

DT Journal

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**Journal of Diagnostics and
Treatment of Oral and
Maxillofacial Pathology**



Editors
Oleksii Tymofieiev • Rui Fernandes
(Kyiv, Ukraine • Jacksonville, FL, USA)



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Maxillofacial and Oral Surgeons

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About the Journal: Aims and Scope

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2018: 4 issues a year

2019: 10 issues a year

From 2020: 12 issues a year

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for the medicinal product

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active substance: benzydamine hydrochloride;
100 mL of solution contain benzydamine hydrochloride 0.15 g;

excipients: ethanol 96%, glycerol, methyl parahydroxybenzoate (E 218), flavor (menthol), saccharin, sodium hydrocarbonate, Polysorbate 20, Quinoline Yellow (E 104), Patent Blue V (E 131), purified water.

Dosage form. Oromucosal solution.

Basic physical and chemical properties: a clear green liquid with a typical mint flavor.

Pharmacotherapeutic group. Dental preparations. Other agents for local oral treatment.

ATC code: A01A D02.

Pharmacological properties.

Pharmacodynamics.

Benzydamine is a non-steroidal anti-inflammatory drug (NSAID) with analgesic and antiexudative properties.

Clinical studies have shown that benzydamine is effective in the relief of symptoms accompanying localized irritation conditions of the oral cavity and pharynx. Moreover, benzydamine has anti-inflammatory and local analgesic properties, and also exerts a local anesthetic effect on the oral mucosa.

Pharmacokinetics.

Absorption through the oral and pharyngeal mucosa has been proven by the presence of measurable quantities of benzydamine in human plasma. However, they are insufficient to produce any systemic pharmacological effect. The excretion occurs mainly in urine, mostly as inactive metabolites or conjugated compounds.

When applied locally, benzydamine has been shown to cumulate in inflamed tissues in an effective concentration

due to its ability to permeate through the mucous membrane.

Clinical particulars.

Indications.

Symptomatic treatment of oropharyngeal irritation and inflammation; to relieve pain caused by gingivitis, stomatitis, pharyngitis; in dentistry after tooth extraction or as a preventive measure.

Contraindications.

Hypersensitivity to the active substance or to any other ingredients of the product.

Interaction with other medicinal products and other types of interaction.

No drug interaction studies have been performed.

Warnings and precautions.

If sensitivity develops with long-term use, the treatment should be discontinued and a doctor should be consulted to get appropriate treatment.

In some patients, buccal/pharyngeal ulceration may be caused by severe pathological processes. Therefore, the patients, whose symptoms worsen or do not improve within 3 days or who appear feverish or develop other symptoms, should seek advice of a physician or a dentist, as appropriate.

Benzydamine is not recommended for use in patients hypersensitive to acetylsalicylic acid or other non-steroidal anti-inflammatory drugs (NSAIDs).

The product can trigger bronchospasm in patients suffering from or with a history of asthma. Such patients should be warned of this.

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No adequate data are currently available on the use of benzydamine in pregnant and breastfeeding women. Excretion of the product into breast milk has not been studied. The findings of animal studies are insufficient to make any conclusions about the effects of this product during pregnancy and lactation.

The potential risk for humans is unknown.

TANTUM VERDE should not be used during pregnancy or breast-feeding.

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When used in recommended doses, the product does not produce any effect on the ability to drive and operate machinery.

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Pour 15 mL of TANTUM VERDE solution from the bottle into the measuring cup and gargle with undiluted or diluted product (15 mL of the measured solution can be diluted with 15 mL of water). Gargle 2 or 3 times daily. Do not exceed the recommended dose.

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The product should not be used in children under 12 years due to a possibility of ingestion of the solution when gargling.

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No overdose has been reported with benzydamine when used locally. However, it is known that benzydamine, when ingested in high doses (hundreds times higher than those possible with this dosage form), especially in children, can cause agitation, convulsions, tremor, nausea, increased sweating, ataxia, and vomiting. Such acute overdose requires immediate gastric lavage, treatment of fluid/salt imbalance, symptomatic treatment, and adequate hydration.

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Adverse reactions are classified according to their frequency: very common ($\geq 1/10$); common ($\geq 1/100$ to $<1/10$); uncommon ($\geq 1/1,000$ to $<1/100$); rare ($\geq 1/10,000$ to $<1/1,000$); very rare ($<1/10,000$); frequency unknown (cannot be estimated from the available data).

Gastrointestinal disorders: rare – burning mouth, dry mouth; *unknown* – oral hypesthesia, nausea, vomiting, tongue edema and discoloration, dysgeusia.

Immune system disorders: rare – hypersensitivity reaction, *unknown* – anaphylactic reaction.

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Over-the-counter medicinal product.

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Location of the manufacturer and its business address.
Via Vecchia del Pinocchio, 22 – 60100 Ancona (AN), Italy.

