CASE REPORT

Volume 21 Issue 1 2026

DOI: 10.21315/aos2026.2101.CR03

ARTICLE INFO

Submitted: 31/11/2025
Accepted: 29/03/2026
Online: 30/06/2026

Incidental Detection of Submandibular Sialolithiasis in Panoramic Radiographs: A Report of Four Cases

Meltem Horoz*, Melda Mısırlıoğlu

Department of Oral and Maxillofacial Radiology, Faculty of Dentistry, Kırıkkale University Yahşihan, 71450 Kırıkkale, Türkiye

*Corresponding author: meeltemhoroz@hotmail.com

To cite this article: Horoz M, Mısırlıoğlu M (2026). Incidental detection of submandibular sialolithiasis in panoramic radiographs: A four-case report. *Arch Orofac Sci*, **21**(1): 79–85. https://doi.org/10.21315/aos2026.2101.CR03

To link to this article: https://doi.org/10.21315/aos2026.2101.CR03

ABSTRACT

Submandibular sialolithiasis is one of the most common pathologies of the salivary glands and, while it can present with clinical symptoms, it can also be detected incidentally during routine dental radiographic examinations. Due to its anatomical and physiological characteristics, the submandibular gland is the most common site for sialolith formation. This case series describes four asymptomatic male patients with submandibular sialoliths incidentally detected on panoramic radiographs and subsequently confirmed by cone-beam computed tomography (CBCT). CBCT allows for the localisation of calcified lesions and assessment of their size. This case series highlights the importance of routine radiographic examination in dentistry and demonstrates the complementary role of CBCT in the diagnosis and treatment planning of submandibular sialolithiasis.

Keywords: *Cone-beam computed tomography; Dental radiology; Imaging modalities; Panoramic radiography; Sialolithiasis; Submandibular gland*

INTRODUCTION

Sialolithiasis is defined as the formation of calcified structures—commonly known as salivary stones or sialoliths—within the ductal or glandular tissue of the salivary glands. It is the most common non-neoplastic salivary gland disorder, with an estimated prevalence of more than 1% in the general population. Among the major salivary glands, the submandibular gland is affected in approximately 80% to 90% of cases, followed by the parotid and sublingual glands (Pachisia *et al.*, 2019; Ashindoitiang *et al.*, 2023)

The submandibular gland is particularly predisposed to stone formation due to several anatomical and physiological factors: its duct (Wharton's duct) is long and narrow, the saliva is more alkaline and mucin-rich, and it must flow upward against gravity. These features, collectively, contribute to a slower salivary flow rate and increased mineral deposition, fostering an ideal environment for stone formation (Uğur & Yılmaz, 2023).

Sialoliths are primarily composed of inorganic materials, including calcium phosphates and calcium carbonates, interspersed with organic components such as glycoproteins, mucopolysaccharides, and cellular debris (Badash *et al.*, 2022). While sialolithiasis frequently presents with symptoms such as pain, swelling (especially during meals), and recurrent infections, it can also remain clinically silent (Özemre *et al.*, 2016). In asymptomatic cases, stones may be discovered incidentally during routine dental radiographic examinations. Dentists, including general practitioners and oral and maxillofacial radiologists, are usually the first to detect these lesions. Radiographic imaging is crucial for diagnosing and evaluating sialoliths when clinical findings are insufficient or non-specific. Various imaging methods are used to accurately assess the localisation, size, and structural characteristics of sialoliths.

Panoramic radiographs are a staple of dental diagnostics and are often the first imaging modality used to assess jaw structures. Sialoliths appear as well-circumscribed radiopaque masses in the soft tissue shadow below the mandibular angle, often near the inferior border of the mandible (Özemre *et al.*, 2016; Taşyapan *et al.*, 2020). Recent advancements, including artificial intelligence-based detection algorithms, have improved interpretation but have not eliminated these fundamental limitations (White & Pharoah, 2014; Putra & Epsilawati, 2024).

Cone-beam computed tomography (CBCT) has emerged as a powerful diagnostic tool in oral and maxillofacial radiology. Compared to conventional CT, CBCT offers reduced radiation exposure and excellent spatial resolution, making it suitable for evaluating calcified lesions in the head and neck region. CBCT utilises a conical X-ray beam and completes the scan in a single rotation, usually within 9 sec to 40 sec (Putra & Epsilawati, 2024). Comparison between CBCT and traditional sialography showed comparable radiation doses, supporting CBCT as a viable and safe imaging modality for salivary gland evaluation (Jadu *et al.*, 2010).

