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Aspirin-Exacerbated Respiratory Disease: The Dentist's Role in Recognition, Referral, and Management

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Abstract

Aspirin-exacerbated respiratory disease (AERD), also known as Samter's triad, is characterized by aspirin intolerance, nasal polyps with recurrent rhinitis, and asthma. The components of AERD are frequently encountered in dental offices. This article reviews the screening and appropriate referral of patients who may have AERD. The implications of AERD on a patient's daily life, as well as a brief overview of potential treatments, are followed by a case report of a 36-year-old female patient. In the case report, a 36-year-old female patient with a history of chronic sinusitis, asthma, and aspirin allergy presents to a dental office with no evidence of oral disease. The case then describes the referral process to Otorhinolaryngology (ENT) for further evaluation, the diagnosis of Samter's triad, and subsequent treatment through endoscopic sinus (ESS) surgery to remove nasal polyps. The patient experienced relief of symptoms at the one-year postoperative follow-up. As dental providers often serve as a frequent point of contact for many patients—some of whom may see their dentists more regularly than their primary care providers—we are uniquely positioned to recognize signs and symptoms in the head and neck region that may indicate systemic disease.

Keywords

Dentistry, Asthma, Aspirin, Samter's Triad

1. Introduction

With modern advances in technology and research, the body and depth of knowledge in health sciences rapidly expand by the day. As such, new levels of expertise emerge, and naturally, providers trend toward higher degrees of specialization. While beneficial in many ways, this may also cause different arms of

healthcare (*i.e.*, medicine and dentistry) to become further siloed into their own fields of practice and the narrowing of a single provider's own breadth of knowledge. The dental practitioner must keep this in mind and balance the rapid advances in technology and material sciences in our field with the wider implications of manifestations in the oral cavity. Aspirin Exacerbated Respiratory Disease (AERD) is a group of seemingly unrelated signs and symptoms the dental provider may encounter and can play an important role in referring the patient for comprehensive treatment, as well as encouraging and prescribing appropriate medications for pain management following dental treatment.

A systematic review by Rajan *et al.* (2015) [1] found the prevalence of AERD to be approximately 7% in adult asthmatic patients and as high as 14% in adults with severe asthma. In AERD patients, the primary risk of mortality is linked to the initial reaction upon exposure to NSAIDs. AERD typically presents in the third or fourth decade of life, with a higher prevalence in men but greater severity in women. Although the pathophysiology of AERD is complex, a major mechanism involves the upregulation of 5-lipoxygenase (5-LO) and LTC4 synthase, which leads to an overproduction of cysteinyl leukotrienes (CysLT) [2]. A definitive diagnosis of AERD can be made through an aspirin challenge in patients with a history of NSAID hypersensitivity.

Long-term management of AERD requires a collaborative approach involving both an allergist and pulmonologist, and includes several key interventions: aspirin desensitization, leukotriene modifiers, and monoclonal antibodies targeting specific inflammatory pathways. Aspirin desensitization is often a cornerstone of treatment for AERD. Under close medical supervision, patients undergo a desensitization protocol, which gradually increases aspirin doses to build tolerance. This enables daily aspirin therapy, which can reduce the recurrence of nasal polyps, sinusitis, and asthma symptoms, ultimately lowering the dependency on corticosteroids and improving respiratory function [3]. Leukotriene modifiers such as montelukast and zileuton are commonly used to manage AERD symptoms by targeting leukotriene pathways, which are overactive in these patients. These medications inhibit cysteinyl leukotrienes—potent inflammatory mediators involved in bronchoconstriction and mucosal inflammation. Clinical studies have shown that these agents help reduce asthma exacerbations and improve overall respiratory function in AERD patients [4]. Monoclonal antibody therapy represents a more recent advancement, particularly for patients whose symptoms are severe or refractory to standard treatment. Biologics such as omalizumab (anti-IgE) and mepolizumab (anti-IL-5) target underlying inflammatory processes, specifically reducing eosinophilic inflammation that drives many AERD symptoms. In patients with comorbid asthma and AERD, these biologics have been shown to improve symptom control and reduce exacerbation frequency [5] [6]. Continual monitoring and follow-up with an interdisciplinary team is crucial for optimizing treatment and ensuring early intervention for any adverse effects of long-term therapy. Regular assessments allow healthcare providers to adjust treatment

regimens as needed, aiming for the best possible quality of life and symptom management for AERD patients [7].

