

## Hypotension Without Skin Symptoms at Local Anesthesia in Dental Treatment: Anaphylaxis? Or Vasovagal Reaction?

In 2020, the World Allergy Organization Anaphylaxis (WAOA) Guidance document was published that updated the definition of and amended the criteria for diagnosing anaphylaxis (Table). The WAOA definition now reads as follows: “Anaphylaxis is a serious systemic hypersensitivity reaction that is usually rapid in onset and may cause death. Severe anaphylaxis is characterized by potentially life-threatening compromise in airway, breathing and/or the circulation, and may occur without typical skin features or circulatory shock being present.”<sup>1</sup>

Anaphylaxis is one of the medical emergencies (systemic contingencies) that can occur in dental practice and is a serious, life-threatening allergic reaction.<sup>2,3</sup> It has a rapid onset (minutes to several hours) and includes signs and symptoms such as skin changes, dyspnea (respiratory difficulty), and cardiovascular collapse.<sup>1</sup> Skin changes can include urticaria (hives), erythema, itching, and edema of mucous membranes. Many dentists become convinced that anaphylaxis has occurred upon observing such findings. Although many of these signs and symptoms are typically visible, not all patients experiencing anaphylaxis will have all of them. During anaphylaxis, histamine released from mast cells and/or basophils causes vasodilation, and reflexive tachycardia is generally observed in the early stages as a compensatory reaction.<sup>4</sup> However, bradycardia may also be noted rather than tachycardia.<sup>5</sup>

Vasovagal syncope (VVS) is the most common medical emergency in dentistry (>60%)<sup>6</sup> and is often induced by fear of or pain during the injection of local anesthesia.<sup>7</sup> VVS stems from abrupt changes in autonomic activity: increased parasympathetic activity (ie, increased vagal tone) that leads to bradycardia and decreased sympathetic activity that causes arterial relaxation resulting in hypotension. If the drop in cardiac output and blood pressure (BP) is severe, cerebral blood flow is substantially reduced, and loss of consciousness may occur. Because VVS is a reflex, signs and symptoms are usually observed rapidly (seconds to minutes) following a triggering stimulus.

VVS often does not require treatment with medications (eg, atropine), as placing the patient in the Trendelenburg position is usually sufficient. However, administration of atropine may be needed if the VVS episode is severe or unresponsive to patient repositioning. Bradycardia is one of the typical signs noted with VVS, but modest tachycardia may be noted during the prelude to the actual syncopal event. Differentiating between VVS and anaphylaxis may be difficult given that some of the common signs and symptoms may overlap, which may negatively affect diagnosis and treatment.

It has been a point of debate whether dentists should consider nausea and hypotension without skin symptoms after administration of local anesthesia to be anaphylaxis or VVS. Given the low incidence of allergy to local anesthetic agents, particularly amides, and the high incidence of VVS associated with local anesthesia delivery, the likelihood of anaphylaxis remains quite low as compared with VVS. However, dentists following the WAOA Guidance 2020 could erroneously consider such a situation to be anaphylaxis without skin symptoms (Table) and inappropriately administer intramuscular epinephrine. Although epinephrine is first-line treatment for true anaphylaxis, it should ideally be reserved for accurately diagnosed anaphylactic emergencies and carefully administered because of severe systemic side effects such as coronary vasospasm, myocardial infarction, and cardiomyopathy.<sup>8,9</sup>

Key points to consider when differentiating between anaphylaxis and VVS are the differences in heart rate (HR) and BP, the speed of onset and resolution, positioning of the patient, and the likelihood of exposure to offending agents. With VVS, there is often a prelude where the patient becomes quite pale and/or diaphoretic, especially if not in the supine position. Furthermore, the immediate bradycardia and hypotension noted upon loss of consciousness typically resolves relatively quickly following appropriate management (placement into the Trendelenburg position, administration of atropine). Regarding anaphylaxis, patients with cardiovascular involvement would generally be expected to have profound hypotension and tachycardia, even though bradycardia may be seen rarely. In dental patients, exposure to offending agents for anaphylaxis is relatively uncommon outside of known triggers such as antibiotics (eg, penicillin), latex, and neuromuscular blockers. Local anesthetic allergies are so rare they would seem unlikely to fit the definition of a high-risk allergen as presented in the WAOA Guidance 2020 document. Looking at these differences, it appears that the WAOA anaphylaxis recommendations would be inappropriately applied to hypotension in the absence of skin symptoms following

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**Table.** World Allergy Organization Anaphylaxis Guidance 2020 Amended Criteria for Diagnosing Anaphylaxis<sup>1</sup>


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*Anaphylaxis is highly likely when any 1 of the following 2 criteria are fulfilled:*

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1. Acute onset of an illness (minutes to several hours) with simultaneous involvement of the skin, mucosal tissue, or both (eg, generalized hives, pruritus or flushing, swollen lips-tongue-uvula) and at least 1 of the following:
  - a. Respiratory compromise (eg, dyspnea, wheeze-bronchospasm, stridor, reduced peak expiratory flow, hypoxemia)
  - b. Reduced BP or associated symptoms of end-organ dysfunction (eg, hypotonia [collapse], syncope, incontinence)
  - c. Severe gastrointestinal symptoms (eg, severe crampy abdominal pain, repetitive vomiting), especially after exposure to nonfood allergens
2. Acute onset of hypotension, bronchospasm, and/or laryngeal involvement after exposure to a known or highly probable allergen for that patient (minutes to several hours), even in the absence of typical skin involvement

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administration of local anesthesia for dental treatment (especially when bradycardia is observed). Therefore, when unsure of the diagnosis (VVS vs anaphylaxis) in these circumstances, dentists should first rule out VVS by appropriately managing it before moving on to anaphylaxis. Once the differential diagnosis shifts from VVS to anaphylaxis, emergency medical services should be immediately activated and preparations made to administer epinephrine. In addition, dental providers must also understand that BP should never be treated without assessing the HR.

Although the WAOA Guidance 2020 document describes hypotension in the absence of skin symptoms after exposure to an allergen as a possible presentation of anaphylaxis, we want to note that hypotension without skin symptoms after local anesthesia in dentistry is more consistent with VVS, not anaphylaxis. All dental providers should be aware of the challenges in how anaphylaxis may present and be able to quickly form a differential diagnosis when a patient experiences signs and symptoms that could be anaphylaxis or VVS.

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