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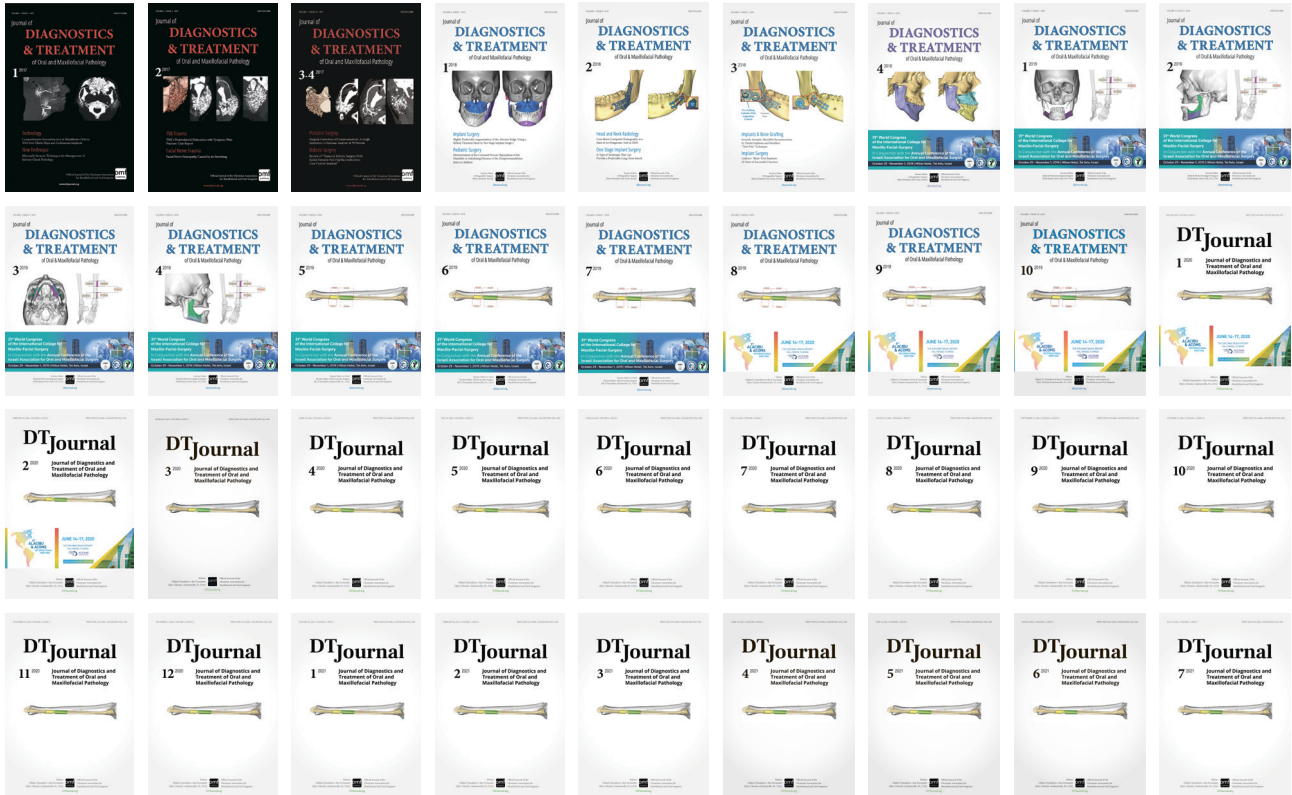
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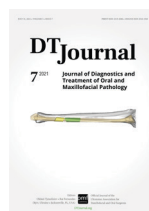
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ESSAY

77 **Sialoliths of Submandibular Gland and Wharton's Duct:
Orthopantomography**

Valentyn H. Demidov & Serhii I. Khrulenko



COURTESY

Journal's cover image (virtual surgical planning for a segmental mandibular reconstruction with fibula transplant) is courtesy of Rui P. Fernandes, MD, DMD, FACS, FRCS.

Image was taken from the article: Fernandes RP, Quimby A, Salman S. Comprehensive reconstruction of mandibular defects with free fibula flaps and endosseous implants. *J Diagn Treat Oral Maxillofac Pathol* 2017;1(1):6–10.

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ESSAY

Sialoliths of Submandibular Gland and Wharton's Duct: Orthopantomography

Valentyn H. Demidov^{a,*} & Serhii I. Khrulenko^b

SUMMARY

Orthopantomography (OPG), which is also known as panoramic radiography, pantomography, and panoramic imaging, proved its efficacy in infection, trauma, jaw lesions, tumor cases, etc. Calcification of the soft tissues in perimaxillary and perimandibular regions can also be visualized on OPG images. Reports clearly showed sialolith occurrence in the parotid gland in 10%, in submandibular gland in 83%, and in sublingual and minor salivary glands in 7%. Typically, sialoliths are visualized on the panoramic radiographs as radiopaque lesions. They are of round or oval shape, cylindrical or irregularly-shaped calcifications. Only in limited cases, sialoliths can be X-ray negative. The research data shows – from 10 to 20% the salivary stones are radiolucent. Digital OPG combines a lot of advantages. In summary, digital orthopantomography proved its efficacy in diagnostics of sialoliths located in the submandibular gland and its duct. Simultaneously, OPG is more than useful for diagnosis establishment and control of treatment for neighboring specialties.

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Abbreviation 'OPG' at the upper right icon means that article contains orthopantomography (OPG) images.

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INTRODUCTION

Sialolithiasis of the submandibular gland to some moment can be asymptomatic or can lead to symptoms of obstructive sialadenitis. According to the 10-year experience of the Department of Maxillofacial Surgery, Shupyk National Healthcare University of Ukraine, calculous submaxillitis occurs in 98.2% of patients, and calculous parotitis – only in 1.8% of all calculous sialadenitis (Tymofieiev, 2012).¹ In their observations, salivary stones in the sublingual gland were not detected. Nikulin et al (2020) presented the case of sublingual gland sialolithiasis with description of ultrasound appearance.² Study of Lommen et al (2021) revealed that in 58.6% of cases the sialoliths is localized in submandibular glands and in 41.4% – in the parotid gland.³ Other reports showed sialolith occurrence in the parotid gland in 10%, in submandibular gland in 83%, and in sublingual and minor salivary glands in 7%.⁴⁻⁵

Stone size can vary from less than 1 mm (microsialolith) (Demidov and Ripolovska, 2019) to giant ones, reaching 3.5 cm (Goh et al, 2016), 3.7 cm (Omezli et al, 2016), or even 5.5 cm (megasialolith) (Raksin et al, 1975).⁶⁻⁹

For example, the case published in 2019 revealed that number of sialoliths in the intraglandular duct system of the submandibular gland specimen can reach 8 stones (Demidov and Ripolovska, 2019).⁶

A lot of basic imaging techniques (unenhanced computed tomography [CT], magnetic resonance imaging [MRI], different X-ray, ultrasonography, sialoendoscopy, and different sialography imaging techniques) for sialolith detection are applied around the globe (Rzyska-Grala et al, 2010).¹⁰ In some countries (like United States) the leading imaging for that purpose is unenhanced CT,¹¹ in others (like European countries) ultrasonography and X-ray techniques are equally popular.¹⁰ Application of orthopantomography (OPG) in our hospital became a new first line imaging for the patients with obstructive sialadenitis symptoms.

