

DT Journal

9²⁰²³

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



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



Official Journal of the
Ukrainian Association for
Maxillofacial and Oral Surgeons

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TANTUM VERDE®

QUICK RELIEF FROM PAIN
AND INFLAMMATION IN THE
MOUTH AND THROAT¹

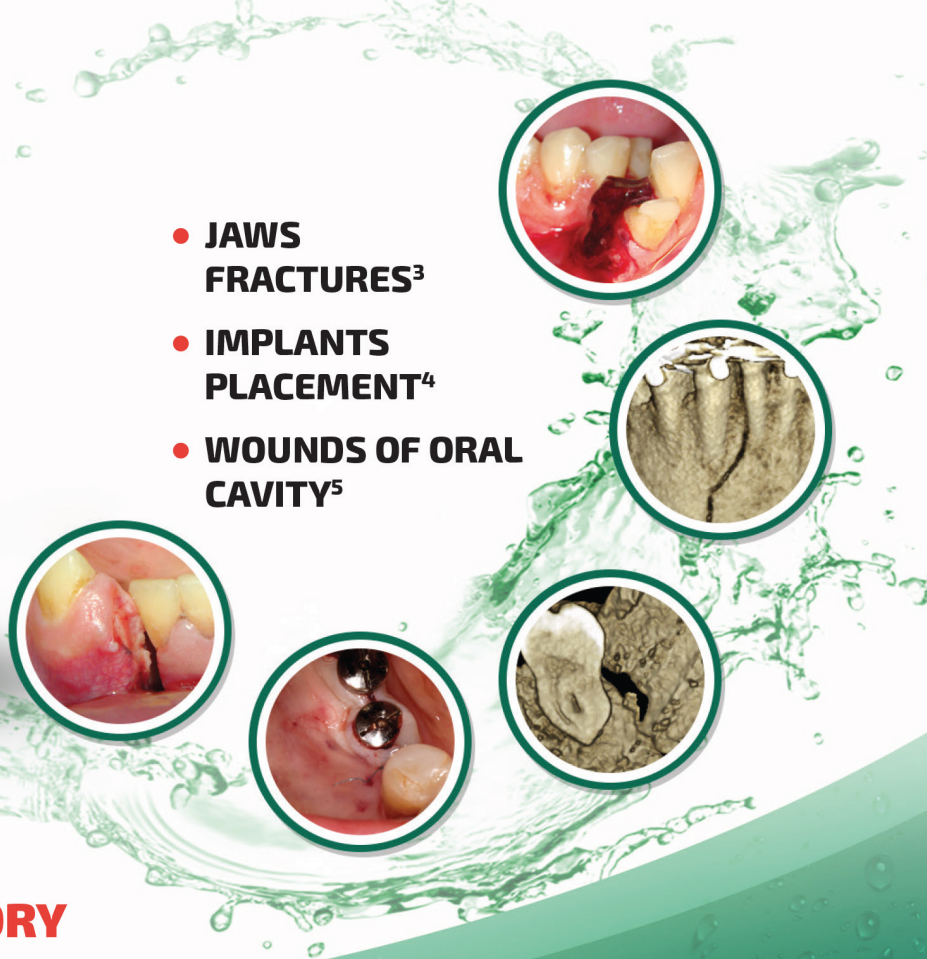
**AN INTEGRAL COMPONENT OF THE TREATMENT
OF PAIN AND INFLAMMATION IN THE ORAL CAVITY
IN 60 COUNTRIES WORLDWIDE!²**



Reg. № UA/3920/01/01

**LOCAL ANESTHETIC
AND ANTI-INFLAMMATORY
EFFECT¹**

- **JAWS FRACTURES³**
- **IMPLANTS PLACEMENT⁴**
- **WOUNDS OF ORAL CAVITY⁵**



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.

1. Інструкція для медичного застосування лікарського засобу Тантум Верде®, розчин для ротової порожнини, РПН № UA/3920/01/01, затверджено Наказом Міністерства охорони здоров'я України № 636 від 01.10.2015.

2. <http://www.angelini-pharma.com/wps/wcm/connect/com/home/Angelini+Pharma+in+the+world/>

3. Тимофеев А.А. и др. "Особенности гигиены полости рта для профилактики воспалительных осложнений при переломах нижней челюсти". Современная стоматология 2015;1(75):52-8.

4, 4.5. Tymofiejew O.O. et al "Prevention of inflammatory complications upon surgeries in maxillofacial region". J Diagn Treat Oral Maxillofac Pathol. 2017;1:105-12.

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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About the Journal: Aims and Scope

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Official Title

Journal of Diagnostics and Treatment of Oral and Maxillofacial Pathology

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J. Diagn. Treat. Oral Maxillofac. Pathol.

Acronym

JDTOMP

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Aims & Scope

This is a monthly peer-reviewed oral and maxillofacial surgery journal focused on: microvascular and jaw reconstructive surgery, dental implants, salivary gland tumors/diseases, TMJ lesions, virtual surgical planning, implementation of ultrasonography into the practice of oral and maxillofacial surgeons.

Editorial Board (EB) Composition

- EB shows significant geographic diversity representing 30 opinion leaders from 13 countries: Brazil, Canada, Colombia, Greece, Hong Kong (SAR, China), India, Israel, Italy, Slovak Republic, Spain, Ukraine, United Arab Emirates, and United States.
- The majority of the EB Members have a discernible publication history in Scopus, Web of Science, and journals with a high impact factor.
- The publication records of all EB members are consistent with the stated scope and published content of the journal.
- The journal has a several full-time professional editors.
- Gender distribution of the editors: 10% women, 90% men, 0% non-binary/other, and 0% prefer not to disclose.

Frequency

12 issues a year (from January 2020)

Publication History

2017: 4 issues a year

2018: 4 issues a year

2019: 10 issues a year

From 2020: 12 issues a year

Publishing Model

Journal of Diagnostics and Treatment of Oral and Maxillofacial Pathology is a fully online-only open access and peer-reviewed publication.

Type of Peer Review

The journal employs “double blind” reviewing.

Article Publishing Charge (APC)

The APC in this journal is US \$500 and US \$250 (excluding taxes) depending on the article’s type. Details at website: dtjournal.org.

13 Types of Articles Currently Published by the Journal

Editorials/Guest Editorials/Post Scriptum Editorials, Images, Case Reports/Case Series, Original Articles, Review Articles, Discussions, Paper Scans (*synonyms*: Review of Articles, Literature Scan), Book Scans (*synonym*: Book Reviews), Letters to the Editor (*synonym*: Letters), and Viewpoints.

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2. Private Higher Educational Establishment “Kyiv Medical University.”
3. OMF Publishing, Limited Liability Company.

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TANTUM VERDE®

INFORMATION LEAFLET
for the medicinal product

Composition:

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.

For athletes: the use of medicinal products containing ethyl alcohol might result in positive antidoping tests considering the limits established by some sports federations.

Use during pregnancy or breast-feeding

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.

Effects on reaction time when driving or using machines

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

Method of administration and doses.

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.

Children.

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

Overdosage.

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.

Adverse reactions.

Within each frequency group, the undesirable effects are presented in order of their decreasing seriousness.

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.

Respiratory, thoracic and mediastinal disorders: very rare – laryngospasm; *unknown* – bronchospasm.

Skin and subcutaneous tissue disorders: uncommon – photosensitivity; very rare – angioedema; *unknown* – rash, pruritus, urticaria.

Nervous system disorders: *unknown* – dizziness, headache.

TANTUM VERDE contains methyl parahydroxybenzoate, which can cause allergic reactions (including delayed-type reactions).

Shelf life. 4 years.

Storage conditions.

Do not store above 25°C. Keep out of reach of children.

Packaging.

120 mL of solution in a bottle with a measuring cup; 1 bottle per cardboard box.

Dispensing category.

Over-the-counter medicinal product.

Manufacturer.

Aziende Chimiche Riunite Angelini Francesco A.C.R.A.F. S.p.A., Italy.

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

Date of the last revision of the text.

September 26, 2018.

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FIGURE. Evangelos G. Kilipiris, MD, DMD from the National Institute of Children’s Diseases and Faculty of Medicine at Comenius University, Bratislava, Slovak Republic. A kind support of Dr. Kilipiris during the 5 years at the position of Director, Journal Development Department helped our journal to move forward and to evolve. An honorary plaque was presented to him on behalf of the Chief Editor with words “To a Founding Director, Author of Multiple Articles and Reviews, Great Thanks and Appreciation.” Photo was taken on November 23, 2021.