2. A Case Presentation

A 36-year-old female presented to her general dentist for an examination. She had no acute dental needs but reported a history of chronic sinus pain, pressure, and postnasal drip that had persisted for several years. Notably, she had undergone endoscopic sinus surgery approximately 10 years earlier to address her sinus symptoms. Her medical history was significant for asthma, for which she used an albuterol inhaler as needed, and she listed an allergy to aspirin and other non-steroidal anti-inflammatory drugs (NSAIDs).

Her dental examination was unremarkable, aside from the need to replace a restoration, and her oral cavity showed no signs of disease. Given her history of sinus symptoms, she was referred to an ENT for further evaluation.

A computed tomography (CT) scan was performed by her ENT, with the radiology report noting the following findings: "Near complete opacification of the maxillary, ethmoid, and left frontal sinuses. Occlusion of the osteomeatal complexes. Nasal cavity with additional soft tissue density on the left and right inferior and middle turbinates, consistent with nasal polyps." (**Figures 1 and 2**)

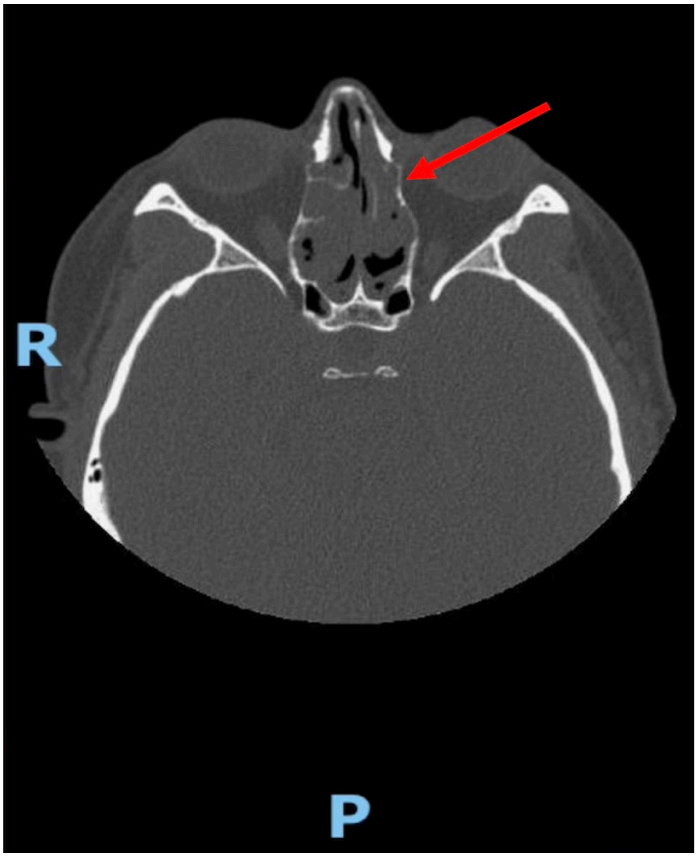

Figure 1. Red arrow denotes sinonasal soft tissue and bony changes indicating the presence of nasal polyps.

