

CASE REPORT

Unusual Necrotizing Ulcerative Gingivitis Caused by *Actinomyces odontolyticus* in Leukemic Child with Long COVID-19 Syndrome: A Case Report

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ABSTRACT

Actinomyces odontolyticus is an anaerobic gram-positive bacterium that rarely causes necrotizing ulcerative gingivitis (NUG). A 15-year-old male was referred to Oral Medicine Clinic with acute myeloblastic leukemia (AML) and long coronavirus disease 2019 (COVID-19) syndrome. The chief complaints were pain, spontaneous gum bleeding, and foul-smelling breath. Extraoral examination showed an anaemic, asymmetrical face, swelling at the left buccal, and lymphadenitis. Intraoral examination showed localized gingival enlargement, tend to bleed, crater-like with punched-out of interdental papilla at posterior left mandibular gingiva, and deep caries in tooth 36. Oral microbiological examination revealed *Actinomyces odontolyticus*. He was diagnosed with NUG. The treatment included debridement with 1.5% hydrogen peroxide followed by 0.9% NaCl, 0.12% chlorhexidine digluconate mouthwash, metronidazole tablets 500 mg, and amoxicillin-clavulanic acid tablets 500 mg/125 mg. In conclusion, NUG caused by *Actinomyces odontolyticus* in a leukemic child that may relate to pulmonary long COVID-19 syndrome is particularly rare.

Keywords: *Actinomyces sp.*; Necrotizing ulcerative gingivitis; Acute myeloblastic leukemia; Long COVID-19 syndrome

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INTRODUCTION

Leukemia is a haematological malignancy due to the proliferation of blasts in the bone marrow with suppression of normal haematopoiesis. The disease typically showed abnormal results on a full blood count that leads to the deficiency of mature leukocytes, erythrocytes, and platelets. Acute myeloid leukemia (AML), also called myelogenous or myeloblastic leukemia, represents around 25% of paediatric leukemia. Oral manifestations include petechiae or spontaneous bleeding in 56% of patients, mucosal ulceration in 53% of patients, and gingival enlargement with or without necrosis in 36% of patients. Leukemia causes an immunosuppressive condition so the patient will be vulnerable to opportunistic infections from various microorganisms such as bacteria, viruses, fungi, and parasites.(1)

The severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) causes an infectious disease called Coronavirus disease 2019 (COVID-19). This infectious disease attacks the respiratory system from mild to severe symptoms. Elderly and immunocompromised populations are very risky of severe complications related to COVID-19. These complications and some symptoms can persist for some time. This condition is referred to long COVID-19 syndrome. The opportunistic infections can occur due to immune system imbalance from these underlying diseases.(2)

To the best of our knowledge, there are no studies or case reports regarding NUG caused by the *Actinomyces odontolyticus*. Therefore, the objective of this case report is to report an unusual NUG caused by *Actinomyces odontolyticus* in a paediatric patient with leukemia (AML) and long COVID-19 syndrome.

CASE REPORT

A 15-year-old male patient was referred from

Paediatric Department to Oral Medicine Department with the diagnosis of (AML), anemia gravis et causa bleeding, severe thrombocytopenia, and long COVID-19 syndrome. The chief complaints were pain, spontaneous gum bleeding, and foul-smelling breath. He had undergone the first cycle of chemotherapy, while the second cycle was delayed because the patient confirmed positive for COVID-19 and became negative after 81 days. One month after the patient was negative, he still experienced fatigue, headache, and earache. He received paracetamol, ampicillin, ondansetron, doxorubicin, methotrexate, dexamethasone, and cytosine arabinoside (Ara-C). Chest X-ray examination was normal. The result of the complete blood count (CBC) can be seen in Table I.

Table I : The result of a complete blood count test

Haematology	Result	Normal
Haemoglobin (g/dL)	9.1 (L)	13-16
Haematocrit (%)	27.2 (L)	37-49
White blood cell (10 ³ /uL)	17.6 (H)	4.5-13
Red blood cell (10 ⁶ /uL)	3.21 (L)	4.5-5.3
Platelets (10 ³ /uL)	47 (LL)	150-450
MCV (fL)	84.7	78-108
MCH (pg)	28.3	25-35
MCHC (%)	33.5	31-37
Quantitative CRP (mg/dL)	3.12 (H)	< 0.3

H: high, L: low, LL: lower low, MCV: mean cell volume, MCH: mean cell haemoglobin, MCHC: mean cell haemoglobin concentration, CRP: C-reactive protein