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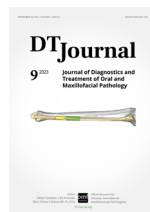
A5 **Our Supporters**

A6 **Content, Courtesy, & Erratum**

CASE REPORT

94 **A Lower Lip Infection (Furuncle) Complicated by Abscess of the Lip, Suppurative Cheilitis Glandularis, Lip Necrosis, Septic Bilateral Multilobar Necrotizing (Destructive) Pneumonia, and Pleurisy (Pleuritis): A Case Report and Literature Review**

Vasyl Morkotun, Oleksii O. Tymofieiev, Ievgen I. Fesenko, Ihor Chaikovskiy, & Fedir Kuzmenko



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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CASE REPORT

A Lower Lip Infection (Furuncle) Complicated by Abscess of the Lip, Suppurative Cheilitis Glandularis, Lip Necrosis, Septic Bilateral Multilobar Necrotizing (Destructive) Pneumonia, and Pleurisy (Pleuritis): A Case Report and Literature Review

Vasyl Morkotun^a, Oleksii O. Tymofieiev^b, Ievgen I. Fesenko^{c,*}, Ihor Chaikovskiy^d, & Fedir Kuzmenko^e

SUMMARY

Infection of the lower lip can manifest differently. The likelihood of such prompt life-threatening septic complications, as thrombophlebitis, pneumonia, pleurisy, etc, may be underestimated due to the small size of the local inflammation of the lip. We present a 21-year-old Caucasian female with a *Staphylococcus epidermidis* infection of the lower lip (furuncle) complicated by lip abscess, suppurative cheilitis glandularis, lip necrosis, septic bilateral multilobar necrotizing (destructive) pneumonia, pleurisy (pleuritis), and pulmonary insufficiency of the first degree (type I). Clinical photos of the report demonstrate all stages of the course of inflammation and treatment of the severe lower lip infection from the moment of admission. Preoperative condition, the period of formation and demarcation of necrosis, cleaning of the wound from purulent content, demonstration of fibrinous exudate (also known as fibrinous plaques), the appearance of granulations, and visualization of lip scars as of the day of discharge from the hospital (day 26) are presented. The article also includes a chest X-ray at the time of admission, on the second day, and on the seventh day of hospital stay. The report is enriched as well by three-dimensional multi-slice computed tomography (3D MSCT) images on the eighth, eighteenth,

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The abbreviation 'CT' at the upper right icon means that article contains computed tomography images.

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and fortieth days from the moment of admission to our hospital. 3D MSCT of the lungs is showing the areas of pulmonary tissue necrosis and the healing phase. The article contains two videos (cine images) with a duration of 21 seconds and 2 minutes 11 seconds, which demonstrate chest MSCT on the hospital day 8 and 18. The patient was discharged on the 27th day of admission. According to our English-language literature search, it's a first ever reported case of the lower lip furuncle which led such a unique combination of severe local and septic complications documented at all stages of treatment from both aspects clinical and radiological. An update of the classification of uncomplicated and complicated forms of development of furuncles (i.e., boils) and carbuncles is done and presented. More than 37 literary sources were analyzed, and their key aspects complemented our report. Articles with necrotizing fasciitis of the lips were also analyzed.

Keywords: Furuncle, boil, lower lip, lip necrosis, necrotizing fasciitis, suppurative cheilitis glandularis, necrotizing pneumonia, destructive pneumonia, pleurisy, pleuritis, chest X-ray, multi-slice computed tomography.

INTRODUCTION

Furuncles and carbuncles of the lips are an extremely dangerous inflammatory conditions.¹ Furuncles also termed as boils.^{2,3} According to Tymofiev (2020), coincidentally with a furuncle, acute purulent-necrotic inflammation of the hair follicle and surrounding connective tissue develops.⁴ A carbuncle is a diffuse purulent-necrotic inflammation of the skin and subcutaneous fatty tissue, emanating from several hair follicles and sebaceous glands.⁴ The carbuncle is also described as a cluster of furuncles.⁵ Consequently, the main difference between boils and carbuncles from odontogenic abscesses/phlegmons is the absence of odontogenic foci and the presence of purulent-necrotic rods.⁴

The danger of these two somewhat similar pathological conditions lies in extremely formidable general complications, like sinus thrombosis, meningitis, and septic conditions.^{1,6} Back in 1926, Wheeler summarized articles devoted to carbuncles and furuncles of the lips and their septic complications.⁷ Some articles highlight lower lip infection cases with local complications (simple/suppurative cheilitis glandularis,¹ labio-facial necrotizing fasciitis,⁷ etc). But very limited number of English language papers present combination of local and general complications of the lower lip infection.⁸⁻¹⁰ And only one study (Bruno and colleagues, 2007) describes septic necrotizing pneumonia as a complication of the lower lip infection.⁸ In their study, the necrotizing pneumonia was a septic complication of the lower lip bite but not a furuncle or carbuncle. So, it's a reason why we report a first to our knowledge presentation of lower lip abscessing furuncle complicated by suppurative cheilitis glandularis, lip necrosis, septic bilateral multilobar necrotizing pneumonia,

and pleurisy. Our study is enhanced by a multi-slice computed tomography (MSCT) with three-dimensional reconstruction at different stages of necrotizing pneumonia treatment which was done in case of lower lip infection for the first time in the English-language literature.

CASE

A 21-year-old Caucasian female was referred to the Center of Maxillofacial Surgery with complaints for a severe lower lip swelling, change of its color, pain, inability to eat, and fever. On the day of the visit to the hospital, the patient did not notice any other complaints. According to the patient, the large swelling of the lip began when she tried to squeeze out the furuncle located in the red border of the lower lip.

Clinical examination revealed significant lower lip swelling and the bluishness of the one third of lip mucosa, which resembled the formation of limited necrosis (Fig 1). The lower vermilion body (also known as lower lip vermilion) closer to the area of necrosis was covered with densely fixed red-yellow crusts. Palpation of the lower lip was very painful and opening of the mouth was slightly limited. Chest X-ray (Fig 2) was performed according to the treatment protocol. The diagnosis of the abscessing furuncle of lower lip complicated by suppurative cheilitis glandularis and necrosis of the lip mucosa was established. Drainage of the purulent locus in the lower lip was done under the local potentiated anesthesia (2.0 mL of Dexalgin® inject [Laboratorios Menarini S.A., Barcelona, Spain] intramuscularly 45 minutes before surgery and 3.0 mL of 4% Ultracaine® D-S forte [Aventis Pharma Deutschland GmbH, Frankfurt, Germany] intraorally for the nerves block. During the surgical treatment of the focus of infection



FIGURE 1. Hospital day 1. The pretreatment view of lower lip abscessing furuncle complicated by suppurative cheilitis glandularis and necrotizing fasciitis. Formation of the necrotic tissue is indicated by *arrow*. The lower vermilion body closer to the area of necrosis is covered with densely fixed red-yellow crusts. Printed with permission and copyrights retained by I.I.F.



FIGURE 2. Antero-posterior view of the chest X-ray upon admission to the hospital. Printed with permission and copyrights retained by I.I.F.

of the lower lip, a clinical picture more usual for the lower lip carbuncles was noted¹. From the lingual side of the lower lip under its mucous membrane, the presence of prolapsing numerous anatomically limited areas of suppuration corresponding to the localization and size of the small salivary glands was noted. This clinical/intraoperative picture corresponded to secondary suppurative cheilitis glandularis (also known as purulent cheilitis¹). A smear was taken from the wound during the surgery to determine the type of bacterial pathogens and sensitivity to antibiotics. Drug therapy was started immediately upon admission in the form of intramuscular injections of ceftriaxone (1.0 g two times daily), intravenous metrogyl (100 mL two times daily) and detoxification therapy.

On the second day after hospitalization and surgical treatment of the infectious process of the lower lip, despite improvement of the local status and cleaning of the wound from purulent exudate, the attending physician (I.I.F) noticed a slight cough in the patient. Chest X-ray (Fig 3) revealed radiological signs of the pneumonia and after the consultation of the pulmonologist (V.M.M.) the diagnosis of septic bilateral multilobar pneumonia was established and correction of treatment was performed. Figure 4 demonstrates condition of the lower lip on day 4 of the treatment. Lip swelling is decreased. Notes the formation and demarcation of the area of necrosis.

Chest X-ray (Fig 5) on hospital day 7 showed the radiological signs of the bilateral multilobar pneumonia and pleurisy (pleuritis) and the dynamic of the process.

