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## CASE REPORT

### A Rare Radiopaque Parotid Duct Calculus. A Case Report

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#### ABSTRACT

Salivary duct lithiasis is a condition characterized by the obstruction of a salivary gland or its excretory duct due to the formation of calcareous concretions or sialoliths, resulting in salivary ectasia, and even provoking the subsequent dilation of the salivary gland.

Sialolithiasis accounts for 30% of salivary diseases, and most commonly involves the submaxillary gland (83 to 94%), and less frequently, the parotid (4 to 10%) and sublingual glands (1 to 7%).

The present study reports the case of a 50-year-old female patient who attended our clinic, complaining of a painful swelling over the cheek which aggravated with chewing movements, bad breath and foul-tasting mouth at meal times and presenting with a salivary calculus in the right Stensen's duct. Once the patient was diagnosed with a radiopaque stone, the sialolith was surgically removed using general anaesthesia. In this paper, we have also updated a series of concepts related to the aetiology, diagnosis and treatment of sialolithiasis.

**Key Words:** Lithiasis, parotid diseases, radiopaque salivary duct calculi.

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#### Introduction

Salivary duct lithiasis is a condition which is characterized by the obstruction of a salivary gland or its excretory duct, due to the formation of calcareous concretions or sialoliths, resulting in salivary ectasia, and even provoking the subsequent dilation of the salivary gland. A further effect may be the infection of the salivary gland, which may result in chronic sialadenitis [1].

The clinical symptoms are clear, and allow for an easy diagnosis, whenever we take into account that pain is only one of the symptoms and that it does not occur in 17% of the cases[2].

Sialolithiasis accounts for 30% of salivary diseases, and it most commonly involves the submaxillary glands (83 to 94%) and less frequently the parotid (4 to 10%) and sublingual glands (1 to 7%). Sialolithiasis usually appears around the age of 40, though it can have an early onset in teenagers, and it can also affect old patients. It has a predilection for male patients, particularly in the case of parotid gland lithiasis[1].

Several hypotheses have been put forward to explain the aetiology of these calculi: mechanical, inflammatory, chemical, neurogenic, infectious, strange bodies, etc. However, it appears that the combination of a variety of these factors

usually provokes the precipitation of the amorphous tricalcic phosphate, which, once crystallized and transformed into hydroxyapatite, becomes the initial focus. From this moment on, it acts as a catalyst that attracts and supports the proliferation of new deposits of different substances[2]. Salivary calculi affecting the parotid gland, are usually unilateral, and are located in the duct. Their size is smaller than submaxillary sialoliths, most of them < 1 cm. [3], [4].

Different conditions should be considered when carrying out the differential diagnosis of salivary duct lithiasis. The unilateral enlargement of the parotid region is characterized by the presence of a discreet, palpable mass, or either a diffuse swelling. Sialadenitis may be considered in the absence of this mass. A superficial mass in the salivary gland may suggest either a case of lymphadenitis, a preauricular cyst, a sebaceous cyst, benign lymphoid hyperplasia or extraparotid tumour.

A mass inside the salivary gland may suggest either a neoplasia (benign or malignant), an intraparotid adenopathy or a hamartoma [5]. Malignancy involving the parotid gland would present with rapid growth, facial nerve palsy, petrous texture, pain and a higher incidence rate among elderly patients.

The differential diagnosis of the asymptomatic bilateral enlargement of the parotid region includes benign lymphoepithelial lesions (Mikulicz syndrome), Sjogren's syndrome and sialadenitis secondary to alcoholism, long-term treatment with different drugs (iodine and heavy metals) and Whartin's tumour. Painful bilateral enlargements may result from radiotherapy, or may be secondary to viral sialadenitis (including mumps), whenever they co-occur with other systemic symptoms. Among the conditions presenting with diffuse facial swelling of the parotid region, but

unrelated to the glands, we must mention masseter muscle hypertrophy, lesions in the temporomandibular articulation and osteomyelitis affecting the ascending maxillary branch. It is also important to differentiate sialoliths from other soft tissue calcifications. While the former are characterized by pain and swelling of the salivary gland, other calcifications such as those of the lymphatic ganglia, are symptom free.