OPG, which is also known as panoramic radiography, pantomography (Benson, 2014),¹² and panoramic imaging, proved its efficacy in infection, trauma, jaw lesions, tumor cases, etc. Calcification of the soft tissues in perimaxillary and perimandibular regions can also be visualized on OPG images (Huang et al, 2009).¹³ Digital OPG combines a lot

of advantages. Advantages and disadvantages of OPG were presented in detail study of Sidorenko de Oliveira Capote et al (2015).¹⁴ The main advantage of OPG over trans-occlusal endoral radiography is that all teeth, upper and lower jaw, maxillary sinuses, nasal cavity, and styloid processes are showed on the OPG image. And such OPG images can be used for the treatment by different dental specialists.

For identification of the sialoliths in the anterior part of the Wharton's duct both an *occlusal radiography* (Jardim et al, 2011)¹⁵ (also known as *mandibular occlusal radiography* [Rzyska-Grala et al, 2010]¹⁰ and *transocclusal endoral radiography* [Shahoon et al, 2015])¹⁶ are useful. And for the stone identification in the posterior part of the duct, the *transangular flour of the mouth radiography* is recommended (Tymofieiev, 2012).¹

In the literature (Benson, 2014) can be also found such terms as a *cross-sectional mandibular occlusal projection radiography* for examination of the anterior two thirds of the Wharton's duct and an *over-the-shoulder occlusal projection view* for the posterior one third.¹²

Comparison of sialolith visualization on *trans-occlusal endoral radiography* versus OPG is highlighted in the case series of Oteri et al (2011).¹⁷ The purpose of our essay is to present appearance of submandibular gland and its duct sialoliths on orthopantomography.

MATERIALS AND METHODS

OPG presented in this publication was obtained at panoramic x-ray machine (Planmeca ProMax® 2D S3, Planmeca, Helsinki, Finland), Kyiv Regional Clinical Hospital by an experienced x-ray technician (S.I.K., his experience – 25 years). The digital processing of radiographs was carried out using the Romexis Viewer software. The OPG images of the patients with submandibular gland sialolithiasis were retrospectively meticulously analyzed. OPG with radiopaque salivary stones were collected for this essay.

Eight patients of the age varied from 41 to 74 years (5 males and 3 females) with radiopaque lesions on OPG images were analyzed (Figs 1–8). One case (Fig 5) depicts two OPG – before and after sialolith removal. In five cases single sialoliths have been noted and in three cases – multiple sialoliths (two or three calculi).

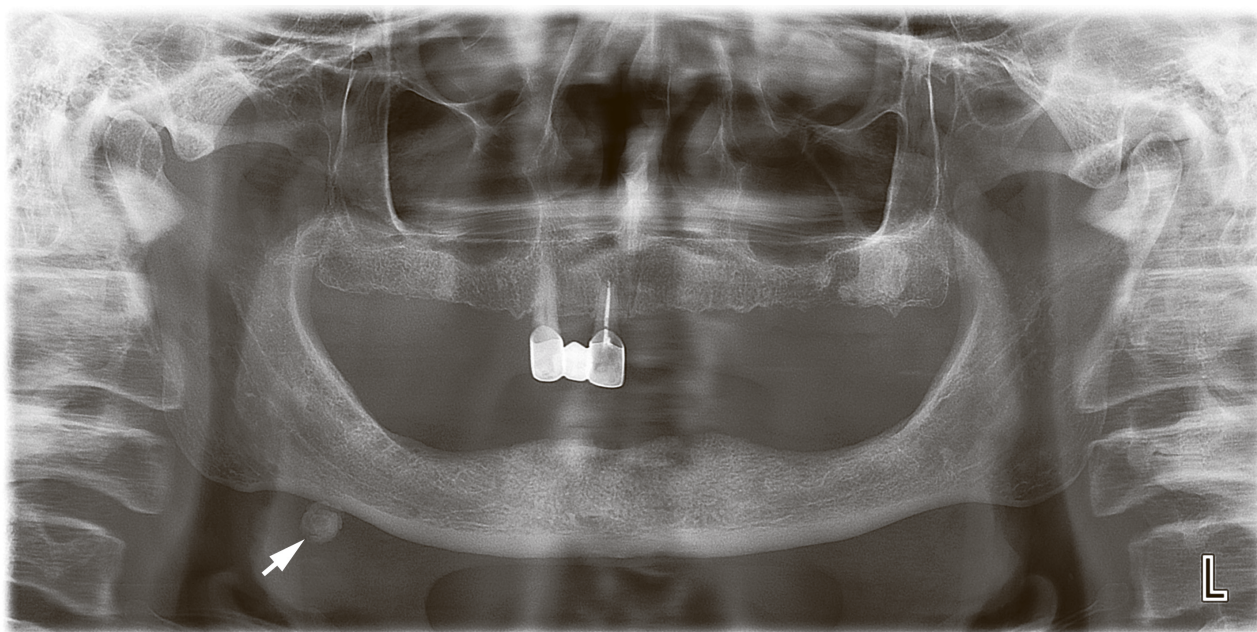


FIGURE 1. Case 1: An orthopantomogram of a 66-year-old gentleman with symptoms of obstructive submandibular sialadenitis. A radiopaque causative sialolith with laminated structure is indicated by *arrow*.