Microbiological examination of a purulent wound showed the presence of *Staphylococcus epidermidis* (*S. epidermidis*) sensitive to Augmentin, Lincomycin, Oxacillin, Moxifloxacin, Vancomycin, and *Candida* spp. sensitive to Fluconazole and Ketoconazole.

The MSCT (HiSpeed Dual, General Electric Company, Boston, Massachusetts, United States) of the lungs performed on hospital day 8 showed multiple areas of pulmonary tissue necrosis (Fig 6). Supplemental Video Content 1 demonstrates a sequence of MSCT images of the chest with bilateral necrotizing pneumonia and pleurisy. Video is available in the page of the full-text article on dtjournal.org and in the YouTube channel, available at <https://youtu.be/R0RtPQm2mK8>.

Based on clinical and radiological data the diagnosis was adjusted to the following – a lower lip infection (abscessing furuncle) complicated by

suppurative cheilitis glandularis, lip necrosis, septic bilateral multilobar necrotizing pneumonia, pleurisy (pleuritis), and pulmonary insufficiency of the first degree (type I).

Daily dressing with liniment (Oflocain-Darnitsa®, tube 15 g, Kyiv, Ukraine) and debridement (minimally invasive necrectomy [also known as necrosectomy]) were performed upon the treatment of the lip infection. Figure 7 shows anterior and superior lip views after removal of necrotic tissue on hospital day 11. Noted a presence of fibrinous exudate (also known as fibrinous plaques).

Figure 8 shows anterior lip view on day 17 of the treatment. An appearance of the granulation tissue was noted.

Microbiological examination of the blood showed no growth of microflora.

Supplemental Video Content 2 demonstrates MSCT images at day 18 of treatment of the severe lower lip infection complicated by lip necrosis, septic bilateral necrotizing pneumonia, and pleurisy. A decrease in the number of infiltrates and the amount of fluid is noted. The dynamics is weakly positive. Video is available in the page of the full-text article on dtjournal.org and in the YouTube channel, available at <https://youtu.be/k7OEuPlUJ8>.

Figure 9 demonstrates three-dimensional MSCT images of the lungs at day 18 of treatment of the severe lower lip infection complicated by lip necrosis, septic bilateral necrotizing pneumonia, and pleuritis. Multiple areas of pulmonary tissue defects are indicated on the images.

Figure 10 shows anterior view of the lips on day 26 after the initiated treatment in hospital. Visualized is a complete healing of the lower lip and its scarring. The patient was discharged with a significant improvement in her local and general condition. The medical treatment carried out in the hospital included: ceftriaxone, levofloxacin, metrogyl, ampicillin, meropenem, avelox, karsil, yogurt (capsules), fluconazole, naclofen, omez, dexalgin, acelysin, reosorbilact, and lasolvan. The patient was discharged on the 27th day of admission.

Figure 11 highlights a follow-up 3D MSCT image of the lungs at day 40 after the treatment of the severe lower lip infection complicated by septic bilateral necrotizing pneumonia and pleurisy was initiated. Noted a healing of the areas of pulmonary tissue defects.

According to analysis of sputum no acid-resistant rods (*Mycobacterium tuberculosis*) were detected.

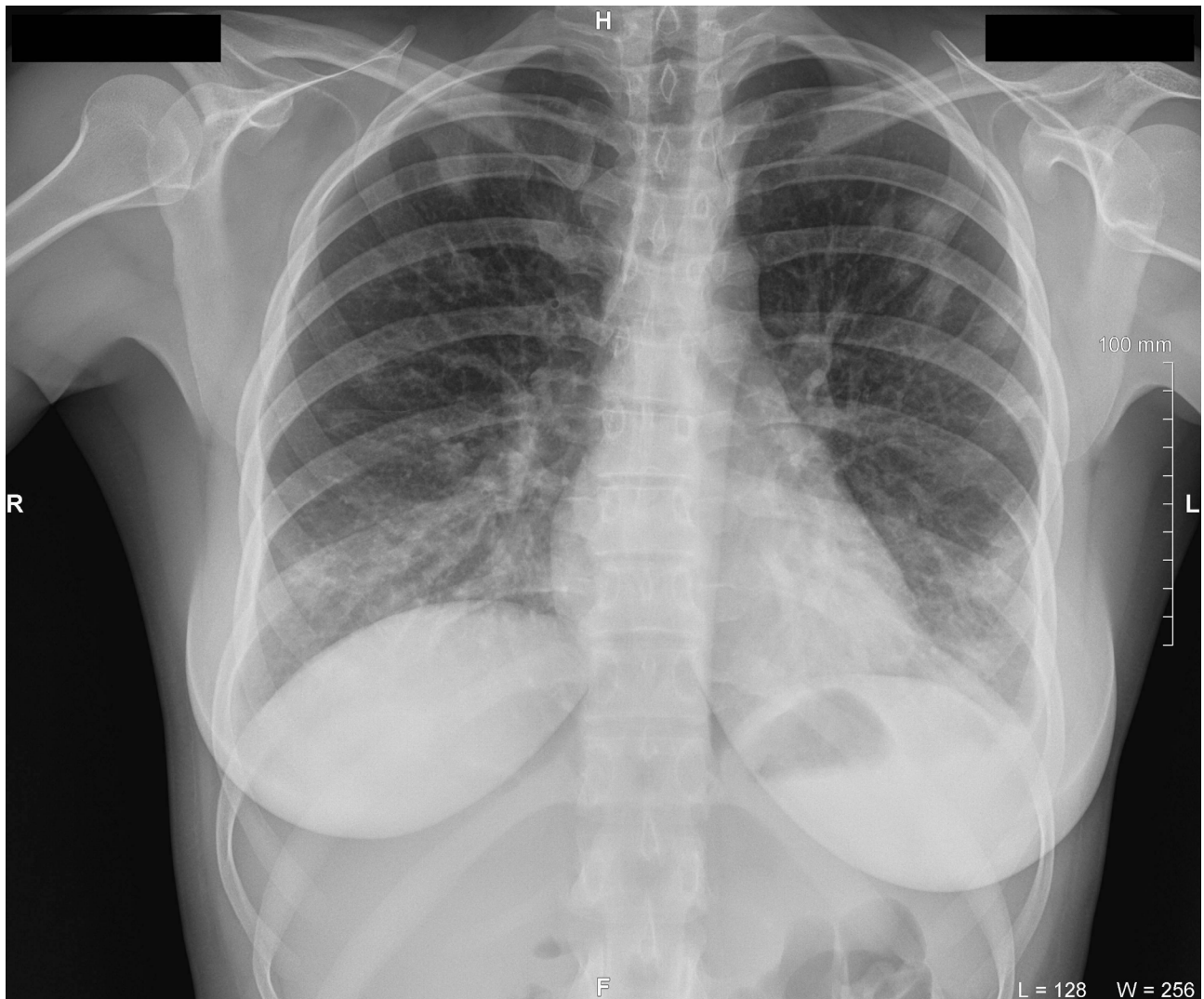


FIGURE 3. Antero-posterior view of the chest X-ray at day 2 of the treatment of lower lip furuncle complicated by necrotizing fasciitis of the lip. Radiological data corresponds to the bilateral multilobar pneumonia. H, head; R, right; L, left. Printed with permission and copyrights retained by I.I.F.



FIGURE 4. Day 4 of the treatment (**A, B**). Lip swelling is decreased. Notes the formation and demarcation of the area of necrosis (*arrows*). Printed with permission and copyrights retained by I.I.F.

