

## Chewing gum as an unusual cause of systemic allergic reaction

### 香口膠為全身性過敏反應的一個不尋常原因

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Chewing gum allergy is a rare condition in emergency settings. A 48-year-old man presented to the emergency department with generalised itchiness which was more prominent on the periorbital areas, nausea, vomiting, and dyspnoea after taking chewing gum. Vital signs showed hypotension with a blood pressure of 72/45 mmHg, and heart rate 95 beats per minute. Auscultation of the chest revealed diffuse rhonchi and coarse crackles. There was blanchable skin rash over the body especially on the abdomen. As the symptoms were compatible with systemic allergic reactions after chewing gum, the patient was given supplemental oxygen, subcutaneous adrenaline, intravenous methylprednisolone and nebulised salbutamol. The patient responded dramatically. He was discharged with oral hydroxyzine (Atarax® tablet) prescription. Although there are lots of well-known allergic substances including foods and drugs, we may encounter allergic reactions associated with rare allergens like chewing gum. (*Hong Kong j.emerg.med.* 2010;17:293-296)

在急症環境下，香口膠過敏為罕有的情況。一名 48 歲男子因咀嚼香口膠後全身痕癢（眼眶周圍較顯著），作嘔、嘔吐及氣促而到急症室求診。生命表徵顯示低血壓 72/45 mmHg 及心率每分鐘 95 次。胸部聽診顯示廣泛的乾囉音及粗噼啞音。身體有可變白的皮疹，尤其是腹部。由於症狀與香口膠全身性過敏反應吻合，病人被施與輔助氧氣，皮下腎上腺素、靜脈內甲基潑尼松龍及沙丁胺醇氣霧劑。病人反應良好，他出院時處方口服羥嗪（安泰樂藥片）。雖然有很多熟悉的過敏物質包括食物及藥物，我們仍會遇上與罕有的過敏原有關的過敏反應，例如香口膠。

**Keywords:** Anaphylaxis, dyspnea, hospital emergency service, hypersensitivity

**關鍵詞：**過敏、氣促、醫院急症服務

## Introduction

Allergic reactions are important and common health problems especially in emergency departments. Clinical presentations of these reactions vary from insignificant or mild reactions requiring no or only basic medical

treatment, to serious life-threatening reactions requiring urgent medical interventions. Food, drugs, chemicals, animals, and plants are common causes of allergic reactions.<sup>1</sup>

Anaphylaxis is a potentially life-threatening allergic reaction which is caused by IgE-mediated release of mediators including histamine, tryptase, chymase, prostaglandins and cytokines. It occurs in 30 out of 100,000 people annually in the United States and the reported mortality rate is 1-2%.<sup>2</sup> In spite of the fact that foods and drugs are the most well-known allergens, almost any organic/inorganic substance may be an allergen. Chewing gum allergy is a rare condition in emergency settings. In this case report, systemic allergic

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reactions occurring soon after exposure to chewing gum is presented.

## Case report

A 48-year-old man presented to the emergency department in March 2008 with generalised itchiness which was more prominent on the periorbital areas, nausea and repeated vomiting for half an hour. When he woke up, he only consumed a chewing gum and then developed the above symptoms within three minutes. He also had burning sensation over his chest and abdomen. He felt dizzy and exhausted nearly to the point of fainting. When he arrived at the emergency department, he had shortness of breath and erythematous skin lesions all over his body. His general clinical status was critical with impaired consciousness and he was in severe respiratory distress. Vital signs showed hypotension with a blood pressure 72/45 mmHg, heart rate 95 beats per minute (bpm), and body temperature 36°C. Auscultation of the chest revealed diffuse rhonchi and coarse crackles. On the whole body surface especially on the abdomen, there was some faint erythematous blanchable rash. He had no medical history of diabetes mellitus, ischemic heart disease, chronic obstructive pulmonary disease or asthma. He reported that he consumed chewing gum occasionally. It was found out that all his family members consumed chewing gum of the same brand/flavour but no allergic incident had been reported so far. He had once drug induced allergic reaction six months ago after taking an ampicillin-sulbactam tablet (Alfasid® tablet) with a similar clinical presentation. He did not consume alcohol but he had a 20 pack-year smoking history (20 cigarettes per day for 20 years). Blood results showed a mild leukocytosis (WBC  $12.2 \times 10^9/L$ ), eosinophils  $0.054 \times 10^9/L$ , haemoglobin 16.2 g/dl, platelet count  $365 \times 10^9/L$ , and troponin I 0.004 ng/ml. Liver-kidney function tests and urinary analysis were within normal range. Electrocardiography revealed regular sinus rhythm with a heart rate of 95 beats per minute. Posteroanterior chest X-ray revealed no pathology. The clinical condition was compatible with systemic allergic reaction possibly related to chewing gum.

After airway management, an intravenous access was established and oxygen supplement was given. The patient was then given subcutaneous injection of 0.3 mg adrenaline (0.3 ml of the 1:1000 dilution) and 1 mg/kg methylprednisolone intravenous injection. Nebulised salbutamol 0.15 mg/kg was given and repeated at the same dose once 20 minutes later. The patient responded dramatically and his dyspnoea diminished. His vital signs were normalised with blood pressure at 110/70 mmHg and heart rate at 86 bpm. The patient was observed for two hours. The patient was discharged uneventfully with oral hydroxyzine (Atarax® tablet) prescription.

