripsy, sialendoscopy, interventional radiology, endoscopically video-assisted trans-oral and cervical surgical retrieval of stones etc., have been advocated but the success rates are highly variable. If the stone is near to the orifice of the duct then milking of the gland and manipulation may pop the stone out of the duct. This case report presents a minimally invasive surgical procedure for removal of single ovoid sialolith within the submandibular duct in the floor of the mouth through intraoral approach.

### **Case Report**

A 24 year old male patient, a priest by occupation reported to Kakani Hospital, Dharmabad, Maharashtra, India in the month of November 2019 with chief complaint of swelling in his mouth below the tongue since 3 months (Fig.1). Patient also complains of discomfort during speech. There is no history of trauma, mucopurulent discharge from the swelling. There was no associated history of fever, malaise, weight loss, anorexia, or burning sensation in the oral cavity. The swelling was initially small in size but gradually attained the present size.

On Intraoral examination there was a stony hard swelling in the floor of the mouth on the left side near the left submandibular duct orifice. There was mild tenderness elicited on bimanual palpation of the swelling. There was complete absence of salivary flow from the left submandibular duct and not associated with pus discharge.

There were no visible extraoral findings on examination. Initially radiovisiography of the floor of the mouth was taken which shows a radioopaque mass at the site of the swelling and we came to a preliminary confirmation as a sialolith of the submandibular gland duct (Fig.2). A ultrasonography of the floor of the mouth was advised to the patient to identify similar radioopaque masses in the submandibular region. The USG report shows enlarged left submandibular gland with increased echo texture and a large hyper dense area in the left submandibular region near the opening of the Wharton's duct. No similar masses were identified in the USG. A diagnosis of left submandibular duct sialolithiasis was made.

### **Surgical Procedure**

The surgical procedure was planned under local anesthesia. The risk and benefits of the procedure was explained to patient, and informed consent was obtained. A left lingual nerve block was given using lignocaine with adrenaline (1:80,000). Local infiltration was also given

near the submandibular duct orifice. After the induction of anesthesia, incision was given over the mucosa on the prominent aspect of the swelling parallel to the submandibular duct using no. 15 BP bade. Dissection was carried out until the yellowish white stone/calculi are clearly visible within the duct. Incision was then given over the duct. This is followed by undermining of the mucosa surrounding the stone. Pressure is applied from posterior aspect of the duct on the posteromedial side and calculi was removed (Fig.3-4).After removal of the sialolith, milking of the gland is performed to visualize the salivary flow from the involved duct. A 20G IV catheter was inserted into the duct to check for duct patency (Fig.5). The surgical incision site was carefully closed using 3-0 silk and the catheter was removed (Fig.6).The successful removal of the sialolith was confirmed using post-operative Ultrasonography of floor of mouth.

### **Discussion**

Obstructive salivary gland disease is thought to account for approximately half of major salivary gland disorders<sup>[7]</sup>.The main causes of obstructive disorders are stones in about 60% to 70%, stenosis in about 15% to 25%, inflammation of the duct (sialodochitis) in about 5% to 10%, and other obstructions, such as an atomic variations or foreign bodies, in about 1% to 3%<sup>[8]</sup>.

Most cases of sialolithiasis present with symptoms such as pain and swelling in the submandibular region during meal time. In incomplete obstruction of the duct, saliva can seep through or around the sialolith. In these cases, a salivary stone can be symptomless and these stones may be an incidental finding on a dental panoramic radiograph<sup>[9]</sup>.In the present case report, patient was complaining of swelling and difficulty during speech and there was no associated pain.

Most of the submandibular salivary stones are radioopaque and only 20% of submandibular stones are

radiolucent <sup>[10]</sup>.Sometimes radioopaque masses in the region of the salivary gland can be falsely interpreted as salivary stones. Standard occlusal radiographs visualize any stone in the anterior two-thirds of the Wharton duct, whereas an oblique occlusal view can be successful in showing sialoliths that are posteriorly situated in the region of the hilum<sup>[11]</sup>.Alternatively a CT-scan may be required for stones located within the gland or behind the region of hilum. USG with high frequency linear transducer is first choice investigation for diagnosis of salivary stones<sup>[12]</sup>. USG may not be effective in imaging of small calculi/stones. Sialography would be required to identify radiolucent stones in the ductal systems or the parenchyma of the gland. In the present case we have taken a RVG (radiovisiography)for identifying the calculi. The RVG sensor was placed in the floor of the mouth just above the swelling and x -ray cone was projected from below the mental region. USG of floor of the mouth was also advised for confirmation and also to rule out multiple stones in the gland. Several conservative and minimally invasive techniques have been developed for salivary gland surgery, including extracorporeal lithotripsy, interventional radiology, and operative sialoendoscopy but there success rates are variable. Trans oral removal of stones by incision of the duct over the stones has also been reported to be a successful treatment modality <sup>[13]</sup>.An intraoral surgical approach can be used to remove stones in the submandibular duct anterior to the mandibular second molar. Stones in the hilar area of the submandibular duct may require an extraoral surgical approach that involves gland removal and sialolithectomy. In the present case the sialolith was present in the submandibular duct just anterior to the second premolar. So an intraoral approach was considered. A minimal surgical incision of 5mm length was given in the floor of the mouth over the most prominent aspect of the swelling.

The incision is given parallel to the submandibular duct. Dissection was carried out to visualize the stone. A small incision was then placed in the duct followed by undermining the tissues surrounding the stone. Posteroanteriorly pressure was applied to expel the stone from the surgical site. Then a curved hemostat was used to grasp the stone for the removal. 2 sutures were placed over the mucosa at the surgical site. Cannulation of the duct may be required to maintain the lumen of the duct open and also to prevent stricture of the duct. After Ancelin developed sialography and successfully revealed a sialolith in Wharton's duct with a bismuth suspension by means of simple cannulation method, numerous advances have been made in instrumentation and techniques for cannulation of duct<sup>[14]</sup>. Following the angiographic principle, a 20G IV catheter was used in the present case for cannulation of the duct for maintaining duct patency. The sheath of the IV catheter is flexible and less likely perforate the duct. Usually catheter is sutured to the surrounding mucosa to allow unobstructed salivary flow for a period of 2 weeks. In the present case, after placing the catheter into the duct, two sutures were placed over the mucosa surrounding the duct in order to prevent blockade of the duct. After sutures were placed the catheter was removed. There is no complication of recurrence, stricture, stenosis or complete obstruction of the duct during follow-up period.

We conclude that though there are various techniques employed for management of sialolithiasis, intraoral Minimal invasive surgical procedure for removal of calculi/stones is considered to be effective treatment modality as the procedure is done under local anesthesia as a day care procedure. It requires less operating time, minimal surgical equipment, economical and also has fewer complications.

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**Legend Figures**



Figure 1 : Intraoral photograph showing swelling involving the left submandibular duct



Figure 2: RVG image showing radioopaque mass in the floor of the mouth



Figure 3: Intraoperative photograph showing ovoid shaped sialolith removal from the duct



Figure 4: large Ovoid shaped sialolith



Figure 5: 20G IV cannula used for confirming the patency of the left submandibular duct



Fig.6: Suturing the mucosa overlying the duct