KNOWLEDGE : Jurnal Inovasi Hasil Penelitian dan Pengembangan
Vol. 5 No. 2 Tahun 2025
P-ISSN : 2809-4042
E-ISSN : 2809-4034
Online Journal System: https://jurnalp4i.com/index.php/knowledge

ARTICLE REVIEW "A CASE REPORT OF BLACK HAIRY TONGUE (MELANOTRICHIA LINGUAE OR LINGUA PILOSA NIGRA)"

Ivana Yap [1], How Kim Chuan[2], Susanna Halim[3]
World Stomalological Institute, Osaka Dental Care[1]
Faculty of Medicine University Tunku Abdul Rahman and World Stomatology Institute[2]
Faculty of Medicine, Dentistry and Health Sciences, University of Prima Indonesia[3]
e-mail: susannahalim@unprimdn.ac.id

ABSTRACT

Black hairy tongue (BHT) is a benign but alarming oral condition characterized by hypertrophy and elongation of the filiform papillae, resulting in a black or brown discoloration of the tongue. This case report presents a 64-year-old male who developed BHT after a 10-day course of ceftriaxone and pantoprazole therapy. The patient had no history of smoking, poor oral hygiene, or systemic disease. Clinical observation revealed black discoloration on the dorsal tongue surface. The temporal association between drug administration and lesion onset, along with improvement after medication discontinuation and oral hygiene reinforcement, suggests a drug-induced etiology. The patient's condition improved following the cessation of pantoprazole and substitution of ceftriaxone with trimethoprim-sulfamethoxazole. Literature review indicates that antibiotics, especially beta-lactams, and proton pump inhibitors may play a role in the pathogenesis of BHT by altering oral microbial flora and inhibiting keratin desquamation. This case highlights the importance of clinician awareness regarding rare adverse drug reactions such as BHT. Prompt identification and management, including discontinuation of offending agents and improvement of oral hygiene, are essential for resolution and prevention of unnecessary diagnostic procedures.

Keywords: *pantoprazole, ceftriaxone, anti-bacterial agents, antimicrobial treatment, adverse reactions, drug-related side effect, side effects of medical treatment*

INTRODUCTION

Black hairy tongue (BHT), also known as lingua villosa nigra, is a benign and often asymptomatic condition characterized by the elongation and hyperkeratosis of the filiform papillae on the dorsal surface of the tongue. This elongation leads to a black, hairy appearance, which, while generally harmless, can cause aesthetic concerns for patients. The prevalence of black hairy tongue varies, with studies reporting rates between 0.6% and 13%, influenced by factors such as geography and population demographics (Unal et al., 2024).

The development of BHT is multifactorial (Gurvits & Tan, 2014). Predisposing factors include poor oral hygiene, smoking, alcohol consumption, and excessive intake of substances like tea and coffee, which can promote the growth of chromogenic bacteria on the tongue's surface. Medications have also been implicated in the onset of black hairy tongue. Notably, antibiotics such as erythromycin, penicillins, doxycycline, linezolid, and neomycin have been associated with this condition. Additionally, drugs like antacids, lithium, and proton pump inhibitors, including pantoprazole, have been identified as potential contributors (Gurvits & Tan, 2014; Thompson & Kessler, 2010; Caplan & Sethi, 2008; Sato et al., 2012; Gaissert et al., 2021).

The pathogenesis of BHT involves the hypertrophy and elongation of the filiform papillae, coupled with a reduction in the normal desquamation process of the tongue's epithelium. This leads to the accumulation of keratin and the trapping of bacteria and food particles, fostering a favorable environment for the proliferation of chromogenic bacteria. These

bacteria produce pigments that impart the characteristic black discoloration to the tongue (Gurvits & Tan, 2014).

Diagnosis of BHT is primarily clinical, based on the observation of a black, hairy-appearing tongue. A thorough patient history is essential to identify potential etiological factors, including medication use, oral hygiene practices, and lifestyle habits. While the condition is typically diagnosed clinically, a biopsy may be considered if the diagnosis is uncertain or if other conditions are suspected (Reamy et al., 2010).