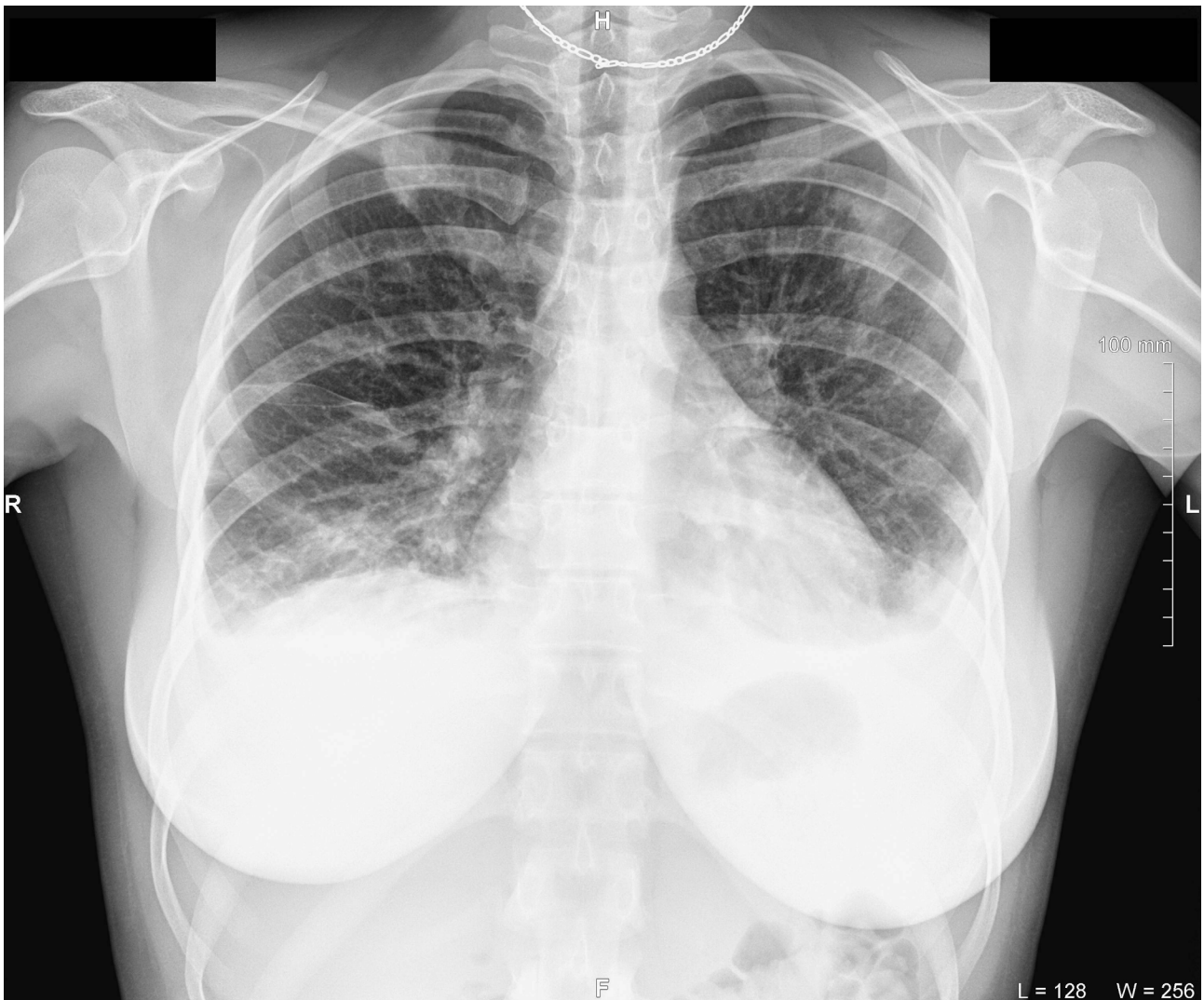


FIGURE 5. Antero-posterior view of chest X-ray on hospital day 7. Radiological data corresponds to the bilateral multilobar pneumonia and pleurisy. H, head; R, right; L, left. Printed with permission and copyrights retained by I.I.F.

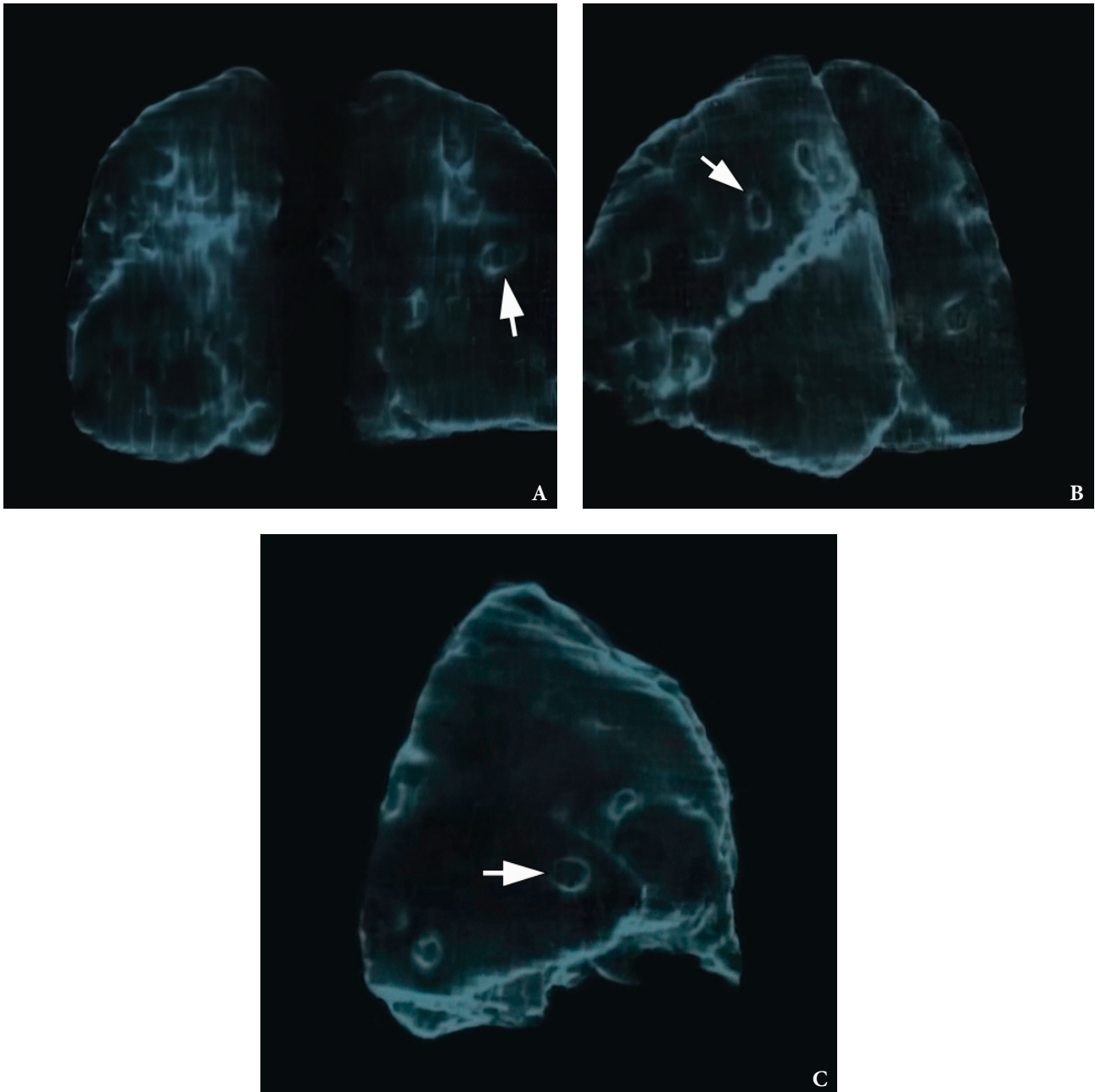
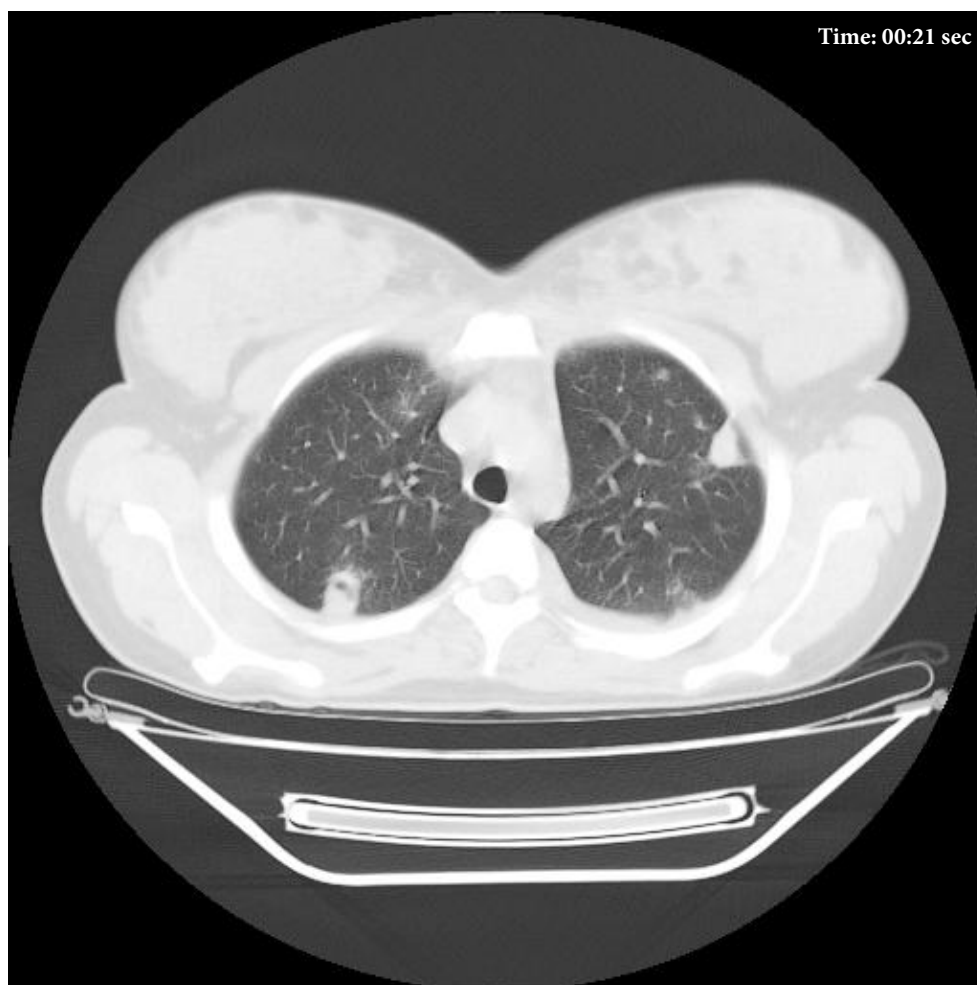


