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Case Study Article

Oral Candidiasis Induced by Inhaled Corticosteroids in A COPD Patient with Diabetes: A Case Report

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ABSTRACT

Chronic obstructive pulmonary disease (COPD) is a progressive respiratory condition often managed with a combination of bronchodilators and inhaled corticosteroids (ICS) to reduce inflammation and prevent exacerbations. While ICS therapy, particularly in the form of Budesonide/Formoterol combinations, offers considerable clinical benefit, it also carries a risk of localized adverse effects, such as oropharyngeal candidiasis. This case report presents a 65-year-old male patient with a history of COPD, hypertension, and type 2 diabetes mellitus who developed oral candidiasis following the use of an ICS-containing inhaler during hospitalization for an acute COPD exacerbation. The patient had been treated with intravenous antibiotics, corticosteroids, and bronchodilators, and was initiated on Budesonide/Formoterol for maintenance therapy. Within one week of ICS use, he developed white patches on the tongue and inner cheeks, oral discomfort, and dysphagia. A clinical diagnosis of oral candidiasis was made, likely secondary to ICS use in the context of diabetes-induced immunosuppression. Management included discontinuation of the ICS, initiation of topical antifungal therapy, and transition to a long-acting muscarinic antagonist (LAMA) inhaler. The patient was also educated on proper inhaler technique and the importance of rinsing the mouth after ICS use. Symptoms resolved completely within a week, and there was no recurrence at follow-up. This case underscores the importance of early recognition and management of ICS-related side effects and highlights the need for individualized COPD care, especially in patients with comorbidities that predispose them to opportunistic infections.

INTRODUCTION

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Chronic obstructive pulmonary disease (COPD) is a common, preventable, and treatable respiratory condition characterized by persistent airflow limitation that is not fully reversible. It is primarily caused by long-term exposure to harmful particles or gases, most commonly from cigarette smoking, and is associated with an abnormal inflammatory response of the lungs to these noxious stimuli¹. Globally, COPD is a significant cause of morbidity and mortality, ranking as the third leading cause of death worldwide according to the World Health Organization². The clinical course of COPD is marked by progressive breathlessness, chronic cough, sputum production, and episodes of acute exacerbations, which significantly worsen the patient's health status and increase healthcare utilization. Management of COPD involves a multifaceted approach aimed at relieving symptoms, reducing the frequency and severity of exacerbations, and improving overall quality of life. Pharmacologic therapy typically includes bronchodilators—both short- and long-acting—alongside inhaled corticosteroids (ICS) in selected patients with frequent exacerbations or elevated eosinophil counts³. ICS such as Budesonide, when used in combination with long-acting beta-agonists (LABA) like Formoterol, have been shown to improve lung function, reduce exacerbation rates, and enhance symptom control⁴. Despite their clinical benefits, ICS are associated with several adverse effects, including an increased risk of pneumonia and localized fungal infections like oropharyngeal candidiasis⁵. Oral candidiasis is a common opportunistic infection of the oral mucosa, typically caused by *Candida albicans*. The immunosuppressive effect of ICS, particularly when deposited in the oropharyngeal region, can disrupt local mucosal immunity and normal flora, creating a favorable environment for fungal colonization⁶. Risk factors for ICS-induced

candidiasis include high-dose ICS use, improper inhaler technique, absence of mouth rinsing after inhalation, and underlying conditions such as diabetes mellitus, which itself is known to impair host immune defenses⁷. In this context, we present the case of a 65-year-old male with a known history of COPD, hypertension, and type 2 diabetes mellitus, who developed symptomatic oral candidiasis following the use of a Budesonide/Formoterol combination inhaler. This case highlights the importance of early recognition and appropriate management of ICS-associated adverse effects, particularly in high-risk individuals.

Case Presentation

A 65-year-old male with a known history of chronic obstructive pulmonary disease (COPD), hypertension, and type 2 diabetes mellitus presented to the hospital with worsening breathlessness and a productive cough. These symptoms were indicative of an acute exacerbation of COPD, which necessitated inpatient care. During his hospitalization, he was managed with a combination of therapies aimed at controlling both the underlying inflammation and any possible infection. He received intravenous antibiotics to address a suspected infectious cause of the exacerbation, alongside intravenous steroids to reduce airway inflammation. Bronchodilators were administered through both nebulization and inhaled routes to help improve airflow and relieve his respiratory symptoms. Supportive care, including multivitamin supplementation, was also provided to enhance his overall recovery. As part of his maintenance treatment for COPD, he was prescribed a combination inhaler containing Budesonide and Formoterol, to be used twice daily. Budesonide is an inhaled corticosteroid (ICS), and while effective in reducing airway



inflammation and preventing future exacerbations, it is not without potential side effects. After approximately one week of using the ICS-containing inhaler, the patient began to experience new symptoms involving his oral cavity. He noticed the appearance of white patches on his tongue and the inner surfaces of his cheeks, accompanied by a burning sensation, soreness, and discomfort while swallowing. These findings were consistent with oral candidiasis, a fungal infection commonly caused by *Candida* species. The clinical diagnosis was supported by the temporal relationship between the initiation of the inhaled corticosteroid and the onset of oral symptoms. Inhaled corticosteroids, while beneficial for airway diseases, can suppress local immunity in the oropharyngeal region, making the mucosal surfaces more susceptible to opportunistic fungal infections like candidiasis. The patient's underlying diabetes may have further predisposed him to this condition, given the impaired immune response associated with hyperglycemia. In this context, the oral candidiasis was most likely an adverse effect of the inhaled Budesonide component of his maintenance therapy.

