Case Report

Massive Submandibular Sialolith: Complete Radiographic Registration and Biochemical Analysis through X-Ray Diffraction

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1. Introduction

The salivary calculi are calcified structures often referred to as sialoliths, which consist of minerals such as calcium phosphate and hydroxyapatite, as well as other substances such as magnesium, potassium, and ammonia [1]. Sialoliths often lead to sialolithiasis, which is a common disease, affecting around 60 million people per year [1]. Mostly, sialolithiasis is clinically characterized by local pain and edema, reduced salivary flow, hampered mouth opening, spontaneous bleeding, and purulent discharge [2]. Radiographically, rounded or cylindrical radiopaque structures are observed near to the salivary glands or their ducts, especially in panoramic and occlusal radiographs [3].

Small sialoliths can be spontaneously expelled through the stimulation of the salivary flow by performing local massage or using mechanical or chemical sialogogues, such as bubble gums and citric acid, respectively [4]. On the other hand, multiple or massive sialoliths often require major approaches, such as lithotripsy, sialadenectomy, sialotomy, and sialodochoplasty [3].

The present study aims to report the case of a 47-year-old female patient, who was diagnosed with sialolithiasis based on clinical and radiographic signs. Specifically, the present case is illustrated by a minimal invasive surgical procedure, a radiographic registration of 8 years covering the entire period of a massive sialolith formation, and a biochemical analysis through X-ray diffraction.

2. Case Report

In August 2012, a 47-year-old, white Caucasian, female patient was referred, by an orthodontist, to the Stomatology Department of the Pontifícia Universidade Católica do Paraná, Brazil, presenting with extreme signs of local pain and hampered mouth opening. Clinically, left submandibular lymphadenopathy was detected, as well as edema in the left
side of the floor of the mouth, with a purulent discharge. In addition, a yellowish structure of hard consistency was observed near to the sublingual caruncle. An occlusal radiograph revealed a cylindrical radiopaque sialolith-compatible image, measuring approximately 2 x 1 cm, in the lower left canine region, confirming the diagnosis of submandibular sialolithiasis (Figure 1).

During the anamnesis, the patient did not report systemic diseases and reported being allergic to Penicillin. Further, the surgical excision was executed in the same day due to the exacerbated symptoms and the favorable position, in which the sialolith took place after a submandibular massage. Under local anesthesia, a 5 mm incision was performed on the mucosa, over the sialolith. In order to move the sialolith close to the incision, the submandibular massage in the posteroanterior direction was repeated. Using forceps, a 20 mm sialolith (Figure 2) was removed from the floor of the mouth. After the sialolith removal, it was possible to see the reinstatement of salivary flow and also the reduction of the purulent discharge. The patient was medicated with Azithromycin 500 mg, Ibuprofen 600 mg, and Paracetamol 750 mg.

In the following week, the patient returned without edema and local inflammation. The submandibular gland function was tested performing local massage, indicating normal salivary flow. Surprisingly, the patient provided a previous panoramic radiograph, dating from March 2011 (Figure 3), representing the last radiographic exam for conclusion of orthodontic treatment. Despite slight morphological alteration, the orthodontic radiograph allowed for the detection of the sialolith. Based on the lack of early detecting the sialolith on the orthodontic radiograph, a deeper investigation in the patient’s dental files was carried out revealing an additional panoramic radiograph, dating from June 2004, in which no sign of sialolith was detected (Figure 4). Clinical and radiographic follow up were performed 6 months after the surgery revealing no alterations.

3. Biochemical Analysis

The sialolith was referred to the Laboratory for Analysis of Minerals and Rocks, Geology Department, Universidade Federal do Paraná, Brazil (LAMIR-UFPR), for biochemical analysis through X-ray diffraction. The stone weighted 0.593 g. An Empyrean Diffractometer (PANalytical, Almelo, the Netherlands) processed the powdered sialolith. The measured scattered pattern produced out of the interaction between the X-ray beam and the sialolith surface indicated hydroxyapatite Ca5(PO4)(CO3)3(OH) as the only mineral present (Figure 5).

4. Discussion

The medical literature reports the submandibular salivary glands as the most commonly related pair of glands in cases of sialolithiasis (around 80% of prevalence) [5–7], specially involving massive sialoliths [8]. It is explained by
and facilitates the deposition of minerals, such as calcium, in what is known as the “comma area,” which is located near to the duct’s outfall. The most narrowed path of the referred duct is named the submandibular salivary duct morphology, a tortuous structure which links the salivary gland to the oral cavity. Such ducts are narrower, more prone to the formation of sialoliths.

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In the present study, as consequences of the sialolithiasis, local pain, lymphadenopathy, edema, and purulent discharge were detected. Based on these findings, the patient was medicated with antibiotics during a week. Similarly, Overton et al. [12], 2012, and Combes et al. [13], 2009, treated their patients with antibiotic therapy in the immediate postoperative week. Specifically in the present report, considering the presence of purulent discharge and the patient’s allergy to Penicillin, Azithromycin 500 mg was prescribed for antibiotic coverage in combination with anti-inflammatory (Ibuprofen 600 mg) and analgesic (Paracetamol 750 mg) drugs.

Differently from the case reports already described in the medical literature, the present study is highlighted by the registration of the entire sialolith formation once no sign of ectopic mineralization was detected within the radiographs obtained out of the patient’s dental records. These radiographs support the need for correctly recording dental interventions and updating patient’s files, as well as early and accurately diagnosing sialolithiasis, for an optimal treatment outcome.

**Conflict of Interests**

The authors declare that there is no conflict of interests regarding the publication of this paper. The authors are grateful to José Manoel dos Reis Neto since he passed away few months after the submission of this paper.

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