## Discussion

Allergic reactions are becoming an important health issue in the last 2-3 decades and getting more common day by day. Hypersensitivities are inappropriate immune responses to foreign materials with anaphylaxis as the most dramatic and severe form. Urticaria, angioedema, abdominal pain or cramping, nausea, vomiting, diarrhoea, bronchospasm, rhinorrhoea, conjunctivitis, dysrhythmia, and/or hypotension are the most common clinical signs and symptoms of allergic reactions. Anaphylaxis can include any combination of these signs along with hypotension or airway compromise.<sup>1</sup>

Anaphylaxis can present with hypotension associated with clinically obvious vasodilatation or a rapid onset of shock with peripheral circulatory failure and occasionally cardiac arrest. Generally, heart rate increases in order to compensate for the hypotension but a phenomenon of relative bradycardia can occur as in our case. It was reported that both increased levels of serotonin, catecholamines, prostaglandins and nitric oxide during anaphylaxis and neurocardiogenic reflex triggered by cardiac mechanoreceptors could cause bradycardia.<sup>3</sup> Anaphylactic shock is associated with vasodilatation and fluid extravasation that cause a mixed distributive-hypovolemic shock pattern.<sup>4</sup> Establishing a patent airway is the first priority and the arterial oxygen saturation should be greater than 90 percent. At least one litre of normal saline (NS)

solution should be given as an intravenous infusion (10 to 20 ml/kg in children). Adrenaline is the most important medication, and the way of administration is worthy of discussion. If severe hypotension is present, an intravenous preparation can be prepared by diluting 0.1 mg adrenaline (0.1 ml of 1:1000 dilution) in 10 ml NS solution which should be given over 5 to 10 minutes. An intravenous infusion can be prepared by diluting 1 mg adrenaline (1 ml of 1:1000 dilution) in 500 ml 5% dextrose water (2 µg/ml) or NS with a rate of 0.5-2 ml/min recommended in refractory cases.<sup>1,5</sup> Intramuscular administration of 0.3-0.5 mg adrenaline (0.3 to 0.5 ml of 1:1000 dilution) could be used in less severe cases. Although intramuscular administration of adrenaline is much more frequently used than subcutaneous administration, it is suggested that subcutaneous administration is also an effective and safe treatment especially in the pre-hospital setting.<sup>6</sup> In this case adrenaline was administered subcutaneously and it was efficacious. Intramuscular administration of adrenaline, when compared to the subcutaneous route, has been reported to have better absorption and the peak plasma level is reached faster, so adrenaline is recommended to be administered intramuscularly.<sup>7-9</sup> Antihistamines (e.g. 25-50 mg diphenhydramine), corticosteroids (e.g. 1-2 mg/kg methylprednisolone) and bronchodilators are commonly used to treat anaphylaxis.<sup>1,4</sup> Patients who had anaphylactic reactions should be observed for at least four hours to monitor for the biphasic reaction. Patients should be given instructions before discharge from the hospital.<sup>1</sup> Our patient was discharged after observation for two hours as he requested to leave the emergency department early. No complication was reported a week following this episode.

Chewing gum has a polymer structure with basic ingredients including sugar/sweetener, gum base, preservatives, softeners, flavourings and colourings.<sup>10,11</sup> The major allergic trigger is assumed to be the latex ingredient in gum allergy.<sup>10</sup> Latex exposure is associated with three clinical syndromes. These are irritant dermatitis, delayed (type IV) hypersensitivity reaction and immediate (type I) hypersensitivity. Anaphylactic reaction begins within minutes of exposure to the allergen and it can be fatal without emergent treatment.

Persons with allergies to avocado, banana, chestnut, kiwi, papaya, peach, or nectarine are at increased risk of latex allergy. Cross-reacting antigens have been found between these tropical fruits and latex.<sup>12</sup> Ingredients like sweeteners and preservatives in chewing gum can cause allergic reactions. It was reported that flavours in chewing gum could cause type IV hypersensitivity reaction like allergic contact stomatitis.<sup>13</sup> It was also reported that aspartame in chewing gum which was absorbed directly through the buccal mucosa and circulated to the brain could cause poisoning.<sup>14</sup> In our case, the patient chewed gum that contained aspartame, sorbitol, xylitol, maltitol, sucralose, and acesulfame-K as sweeteners. As the patient had never had allergic reaction to chewing gum, some ingredients of the chewing gum could be the underlying cause of the allergic reactions.

In the literature we found only two case reports of chewing gum allergy. Wolf et al reported latex allergies in patients who consumed chewing gum.<sup>10</sup> Martinez Rivera et al observed urticaria and asthma cases in factories which produced chewing gum.<sup>15</sup> These two reports can be considered as local allergic reactions but our case is different as the patient showed generalized and systemic allergic reaction.

## Conclusion

Although there are lots of well-known allergic substances, we may encounter allergic reactions associated with rare allergens like chewing gum. Ingredients of chewing gum can cause not only hypersensitivity reactions but also anaphylaxis and even deaths. People who are sensitive or allergic to chewing gum should avoid foods that contain similar ingredients.

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