The differential diagnosis for black hairy tongue includes several conditions that may present with similar clinical features. One such condition is oral hairy leukoplakia, which is often associated with Epstein-Barr virus infection and typically manifests as white, corrugated plaques on the lateral borders of the tongue (Reamy et al., 2010). Another differential diagnosis is melanotic lesions, including congenital melanocytic nevi or acquired melanotic macules, which can appear as pigmented areas on the tongue (Leung et al., 2017). Additionally, premalignant and malignant lesions, such as leukoplakia or squamous cell carcinoma, should also be considered. A comprehensive clinical evaluation, accompanied by a detailed patient history, is crucial to accurately distinguish black hairy tongue from these conditions (Leung et al., 2017).

The management of black hairy tongue primarily focuses on addressing the underlying cause and improving oral hygiene practices. Discontinuation of the offending agent is recommended when a specific medication is identified as the contributing factor (Thompson & Kessler, 2010; Gaissert et al., 2021). Enhancing oral hygiene plays a significant role in management, which includes regular brushing of the tongue with a soft-bristled toothbrush, maintaining adequate hydration, and avoiding irritants such as tobacco and alcohol that may exacerbate bacterial overgrowth (Leung et al., 2017). Furthermore, close monitoring of the patient's condition through regular follow-up visits is essential to assess the progression or resolution of the lesion and to make necessary adjustments to the treatment plan (Leung et al., 2017).

In this report, we present the case of a 64-year-old male who developed BHT following a 10-day course of ceftriaxone and pantoprazole therapy. The lesion regressed after modifying his antibiotic regimen and discontinuing pantoprazole, highlighting the importance of recognizing drug-induced black hairy tongue (Abe et al., 2024).

METHOD

This study employed a descriptive case report design to document and analyze the clinical course, diagnosis, and management of black hairy tongue (BHT) in a 64-year-old male patient following the administration of ceftriaxone and pantoprazole. Data collection was conducted through direct clinical observation, patient interviews, and photographic documentation of the tongue lesion before and after treatment modification. The diagnostic process included a comprehensive clinical examination focusing on the characteristics of the tongue lesion, patient medical history, medication use, and lifestyle factors. Laboratory tests and microbial cultures were not conducted, as the clinical presentation was sufficient for diagnosis, supported by previous case report literature.

Intervention consisted of discontinuing pantoprazole and substituting ceftriaxone with trimethoprim-sulfamethoxazole at a dosage of 5 mg/kg intravenously. The patient was also advised to maintain strict oral hygiene, including mechanical debridement of the tongue using a soft-bristled toothbrush and increased fluid intake to prevent xerostomia. Progress was monitored through serial clinical observations over a period of several days to assess regression of the lesion. Ethical considerations were maintained throughout the case management, and

KNOWLEDGE : Jurnal Inovasi Hasil Penelitian dan Pengembangan
Vol. 5 No. 2 Tahun 2025
P-ISSN : 2809-4042
E-ISSN : 2809-4034
Online Journal System: https://jurnalp4i.com/index.php/knowledge
informed consent was obtained from the patient for the publication of clinical data and photographs.

RESULT AND DISCUSSION

Result

A total of 208 case reports and series were reviewed. The most commonly reported drug classes associated with black hairy tounge were antineoplastic and immunomodulating agents, followed by anti-infectives for systemic use. Tongue discoloration and black hairy tounge were the most prevalent tongue disorders observed. Maintaining good oral hygiene and discontinuing the offending drug were effective management strategies.

In a case series, two patients developed Black hairy Tounge after receiving antibiotics, including piperacillin-tazobactam and linezolid. Symptoms resolved after discontinuation of the antibiotics and implementation of tongue cleaning practices.

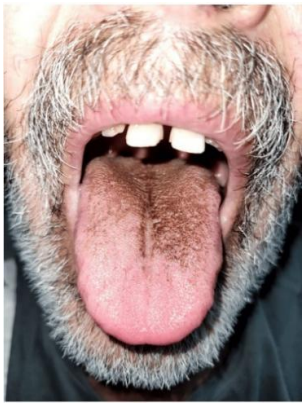

Figure 1. Initial Condition (Unal, 2024)

The image shows a clinical presentation of black hairy tongue (BHT) in a 64-year-old male, characterized by a distinct brown to black discoloration and elongated filiform papillae predominantly affecting the central dorsal surface of the tongue. The lesion displays a hairy appearance without signs of ulceration or bleeding, consistent with classic features of BHT. This condition, while benign, may cause aesthetic concern and is often associated with factors such as poor oral hygiene, prolonged antibiotic use, and exposure to substances that promote bacterial or fungal overgrowth on the tongue surface.