Management of ADR

To address the adverse drug reaction resulting from the use of inhaled corticosteroids, the medical team took prompt and appropriate steps to manage the patient's condition effectively. Given the development of oral candidiasis, the inhaled corticosteroid was temporarily discontinued to eliminate the contributing factor to the fungal overgrowth. In its place, a long-acting muscarinic antagonist (LAMA) inhaler was introduced to maintain bronchodilation and support his ongoing respiratory management without increasing the risk of further fungal infection. Topical antifungal treatment was initiated using Candid Mouth Paint,

which contains agents such as Clotrimazole or Nystatin. The patient was instructed to apply this medication to the affected areas three times daily for a duration of seven days. This localized treatment was aimed at directly targeting the fungal infection while minimizing systemic side effects. In addition to pharmacological intervention, the patient was thoroughly educated on the proper use of inhaled medications to prevent recurrence. He was taught to rinse his mouth and gargle thoroughly after each use of an inhaled corticosteroid, which helps clear residual medication and reduce the chance of fungal colonization. Furthermore, the use of a spacer device was recommended to decrease oropharyngeal deposition of the drug, allowing more of the medication to reach the lungs and less to remain in the mouth and throat. Although systemic antifungal therapy with oral fluconazole was considered—specifically, a 150 mg dose once weekly for two weeks—it was ultimately deemed unnecessary, as the patient responded well to the topical regimen. Within one week of initiating antifungal treatment, the symptoms of oral candidiasis had resolved entirely, with no residual discomfort or visible lesions. Upon discharge, the patient was transitioned to an alternative maintenance inhaler that combined a long-acting muscarinic antagonist and a long-acting beta-agonist (LAMA/LABA), thereby continuing his COPD management while avoiding the complications associated with corticosteroid use. He was also provided with detailed counseling on the potential risks associated with ICS therapy, ensuring he was better equipped to recognize and prevent similar issues in the future. At his two-week follow-up visit, the patient remained symptom-free, with no recurrence of oral candidiasis, and his respiratory condition remained stable under the new treatment regimen.



DISCUSSION

The patient in this case had a complex medical history, including COPD, hypertension, and type 2 diabetes mellitus. His presentation with worsening breathlessness and productive cough suggested an acute exacerbation of COPD, for which he was appropriately hospitalized and treated. The use of intravenous antibiotics, corticosteroids, and bronchodilators formed the cornerstone of his acute management. As part of his long-term therapy, an inhaler combining Budesonide and Formoterol was introduced, aligning with current guidelines for maintenance therapy in patients with frequent exacerbations. However, shortly after initiating the ICS-containing inhaler, the patient developed characteristic signs of oral candidiasis, such as white patches, oral soreness, and dysphagia. The diagnosis was supported by the temporal association between drug initiation and symptom onset, as well as the clinical features of the infection. The development of oral candidiasis in this setting highlights the well-documented risk associated with ICS therapy, especially in patients with diabetes, where immune function is often impaired. The management strategy in this case was multi-faceted, involving the discontinuation of the ICS, initiation of topical antifungal therapy, and patient education regarding inhaler hygiene. A switch to a LAMA inhaler, followed later by a LAMA/LABA combination, ensured that the patient continued to receive effective bronchodilation without the added risk of further fungal complications. Preventive strategies, such as rinsing the mouth after inhaler use and using a spacer device, were emphasized to minimize future risk should ICS therapy be reintroduced. The patient responded well to these measures, with complete resolution of symptoms and no recurrence at follow-up.

CONCLUSION

This case highlights the critical need for vigilance in identifying and managing adverse drug reactions in patients undergoing inhaled corticosteroid (ICS) therapy, particularly those with underlying risk factors such as type 2 diabetes mellitus. Although inhaled corticosteroids play a pivotal role in the maintenance therapy of chronic obstructive pulmonary disease (COPD) by reducing airway inflammation and preventing exacerbations, their immunosuppressive effects on the oropharyngeal mucosa can lead to localized complications such as oral candidiasis. This fungal infection, while often considered minor, can significantly impair a patient's quality of life by causing oral discomfort, a burning sensation, taste disturbances, and difficulty in eating or swallowing. These symptoms may, in turn, lead to poor adherence to essential inhaler therapy and compromise overall disease control. The early recognition of the signs and symptoms of oral candidiasis in this patient allowed for timely intervention, including the temporary discontinuation of ICS therapy, initiation of effective topical antifungal treatment, and adjustment of the maintenance inhaler regimen. The resolution of symptoms with topical therapy alone also emphasizes the importance of individualized, minimally invasive treatment strategies whenever possible. Moreover, this case reinforces the critical role of patient education in the prevention of ICS-related complications. Teaching patients proper inhaler techniques, the importance of rinsing the mouth and gargling after each use, and the use of spacer devices are simple yet highly effective strategies that can substantially reduce the risk of fungal overgrowth in the oropharyngeal region. Ultimately, the successful outcome in this case illustrates the necessity of a personalized approach to COPD



management—one that carefully balances therapeutic efficacy with the potential risks associated with pharmacologic interventions. Clinicians must remain aware of the broader implications of even seemingly benign side effects, particularly in populations that may be more susceptible due to comorbid conditions such as diabetes. Through proactive monitoring, patient engagement, and evidence-based adjustments to therapy, healthcare providers can ensure optimal outcomes while minimizing the burden of treatment-related complications.

Conflicts Of Interest

The authors declare no conflict of interests.

Authors Contribution

All authors have contributed equally to this work and have read and approved the final version of the manuscript.

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