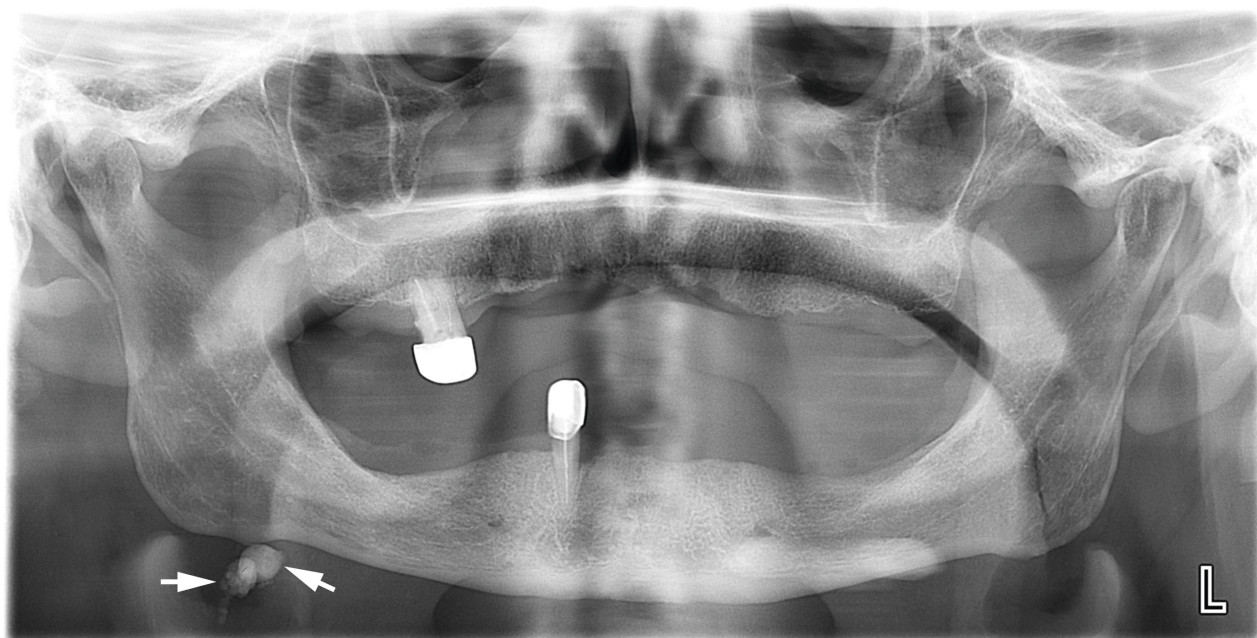


FIGURE 2. Case 2: A 61-year-old gentleman with sialolithiasis of right submandibular gland. *Arrows* label radiopaque salivary stones below the lower border of mandible. Lower sialolith has a teardrop shape.

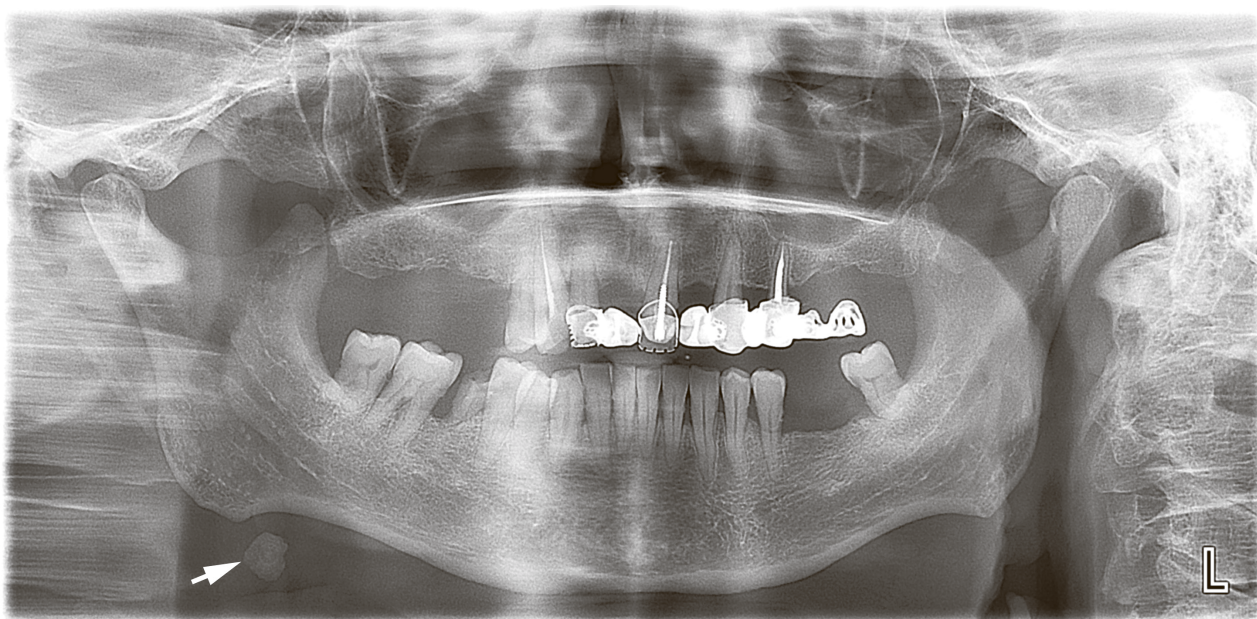


FIGURE 3. Case 3: An orthomantogram of a 56-year-old gentleman with obstructive submaxillitis. A radiopaque sialolith with homogenous structure is indicated by arrow.

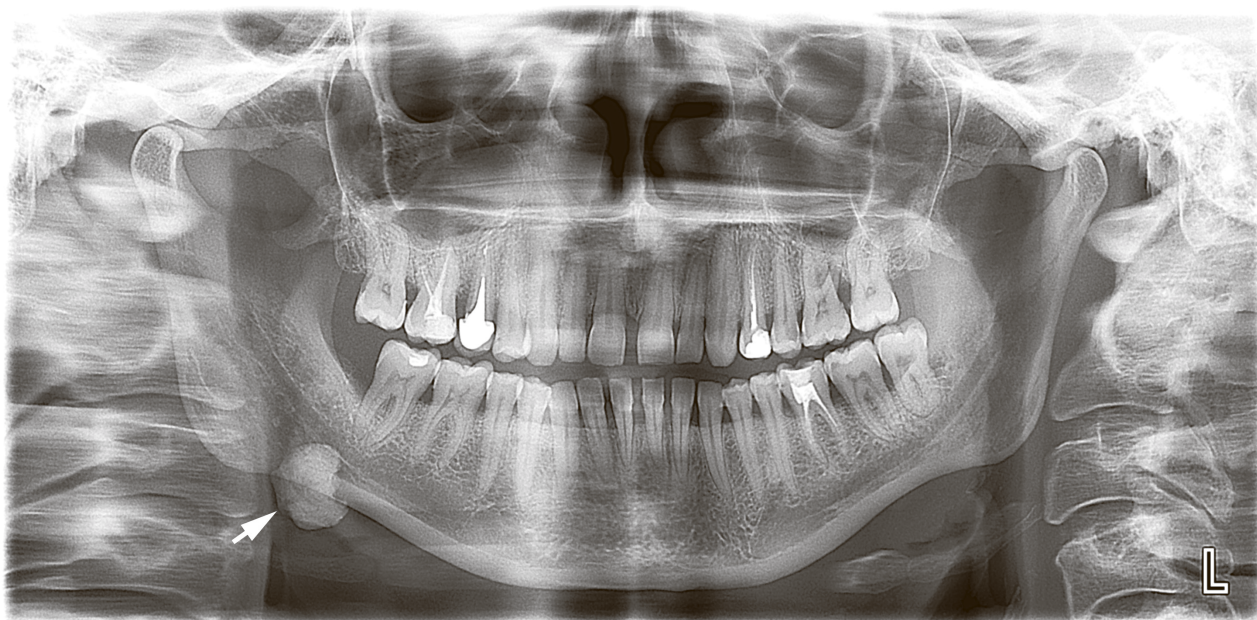


FIGURE 4. Case 4: An orthomantogram of 56-year-old lady with sialolith (arrow) visualized in the projection of right submandibular gland.