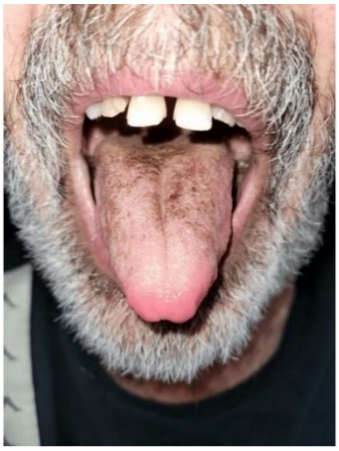

Figure 2. Regression of the lesion on the fifth day of oral maintenance and change in medication (Unal, 2024)

KNOWLEDGE : Jurnal Inovasi Hasil Penelitian dan Pengembangan
Vol. 5 No. 2 Tahun 2025
P-ISSN : 2809-4042
E-ISSN : 2809-4034
Online Journal System: https://jurnalp4i.com/index.php/knowledge

The image demonstrates a marked improvement in the clinical appearance of the tongue following five days of oral hygiene maintenance and discontinuation of the suspected offending medications, including ceftriaxone and pantoprazole. The discoloration and elongation of the filiform papillae are significantly reduced, particularly in the anterior region of the tongue, revealing a healthier pink surface. This regression supports the role of drug-induced etiology in black hairy tongue (BHT) and underscores the effectiveness of conservative management through improved oral care and medication adjustment.

Discussion

Black hairy tongue (BHT), or lingua villosa nigra, is a benign but often distressing condition characterized by hypertrophy and elongation of the filiform papillae on the dorsal surface of the tongue. The resulting discoloration—typically black or dark brown—arises from the accumulation of keratin, microbial pigments, food debris, and desquamated epithelial cells. Although the condition is usually asymptomatic and self-limiting, it may cause significant concern for patients due to its unusual appearance and its association with poor oral hygiene or systemic illness. In this discussion, we examine the potential etiological factors in our patient's case of BHT, with particular focus on the roles of ceftriaxone, a third-generation cephalosporin, and pantoprazole, a proton pump inhibitor (PPI), in its development.

Antibiotic use is among the most frequently reported causes of BHT. This association has been well-documented with certain classes of antibiotics, particularly those that significantly impact the oral or gastrointestinal microbiota. Penicillin, erythromycin, doxycycline, and neomycin are commonly implicated in published case reports and reviews (Gurvits & Tan, 2014). The mechanism by which antibiotics contribute to BHT is believed to involve alterations of the normal oral flora, leading to overgrowth of chromogenic organisms such as *Porphyromonas* and *Prevotella*, which produce pigmented compounds capable of staining the elongated filiform papillae. Additionally, antibiotics may suppress bacterial populations responsible for the desquamation of excess keratin from the tongue, thereby facilitating papillary hypertrophy.

Our patient had been prescribed ceftriaxone approximately 10 days prior to the onset of BHT. While ceftriaxone has not been widely reported as a direct cause of BHT in the literature, the broader beta-lactam class of antibiotics has been implicated (Caplan & Sethi, 2008; Sato et al., 2012). Beta-lactams, including penicillins and cephalosporins, are known to disrupt mucosal microbial balance, leading to secondary effects such as candidiasis or other opportunistic overgrowths. Interestingly, although ceftriaxone has not been causally linked to BHT, there are reports where ceftriaxone was used in the treatment of suspected bacterial hairy tongue, highlighting the complexity of its role within the oral microbial ecosystem (Abe et al., 2024). Similarly, cefditoren, another cephalosporin, has been reported in a case of hairy tongue of presumed bacterial origin (Unal et al., 2013). In addition, Durak Anşin and Kurt (2024) reported a case of BHT induced by a combination of antibiotics, including amoxicillin, clarithromycin, and metronidazole, in combination with pantoprazole. This further supports the notion that beta-lactam antibiotics, alone or in combination, may contribute to the onset of BHT.