Ultrasound is widely used in otolaryngology and head and neck radiology due to its non-invasive nature and absence of radiation exposure. It can detect stones larger than 2 mm and assess glandular inflammation and ductal dilation. However, its diagnostic efficacy is reduced for deeply situated stones or in the presence of extensive calcification. It is also operator-dependent and less frequently used in routine dental practice (Rzymska-Grala *et al.*, 2010; Orhan *et al.*, 2021).

Sialography involves cannulation of the duct and the injection of a radiopaque contrast medium, followed by radiographic imaging. It provides a detailed visualisation of ductal architecture and is particularly helpful for identifying strictures, dilations, or multiple stones. However, it is contraindicated in acute infections and may be uncomfortable for the patient. While its use has declined, it remains valuable in complex diagnostic scenarios (Riyaz, 2020).

Magnetic Resonance Sialography (MR-S) provides a non-invasive alternative to traditional contrast-based sialography, employing heavily T2-weighted sequences to highlight the ductal system. It is particularly useful for evaluating soft tissue abnormalities, non-calcified obstructions, and chronic inflammatory conditions. The high cost and limited availability currently restrict its use primarily to specialised settings (Riyaz, 2020).

Sialoendoscopy is a minimally invasive technique that enables both diagnosis and treatment of ductal pathologies. It allows direct visualisation of the ductal system and facilitates the retrieval of stones. The technique can be combined with real-time ultrasound for intraoperative localisation of deeply embedded calculi. This fusion of diagnostic imaging and minimally invasive surgery reflects the trend towards function-preserving treatments in salivary gland pathology (Riyaz, 2020; Navalakhe *et al.*, 2025).

This paper presents four asymptomatic cases of submandibular sialolithiasis incidentally detected on panoramic radiographs and confirmed by CBCT. It also reviews imaging modalities for salivary gland evaluation, highlighting their relevance in dental practice. Written informed consent was obtained from all patients, and consent must be secured before any treatment or intervention.

CASE REPORT

Case 1

A 59-year-old male patient presented to the Department of Oral and Maxillofacial Radiology for routine dental treatment, including caries treatment and prosthetic rehabilitation. The patient had no systemic disease or salivary gland complaints. A panoramic radiograph revealed a radiopaque mass in the left submandibular region. For three-dimensional (3D) evaluation, CBCT images were obtained using an i-CAT device with parameters of 120 kVp, 5 mA, 4 sec scan time, 0.3 mm voxel size, and 6.0 cm field of view (FOV). CBCT confirmed a sialolith measuring 6.50 mm × 5.09 mm containing four calcified foci (Fig. 1). The lesion had regular edges and was located within the course of Wharton's duct. There were no signs of infection or gland swelling. Conservative treatment was recommended with routine 6-month follow-up.

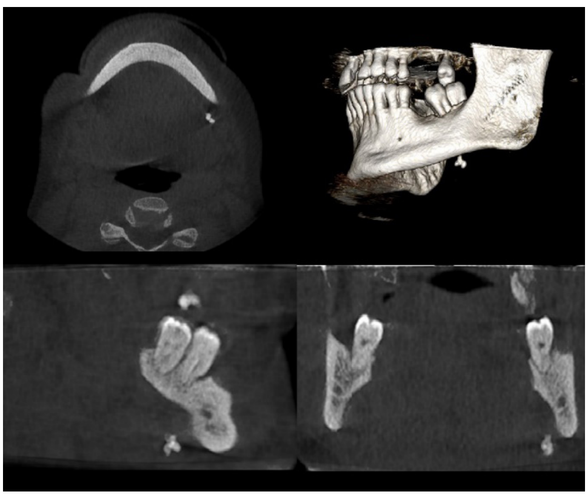

Fig. 1 CBCT images of a sialolith in the left submandibular region.

Case 2

A 52-year-old male patient, systemically healthy, presented with a complaint of deep caries. Radiographic examination revealed a radiopaque lesion in the right submandibular region. For 3D imaging, CBCT images were obtained using an i-CAT device with parameters of 120 kVp, 5 mA, 4 sec scan time, 0.4 mm voxel size, and 6.0 cm FOV. CBCT evaluation revealed a single salivary stone (sialolith) with smooth edges, measuring 6.60 mm × 7.60 mm (Fig. 2). The patient reported mild dry mouth but no swelling, pain, or signs of infection. Fluid intake, saliva-stimulating medications, and 6-month follow-up were recommended.

