MINI REVIEW

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Gustatory rhinitis*

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SUMMARY

Gustatory rhinitis is characterized by watery, uni- or bilateral rhinorrhea occurring after ingestion of solid or liquid foods, most often hot and spicy. It usually begins within a few minutes of ingestion of the implicated food, and is not associated with pruritus, sneezing, nasal congestion or facial pain. It is considered to be a non-immunological reaction. Immunohistological and pharmacological observations suggest that this disease is most likely caused by stimulation of trigeminal sensory nerve endings located at the upper aerodigestive track. Recent evidence suggests that sensory nerve stimulations could be associated with a parasympathetic reflex and activation of cholinergic muscarinic receptors, sensitive to atropine. There are various types of gustatory rhinitis, including age-related, posttraumatic, postsurgical and associated with cranial nerve neuropathy.

Avoidance of the implicated foods, is the first treatment option, but is rarely sufficient. The intranasal topical administration of anticholinergic agents such as atropine, either prophylactically or therapeutically has been shown effective. Surgical therapy in the form of posterior nasal nerve resection or vidian nerve neurectomy is not recommended because of its short lasting result and frequent unpleasant side effects.

Key words: gustatory rhinitis, gustatory rhinorrhea, rhinitis, rhinorrhea, trigeminal, parasympathetic nerve

INTRODUCTION

Gustatory rhinitis is a syndrome, characterized by the acute onset of annoying rhinorrhea, occurring immediately after the ingestion of liquid or solid foods. It is more frequently associated with hot and/or spicy foods [(1-4)]. The rhinorrhea, depending on the patients medical background, can be uni- or bilateral. The occurrence of these nasal secretions are not associated with pruritus, sneezing, congestion or facial pain [(2)].

A very large variety of different types of foods have been reported to induce such a syndrome. According to several authors, the number of these foods may vary between 1 to 102. Implication of hot and/or spicy have been reported by 49 to 73% of patients [(1,4)]. The most frequent foods always contain capsaicin, the pungent substance present in all types of hot chili peppers, red cayenne, tabasco sauce, red pepper, horseradish or black pepper. Other chemical irritants such as onion, vinegar or mustard have also been reported as gustatory rhinorrhea inducers [(1,4)].

Patients with gustatory rhinitis do not have any disturbance in taste or olfaction (5). There is no predilection for either sex or ethnic origin and atopic individuals are not more commonly affected [(1,4)]. It can be observed in all age groups [(4)]. However, the prevalence of the syndrome increases with age [(4,5)].

Various types of gustatory rhinitis might be proposed according to their association with aging, history of head trauma or surgery as well as cranial nerves neuropathy. Idiopathic or age associated gustatory rhinitis is always bilateral, while the other types might be uni- or bilateral. Idiopathic gustatory rhinitis was first described in detail by Raphael et al. in 1989 [(1)]. Boddie was the first to describe (in 1976) postsurgical gustatory rhinorrhea as a complication of unilateral radical parotidectomy [(6)].

Gustatory rhinitis can be associated with major quality of life impairment. However, only a few studies are available regarding this issue. Almost half of the patients describing symptoms of gustatory rhinitis (46%) state that they are never bothered by their symptoms, while 65% never avoid the causative food [(4)]. However, it can be socially embarrassing and occasionally troublesome [(4,5)]. About 2% of the patients claim to be “very bothered” and 1% “extremely bothered” by their symptoms [(4)].

AETIOLOGY AND PATHOPHYSIOLOGY

Gustatory rhinitis seems to be secondary to an anomalous gustatory reflex. This could be a congenital or acquired condition, in which a sensory gustatory input is followed by a normal physiological salivatory reflex associated with an abnormally strong sensory-parasympathetic reflex involving parasympathetic inner-

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vation of the nasal mucosa [5,7,8].
The precise aetiology of gustatory rhinorrhea remains to be clarified [1,4,5]. However, postsurgical, posttraumatic and gustatory rhinorrhea associated with cranial nerves neuropathy (as seen in leprosy) are all thought to result from abnormal re-innervation from both sympathetic and parasympathetic nerve fibres [7,9-17]. As concluded by Franceschini et al, this abnormal re-innervation could occur in the presence of a pre-existing anatomical abnormality [7].