FIGURE 6. A 3D MSCT images (**A**, posterior view; **B**, latero-posterior view; **C**, lateral view) of the lungs. Day 8 of treatment of the severe lower lip infection complicated by lip necrosis, septic bilateral necrotizing pneumonia, and pleurisy (pleuritis). Multiple areas of pulmonary tissue defects are indicated by *arrows*. Printed with permission and copyrights retained by I.I.F.



VIDEO 1. Supplemental Video Content 1 demonstrates a sequence of non-contrast axial MSCT images (in lung and in chest windows) and reformatted coronal and sagittal images of the chest (in lung and in chest windows). Magnification 1.3x. The MSCT shows the state of the lungs at day 8 of treatment of the severe lower lip infection complicated by lip necrosis, septic bilateral multilobar necrotizing pneumonia, and pleurisy. This axial MSCT image in lung window corresponds to the 21st second of the video. Video is available in the page of the full-text article on www.dtjournal.org and in the YouTube channel 'Videos of JD TOMP,' available at <https://youtu.be/R0RtPQm2mK8>. Total video's duration: 3 min 08 sec. Video time of the image: 0 min 21 sec.



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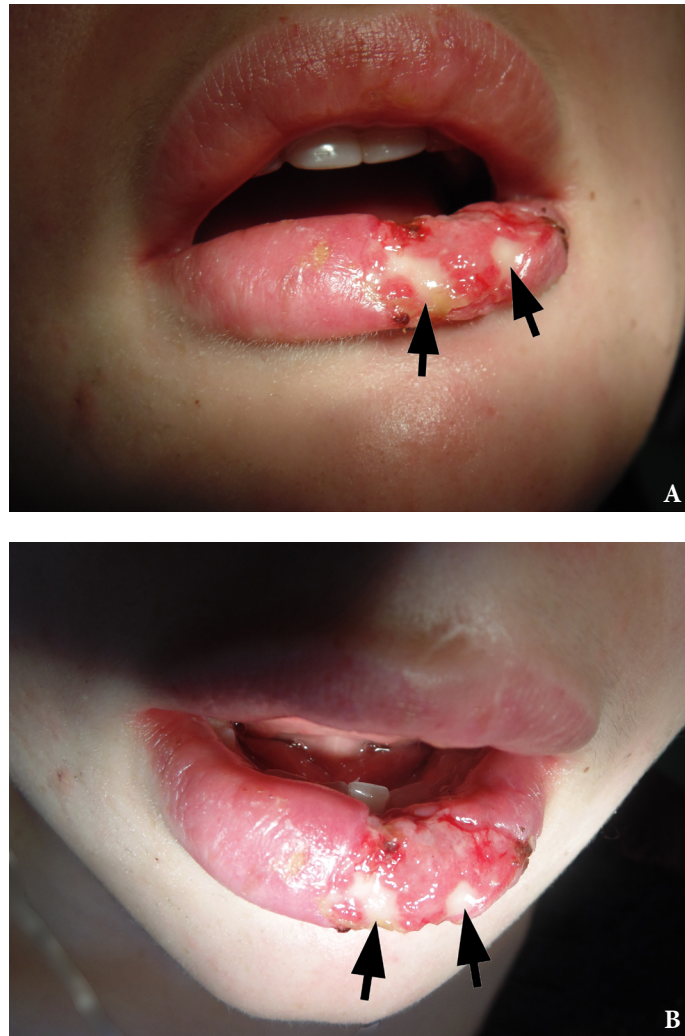
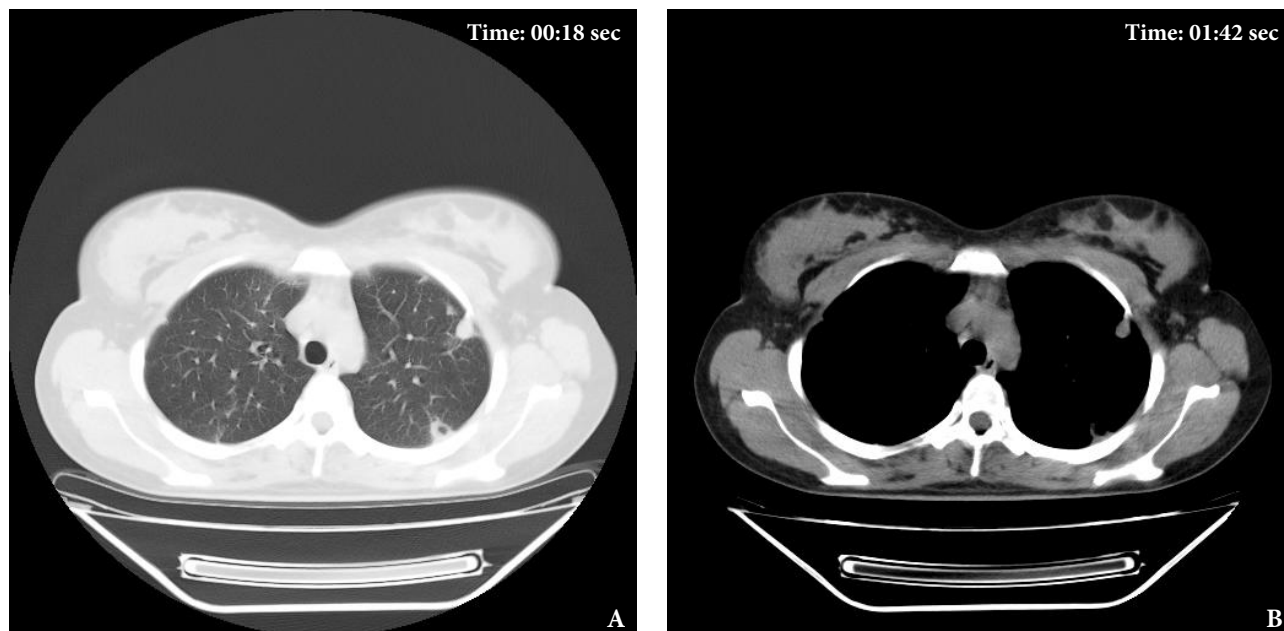


FIGURE 7. Hospital day 11 (**A, B**). View after removal of necrotic tissue. Fibrinous exudate (also known as fibrinous plaques) is indicated by *arrows*. Printed with permission and copyrights retained by I.I.F.



FIGURE 8. Day 17 of the treatment. Notes appearance of the granulation tissue. Printed with permission and copyrights retained by I.I.F.



VIDEO 2. Day 18 of treatment of the severe lower lip infection complicated by lip necrosis, septic bilateral necrotizing pneumonia, and pleurisy (pleuritis). Notes presence of the cavitary lesions. A decrease in the number of infiltrates and the amount of fluid is noted. The dynamics is weakly positive. Supplemental Video Content 2 demonstrates a sequence of non-contrast axial MSCT images (in lung and in mediastinal [chest] windows) and 3-dimensional MSCT images of the lungs. **A**, axial MSCT scan in lung window; **B**, axial MSCT scan in mediastinal window. Magnification 1.3x. Video is available in the page of the full-text article on www.djournal.org and in the YouTube channel 'Videos of JD TOMP,' available at <https://youtu.be/k70EuPIUJ8>. Total video's duration: 2 min 11 sec. Video time of the images: 0 min 18 sec (**A**) and 1 min 42 sec (**B**).



