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CONSIDERATIONS OF MULTI-IMAGING MODALITIES FOR DIAGNOSING OF SIALOLITHIASIS IN THE SUBMANDIBULAR GLAND: A CASE REPORT

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ABSTRACT
***Introduction*:** Sialolithiasis is a condition that occurs due to obstruction in the salivary gland or ductus excretory by calculus or sialolith. Sialolithiasis was the most common disease of salivary glands with a percentage of about 50%, and approximately 80-90% occurs in the submandibular gland. This paper analyzes the sialolithiasis in the submandibular gland being reviewed from the radiograph. Radiography screening becomes one of the most essential supporting examinations to help enforce the diagnosis and treatment plan to be conducted.
Case : A 33-year-old patient was seen in Oral and Maxillofacial Surgery of General Hospital, Bandung, Indonesia. The chief complaint of swelling in the right side of his lower jaw was under the chin. Multi-imaging and radiography modalities screening were panoramic, occlusal, cervical, CT Scan, USG, and sialography. **Case management :** On radiographic examination, radiological suspicion was sialolithiasis with a well-defined and irregularly shaped radiopaque lesion in the lower right jaw area. Therefore, radiographic techniques with different modalities were performed to support each other in delivering accurate radiodiagnosis. **Conclusion:** The considerations of using appropriate multi-imaging and radiographic modalities are necessary to confirm the diagnosis of sialolithiasis in the submandibular salivary glands, especially in hard-recognized cases on plain radiographs.

Keywords: *Radiography, Sialolithiasis, Submandibular gland*

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INTRODUCTION

Sialoliths are calcified structures formed in the salivary glands and ducts, consisting of minerals such as calcium phosphate and hydroxyapatite and other substances such as magnesium, potassium, and ammonia. Sialoliths often cause sialolithiasis, the most common salivary gland disease affecting approximately 60,000,000 people per year. Generally, sialolithiasis is clinically characterized by local pain and edema, reduced salivary flow, restricted mouth opening, spontaneous bleeding, and the presence of purulence. Approximately 83-94% of cases occur in the submandibular gland, while the rest occur in the parotid and minor salivary glands.[1–4] The etiology and pathogenesis of sialolithiasis are still clearly unknown. The hypothesis from several kinds of literature states that sialolithiasis can occur due to anatomic variations of the salivary gland ducts and the biochemical composition of saliva. Salivary flow also contributes to calcium deposition.[5,6] In radiographic examination such as an occlusal or panoramic radiograph, sialolithiasis is generally seen

as a well-defined radiopaque entity with rounded or cylindrical to irregularly shaped near the salivary glands area or their ducts.[7]

CASE REPORT

A 33-year-old patient was seen in Oral and Maxillofacial Surgery of General Hospital, Bandung, Indonesia, with the chief complaint of swelling in the right side of his lower jaw under the chin. Based on the information obtained from anamnesis, the patient feels pain in the right lower jaw in recent months, especially at mealtime. Extraoral examination revealed a slight facial asymmetry on the right mandibular side, bony-hard and non-tender on palpation, and restricted mouth opening. On intraoral examination, redness was seen around the posterior region of the right lower jaw. It was suspected that there was a temporary blockage in the patient's salivary gland duct. The patient is then referred to perform a panoramic radiographic examination to establish the clinical diagnosis that has been determined.

Figure 1. Patient's profile showing slight facial asymmetry on the right mandibular side

Figure 2. The intraoral appearance of a patient with edema in the posterior mandibular buccal region

Panoramic radiographs do not show specific features related to the patient's clinical condition. However, in the same region, the root of the mandibular right first molar was retained, but it was not significantly associated with the patient's complaints. Then, the patient was referred for further dental occlusal and cervical x-ray examination. However, the results did not show a well define radiopaque appearance related to sialolithiasis on the right or left side of the mandible or the lingual area where the salivary glands are located, as well as lateral and posteroanterior cervical radiographs.