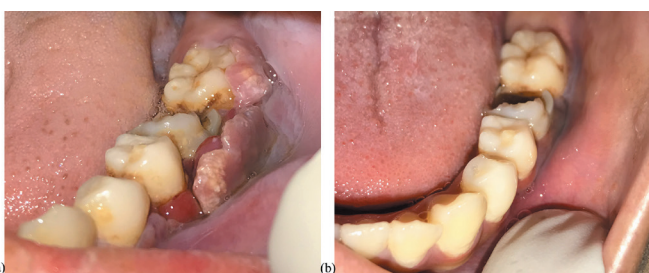


Fig. 1 : Clinical features at the first visit showed localized gingival enlargement, tend to bleed, crater-like with punched-out of interdental papilla at posterior left mandibular gingiva (a), and complete improvement after two months of follow-up (b).

Extraoral examination showed an anaemic, asymmetrical face, swelling at the left buccal, and lymphadenitis. The lips were dry and exfoliative. Intraoral examination showed localized gingival

enlargement, tend to bleed, crater-like with punched-out of interdental papilla at posterior left mandibular gingiva, petechiae in the upper labial mucosa, and deep caries in tooth 36 (Fig.1a). There was a yellowish-white plaque that can be scrapped without an erythematous area left at two-thirds of the posterior dorsal tongue. The oral hygiene was poor.

The patient was diagnosed with NUG, coated tongue, exfoliative cheilitis, and irreversible pulpitis of tooth 36. The systemic therapy was metronidazole tablets 500 mg and amoxicillin-clavulanic acid tablets 500 mg/125 mg three times a day. The topical therapy included rinsing with 0.12% chlorhexidine digluconate three times a day and the operator performed irrigation using 1.5% hydrogen peroxide (H₂O₂) and 0.9% NaCl once daily until the lesion healed. He was also instructed to apply a thin layer of petroleum jelly on his lips and improve his oral hygiene by brushing his teeth and tongue two times a day. An anaerobic microbiological examination was carried out with the result of *Actinomyces odontolyticus* released after 20 days (Fig.2).

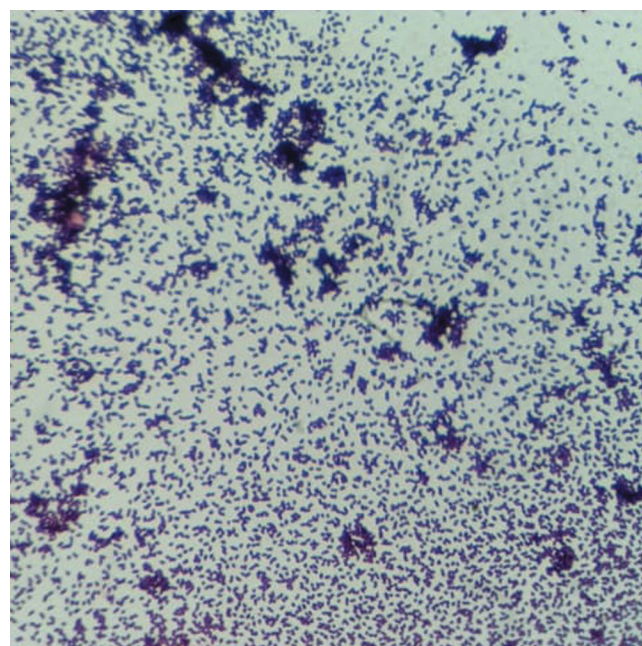


Fig. 2 : The anaerobic microbiological examination showed *Actinomyces odontolyticus* (100x magnification).

After three days of follow-up, the pain disappeared. After one week of follow-up, the pain and taste disorder disappeared, no spontaneous gingival bleeding, but the gingival enlargement was still visible. Gingival hyperkeratosis still appeared at one month of follow-up and disappeared after two months. The lesion resolved completely after two

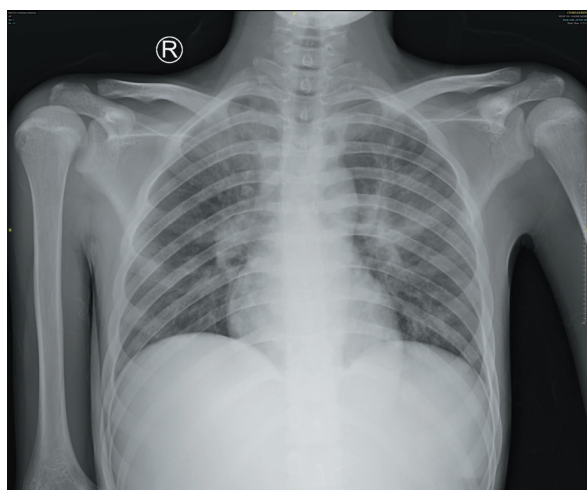


Fig. 3 : The chest X-ray examination revealed bilateral pneumonia.

months (Fig.1b). In the last visit, a chest X-ray examination revealed bilateral pneumonia (Fig.3).