Postsurgical gustatory rhinorrhea has been reported after uni- and bilateral total parotidectomy [6,10,12], hemiresection of maxilla [14], total maxillectomy [11,16], septoplasty [13] and oral surgery (such as difficult dental extraction) [17]. Posttraumatic gustatory rhinorrhea has been reported in cases of skull trauma [7,9]. Following cranial nerve neuropathy in leprosy, there is one case report of gustatory rhinorrhea [15].

The exact pathophysiological mechanisms of gustatory rhinitis are still unknown. However, according to immunohistological, pharmacological and clinical observations, this syndrome seems to be most likely associated with the following cascade of neurological events. The ingestion of any kind of food causes the stimulation of trigeminal sensory nerves endings located in the upper part of the aerodigestive track. Since gustatory rhinorrhea can be significantly reduced by topical atropine application, the final effector step is most likely the activation of post ganglionic cholinergic muscarinic parasympathetic fibers. Morphological studies have shown tight connexions between trigeminal sensory nerve fibers and postganglionic parasympathetic neurons present in the sphenopalatine ganglion. Thus, sensory nerve stimulation is most likely associated with a parasympathetic reflex and activation of post ganglionic cholinergic muscarinic parasympathetic fibers, know to be sensitive to atropine [1,3,18,19].

Spicy and hot foods contain capsaicin (8-methyl-n-vanillyl-6-nomamide), the pungent agent in red hot peppers, which stimulates afferent sensory nerves in the mucosa of the oral cavity and oropharynx [1,20,21]. Capsaicin stimulates and can also up-regulate Transient Receptor Potential Vanilloid Receptors subtype 1 (TRPV1) in trigeminal nerve endings in the mouth and thus stimulate sensory nerve fibres, such as C and A- -fibres, producing a burning sensation [20,22]. The peptidergic sensory C-fibres, are specifically sensitive to capsaicin [23]. The stimulation of sensory C-fibres produce effects either through an orthodromic, central neural reflex, associated with efferent sympathetic but predominantly parasympathetic nerve activation, or via an antidromic reflex, called axonal reflex with local release of multiple neuropeptides from sensory neurones [22-26]. When the amount of released sensory peptides following capsaicin exposure is higher than the amount of sensory neuropeptides available via axonal transport, desensitisation may occur. Desensitisation of sensory nerve endings could explain the development of tolerance to hot spicy food in individuals when capsaicin is present in their everyday diet [22].

After the stimulation of afferent sensory nerves, a neural reflex arc is initiated, that stimulates parasympathetic efferent nerves supplying the nasal mucosa, especially submucosal glands [1]. The reaction observed in gustatory rhinitis is thought to be purely neurogenic, with overstimulation of the parasympathetic system, leading to clear rhinorrhea [18,24]. Such a neurogenic pathway could explain the reactions to capsaicin, as well as any other type of food able to stimulate sensory receptors in the upper aerodigestive tract.
Interaction between sympathetic and parasympathetic nerves may also be involved in the pathophysiological mechanisms of gustatory rhinitis [27]. Strong sympathetic nerves stimulation is known to induce the release of both noradrenaline and neuropeptide Y (NPY) [8,28-30]. This neuropeptide is known to have several biological properties such as potent vasoconstrictor and neuromodulation of both sensory and parasympathetic nerves activity [8,29-31]. One possible mechanism underlying gustatory rhinitis could be a marked reduction of NPY inhibitory activity on parasympathetic activity [8,27-29,31]. In a prospective study, 15 patients suffering from severe gustatory rhinitis, a significant reduction of NPY immunoreactive nerves fibers was observed in their middle turbinate mucosa biopsies. In addition, the application of exogenous NPY onto their nasal mucosa was followed by a marked reduction of their watery rhinorrhea induced by food intake (Lacroix et al.: personal communication).

DIAGNOSIS

Currently, there are no standard objective tests for the diagnosis of gustatory rhinitis [4], which is usually based on clinical history and exclusion of other types of chronic rhinitis [23]. A food-reaction questionnaire, assessing the implicated types of food and avoidance behaviour, is very useful in obtaining history details [4].

In order to confirm the diagnosis of gustatory rhinitis, Franceschini et al. stimulated the tip of the tongue of patients with lemon juice, and confirmed the initiation of rhinorrhea [7]. Raphael et al. exposed patients to skin tests to exclude an allergic reaction and subsequently performed food challenges to the foods that were implicated by history [1]. All the subjects that had a history indicating gustatory rhinitis had watery rhinorrhea during the food challenge, but did not have any other nasal symptoms.