Figure 3. Panoramic radiograph

Figure 4. Occlusal radiograph

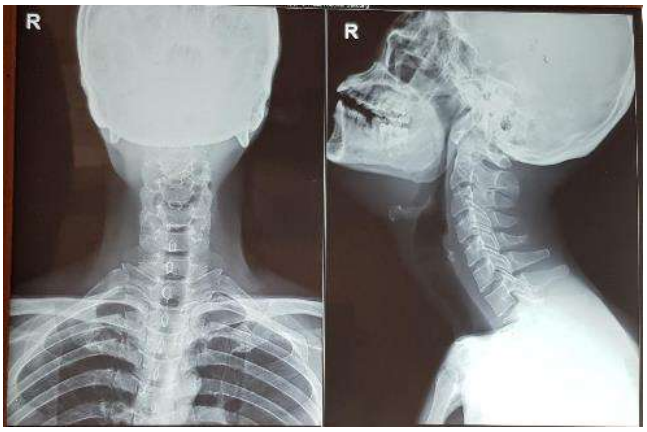

Figure 5. Cervical radiograph

It was decided to do an FNAB examination in the sublingual region. Examination results found benign cystic lesions with non-specific chronic inflammation. The results were different from the provisional diagnosis obtained on clinical examination, the cystic lesions were non-specific, and there was no calcification associated with sialolithiasis involved. As a follow-up examination, a CT scan was performed.

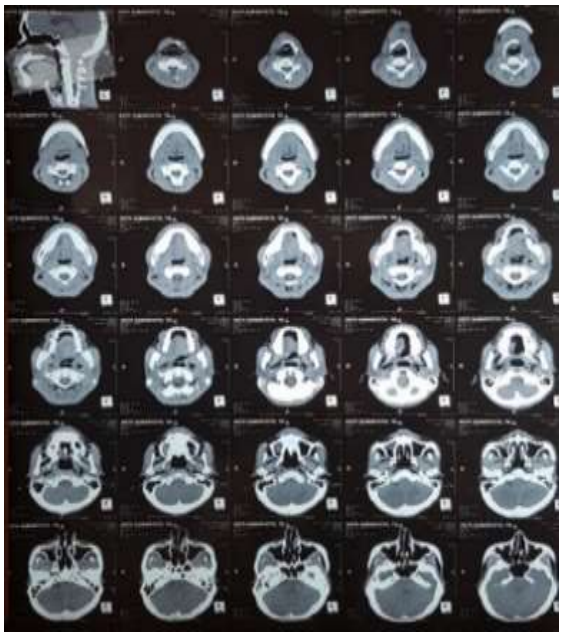

Figure 6. CT Scan

The CT scan results have not been able to show a picture that supports the diagnosis of sialolithiasis. No hyperdense lesions were found in the sublingual or submandibular regions, either right or left. It was decided to perform a radiographic examination using the sialographic technique to define a diagnosis in this hard-to-recognize case. In the sialograph, the lesion was found in the right submandibular area with a well-defined radiopaque appearance. Supporting ultrasound examination also showed a hyperechoic mass in the right submandibular region.

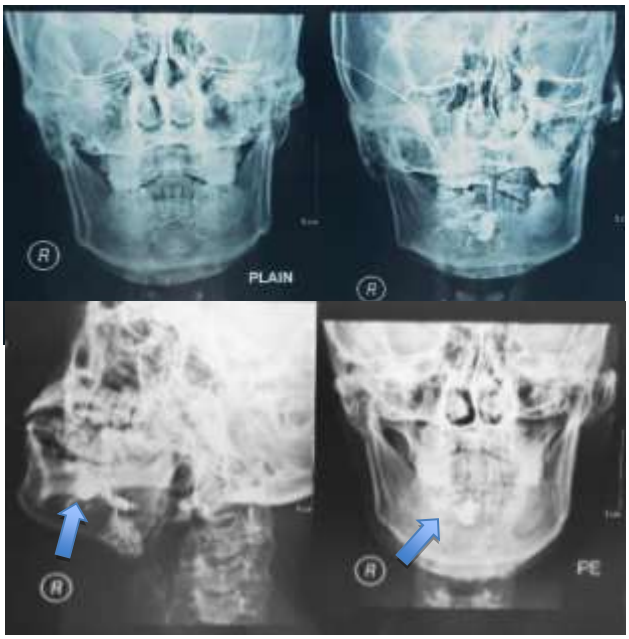

Figure 7. Sialograph, blue arrow show sialolithiasis

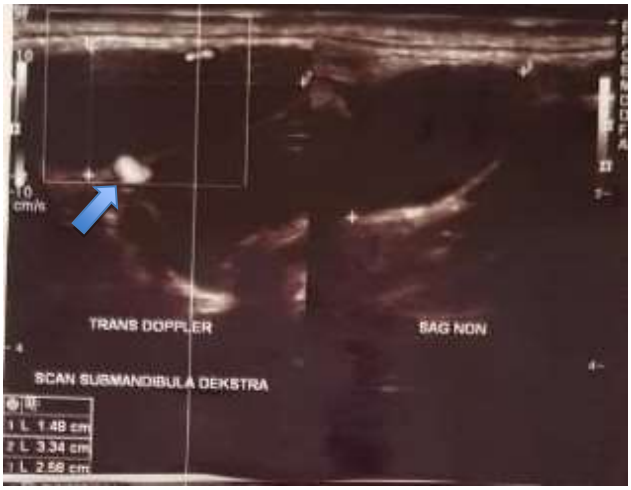

Figure 8. Ultrasonography, blue arrow show sialolithiasis.