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FIGURE 9. A three-dimensional multi-slice computed tomography images (**A**, posterior view; **B**, latero-posterior view; **C**, anterior view) of the lungs at day 18 of treatment of the severe lower lip infection. The infection process complicated by lip necrosis, septic bilateral necrotizing pneumonia, and pleurisy (pleuritis). Notes multiple areas of pulmonary tissue defects (*arrows*) due to septic bilateral necrotizing pneumonia. A, anterior; P, posterior; R, right; L, left. Magnification 1.1x. Printed with permission and copyrights retained by I.I.F. (**Figure 9 continued on next page.**)

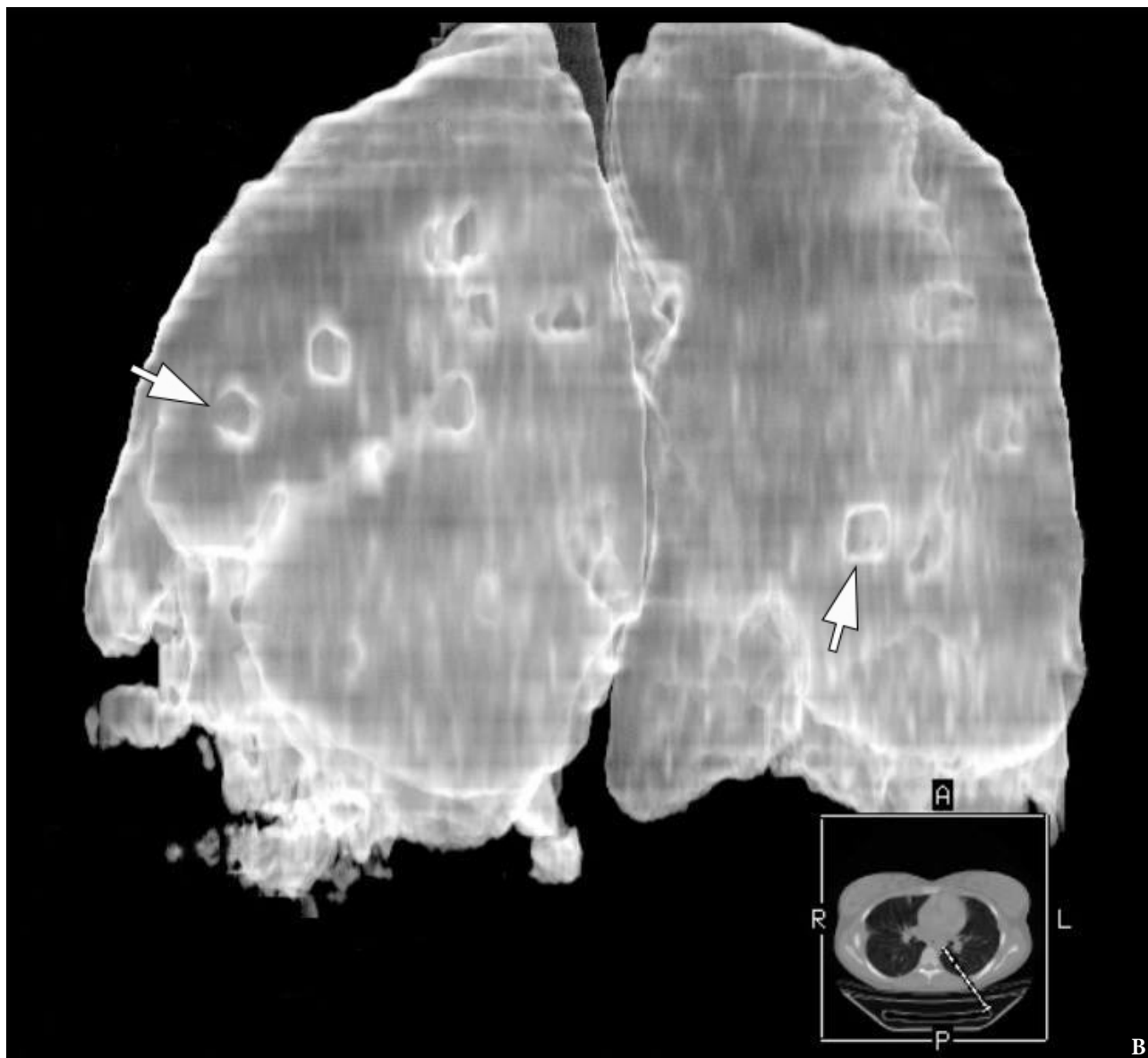


FIGURE 9 (continued). A three-dimensional multi-slice computed tomography images (**A**, posterior view; **B**, latero-posterior view; **C**, anterior view) of the lungs at day 18 of treatment of the severe lower lip infection. The infection process complicated by lip necrosis, septic bilateral necrotizing pneumonia, and pleurisy (pleuritis). Notes multiple areas of pulmonary tissue necrotizing cavities (*arrows*) due to septic bilateral necrotizing pneumonia. A, anterior; P, posterior; R, right; L, left. Magnification 1.1x. Printed with permission and copyrights retained by I.I.F. (**Figure 9 continued on next page.**)