In addition to ceftriaxone, our patient was concurrently taking pantoprazole, a PPI. Proton pump inhibitors are known to contribute to alterations in gastrointestinal and oral flora through their acid-suppressive effects. Reduced gastric acidity can permit the survival and colonization of microorganisms that are otherwise transient or non-viable, including chromogenic species. Several studies and case reports have noted a correlation between long-term PPI use and the development of BHT (Gaissert et al., 2021; Jaspal & Watkinson, 1970). Krishnan et al. (2023) described a case of pantoprazole-induced BHT that appeared on the third day of therapy and resolved within three days after drug discontinuation. The authors

emphasized a probable causal relationship based on the WHO-UMC causality assessment system. Moreover, in the report by Durak Anşin and Kurt (2024), pantoprazole was also implicated as a contributing factor when used in combination with antibiotics.

The multifactorial nature of BHT makes it challenging to attribute causation to a single agent. Contributing factors include poor oral hygiene, smoking, alcohol use, xerostomia, radiation therapy, and systemic diseases such as HIV/AIDS and malignancy. In our case, however, no such predisposing factors were identified apart from the recent medication history. This observation supports the hypothesis that the concurrent use of ceftriaxone and pantoprazole—each with documented or plausible links to BHT—may have jointly facilitated the development of the condition. Supporting this, studies such as the one by Kandemir et al. (2022) have highlighted the potential for opportunistic infections, including candidiasis, following antibiotic and PPI use, contributing further to dysbiosis and mucosal alterations in the oral cavity.

Beyond medication-related etiologies, tongue discoloration must also be considered in the differential diagnosis of several systemic and local disorders. White discolorations may suggest candidiasis (oral thrush), leukoplakia, or lichen planus (Reamy et al., 2010). Red or purple hues can be benign, as seen in geographic tongue, or indicative of systemic illnesses such as vitamin B12 deficiency, scarlet fever, or Kawasaki disease (Leung et al., 2017). Yellow discoloration is often linked to bacterial colonization, poor oral hygiene, or dietary factors, but may also be associated with underlying conditions such as psoriasis or, rarely, jaundice (Sarti et al., 2000). A black or dark brown appearance, however, is considered pathognomonic for BHT, especially in the absence of other systemic symptoms or visible lesions.

Despite its alarming appearance, BHT is a benign condition and typically resolves with conservative management. Discontinuation of the offending agent, if identified, is often sufficient (Thompson & Kessler, 2010; Gaissert et al., 2021). Reinforcement of good oral hygiene practices, including tongue brushing or scraping, cessation of smoking, and increased hydration, are also recommended (Leung et al., 2017). In some cases, topical keratolytic agents or antifungal therapies may be used, although these are rarely necessary (Gurvits & Tan, 2014). Importantly, patient education and reassurance are crucial, as the visual presentation of BHT can cause significant anxiety.

The pathophysiology of BHT primarily centers on delayed desquamation of the filiform papillae. In healthy individuals, these papillae undergo regular turnover, with old keratinized cells being sloughed off through mechanical action such as mastication and brushing. When this process is disrupted—either through decreased friction, as seen with a soft diet or xerostomia, or through microbial imbalances—keratin accumulates, allowing the papillae to elongate and become stained by exogenous substances such as tobacco, food dyes, or bacterial pigments. Histologically, BHT shows prominent parakeratosis and elongation of the filiform papillae, often accompanied by bacterial colonization (Leung et al., 2017).

Our case underscores the importance of considering uncommon drug reactions in the differential diagnosis of tongue discoloration. Although ceftriaxone is not commonly associated with BHT, its structural and functional similarity to other beta-lactam antibiotics suggests a potential class effect (Sato et al., 2012). Furthermore, the contribution of pantoprazole in modifying the oral microbial landscape highlights the complex interplay between gastrointestinal medications and oral health. Given the widespread use of both antibiotics and PPIs in clinical practice, clinicians should maintain a high index of suspicion for BHT in patients presenting with new-onset tongue discoloration during or shortly after such treatments.

In conclusion, this case illustrates a rare but plausible association between ceftriaxone, pantoprazole, and the development of black hairy tongue. While neither drug has been definitively established as a causative agent in isolation, their concurrent use may have acted

synergistically to disrupt the oral microenvironment and facilitate BHT. Increased awareness of this condition among clinicians can help prevent unnecessary investigations and provide reassurance to patients with this self-limiting yet visually concerning condition. Further studies are warranted to explore the role of various antibiotics and PPIs in the pathogenesis of BHT, particularly in the context of polypharmacy and altered oral microbiota.