The patient underwent surgery in the form of Sialodenectomy, indicating Sialolithiasis at the right submandibular salivary gland. A hard tissue mass mixed with a soft tissue mass was seen attached to the sialolith. Observations on patients were carried out until postoperative day 2.

Figure 9. Mass Removal of Intraoperation

DISCUSSION

The imaging objectives include localization of the lesion, determination of the nature of the lesion, determination of preoperative planning, and Imaging-guided cytology and biopsy.[8] Based on this, it is important to do additional modalities to help establish the diagnosis.

Sialography is a radiographic technique for visualizing the salivary glands by inserting a contrast material into the salivary gland ducts. Sialography is one of the oldest imaging procedures and was first discovered by Carpy in 1902 using mercury as a contrast agent.[7, 9, 10]

Most sialoliths consist of hydroxyapatite. Oblique orthogonal radiographs, extraoral transcutaneous ultrasonography, sialography, and CT scan can confirm the diagnosis due to hydroxyapatite, which can give a well-defined appearance after imaging. Symptomatic sialoliths need to be treated surgically by transoral sialolithotomy (for ductal sialoliths), interventional sialoliths with or without lithotripsy, or excision of the affected salivary glands (for intraglandular sialoliths).[11–16]

In this case, various modalities were used to establish the final diagnosis of the patient. Some tests aren't really necessary, such as a cervical radiograph. In CT scanning, it is better to combine it directly with sialography to be detected more quickly without using other imaging techniques. This supports the ALARA principle to provide the minimum and most effective radiation exposure possible.[17]

Accurate diagnosis is obtained after Sialography and Ultrasonography (USG) modalities are used. USG is an essential first-line diagnostic method for

sialolithiasis. In most cases, ultrasound alone is sufficient for preoperative preparation.[18] This shows that in establishing a diagnosis, we can not only use one modality, but we need accuracy and precision in choosing a modality to avoid misdiagnosis, which will affect the treatment performed. Combining traditional and modern diagnostic tools with appropriate clinical evaluation helps doctors plan appropriate therapeutic strategies through current approaches.[19, 20]

The sialograph shows a well define the radiopaque appearance of the right submandibular, the sialograph also shows normal variation "Bush in winter appearance" of the submandibular gland. The following is an overview of the normal variations and lesions seen on a sialograph.

Table 1. Sialography appearance.[9]

Normal sialogram pattern of parotid gland	Tree in winter appearance
Normal Sialogram pattern of submandibular gland	Bush in winter appearance
Sialodochitis	Sausage like appearance
Sjogrens syndrome	Snowstorm appearance, Cherry blossom appearance
Sialadenitis	Sialectasis
Benign tumor	Ball in Hand appearance

Sialography remains the "standard" imaging technique for viewing the salivary ducts, although more modern imaging techniques are now available. This enables accurate detection, diagnosis & differentiation of pathological changes that will determine treatment planning. The advantages of this technique are that it has a high spatial resolution and can display abnormalities of up to small ducts, while the drawbacks of this technique are radiation exposure, the need for a cannulation procedure at the ductal orifice (which requires an experienced operator), and pain during gas injection contrast.[10]

Imaging studies are beneficial for diagnosing sialolithiasis. Occlusal radiographs are useful in demonstrating radiopaque stones. Cases in which patients have a combination of radiopaque and radiolucent stones are extremely rare, 40% of parotid stones may be radiolucent. Sialography is thus valuable for patients who show signs of sialadenitis associated with radiolucent stones or deep submandibular/parotid stones. Sialography is contraindicated in acute infection or patients with insignificant contrast allergy.[21, 22]

The considerations of the use of appropriate multi-imaging and radiographic modalities are necessary to confirm the diagnosis of sialolithiasis in the submandibular salivary glands, especially in hard-recognized cases on plain radiographs. The authors would like to special thanks to the Oral and Maxillofacial Radiology Department of Faculty Dentistry in Lambung Mangkurat University, Hasanuddin University, Universitas Airlangga, and Padjadjaran University for helping in this case report.

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