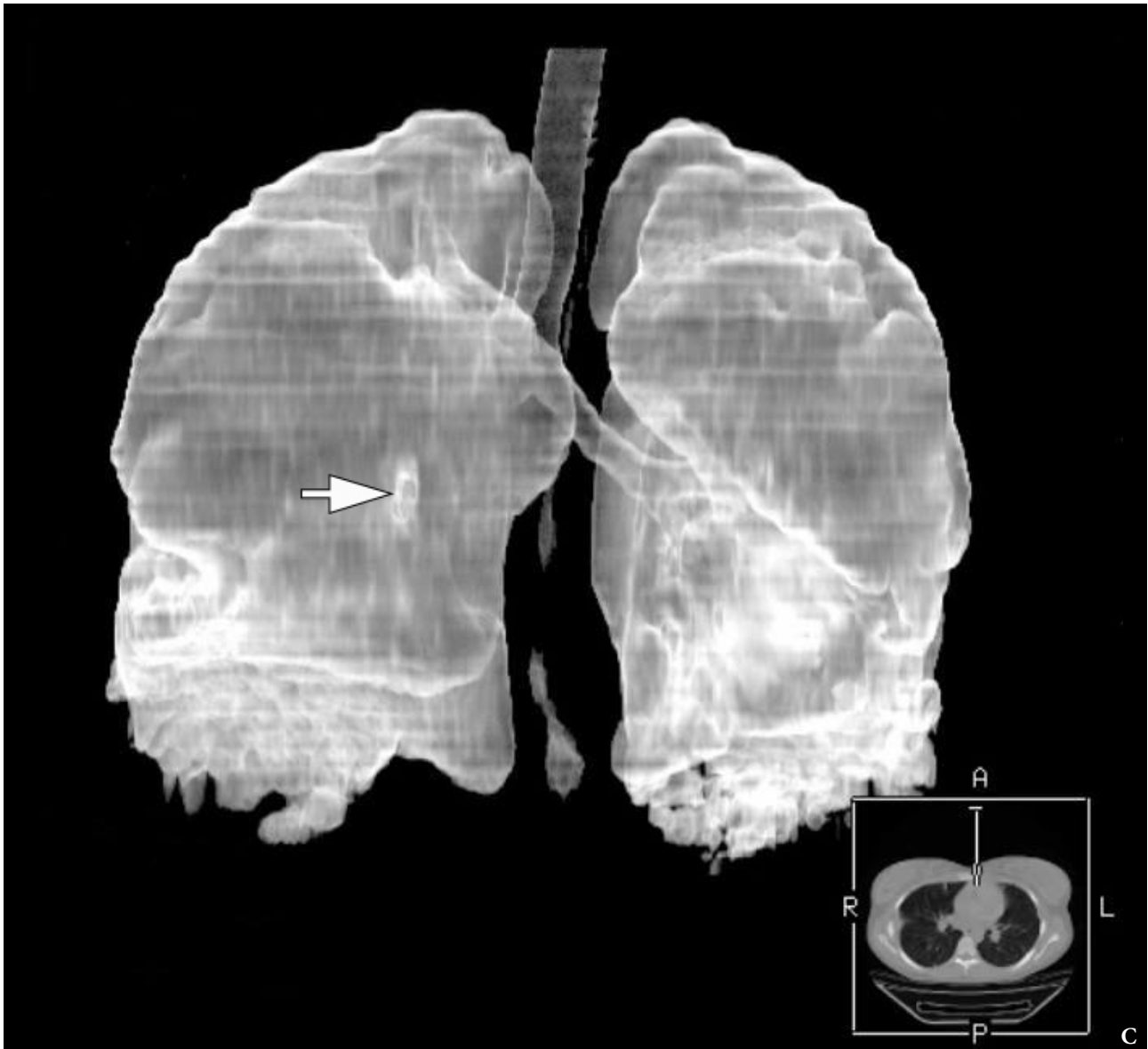


FIGURE 9 (continued). A three-dimensional multi-slice computed tomography images (**A**, posterior view; **B**, latero-posterior view; **C**, anterior view) of the lungs at day 18 of treatment of the severe lower lip infection. The infection process complicated by lip necrosis, septic bilateral necrotizing pneumonia, and pleurisy (pleuritis). Notes multiple areas of pulmonary tissue necrotizing cavities (*arrows*) due to septic bilateral necrotizing pneumonia. A, anterior; P, posterior; R, right; L, left. Magnification 1.1x. Printed with permission and copyrights retained by I.I.F.



FIGURE 10. Day 26 after the initiated treatment in hospital. Notes complete healing of the lower lip and its scarring. Printed with permission and copyrights retained by I.I.F.

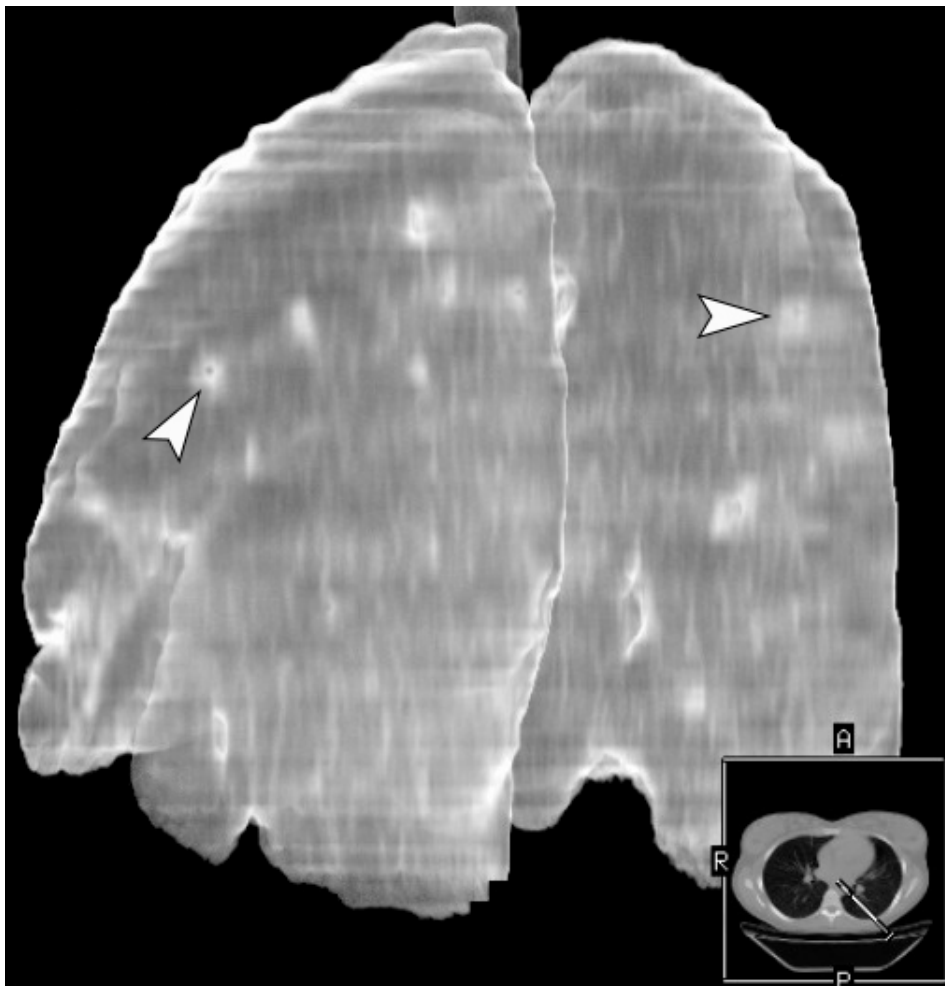


FIGURE 11. A follow-up three-dimensional MSCT image (latero-posterior view) of the lungs at day 40 after the treatment of the severe lower lip infection complicated by septic bilateral necrotizing pneumonia and pleurisy was initiated. Notes healing (*arrowheads*) of the multiple areas of pulmonary tissue defects. A, anterior; P, posterior; R, right. Magnification 1.1x. Printed with permission and copyrights retained by I.I.F.

DISCUSSION

Management of lip infection and its complications is an important part of practice and current literature.¹²⁻¹⁶ For a better understanding, the systematization and possible complications of furuncles and carbuncles of different localizations (including lower lip) are presented in the classification (Table 1) developed by Tymofieiev (2012, 2020).^{1,4} The classification is updated by purulent-necrotic process (i.e., necrotizing fasciitis) and septic pneumonia with pleurisy presented in this report.

One of the typical forms of furuncles on the face is an abscessing furuncle without a necrotic zone.¹⁷ In this case, the patient came to us with an infection of the lip in the form of an abscessing furuncle with the formation of necrosis of the lip and suppurative cheilitis glandularis. Necrosis of the lip looked very similar to the manifestation of such a purulent-necrotic process, which is described in the English-language literature as necrotizing fasciitis.^{18,19} Necrotic tissues in case of *Klebsiella pneumoniae* necrotizing fasciitis on the upper lip (Kim and colleagues, 2020) looked like the necrotic

surface of *S. epidermidis* infection of the lip in our case.¹⁸ In their case, necrosis developed due to the bullous lesion in a patient with diabetes.¹⁸ Even more important is that necrosis of the upper lip also led to a septic complication—embolus in the upper right lobe of the lungs.¹⁸ It is of interest that the infection condition of the lower lip in the case presented by Eltayeb and colleagues (2016) was very similar to inflammatory lip condition in the case by our team.⁸ They reported necrotizing fasciitis of the lower lip following lip infection (acne of the mental region).⁸ The authors reported lip condition in patient as labio-fascial necrotizing fasciitis.⁸

Usefulness of ultrasonographic examination of the lips upon lip infection was proved in the study of Tekcan Şanlı and Boyacı (2021).¹⁹ The possibilities of MSCT in lip infection cases are presented in the study of Amin and colleagues (2021).¹²

We bring to your attention possible variants of manifestations of necrosis of the lower lip of various etiologies. Lower lip necrosis was reported by Lanteri and colleagues (2012) in the female patient after injections of dermal filler.²⁰ In their case, the area of necrosis was deeper, but occupied a much

TABLE 1. An Updated Tymofieiev's (1995) Classification⁴ of Uncomplicated and Complicated Forms of Development of Furuncles (i.e., Boils) and Carbuncles.*

I. Uncomplicated forms of boils (i.e., furuncles) and carbuncles	
1. Initial stage of folliculitis: (a) ostiofolliculitis, (b) deep folliculitis	
2. Inflammatory infiltration	
3. Formation and rejection of a purulent-necrotic core	
4. Resorption of the inflammatory infiltrate	
II. Recurrent furuncles	
III. Complicated forms of the clinical course of furuncles and carbuncles	
A. Local complications	<ol style="list-style-type: none"> 1. Inflammation of the vermilion border of the lip (i.e., red border of the lip), mucous membrane, and skin of the lips – cheilitis glandularis (serous [<u>i.e., simple</u>] and/or purulent). 2. Inflammation of the veins (phlebitis, thrombophlebitis). 3. In regional lymph nodes and lymphatic vessels (lymphangitis, serous and purulent lymphadenitis, periadenitis, and adenophlegmon). 4. Inflammation of the surrounding soft tissues (inflammatory infiltrate, abscess, phlegmon, and <u>purulent-necrotic process [i.e., necrotizing fasciitis]</u>). 5. From bone tissue (osteomyelitis). 6. Erysipelas.
B. General complications	<ol style="list-style-type: none"> 1. Sinus thrombosis. 2. Meningitis. 3. Sepsis (its different forms: <u>septic necrotizing pneumonia with pleurisy, etc.</u>).