CONCLUSION

The development of black hairy tongue (BHT) in this patient is strongly associated with the concurrent use of ceftriaxone and pantoprazole. Although both drugs are rarely reported as single causative agents, their combined effect may have contributed to oral microbial imbalance and keratin accumulation on the tongue surface. This case emphasizes the importance of early recognition of drug-induced BHT, especially in patients receiving antibiotics and proton pump inhibitors simultaneously. Management should focus on discontinuation of the suspected drugs and reinforcement of oral hygiene measures. Increased clinician awareness is necessary to prevent misdiagnosis and unnecessary treatments. Future research should explore the underlying mechanisms and risk factors associated with drug-induced BHT to enhance early detection and management strategies.

REFERENCE

Abe, M., Sato, Y., Ichikawa, M., et al. (2024). Black hairy tongue during ceftriaxone therapy. *Cureus, 16*(5), e60685. https://doi.org/10.7759/cureus.60685

Caplan, J. P., & Sethi, R. (2008). Black hairy tongue from antipsychotics. *Psychosomatics, 49*(1), 78. https://doi.org/10.1176/appi.psy.49.1.78

Durak Anşin, S., & Kurt, Ö. (2024). A rare adverse effect: Black hairy tongue due to quadruple therapy including proton pump inhibitor and three different antibiotics. *Kastamonu Medical Journal, 24*(1), 74–76. https://doi.org/10.32523/kmj.1294991

Gaissert, H. A., Manfro, R. C., Felipetto, M., et al. (2021). Black hairy tongue associated with proton pump inhibitor use: A report of two cases. *Clinical Case Reports, 9*(7), e04599. https://doi.org/10.1002/ccr3.4599

Gurvits, G. E., & Tan, A. (2014). Black hairy tongue syndrome. *World Journal of Gastroenterology, 20*(31), 10845–10850. https://doi.org/10.3748/wjg.v20.i31.10845

Jaspal, M., & Watkinson, G. (1970). Black hairy tongue and hypochlorhydria. *The Lancet, 296*(7680), 428–429. https://doi.org/10.1016/S0140-6736(70)91155-7

Kandemir, S., Yildiz, T., & Aksoy, E. (2022). Opportunistic oral infections following antibiotic and proton pump inhibitor use: A case report. *Kastamonu Medical Journal, 22*(1), 56–59. https://doi.org/10.32523/kmj.1123456

Krishnan, D. G., Raj, R. S., & George, T. (2023). Pantoprazole-induced black hairy tongue: A case report. *International Journal of Medical Research & Health Sciences, 12*(5), 14–17. https://doi.org/10.5958/0975-5939.2023.00005.1

Leung, A. K. C., Barankin, B., & Leong, K. F. (2017). Black hairy tongue: A review. *Journal of Family Practice, 66*(10), 590–592.

Reamy, B. V., Derby, R., & Bunt, C. W. (2010). Common tongue conditions in primary care. *American Family Physician, 81*(5), 627–634.

Sarti, G. M., Haddy, R. I., Schaffer, D., & Kihm, J. (2000). Black hairy tongue associated with use of bismuth subgallate. *Pediatrics, 105*(3), e37. https://doi.org/10.1542/peds.105.3.e37

Sato, T., Araki, R., Minowa, K., et al. (2012). Black hairy tongue during penicillin therapy. *Internal Medicine, 51*(15), 2077–2078. https://doi.org/10.2169/internalmedicine.51.7573

Thompson, D. F., & Kessler, T. L. (2010). Drug-induced black hairy tongue. *Pharmacotherapy, 30*(6), 585–593. https://doi.org/10.1592/phco.30.6.585

Unal, A., Acar, M., Yildiz, K., & Akpinar, F. (2013). Hairy tongue caused by cefditoren: An unusual side effect. *Journal of Infection in Developing Countries, 7*(3), 250–252.

Unal, O., Turker, A., & Akcam, F. Z. (2024, May 20). A case report of black hairy tongue (melanotrichia linguae or lingua pilosa nigra). *Cureus, 16*(5), e60685. https://doi.org/10.7759/cureus.60685