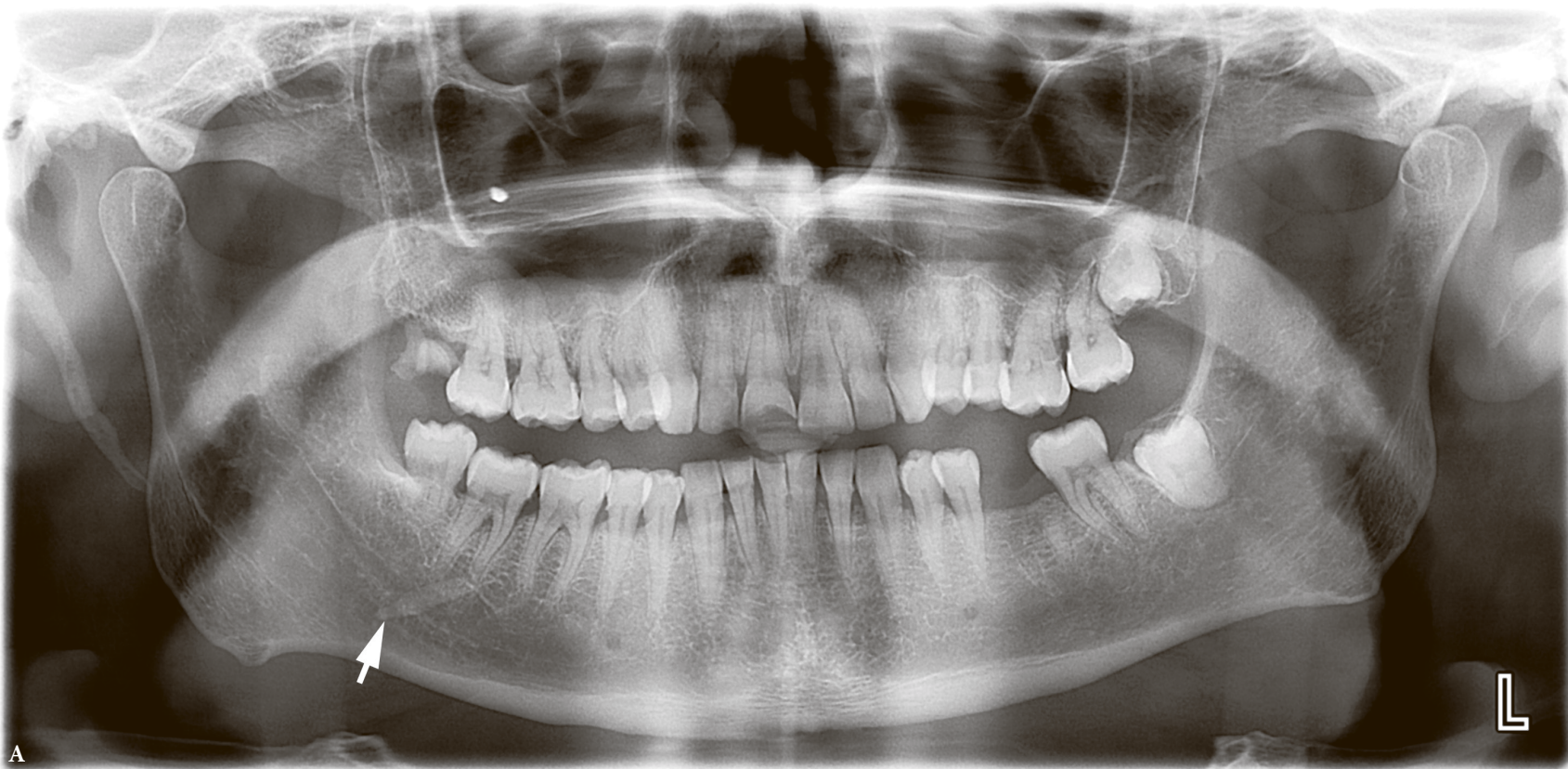


FIGURE 5. Case 5: The orthopantomograms of 41-year-old gentleman before **(A)** and after **(B)** sialolith removal. The sialolith (*arrow*) is visualized as elongated radiopaque lesion overlapping the right mandibular body in the projection of posterior part of Wharton's duct. Image **B** shows no evidence of sialolith. Time period between two images is 4 days. **(Fig 5 continued on next page.)**