* The updated parts of the classification are marked with an underline.

smaller area of the mucous membrane of the lower lip compared to our case.²⁰

Lower lip necrosis as a complication of a prone position in scoliosis surgery was described by [Alsiddiky](#) (2011).²¹ Another pressure necrosis of lower lip due to Guedel's airway was showed in the study by [Bhardwaj](#) and [Bhagat](#) (2014).²²

A deep necrosis of half of the lower lip following a recurrent varicella-zoster virus infection with concomitant herpes simplex-1 infection was highlighted by [McCormick](#) and colleagues in 2016.²³

A different appearance, compared to our case, had necrosis of the left lower hemilabium after dental procedure under local anesthesia ([Cervilla Martín](#) and colleagues, 2022).²⁴

The presence of signs of suppurative cheilitis glandularis in the patient at the time of hospitalization is one of the described local complications of the furuncles and carbuncles.¹ If minor salivary glands of the lip are infected, the disease may manifest as numerous purulent cystic lesions ([Musa](#) and colleagues, 2005).²⁵

Three types of cheilitis glandularis (i.e., simple, superficial suppurative, and deep suppurative) are considered different stages belonging to the clinical spectrum of progression characteristics of cheilitis glandularis.^{25,26} [Paravina](#) (2013) did an excellent analysis of the three subtypes/stages of cheilitis glandularis.²⁷ Simple subtype of cheilitis glandularis is termed as simplex.²⁷

Based on our English-language literature review of septic complications of lower lip infection ([Table 2](#)), we found only one literature case that described necrotizing pneumonia as a septic complication of lower lip infection. [Bruno](#) and colleagues

(2007) reported lower lip infection after insect bite complicated with lip cellulitis and septic bilateral necrotizing pneumonia.⁹

[Nicolaou](#) and [Bartlett](#) (2017) emphasized, that necrotizing pneumonia refers to the development of necrosis, liquefaction, and cavitation of the lung parenchyma from an infectious pathogen.²⁸ Necrotizing pneumonia is also known as cavitory pneumonia or cavitory necrosis.^{29,30} According to [Krishnadasan](#) and colleagues (2000),³¹ necrotizing pneumonia (synonym: destructive pneumonia [[Lossev](#) and colleagues, 2017])³² is a pulmonary inflammation with consolidation and peripheral necrosis. Necrosis is usually representing as multiple small cavities, less than 10 mm in size.³¹ Complications of necrotizing pneumonia can be lung abscess and gangrene.^{33,34}

Understanding computed tomography data in necrotizing pneumonia is important not only for radiologists, but also for surgeons. [Nicolaou](#) and [Bartlett](#) (2017) highlighted axial MSCT scans demonstrating cavitory lesions upon necrotizing pneumonia.²⁸ MSCT analysis of the patient with bilateral necrotizing pneumonia, pleural and pericardial effusion is presented in the study by [Pascual](#) and colleagues (2010).³⁵ [Chatha](#) and colleagues (2014) demonstrated both MSCT data of necrotizing pneumonia and pulmonary gangrene.³³ [Buwalda](#) and [Speelberg](#) (1995) presented MSCT features of septic necrotizing pneumonia in patient with furuncle of the thigh.³³

Analyzing the bacterial agent that was cultured from the wound of the lower lip, namely *S. epidermidis*, and data from the literature that confirm the possibility of septic complications with coagulase-

TABLE 2. Comparison of Published Cases which Highlight the Septic Complications of the Lower Lip Infection.

#	Cases	Age/Sex	Etiology	Local and Septic Complications	Treatment Outcome
1	Bruno and colleagues (2007) ⁹	31/M	Lower lip infection after insect bite	Lip cellulitis, bilateral necrotizing pneumonia	Lethal
2	Cuddy and colleagues (2017) ¹⁰	25/M	Lower lip infection	Septic thrombophlebitis of the left common facial vein from necrotizing lip infection	Recovered
3	Saraux and colleagues (September 20, 2023) ¹¹	18/M	Necrotic lower lip infection	Multiple thoracic septic emboli	Recovered
4	Present case (managed on January-February 2014; published on September 30, 2023)	21/F	Lower lip infection due to the furuncle	Necrotizing fasciitis of the lower lip, bilateral septic necrotizing pneumonia, and pleurisy	Recovered

negative staphylococci (Otto, 2017),³⁶ we confirm the literature data that not only *Staphylococcus aureus*^{1,4} can cause similar infectious processes. *S. epidermidis* can cause even a septic shock, mostly in immunocompromised intensive-care unit patients.³⁷

Our case well describes and demonstrates the descending path of septic complications when the infection is localized within the lower lip.

CONCLUSIONS

This clinical case confirms the formidable septic complications of a lower lip infection caused by *Staphylococcus epidermidis*. Treatment of furuncles of the lips requires urgent treatment by professionals with mandatory monitoring of the functions of internal organs and systems. Multi-slice computed tomography with three-dimensional reconstruction is the gold standard for the diagnosis of septic pulmonary complications at all stages of the treatment of complications of furuncles of the lower lip.

TERM OF CONSENT

Writing patient's consent was obtained for publication the photos.

AUTHORS' CONTRIBUTIONS

Material collection and conceptualization: Morkotun V, Fesenko II. Data analysis and interpretation: Morkotun V, Tymofieiev OO, Fesenko II, Kuzmenko F. Drafting of the manuscript: Fesenko II, Chaikovskiy I. Critical revision of the manuscript: Tymofieiev OO. Approval of the final version of the manuscript: all authors.

CONFLICT OF INTERESTS

The authors declare no conflict of interest.

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ЗВІТ ПРО ВИПАДОК

UKRAINIAN LANGUAGE

Інфекційний процес (фурункул) нижньої губи ускладнений абсцесом губи, гнійним гландулярним хейлітом, некрозом губи, септичною двобічною полісегментарною некротизуючою (деструктивною) пневмонією і плевритом. Звіт про випадок та огляд літератури

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АНОТАЦІЯ

Інфекція нижньої губи може проявлятися по-різному. Вірогідність виникнення таких швидко загрозливих для життя септичних ускладнень, як тромбофлебіт, пневмонія, плеврит тощо, може бути недооцінена через невеликі розміри локального запалення губи. Представляємо вашій увазі 21-річну жінку європеїдної раси з інфекцією нижньої губи (фурункул), спричиненою епідермальним стафілококом (*Staphylococcus epidermidis*), ускладненою абсцесом губи, гнійним гландулярним хейлітом, некрозом губи, септичною двобічною полісегментарною некротичною (деструктивною) пневмонією, плевритом і легеневою недостатністю І ступеня. Клінічні фотографії звіту демонструють усі етапи перебігу запалення та лікування важкої інфекції нижньої губи з моменту надходження пацієнтки. Представлено передопераційний стан, період утворення і відмежування некрозу, очищення рани від гнійного вмісту, виявлення нальоту фібрину, появу грануляцій, вигляд рубців на губі на день виписки зі стаціонару (26-й день). У статтю включено також рентгенографію органів грудної клітки під час госпіталізації, на

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другу добу та на сьому добу перебування в лікарні. Також звіт доповнено зображеннями тривимірної мультиспіральної комп'ютерної томографії (3D МСКТ) на восьму, вісімнадцяту та сорокову добу з моменту надходження до нашої лікарні. 3D МСКТ легенів показує ділянки некрозу легеневої тканини та фазу загоєння. У статті подано два відеоматеріали (кінокадри) тривалістю 21 секунда та 2 хвилини 11 секунд, які демонструють МСКТ грудної клітки на 8 та 18 день стаціонару. Пацієнтка виписана на 27 день госпіталізації. Згідно з нашим пошуком англомовної літератури, це перший в історії випадок фурункула нижньої губи, який спричинив таке унікальне поєднання важких місцевих і септичних ускладнень і які були задокументовані на всіх етапах лікування з обох аспектів, клінічного та радіологічного. Зроблено та подано оновлення класифікації неускладнених та ускладнених форм розвитку фурункулів (тобто фурункулів) і карбункулів. Було проаналізовано більш ніж 37 літературних джерел, основні аспекти яких доповнили наш звіт. Статті з некротизуючим фасціїтом губ також проаналізовані.

Ключові слова: Фурункул, нижня губа, некроз губи, некротизуючий фасціїт, гнійний гландулярний хейліт, некротизуюча пневмонія, деструктивна пневмонія, плеврит, рентгенографія грудної клітки, мультиспіральна комп'ютерна томографія.

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