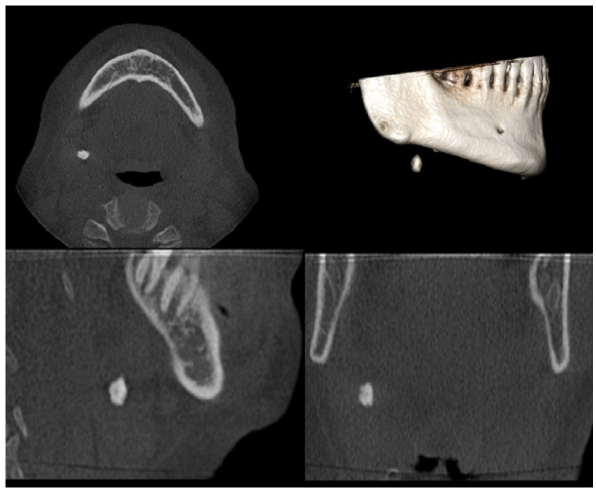

Fig. 2 CBCT images of a sialolith in the right submandibular region.

Case 3

A 41-year-old male patient presented to the clinic for prosthetic treatment planning. Panoramic imaging revealed a radiopaque mass in the right submandibular region. For 3D imaging, CBCT images were obtained using an i-CAT device with parameters of 120 kVp, 5 mA, 4 sec scan time, 0.4 mm voxel size, and 8.0 cm FOV. CBCT imaging revealed a single salivary stone measuring 7.20 × 7.17 mm (Fig. 3). The patient denied symptoms of dry mouth, swelling, or discomfort and refused any invasive treatment. The lesion was managed with regular imaging and 6-month follow-up.

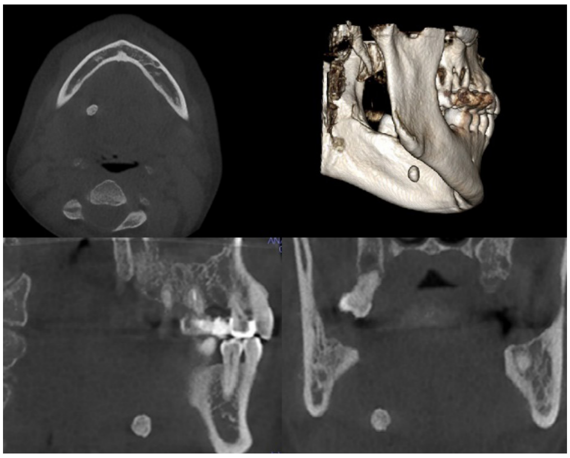

Fig. 3 CBCT images of a sialolith in the right submandibular region.

Case 4

A 45-year-old healthy male patient presented for replacement of his dental prostheses. Panoramic imaging revealed a radiopaque mass on the right side of the lower jaw. For 3D imaging, CBCT images were obtained using an i-CAT device with parameters of 120 kVp, 5 mA, 4 sec scan time, 0.4 mm voxel size, and 13.0 cm FOV. CBCT examination showed a well-defined, calcified structure measuring 6.96 mm × 8.36 mm in the submandibular region (Fig. 4). The patient was asymptomatic and had no history of infection or diaper-related complaints. Based on clinical and radiological findings, a cautious (conservative) approach involving regular follow-up every 6 months is recommended.

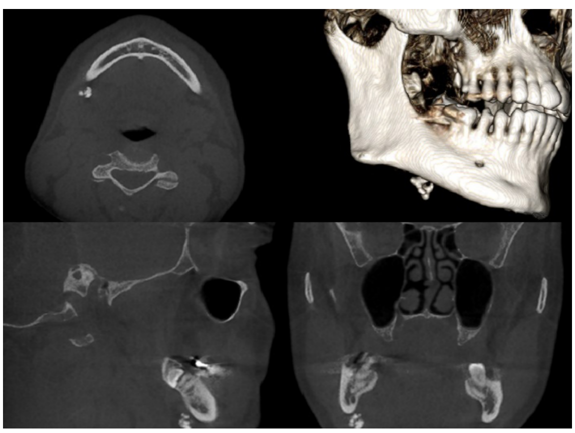

Fig. 4 CBCT images of a sialolith in the right submandibular region.

The choice of intervention should be guided by imaging findings, clinical symptoms, and patient preferences. Dentists, especially those working in multidisciplinary clinics, must be familiar with referral protocols and imaging interpretation to ensure comprehensive patient care. The demographic, clinical, and radiographic characteristics of all four cases are summarised in Table 1.