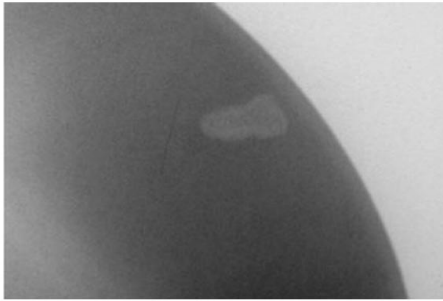
In the case of small calculi, it is advisable to try a non-surgical treatment (spasmolitics, diet, antibiotics, etc) [6]. Otolaryngologists and odontologists are in charge, together with other sanitary professionals, of the diagnosis of salivary glands diseases. They must be aware of them and must be able to apply modern imaging techniques for their diagnosis, and if necessary, manage and treat these diseases.

### Case Study

We report the case of a 50-year-old female patient, complaining about acute pain, suppuration and unilateral swelling in the parotid region. She also reported bad breath and a foul-tasting mouth, both salty and sour at the same time, most frequently at meal times. These symptoms disappear within a relatively short period, never lasting for more than 2 hrs. The patient had been suffering from these symptoms for 9 days, and she had not noticed high temperature or any further symptoms.

Intra-oral examination revealed a swelling near the right parotid duct opening, which was fibrous to touch and was not adhered to any deeper structure. There was mucopus at the duct opening. A simple radiography showed a radiopaque sialolith located in the excretory duct [Table/Fig 1]. To perform the radiological diagnosis, a radiographic film was placed at the level of the swelling and the beam was kept perpendicular to the film; this way,

the whole calcification located in the cheek was reflected in the film.



(Table/Fig 1) x ray picture showing parotid duct stone

Our first decision was to treat the symptoms. Pain was treated with analgesic-anti-inflammatory drugs (diclofenac sodium, 50 mg every 8 hrs for a period of 7 days), and the bacterial infection was treated with antibiotics (cefixime 200 mg, every 12 hrs for 7 days). The patient should follow a diet rich in proteins and liquids, including acid food and drinks to stimulate the production of saliva. Once the symptoms were controlled, we planned the treatment of the disease. Due to the location and size of the calculus, medical therapy was discarded, and the spontaneous discharge of the sialolith was aimed at. We decided on the surgical removal of the calculus. The first step of our treatment, once the sialolith had been located, was to achieve its immobilization by means of suture, to prevent it from moving along the duct during the surgical procedure.

Then, we performed an incision on the swollen region [Table/Fig 2], and a small pressure exerted at this level of the cheek, provoked the discharge of the sialolith through the incision [Table/Fig 3]. The size of the sialolith coincided with the radiographic image [Table/Fig 4] measuring 0.8 cm long.

Once the sialolith was out, the duct had to be repaired and cicatrized. Two possible solutions were considered in this sense, anastomosis of the duct by means of microsurgery, or diversion of salivary

flow by creation of an oral fistula. The second possibility was the technique of choice because of its simplicity, efficacy and satisfactory results, as regards the preservation of glandular function.



(Table/Fig 2) intraoral incision over the duct opening



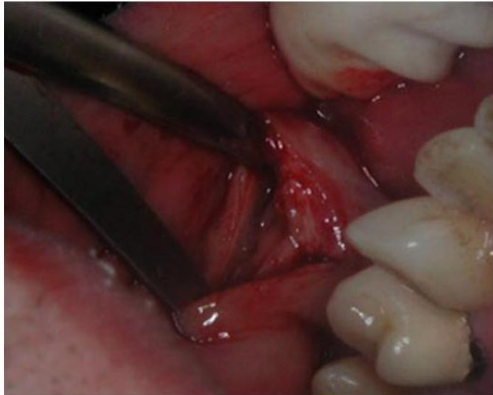
(Table/Fig 3) stone being expelled from the duct



(Table/Fig 4) patotid duct stone measuring 0.8cm

The margins of the lesion were separated using dissecting scissors [Table/Fig 5]. Thus, the cicatrization of the duct was hindered, preventing its obliteration and

favours the formation of a salivary fistula, creating a new access to the oral cavity. In successive follow-up visits, we observed the complete remission of the symptoms, the effectiveness of the salivary drainage and the normal functioning of the parotid gland.



(Table/Fig 5) marsupialization of the duct

## Discussion

Salivary duct lithiasis, ie: the obstruction of a salivary gland or its excretory duct due to the presence of a sialolith, is characterized by a series of symptoms. The first one is salivary duct swelling, either without any obvious reason or at meal times. This symptom lasts for a relatively short period, not for more than 2 hrs, and it disappears throughout the day. On some occasions, the swelling is accompanied by pain, and then the patient presents with an episode of salivary colic, an acute, lacerating pain which does not last for long and disappears after 15 or 20 mins[17]. In this case, the patient did not have classical pain, but swelling used to change in size with chewing and was occasionally associated with pain. She was diagnosed to have recurrent parotitis, and was managed conservatively for the same in the past.