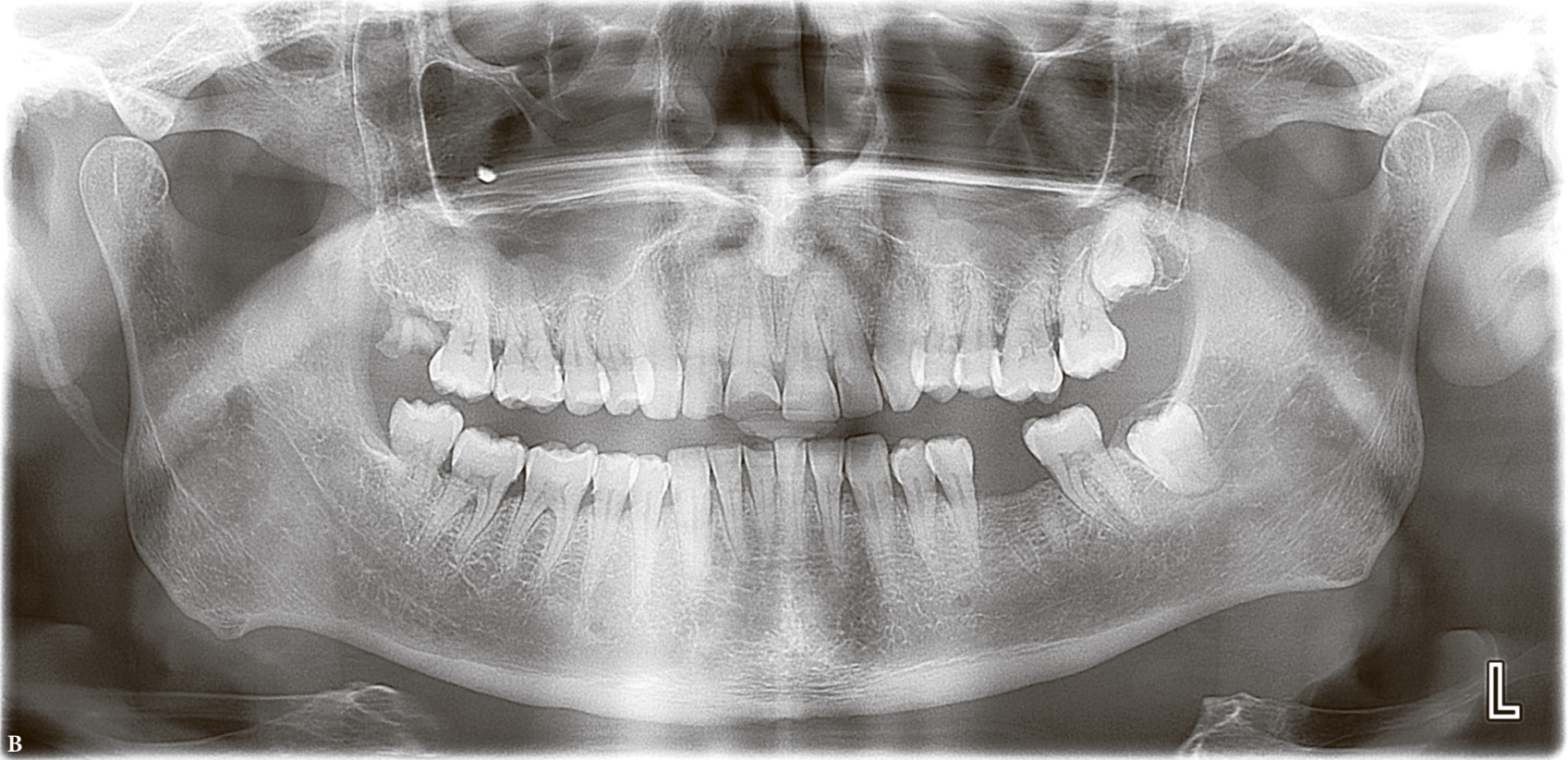


FIGURE 5 (continued). Case 5: The orthomantograms of 41-year-old gentleman before (A) and after (B) sialolith removal. The sialolith (*arrow*) is visualized as elongated radiopaque lesion overlapping the right mandibular body in the projection of posterior part of Wharton's duct. Image B shows no evidence of sialolith. Time period between two images is 4 days.