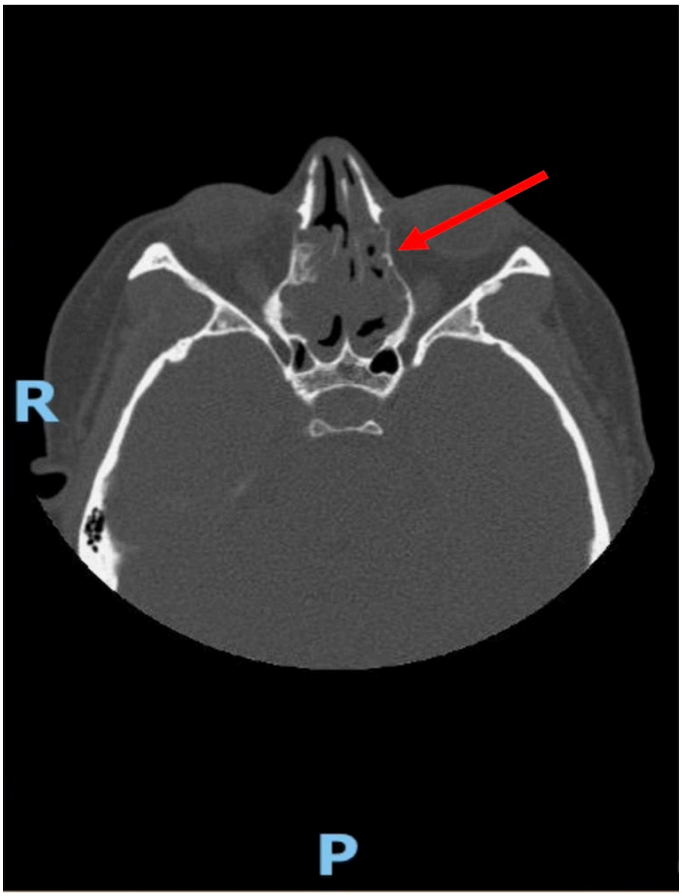

Figure 2. Red arrow denotes soft tissue density on left and right inferior and middle nasal turbinate's consistent with nasal polyps.

With the above clinical and radiographic findings the patient was scheduled for endoscopic sinus surgery (ESS) to remove the polyps and given a diagnosis of Samter's Triad as she had all three criteria (NSAID allergy, Asthma, Nasal Polyps/chronic sinusitis). The patient went on to complete her sinus surgery and is now symptom-free approximately one year post operatively.

3. Discussion

As described by Samter and Beers in 1968, patients with Samter's triad present with a history of asthma, nasal polyps with recurrent rhinitis, and aspirin intolerance. The authors noted that aspirin intolerance is often the last feature of the triad to appear, which may follow the other symptoms by months or even years [8]. Now officially known as AERD, patients typically exhibit severe rhinorrhea and exacerbation of asthma symptoms within several hours of taking aspirin or other NSAIDs [9].

Previous studies have concluded that the biological mechanism behind AERD is due to cyclooxygenase (COX-1) inhibition [10]. This is particularly relevant as most of the postoperative pain in dental offices is managed with non-selective COX-1 and COX-2 inhibitors such as ibuprofen and naproxen. While selective

COX-2 inhibitors like celecoxib (Celebrex) and relatively selective COX-2 inhibitors like meloxicam (Mobic) may be better tolerated in patients diagnosed with AERD, meloxicam poses a greater risk due to its partial inhibition of COX-1 at higher doses [10].

Acetaminophen demonstrates slight cross-reactivity with COX-1 at doses greater than 2,000 mg but is generally tolerable by patients with AERD in doses up to 500 mg [11]. Therefore, acetaminophen may be considered an analgesic option for dental pain management in patients with AERD. Proper consultation with a patient's ENT and allergist should be conducted before managing dental pain in patients either diagnosed with or suspected of having AERD.

Effective pain management for AERD patients extends beyond COX-2 inhibitors and acetaminophen. Gabapentinoids, such as gabapentin and pregabalin, are useful for neuropathic pain and as adjuncts for acute pain, offering relief without impacting the cyclooxygenase pathway [12]. Topical and intravenous lidocaine can also be used safely, providing localized or systemic analgesia under medical supervision [13]. Low-dose ketamine, an NMDA receptor antagonist, is effective for both acute and chronic pain control and reduces opioid requirements in perioperative settings [14]. Tramadol, a centrally acting analgesic, presents a moderate pain management option with low risk of triggering cyclooxygenase pathways, making it appropriate for AERD patients [15]. In cases of severe pain, short-term opioid therapy may be employed under careful monitoring, providing adequate relief without engaging inflammatory pathways, though it requires caution to mitigate risk of dependency [16]. AERD can greatly impact a patient's quality of life, particularly when symptoms overlap with dental issues [17]. For example, patients presenting with upper jaw pain near the maxillary molars may also experience rhinorrhea, anosmia with a subsequent loss of taste, and chronic nasal obstruction, all of which can affect productivity, sleep quality, and overall well-being.

