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Case of ageusia from a variety of causes

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Abstract
We report a case of a 31-year-old woman with ageusia. Her ageusia was related to a variety of causes including an unbalanced diet, administration of the anti-epileptic drug, carbamazepine and psychological factors. Her taste function recovered after stopping the carbamazepine and treatment with liver extracts and zinc sulphate.

Key words: Ageusia; Anorexia; Carbamazepine; Liver extracts; Zinc

Introduction

We have observed 395 patients with dysfunctions of smell or taste at the Smell and Taste Clinic in the Department of Otolaryngology, Kagoshima University Hospital, between January 1991 and April 1993.

We report a case of ageusia related to a variety of causes and discuss the aetiological factors in taste dysfunction.

Case report

A 31-year-old Japanese woman began dieting in the middle of February 1993. Her meals consisted of sandwiches and milk for breakfast, dried noodles for lunch, and some sweets and/or vegetables for dinner. After one month, she had lost 5 kg in body weight. At the beginning of March, she had a common cold, and she noticed hypogeusia one week later. The level of taste function become worse, progressing to ageusia by the time she first visited a doctor. The patient had had epileptic episodes once or twice per month, and had been treated with the antiepileptic drug, carbamazepine since February 1993. She had experienced syncope in July 1992.

At her first visit to our clinic we observed a white coating on her tongue and an erosion at the angle of her mouth. Electrogustometry and the taste quality identification test in the whole mouth and on specific tongue areas revealed a markedly increased threshold (Janneane *et al.*, 1986; Furuta *et al.*, 1992) (Table I). The patient complained of a constant bitter taste in her mouth. The presence of hepatic dysfunction was indicated by laboratory examinations (Table II). Fungiform papillae were seen on the tongue surface by videomacroscopy. Applanation and few capillaries were observed under the mucous membrane at low magnification. At high magnification, however, applanation could not be detected, and some speckled capillaries were present (Figure 1). We consulted with specialists in psychosomatic medicine in our hospital, who diagnosed her condition as reactive anorexia; her eating behaviour tended to react to stress. Because of the hepatic disorder, we also consulted with the digestive disease department.

We initially suspected that the taste disorder was caused by drugs or by viral hepatitis. The patient improved in general status while she was in a nearby private hospital. Medication with carbamazepine was discontinued. Glutathione 200 mg and stronger neo-minophagen C 20 ml which includes glycyrrhizin 40 mg, aminoacetic acid 400 mg and L-cysteine hydrochloride 20 mg a day as drugs for improving liver dysfunction and zinc sulphate 300 mg a day

TABLE I
RESULTS OF TASTE FUNCTION TESTS BEFORE, DURING AND AFTER TREATMENT

			Initial visit (31/3/93)	During treatment (13/4/93)	After treatment (27/4/93)
Electrogustometry average (dB)			S.O.	17	15
Taste quality identification test	Whole mouth	Threshold level	3.25	3.3	1.5
		Recognition level	5	4	1.8
	Specific tongue areas (%)		0	25	75
Salsave			S.O.	S.O.	0.8
Serum zinc			76	/	/
Serum copper			130	/	/

Salsave; Threshold test using the NaCl solution-soaked filter paper technique
S.O.; scale out

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TABLE II
LABORATORY FINDINGS BEFORE, DURING, AND AFTER TREATMENT

	Initial visit (31/3/93)	During treatment (13/4/93)	After treatment (27/4/93)
WBC (/1)	4.7×10^9	11.3×10^9	6.8×10^9
RBC (/1)	5.06×10^{12}	5.06×10^{12}	4.71×10^{12}
Hb (g/dl)	14.1	14	13
Plt (/1)	2.38×10^{11}	3.3×10^{11}	3.5×10^{11}
Eosinophil (%)	7	23	4
GOT (nkat/1)	4200	620	380
GPT (nkat/1)	9590	2696	752
LDH (μkat/1)	12.2	10.2	7.6
ChE (μkat/1)	5.1	4	4.5
LAP (μkat/1)	2.9	1.7	1.3
ZTT (Ku.U)	5.6	4.7	7
TTT (Mc.U)	1.2	0.9	1
T. Bil. (mg/dl)	0.6	0.3	0.3
γ-GTP (μkat/1)	9.8	4.8	2.7

WBC: white blood cell; RBC: red blood cell; Hb: haemoglobin; Plt: platelet; GOT: glutamate oxaloacetate transaminase; GPT: glutamate pyruvate transaminase; LDH: lactate dehydrogenase; ChE: choline esterase; LAP: leucine aminopeptidase; ZTT: zinc sulphate turbidity test; TTT: thymol turbidity test; T. Bil.: total bilirubin; γ- -GTP: γ- -glutamyl transpeptidase

were administered. A dietary plan was begun. Hepatic function gradually improved, but eosinophilia occurred during treatment (Table II). The hepatic dysfunction was now thought to be drug-related, probably due to carbamazepine. After one month of treatment; the threshold on electrogustometry returned to normal (Table I). The patient was discharged on May 1, 1993.