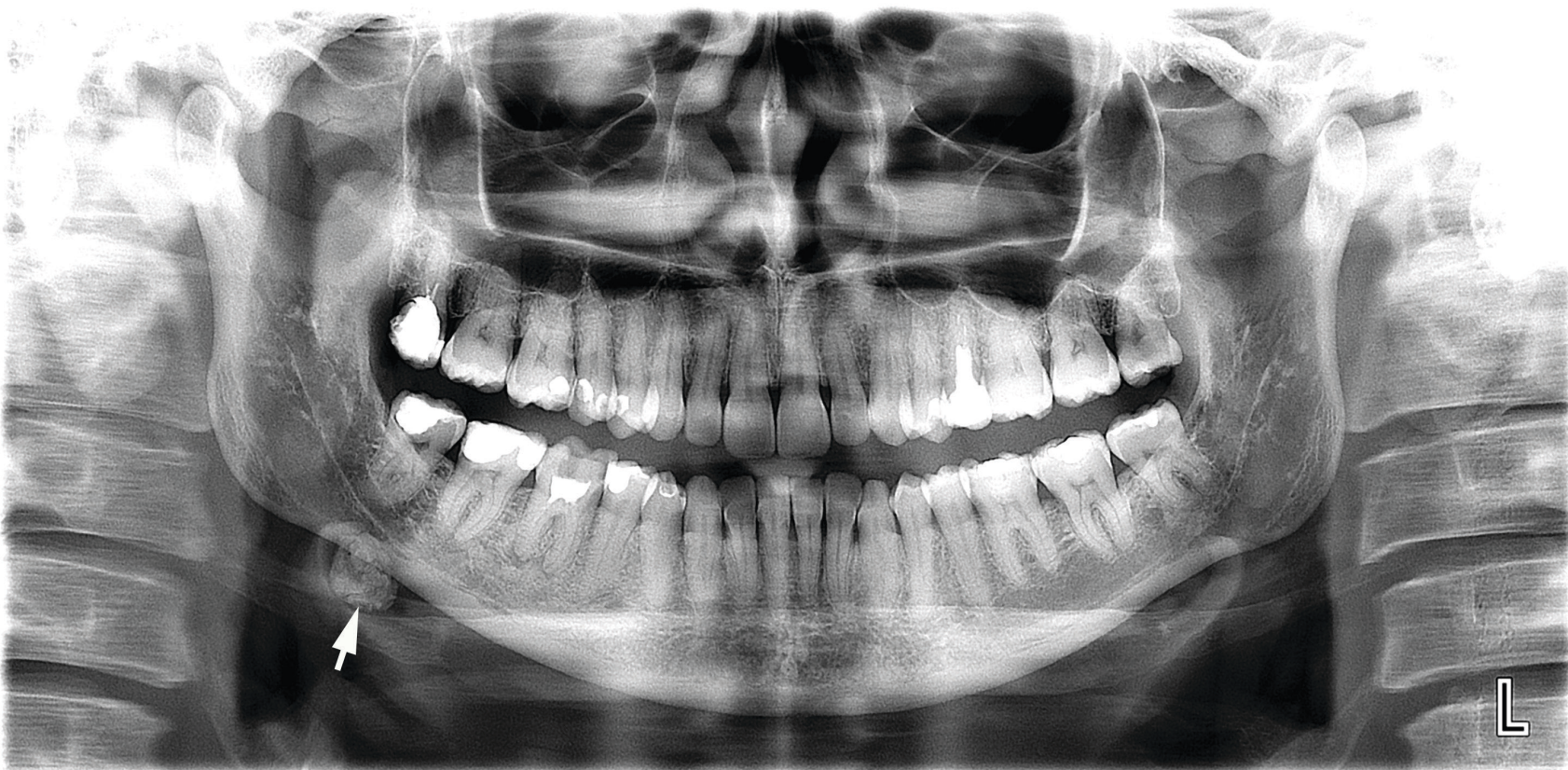


FIGURE 6. Case 6: An orthopantomogram of 46-year-old lady with a radiopaque sialolith (*arrow*) at the level of right submandibular gland.

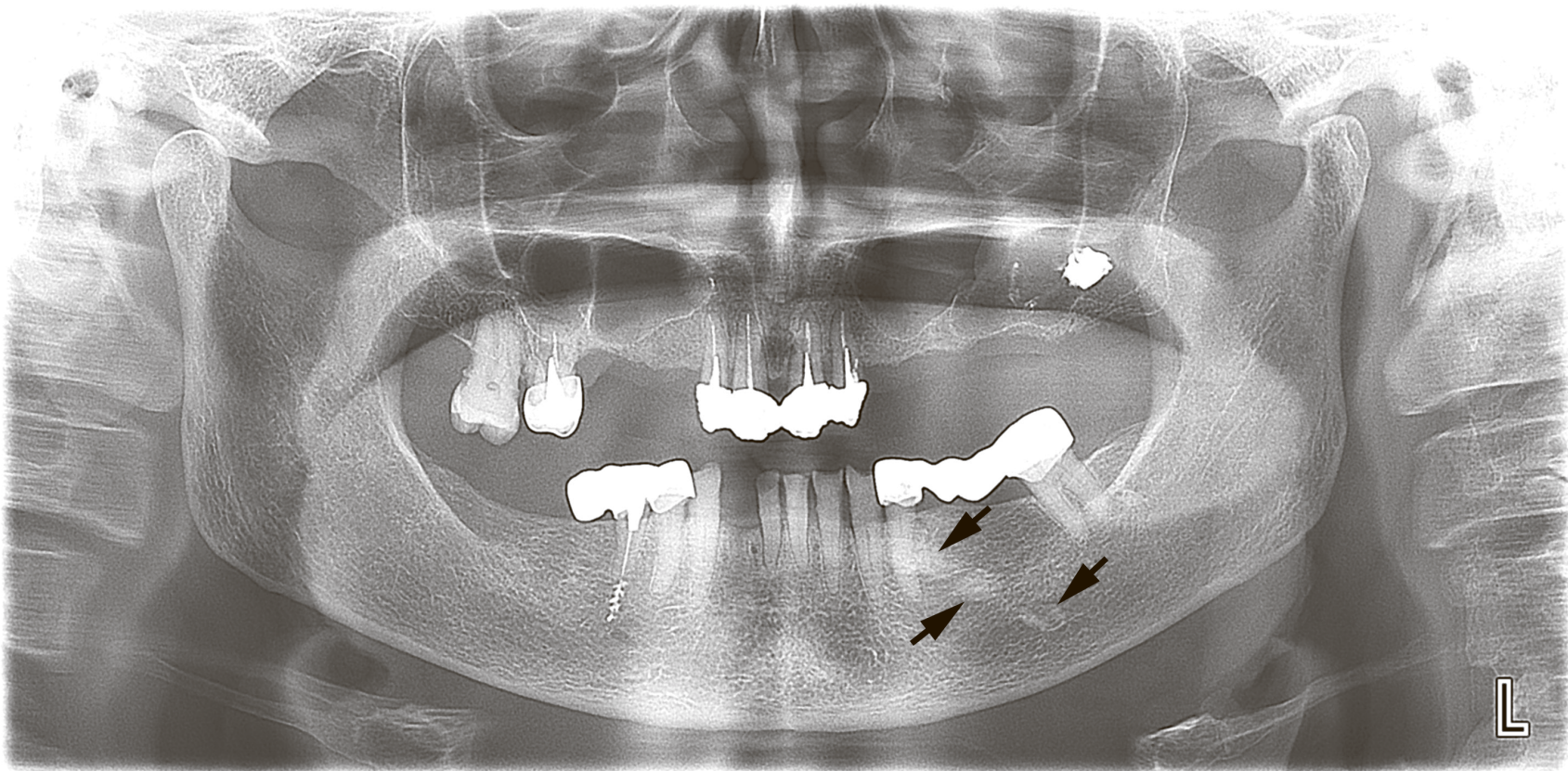


FIGURE 7. Case 7: An orthopantomogram of 74-year-old lady shows three radiopaque salivary stones (*arrows*) in the projection of left Wharton's duct.