Treatment for the sinonasal symptoms of AERD, including medical management and surgery, has been shown to alleviate or reduce bronchial asthma symptoms [9]. However, studies indicate that patients with AERD tend to be more resistant to traditional medical treatments (e.g., nasal sprays and irrigation) and may experience higher recurrence rates of sinus symptoms and nasal polyps postoperatively, requiring more revision surgeries compared to patients without AERD [17] [18]. Due to higher rates of resistance, patient's suffering from AERD should be treated with a 2 - 3 week course of systemic corticosteroids followed by intranasal corticosteroids [5] [6]. As previously mentioned regarding the pathogenicity of AERD, studies have shown that 5-Lipoxygenase inhibitors such as Zileuton are effective in treatment [5]. Even in studies showing comparable symptom relief between patients with and without AERD, CT scans still reveal greater improvement in patients without AERD [19].

A systematic review and meta-analysis by Oykhman *et al.* (2022) identified monoclonal antibodies and aspirin desensitization as promising treatments for chronic sinusitis, including in patients with AERD. Other studies show that

patients who undergo aspirin desensitization prior to ESS have a decreased likelihood of requiring revision surgery two years postoperatively [20]. A systematic review by Adelman *et al*., (2016) [9] also supports surgical management of AERD when combined with adjunctive treatments.

Unlike most allergic inflammatory conditions, AERD typically does not appear until the third or fourth decade of life. This elusive nature complicates early diagnosis, often leading to delayed detection and prolonged suffering due to poor disease control. Clinically, AERD presents with symptoms similar to anaphylactic shock, though the underlying mechanism differs. Up to 70% of patients diagnosed with AERD report sensitivity to red wine and other ethanol-containing beverages. While this is not a diagnostic factor, obtaining an accurate social history can serve as a useful adjunct in the detection of AERD.

A 2021 study by Haque *et al*., highlighted frequent concerns among patients with AERD, including delays in diagnosis, widespread lack of awareness among healthcare professionals, and inadequate communication and disease management between specialties [21]. To address these concerns, it is essential for dental professionals to be knowledgeable about AERD, recognize its symptoms, and facilitate prompt referral and treatment by an ENT.

4. Conclusions

In a dental setting, the provider's role is to identify potential cases of AERD and proceed with appropriate referrals to an ENT, while also educating patients on the need to avoid all COX-1 inhibitors, including over-the-counter treatments that may contain aspirin and/or NSAIDs. Appropriate referrals should be made for patients with suspected AERD prior to prescribing any NSAIDs, as adverse reactions are better managed in a medical facility.

However, if NSAIDs are required for acute dental or postoperative pain, selective COX-2 inhibitors, such as celecoxib, may be considered, as studies have shown no cross-reactivity in patients with AERD. While the use of acetaminophen is not contraindicated, caution should be exercised when prescribing higher doses to patients with AERD. Additionally, dental pain in patients with AERD may be managed with gabapentenoids, lidocaine, low-dose ketamine, tramadol, and short-term opioid therapy. Properly flagging patient charts is essential to prevent acute respiratory reactions from being triggered by the administration of inappropriate medications in the dental office.

Having a fundamental knowledge of the features of AERD, along with an understanding of potential treatments, allows dental providers to recognize relevant aspects of a patient's medical history. This includes appropriately managing nasal obstruction or rhinorrhea during dental visits, as well as safely prescribing pain medications and avoiding certain drugs that could trigger reactions.

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Informed consent was obtained from the patient for the publication of this case

report.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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