DISCUSSION

This case highlights a rare cause of NUG that occurred in a leukemic child. It has been well known that fusospirochete is a common aetiology of NUG. Although the interaction between host and fusospirochete bacteria plays an important role in the etiopathogenesis of NUG, other anaerobic bacteria may be involved including *Treponema sp.*, *Prevotella intermedia*, *Peptostreptococcus sp.*, *Porphyromonas gingivalis*, *Selenomonas sp.*, *Aggregatibacter actinomycetemcomitans*, and *Campylobacter sp.* *Actinomyces odontolyticus* was found infrequently in plaque samples of NUG.(3) This bacterium is a commensal normal flora that persists in several organs such as the oropharynx, lungs, and gastrointestinal tracts. Under immune system imbalance, these initially commensal bacteria can become pathogens, causing opportunistic infections. This bacterium is an anaerobic facultative gram-positive that grows slowly from at least five days until 15 or 20 days. (4) In this case, the bacteria were found after 20 days of growth.

The patient revealed an unusual appearance of NUG. There were localized gingival enlargement, tend to bleed, crater-like with punched-out of interdental papilla at posterior left mandibular gingiva. This may be triggered by an abscess history of deep caries in tooth 36. The patient's systemic disease caused enlargement so that periodontal abscess may appear, while the local factor originated from deep caries causing a periapical abscess. The bacteria can easily enter because of this portal of entry. *Actinomyces odontolyticus* can enter through deep caries, damaged mucous

membranes, infections in the respiratory tract, and damaged gastrointestinal mucosa.(4)

NUG is characterized by the sudden onset of symptoms, sometimes following an episode of debilitating diseases or acute respiratory infections. The acute respiratory infection of this patient was due to COVID-19. The signs and symptoms of COVID-19 exist from four to more than twelve weeks after the diagnosis of COVID-19 and are not explainable by other alternative diagnoses referred to as the long COVID-19 syndrome. The condition of long COVID-19 syndrome in this patient concurred with the occurrence of NUG caused by *Actinomyces odontolyticus*. Even though the patient had already confirmed negative for COVID-19, the symptoms could last longer because the virus may be still replicated. This is known as viral shedding and it can be found in the nasopharynx, oropharynx, gastrointestinal tract, and the body fluids such as blood, saliva, urine, semen, and tears.(2) The viral persisted may be precipitated by the immunosuppressive condition of this patient.

Microbial coinfection instead of the etiopathogenesis of SARS-CoV-2 also plays a critical role in increasing disease symptoms and complications. Tessitore et al. (2021) reported that *Actinomyces odontolyticus* was found in the bacteriological examination after surgical treatment of pleural empyema in COVID-19 patients. The route of *Actinomyces odontolyticus* infection in the lung includes aspiration of oropharyngeal secretions or gastric compositions and extension of infection to the mediastinum.(5) Bilateral pneumonia that emerged in this patient was probably a sequela due to the presence of *Actinomyces odontolyticus* at the site of NUG.

Actinomyces odontolyticus has been reported as a cause of infection in the oral and maxillofacial region, but its incidence in NUG is almost infrequently found. Immunosuppressive conditions have significant risk factors for this patient, including poor oral hygiene, history of intravenous systemic drugs, and friable oral mucosal condition. Beta-lactam antibiotics especially penicillin G or amoxicillin are therapeutic options for *Actinomyces sp.*(4) In this patient, the systemic therapy was metronidazole tablets 500 mg and amoxicillin-clavulanic acid tablets 500 mg/125 mg three times a day. The topical therapy included debridement using 1.5% hydrogen peroxide followed by 0.9% NaCl once daily and 0.12% chlorhexidine digluconate mouth wash three times a day. Furthermore, improving the oral hygiene of the patient could be helpful to increase therapeutic response. This treatment resulted in a very significant improvement.

CONCLUSION

NUG is one of the oral manifestations in a leukemic child, especially AML. The unusual appearance of NUG caused by *Actinomyces odontolyticus* in a paediatric patient with leukemia may be associated with the pulmonary long COVID-19 syndrome. This bacterium can occur in coincidence with other underlying diseases in immunosuppressive conditions.

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