The evolution of this condition is characterized by the repetition of any of these two clinical stages during successive episodes. However, the

swelling of the gland tends to persist, it becomes indurated, and does not recover its normal size. Our patient presented with areas of fibrous swelling in the duct[1].

The epidemiological features of our patient also coincide with those reported in the bibliography (predilection for patients  $\geq 40$  yrs). It is seen more commonly in males, but we've reported in a female patient. Although the parotid gland is less frequently involved (4 to 10% of cases), it can not be considered strange or rare[2],[15]. Submaxillary duct calculi are quite common in South India, but parotid duct calculi are very uncommon in this region, and hence we consider it as a rare case presentation owing to the geographical distribution. Sialoliths are usually more or less organized hard concretions with a pale yellow colour and a porous texture. They usually have an oval or long shape, although we may also find some in the form of a cast [2]. Crystallographic studies revealed the differences between parotid and submaxillary calculi. With respect to the composition of parotid calculi, we must mention the study conducted by Slomiany et al., who reported a total lipidic component of 8.5% and a mineral component of 20.2% [7].

The different chemical properties of the saliva secreted by both glands explain why parotid calculi have about 70% more organic component, 40% more proteins and 54% more lipids than submaxillary calculi [2].

The composition and size of salivary calculi has some diagnostic implications. Around 20% of submaxillary gland sialoliths and 40% of parotid ones are radiolucent due to the low mineral component of the secretion, especially in the case of parotid calculi[2]. But, in our case, we've reported a radiopaque parotid duct calculi which is not so common.

The knowledge of the clinical symptoms is vital for the diagnosis of this condition, and as mentioned before, it is possible that the calculi can go undetected despite being present, as in the present case. It was treated as recurrent parotitis, and a simple bidigital palpation of Stenson's duct revealed the possibility of a calculi. However, the ideal approach is to be able to identify them, and several techniques are available for this purpose.

Conventional intra-oral radiography may be useful, although parotid gland sialoliths are more difficult to detect than submaxillary ones, because of the winding course of Stensen's duct around the anterior portion of the masseter muscle and through the buccinator. In general, only the sialoliths located in the anterior part of the duct, in front of the masseter muscle, can be visualized by means of intra-oral radiography [8].

Conventional extra-oral radiography is of limited use, because most of the images of parotid gland sialoliths are superposed on the body and on the maxillary branch. The sialoliths located in the distal part of Stensen's duct or within the parotid gland, are difficult to see by means of lateral intra-oral or extra-oral radiographies. Nevertheless, a posteroanterior image of the swollen cheek may make the sialolith become detached from the bony area, thus making it visible. Even so, the sialoliths with low mineral content may become darkened by the shadows cast by dense soft tissues in posteroanterior images [8].

Sialography is the most adequate technique to detect salivary gland calculi, as it allows for the visualization of the whole duct system. Submaxillary and parotid glands are more easily studied by means of this technique, than sublingual glands. However, sialography is not indicated in the case of acute infections or in patients who are sensitive to

substances containing iodine. It should not be used either, if a radiopaque calculus is observed in the distal portion of the duct, as this technique could move the calculus to the most proximal portion of the duct, thereby complicating its removal [9]. Sialography is also useful to locate obstructions that cannot be detected by means of bidimensional radiography, especially whenever sialoliths are radiolucid, or whenever they are not present (as is the case with stenosis) [10].

Computerized tomography and nuclear magnetic resonance can also be used for the detection of sialoliths. Although these techniques are more complex and expensive than sialography, they are not invasive. According to some authors, CT scan is the technique of choice to detect calculi inside, or near the salivary glands. Its sensitivity makes it possible to detect recently calcified calculi, which go undetected through conventional radiography [9].

Though scyntygraphy is not clearly indicated for the diagnosis of sialolithiasis, on some occasions, it may be useful as a complementary exploratory technique. A functional study of salivary glands is accomplished by means of scyntygraphy. When the Tc 99m-pertechnetate is intravenously administered, it concentrates and is excreted through such glandular structures as the salivary gland, thyroid and mammary glands. After a few minutes, it is possible to detect the radioisotope in the salivary gland ducts, and it achieves its higher concentration level 30-45 minutes after infusion [8].

