

**Oral Health and Respiratory Diseases - A Major Link**

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**Abstract**

Interest has been mounting on the potential connections between oral health and certain systemic conditions. Oral manifestations are polymorphic in nature, being associated with a variety of respiratory infections and specific therapies. Careful examination of the oral cavity in respiratory medicine is often neglected, although it represents sometimes a clue for clinical diagnosis. Recent literature supports the association between respiratory disease and oral health and confirms the oral cavity to be a harbor of infectious respiratory pathogens. Respiratory obstructive diseases, systemic diseases with pulmonary involvement, lung cancer, cystic fibrosis or tuberculosis all have clinical and/ or therapeutic involvement of the oral cavity, which underlines the necessity of regular dental check-ups and careful oral cavity examination, as well as an active collaboration between dental practitioners and respiratory physician, for patient's ultimate benefit.

**Keywords:** oral health, respiratory diseases, diagnosis.

**1. Introduction**

Respiratory diseases are comprised of a myriad of pulmonary conditions, ranging from acute to chronic, and bacterial, fungal and virus based. It includes conditions such as asthma, emphysema, bronchitis, Chronic

obstructive pulmonary disease (a chronic condition consisting of both emphysema and bronchitis), and pneumonia. While all of these are considered respiratory diseases, pneumonia has been the most researched in regards to its connection to oral health. Pneumonia is considered an acute respiratory infection presenting signs including coughing, shortness of breath, increased respiratory rate, sputum production, and chest pain. The most common respiratory pathogens are found within the dental plaque inside the oral cavity. These bacteria, once established in the mouth, can be aspirated into the lungs and cause infection. Potential respiratory pathogens include *Staphylococcus aureus*, *Pseudomonas aeruginosa*, *Acinetobacter* species and enteric species.<sup>1</sup>

The anatomical continuity between the lungs and the oral cavity makes the latter a potential reservoir of respiratory pathogens. Because anaerobes are implicated in pneumonia, a role for the oral cavity in the pathogenesis of this disease has been suspected since the beginning of the 20th century.<sup>2</sup>

The oral flora may also be implicated in pulmonary diseases affecting airflow. The most prevalent is COPD. The main etiological factor is tobacco smoking, but bacteria (including oral bacteria) may play a key role in progression of the disease. With dental plaque and biofilm

considered as potential factors in the development of respiratory diseases, it is important to understand the role it plays in this association. Over 300 anaerobic and aerobic microorganisms, and also strains of filamentous microorganisms, colonize tooth surfaces, gingival tissues and dental prostheses. Without proper oral home care and mechanical elimination, the microorganisms from these surfaces will continue to proliferate along with subsequent aerobic micro-organisms and inhabit the oral cavity.<sup>3</sup> With poor oral hygiene, these microorganisms will feed off of one another, transferring from healthy bacterial strains to harmful bacterial strains, such as those seen in periodontal disease, which are also considered the strains associated with respiratory diseases.<sup>3,4</sup>

## 2. Mechanism Of Infection

Two routes exist for oral micro-organisms to reach the lower respiratory tract: hematogenous spread and aspiration. Hematogenous spread of bacteria is an inevitable adverse effect of some dental treatments and may occur even after simple prophylactic procedures.<sup>5</sup> In contrast, aspiration of material from the upper airway occurs in 45% of healthy subjects during sleep and in 70% of subjects with impaired consciousness.<sup>6</sup>

Knowing a patients' history can be a key element in allowing the dental hygienist to investigate how a respiratory disease came about. Three mechanisms of infection related to aspiration of material from the upper airway can be envisioned. First, periodontal disease or poor oral hygiene might result in a higher concentration of oral pathogens in the saliva.

These pathogens would then be aspirated into the lung, overwhelming the immune defence. Second, under specific conditions, the dental plaque could harbour colonies of pulmonary pathogens and promote their growth. Finally, periodontal pathogens could facilitate the

colonization of the upper airways by pulmonary pathogens.<sup>1,6</sup>

## 3. Linking Oral Health And Respiratory Infections

Patient assessment can allow the clinician to properly identify possible risk factors and make connections as to how or why the patient could have possibly obtained a respiratory disease. Possible risk factors that should be known due to having a correlation with respiratory diseases: presence of cariogenic and periodontal pathogens, dental decay, and poor oral hygiene.<sup>1</sup> Presence of dental decay, for instance, is significantly related to the incidence of the respiratory disease, aspirated pneumonia.<sup>7</sup> Scannapieco and Ho in their survey found a significant association between **COPD** and periodontal attachment loss. The likelihood of COPD increased with severity of attachment loss, and lung function appeared to diminish as the amount of attachment loss increased.