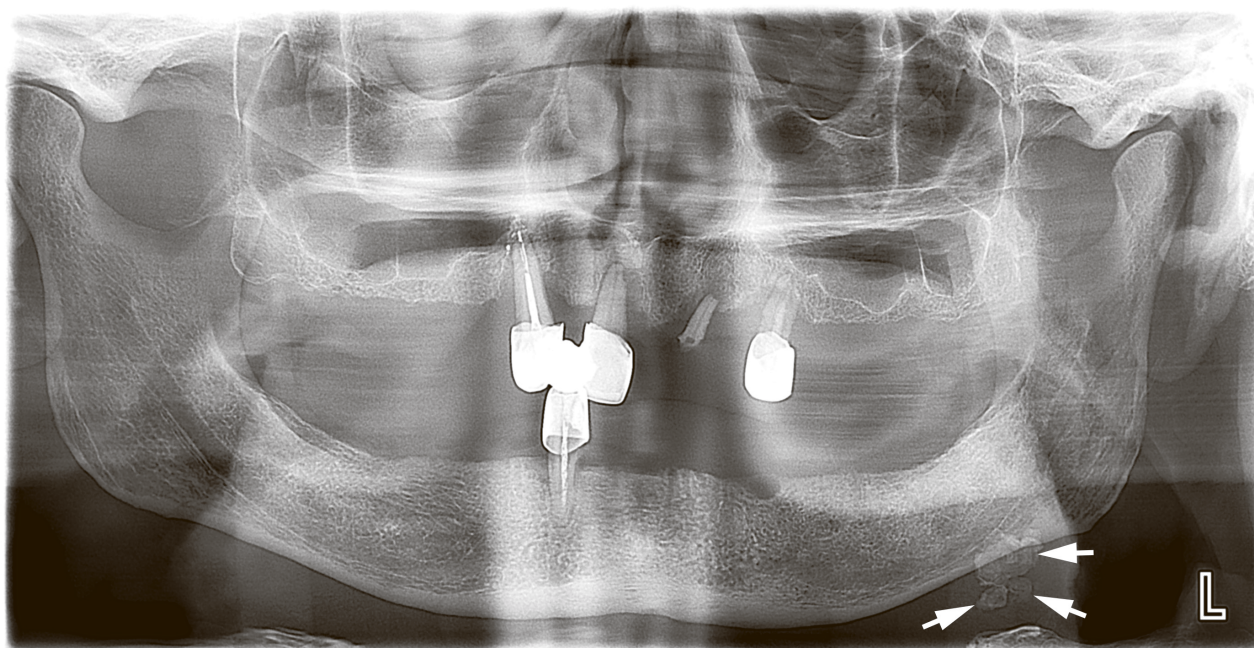


FIGURE 8. Case 8: An orthopantomogram of 61-year-old gentleman. Notes conglomerate of radiopaque sialoliths (*arrows*) in the projection of left submandibular gland.

DISCUSSION

Sialoliths are visualized on the panoramic radiographs as radiopaque lesions (Mumtaz, 2018).¹⁸ They look are of round (Huang et al, 2009)¹³ or oval shape (Larheim and Westesson, 2006),¹⁹ cylindrical or irregularly-shaped (Huang et al, 2009)¹³ calcifications. Only in limited cases, sialoliths can be X-ray negative (Tymofieiev, 2012).¹ The data of Larheim and Westesson (2006) shows — from 10 to 20% of the salivary stones are radiolucent.¹⁹

Rzyska-Grala et al (2010) emphasized that submandibular gland sialoliths produce opacity only in 80–90 percent of the cases, while the calculi of the parotid salivary gland – only in 60 percent.¹⁰

According to Huang et al (2009), sialoliths in the Wharton's duct are predominantly radiopaque (with a laminated or homogeneous structure).¹³

At OP, calculus can be overlapped on teeth, jaw bones (Oteri et al, 2011; Duong et al, 2019)^{17,20} or even hyoid bone (Mumtaz, 2018)¹⁸. When sialolith overlaps the mandibular bone it can mimic mandibular torus and osteoma.

According to Huang et al (2009), sialoliths should be differentiated from mandibular tori, osteomas, calcified lymph nodes, phleboliths and other vascular calcifications, tuberculosis of lymph nodes or of the

salivary gland itself, calcified atherosclerotic plaques in major blood vessels, myositis ossificans, metastasis from distinct calcifying neoplasms.¹³

An important radiographic retrospective study performed by Aoun et al, which included 500 OPG images of patients with different pathology, showed that submandibular sialoliths were noted only in 1.8% of cases and parotid sialoliths only in 1.2% of cases.²¹

Cases presented in this essay clearly showed the radiologic features of sialoliths located in the submandibular gland and Wharton's duct. Sialoliths in our cases are visualized as single or multiple radiopaque lesions being a completely different form – elongated, round, and teardrop-shaped.

CONCLUSIONS

In summary, digital orthopantomography proved its efficacy in diagnostics of sialoliths located in the submandibular gland and its duct. Simultaneously, OPG is more than useful for diagnosis establishment and control of treatment for neighboring specialties.

AUTHOR CONTRIBUTIONS

Conceptualization: Demidov VH. Data acquisition: Khrulenko SI. Data analysis, interpretation, and

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SUMMARY OF PRODUCT CHARACTERISTICS

NAME OF THE MEDICINAL PRODUCT. Tantum Verde 0.15% mouthwash. **QUALITATIVE AND QUANTITATIVE COMPOSITION.** Each 100 ml contains: active ingredient: benzydamine hydrochloride 0.15 g (equivalent to 0.134 g of benzydamine). **Therapeutic indications.** Treatment of symptoms such as irritation/inflammation including those associated with pain in the oropharyngeal cavity (e.g. gingivitis, stomatitis and pharyngitis), including those resulting from conservative or extractive dental therapy. **Posology and method of administration.** Pour 15 ml of Tantum Verde mouthwash into the measuring cup, 2-3 times per day, using it either at full concentration or diluted. If diluted, add 15 ml of water to the graduated cup. Do not exceed the recommended dosage. **Contraindications.** Hypersensitivity to benzydamine or to any of the excipient. **PHARMACOLOGICAL PROPERTIES. Pharmacodynamic properties.** Pharmacotherapeutic group: Stomatologic drugs: other agents for local oral treatment, ATC code: A01AD02. Clinical studies demonstrate that benzydamine is effective in relieving suffering from localised irritation of the mouth and pharynx. In addition, benzydamine possesses a moderate local anaesthetic effect. **Pharmacokinetic properties. Absorption.** Absorption through the oropharyngeal mucosa is demonstrated by the presence of measurable quantities of benzydamine in human plasma. These levels are insufficient to produce systemic effects. **Distribution.** When applied locally, benzydamine has been shown to accumulate in inflamed tissues where it reaches effective concentrations because of its capacity to penetrate the epithelial lining.

Information about medicines. Information for health care professionals for use in professional activities.

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Clinical and CT images are courtesy of: Ievgen Fesenko (Department of Oral & Maxillofacial Surgery, PHEI "Kyiv Medical University", Kyiv, Ukraine), Oleg Mastakov ("SCIEDECE—Scientific Center of Dentistry & Ultrasound Surgery" Kyiv, Ukraine)



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