Scyntygraphy allows for the analysis of all salivary glands at the same time. In the event of a suspected sialolithiasis, this technique is mainly applied when sialography is not indicated, and in patients with non permeable glandular ducts. Functional salivary pathology

(either lithiasic or not) can be detected by the increase, reduction or absence of radioisotope uptake areas [8].

Recent studies show that ultrasonography may also be useful for the diagnosis of duct sialoliths [11]. Sialoendoscopy is a relatively new technique to detect causes of obstruction in the parotid duct and gland directly, and to manage the chronic obstructive parotitis, efficiently combined with continuous lavage and perfusion simultaneously [18]. Methylene blue has been used to identify the duct papilla as sialoendoscopy can be problematic, wherein the dye is tipped around the papilla site, and as the saliva is squeezed out, the opening becomes prominent, and 1 or 2 minutes, the saliva will lead to some washout effect of methylene blue, leaving a circle of brighter tissue amid the deep blue of the orifice [19].

In short, there is not a single technique for the diagnosis of salivary gland sialolithiasis, and we must select the most adequate technique according to the circumstances and pathology to be treated. We must obtain an accurate diagnosis and at the same time, we should minimize the risk and inconvenience for the patient.

A diet rich in proteins and liquids including acid food and drinks, is advisable in order to avoid the formation of further calculi in the salivary gland [1].

In the case of small calculi, the treatment of choice should be medical, instead of surgical. The patient can be administered natural sialogogues such as small slices of lemon or sialogogue medication. Drugs stimulating ductal contraction such as pilocarpine can be prescribed, as also the application of short-wave infrared heating. However, if the calculus is of a medium or large

size, a salivary colic may occur and the calculus may not be discharged.

Surgical removal of the calculus (or even of the whole gland) has traditionally been used as an alternative to medical therapy, whenever the latter was not possible or when it proved ineffective. The case reported here, exemplifies this therapeutic management. Surgical removal of the calculus has the disadvantage of compromising the facial nerve, depending on the location of the sialolith. Extra-oral surgical techniques are not indicated, because of the risk of leaving antiaesthetic scars, and also because intra-oral surgery has proved more effective [6]. A recently published technique prevents these complications. It consists of the use of ultrasound expansive waves to provoke the fragmentation of the calculus. Moreover, it does not require anaesthesia, sedation or analgesia. The procedure lasts for about 30 minutes, and is administered in a series of successive weekly sessions, until all the fragments of the calculus are eliminated, using sialogogues as coadjuvant therapy [12]. Some authors treat sialolithiasis by means of intraductal instillation of penicillin or saline. The low recurrence rate proves, according to these authors, the efficacy of this method in comparison with the systemic administration of drugs. Moreover, this therapy offers the advantage of acting at different levels: it dilates ducts, dislodges sialoliths adherent to the walls of ducts and flushes out the obstructing coagulated albumin [13]. As regards the surgical removal of calculi located in Stensen's duct, there are several possible solutions. The most conservative technique is the anastomosis of Stensen's duct by means of microsurgery. Another feasible option is the creation of a salivary fistula, which is an easier technique yielding equally positive results, as far as glandular function is concerned. In the case of this latter technique, once the sialolith has been

removed, the margins of the lesion are separated, thus avoiding duct collapse in the cicatrization process. This way, we favour the formation of a salivary fistula which acts as a new access to the oral cavity [14],[16].

Inhibition of salivary gland function is hardly employed, with the exception of cases of sialorrhoea, due to the possible complications associated with this technique, and the reduction of salivary flow it provokes. The technique consists in the closure of the duct with suture, once the calculus has been removed. This provokes the collapse and inflammation of the gland. Atrophy is achieved by means of pressure and the administration of successive drugs to attain this goal [14]. All the therapies described here, require the previous treatment of symptoms, and all of them confirm that there is not a single therapeutic approach to the treatment of obstructive sialolithiasis, as it can be successfully treated by using different techniques and even by a combination of some of them. The use of one or another technique depends to a large extent on the sialolith size, location and composition.

### Conclusion

In conclusion, parotid duct calculus is a rare entity, treated conservatively by many physicians as recurrent parotitis, which is very disabling to the patient. The need for a clinical intraoral examination and a plain radiograph cannot be overemphasized. With advent of newer diagnostic modalities, the smallest duct calculus can be detected.

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