Epidemiological studies are suggesting an association between COPD and periodontal disease but, most probably, the common link between these two conditions is exposure to tobacco smoke.<sup>8</sup> Other common issues are thrush - the most frequent mucosa ailment, and worsening of the dental status: gingival bleeding and pocket depth, reduced teeth number and increased incidence of dental plaque.<sup>9</sup>

As to malignancy, a study evaluating the risk of cancer in first-time hospital-diagnosed COPD patients concluded that these patients are exposed to a considerably increased risk of developing tobacco-related cancers, including cancers of the oral cavity, larynx, and tongue, alongside lung cancer.<sup>10</sup>

The most frequent oral health conditions associated with **asthma** are dental cavities, erosions, periodontal disease and oral candidiasis. Furthermore, such patients, particularly those of pediatric age, have a prominent oral breathing pattern, contributing to gingivitis, due to

dehydration of alveolar mucosa, along with various immunological factors which increase gingival inflammation.<sup>11</sup>

**Pulmonary tuberculosis** can lead to oral lesions in both primary and secondary stages. Mouth involvement in secondary tuberculosis is usually a result of reactivation and hematogenous spread from the primary infection of the lung, the lesions being very similar to those of a squamous cell carcinoma: stellate ulcer, undermined edges, a granulating floor, ragged and not indurated and is often painful. Although the tongue is the commonest site for oral tuberculous lesions, they may also occur on the gingiva, floor of mouth, palate, lips and buccal mucosa.<sup>12</sup>

**Sarcoidosis** is a systemic disease with granulomas in the lungs and adenopathies, affecting almost all organs. The oral cavity lesions in sarcoidosis are localized swelling or nodules, painless ulcerations of the gingiva, buccal and labial mucosa, palate, and gingival inflammation, hyperplasia or recession, diagnosis being made through biopsy, that reveals non-caseating granulomas. Involvement of the tongue is very rare, including swelling, enlargement and ulcerations, as well as of the salivary gland, which leads to a tumor-like appearance.<sup>13</sup>

**Wegener granulomatosis**, a necrotizing granulomatous vasculitis of small-to-medium vessels, has a common oral involvement, expressed as ulcerations on oral mucosa or palate, tooth mobility and loss. The pathognomonic finding is granular hyperplastic gingivitis or the so-called “strawberry gingivitis”, with red interdental papillae covered with hyperplastic purple petechiae.<sup>14</sup>

**Lung cancer** causes more than 25% of the oral metastases, the jawbones being more frequently affected, compared to the soft tissue of the oral cavity. The mandible is the most exposed bone, more than 55% of the metastases being located here, while some studies report that oral metastases could be the first manifestation of this

type of cancer, announcing unfortunately an advanced stage of neoplastic pulmonary disease.<sup>15</sup>

**Cystic fibrosis** is a genetic disorder affecting mostly the respiratory tract. Oral manifestations of the disease are enlargement of the salivary glands, the sublingual ones being the most affected, followed by submandibular glands. Patients with cystic fibrosis can also present with xerostomia, cheilosis from vitamin deficiency, tooth discoloration, and hypoplastic defects of permanent dentition.<sup>16</sup>

Nowadays, **inhaled medication** represents the mainstay of therapy in asthma and COPD. Several drug categories are used:  $\beta$ 2-agonists, corticosteroids, anti-cholinergic agents and their combinations. The increased use of inhaled drugs and the fact that a large ratio of the inhaled substances remains in the oro-pharyngeal region has raised attention to the oral consequences of this type of medication: xerostomia, mucosal changes, ulcerations, dental cavities, halitosis, taste disturbances, oropharyngeal candidiasis, gingivitis, periodontitis, and signs of gastroesophageal reflux<sup>17</sup>

Many respiratory disorders can compromise routine dental care and require special treatment for the affected patients. The diagnosis and management of patient with respiratory disease in dental office is very important. Basic methods recommended to intervene with the development of respiratory infections include: elevating the head of the patients' bed, helping to reduce the incidence of aspiration pneumonia in elderly patients, and providing dental care to reduce the amount of plaque bacteria, causing periodontal disease and dental decay.<sup>7</sup>

#### **4. Conclusion**

It has been established that dental professionals have the knowledge and practice experience to provide oral care in hospitals and long-term care facilities. However, due to various barriers, it may take more standard care protocols

with an emphasis on **interprofessional collaboration** to reduce the incidence of respiratory disease. Dental practitioners currently can contribute to this through providing oral health education for healthcare providers and populations at high risk. Once it is globally recognized that the oral health and systemic health are linked, patients should experience a positive impact reducing suffering, morbidity and mortality associated with respiratory illness.

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