Table 1 Summary of the demographic, clinical, and radiographic characteristics of the four cases of submandibular sialolithiasis

Case	Age	Sex	Lesion size	Main symptom
1	59	Man	6.50 mm × 5.09 mm	Asymptomatic
2	52	Man	6.60 mm x 7.60 mm	Asymptomatic
3	41	Man	7.20 mm x 7.17 mm	Asymptomatic
4	45	Man	6.96 mm x 8.36 mm	Asymptomatic

DISCUSSION

Sialolithiasis is one of the most common non-neoplastic diseases of the salivary glands, affecting more than 1% of the population. It predominantly involves the submandibular gland, accounting for 80% to 90% of cases due to a combination of anatomical and biochemical factors (Duong *et al.*, 2019; Taşyapan *et al.*, 2020). These include the long and tortuous course of Wharton's duct, its angulation around the mylohyoid muscle—which promotes salivary flow against gravity—and the gland's production of viscous, alkaline, calcium-rich saliva. Additionally, the excretory duct's relatively narrow diameter, slower salivary flow, and higher protein and mucin content contribute significantly to stone formation (Ashindoitiang *et al.*, 2023).

Histologically, sialoliths are composed of concentric layers of organic material, such as glycoproteins, mucopolysaccharides, and cellular debris, along with inorganic components, including calcium phosphate and carbonate (Badash *et al.*, 2022). Sialolite formation is thought to develop as a result of the precipitation and calcification over time of mineral salts on cellular debris, mucus, bacteria, or other organic materials found in the salivary ducts (Thong *et al*., 2020). This theory is supported by findings in our present case series, particularly in Case 1, where multiple calcification foci were observed.

Sialolithiasis exhibits a clear male predilection, with a male-to-female ratio of approximately 2:1, consistent with all four patients in this report (Ashindoitiang *et al*., 2023). The typical age of onset is between 30 and 60 years, which aligns with the age range of our cases (41 to 59 years). Pediatric cases are rare, likely due to lower calcium and phosphate concentrations in children's saliva, which gradually increase with age (Taşyapan *et al*., 2020; Jadaun *et al*., 2023). The development of sialolithiasis is multifactorial, involving anatomical predispositions, salivary composition, and potential retrograde contamination, all of which culminate in the formation of calcified deposits primarily within the submandibular duct system.

Sialolithiasis commonly presents with pain and swelling of the affected gland, particularly exacerbated during meals due to increased salivary stimulation. However, up to 20% of cases may remain asymptomatic and are discovered incidentally during routine dental imaging, as observed in all four cases in our series (Taşyapan *et al*., 2020).

Radiographically, sialoliths are typically visible as single or multiple radiopaque lesions that may vary in shape—round, oval, cylindrical, or irregular. Nonetheless, approximately 20% of sialoliths are either poorly calcified or radiolucent, which limits their detectability with conventional two-dimensional (2D) imaging alone. Panoramic radiography remains the first-line imaging modality in general dental practice due to its wide availability and ability to visualise anterior or larger radiopaque stones. However, its diagnostic utility is hindered by the superimposition of anatomical structures and its inability to identify small or non-calcified stones, especially those located in the posterior segment of the duct (Putra & Epsilawati, 2024).

Therefore, in panoramic radiographs, differential diagnosis is of great importance in evaluating radiopaque formations in the submandibular region. Calcific structures in this region are not limited to sialoliths; other pathologies, such as lymph node calcifications, phleboliths, and tonsilloliths, can exhibit similar radiographic appearances. Lymph node calcifications generally have irregular and lobulated contours and are distinguished by their soft tissue location; phleboliths frequently show a target-like appearance with a central radiolucent ring. Tonsilloliths, on the other hand, are seen as single or multiple radiopaque areas in the oropharyngeal region, in the airways where the dorsal surface of the tongue passes the ramus. Since it is not always possible to definitively differentiate these structures with two-dimensional imaging methods, sectional imaging techniques such as CBCT provide a significant advantage in clearly revealing the anatomical localisation and characteristic features of the lesions (White and Pharoah, 2014). In the presented case series, the use of CBCT allowed for the reliable differentiation of sialoliths from the differential diagnosis.

To address these limitations, CBCT has emerged as a valuable imaging technique in dental radiology. CBCT utilises a cone-shaped X-ray beam and 2D detectors to obtain volumetric data in a single rotation, offering high-resolution three-dimensional (3D) images with relatively low radiation exposure compared to conventional CT. The CBCT delivers radiation doses that are comparable to conventional sialography while providing significantly more detailed anatomical information (Jadu *et al*., 2010). In the present case series, CBCT played a critical role in confirming the presence and extent of calculi, particularly in asymptomatic patients (Putra & Epsilawati, 2024).