DIFFERENTIAL DIAGNOSIS

A range of different conditions may cause watery rhinorrhea, occurring during or immediately after food ingestion. Rhinitis may be triggered by food or alcohol [2,3]. Food allergy, hypersensitivity and food intolerance are terms used to describe the spectrum of food intake associated disorders (immunological

and non-immunological), which can be to the food per se or to colorants and preservatives [2,18,25]. Rhinitis can be caused by true IgE mediated food allergy, but occurs rarely as an isolated manifestation. In the majority of patients, it will present with concomitant symptoms and signs, from two or more organ systems (gastrointestinal, respiratory, skin)[1-3,18]. Non-immunological factors which can be responsible for rhinitis are: 1) neurogenic (as in gustatory rhinitis), 2) psychosomatic or emotional and 3) additive-induced (colorants and preservatives) [18]. Alcoholic beverages can produce a physiological vasodilatation and nasal congestion related to alcohol, but can also provoke symptoms due to hypersensitivity to their different components such as metabisulphites [2,3].

Aspirin and other non-steroidal anti-inflammatory drugs (NSAIDs) produce nasal symptoms, predominantly rhinorrhea, which can be isolated, but is usually part of "aspirin-triad", involving chronic rhinosinusitis with nasal polyps and asthma [25,32,33]. Many drugs, other than NSAIDs, cause nasal symptoms, predominantly nasal blockage, with watery secretion, postnasal drip and sneezing as accompanying symptoms [23,25,32].

Nonspecific nasal hyperreactivity can be defined as an increased nasal response to a normal stimulus resulting in sneezing, nasal congestion and secretion, in various combinations [25]. This phenomenon can be observed after different types of nasal stimulation including consumption of hot drinks, hot and spicy foods and alcoholic beverages, with more than one trigger in the majority of cases [3,25,34].

Clear profuse watery rhinorrhea can be suggestive of allergic rhinitis. However, gustatory rhinorrhea lasts only as long as the food is eaten, and there is no nasal or oropharyngeal pruritus, nasal congestion, sneezing, or conjuctival itching, all of which are characteristics of allergic rhinitis. Finally, skin tests with extracts of implicated foods are negative in subjects with gustatory rhinitis [1].

Rhinitis in the elderly (people over 65), or senile rhinitis, is one of the best examples of nasal hyperresponsiveness of the parasympathetic neural system after sensory nerves stimulation [2,3,23,25]. It is also called the "old man's drip". It is a profuse clear watery rhinorrhea (with no other nasal symptoms), that forms a dewdrop at the end of the nose, occurs throughout the day, but may be aggravated after eating [2,3,25,35].
Increased cholinergic hyperreactivity has also been documented in patients with and without allergy, as well as in patients with recent upper respiratory tract infections [3].

TREATMENT

Avoidance of the provocative food, especially hot and spicy, should be the first treatment option. It reduces and sometimes completely prevents gustatory rhinorrhea. If the avoidance is not sufficient, intranasal anticholinergics can be used [1,25,36]. Topical, intranasal atropine is the drug of choice, but intranasal ipratropium and oxitropium bromide are also proven to be efficacious [1,3,25,36,37]. Intranasal anticholinergics can be used prophylactically, just before intake of the offending food, or therapeutically [3,5,35,37]. The concomitant use of ipratropium bromide and an intranasal corticosteroid is more effective than administration of either drug alone [3].

Surgical therapy in the form of posterior nasal nerve resection or vidian nerve neurectomy [5,10] is not recommended, because of its short lasting effect or may even be ineffective, and is associated with frequent unpleasant side effects. The lack of satisfactory outcomes after surgical section of the vidian nerve is most likely due to the presence of both sympathetic and parasympathetic fibres. Gustatory rhinorrhea following bilateral parotidectomy has been successfully treated with bilateral vidian neurectomy, but the problem is that re-innervation can occur [10,23].

Topical intranasal application of capsaicin is described to be efficient in producing long-term reduction of symptoms in non-allergic and noninfectious perennial rhinitis patients [21,23,34]. This therapeutic effect is possibly due to the reduction of nasal hyperreactivity, resulting from the desensitization and occasionally degeneration of C-fibres [21-23]. Although there is a need for further studies, it appears that intranasal capsaicin might be the treatment option for intractable gustatory rhinorrhea.

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