CONCLUSION

While panoramic radiography remains a vital screening tool in dental settings, it should be supplemented with CBCT or other cross-sectional imaging when diagnostic ambiguity arises or more detailed anatomical assessment is required. In our case series, panoramic radiographs served as an initial diagnostic step, but CBCT was indispensable in confirming the number, dimensions, and exact location of the stones. The asymptomatic nature of all four cases underscores the need to maintain radiographic vigilance during routine dental evaluations to facilitate early detection and appropriate management.

REFERENCES

Ashindoitiang JA, Nwagbara VIC, Ugbem T, Odoks RK, Udo Solomon A, Akpan SO *et al*. (2023). Huge sialolith of the submandibular gland: A case report and review of literature. *J Int Med Res*, **51**: 3000605221148443. https://doi.org/10.1177/03000605221148443

Badash I, Raskin J, Pei M, Soldatova L, Rassekh C (2022). Contemporary review of submandibular gland sialolithiasis and surgical management options. *Cureus*, **14**: e28147. https://doi.org/10.7759/cureus.28147

Duong LT, Kakiche T, Ferré F, Nawrocki L, Bouattour A (2019). Management of anterior submandibular sialolithiasis. *J Oral Med Oral Surg*, **25**: 16. https://doi.org/10.1051/mbcb/2019021

Jadaun G, Pillai D, Ragji T, Kharodia S, Jadaun Sr, G (2023). Sialolithiasis: An unusually large submandibular salivary stone. *Cureus*, **15**: e41859. https://doi.org/10.7759/cureus.41859

Jadu F, Yaffe M, Lam E (2010). A comparative study of the effective radiation doses from cone beam computed tomography and plain radiography for sialography. *Dentomaxillofac Radiol*, **39**: 257–263. https://doi.org/10.1259/dmfr/62878962

Navalakhe M, Sharma M, Sahai A, Jadhav M, Shriwastav P, Janerao A (2025). A comprehensive study of combined approach sialendoscopy in managing salivary gland sialolithiasis. *Turk Arch Otorhinolaryngol*, **63**(2): 69–74. https://doi.org/10.4274/tao.2025.2024-8-13

Orhan K, Bozkurt P, Berktaş ZS, Kurt MH (2021). Ultrasonography-guided sialolithotomy and stricture dilations of the major salivary glands: A preliminary study. *J Ultrason*, **21**(86): e237-e243. https://doi.org/10.15557/JoU.2021.0038

Özemre MÖ, Köseoğlu Seçgin C, Gülşahı A (2016). Yumuşak doku kalsifikasyonları ve ossifikasyonları: Derleme. *Acta Odontol Turc*, **33**(3): 166–175. https://doi.org/10.17214/aot.55965

Pachisia S, Mandal G, Sahu S, Ghosh S (2019). Submandibular sialolithiasis: A series of three case reports with review of literature. *Clin Pract*, **9**(1): 1119. https://doi.org/10.4081/cp.2019.1119

Putra DS, Epsilawati L (2024). Enhancing the diagnosis of sublingual sialolith using CBCT: A case report. *J Radiol Dentomaksilofasial Indonesia*, **8**(1): 29–32. https://doi.org/10.32793/jrdi.v8i1.1114

Riyaz MA (2020). Diagnostic salivary gland imaging - A review. *Integr J Med Sci*, **8**: 296. https://doi.org/10.15342/ijms.2021.296

Rzymska-Grala I, Stopa Z, Grala B, Gołębiowski M, Wanyura H, Zuchowska A *et al.* (2010). Salivary gland calculi - Contemporary methods of imaging. *Pol J Radiol*, **75**(3): 25–37.

Taşyapan SA, Ertürk AF, Özcan İ (2020). Radyolojik bulgularla submandibular bezde dev siyalolit: Olgu sunumu. *J Adv Res Health Sci*, **3**: 20–25. https://doi.org/10.26650/JARHS2020-656780

Thong HK, Mohamad Mahbob H, Sabir Husin Athar PP, Tengku Kamalden TMI (2020). Recurrent submandibular sialolithiasis in a child. *Cureus*, **12**(12): e12163. https://doi.org/10.7759/cureus.12163

Uğur TA, Yılmaz S (2023). Üç varyasyonuyla submandibular tükürük bezi taşları: Olgu serisi. *Akdeniz Dis Hekiml Derg*, **2**: 110–114.

White SC, Pharoah MJ (2014). Oral radiology: Principles and interpretation. Amsterdam: Elsevier Health Sciences.