Discussion

The sense of taste is involved in the digestive process. Depending on the degree of dysgeusia, the digestive process may be impaired and nutrition is affected (Mattes and Cowart 1994; Mattes, 1995). Our patient had begun an unbalanced diet in an effort to reduce her body weight. Poor nutrition was thought to have had some influence on her hepatic function. Serum levels of both glutamate oxaloacetate transaminase and glutamate pyruvate transaminase, which are intracellular enzymes that escape from hepatocytes during hepatolysis, were elevated. Serum choline esterase, which is considered a criterion of hepatic reserve, was within normal limits. We now believe that it was her poor nutrition that caused the hepatic dysfunction, not the long-term effect of drugs (Smith *et al.*, 1976).

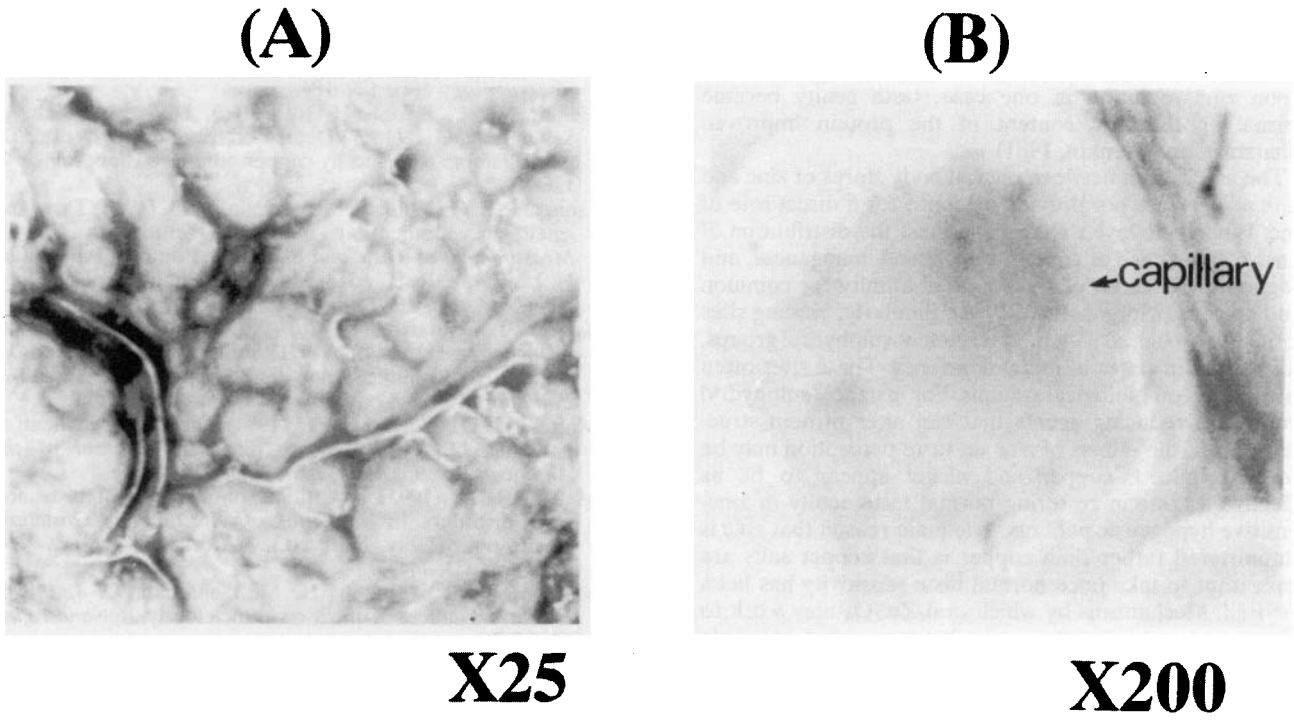

FIG. 1
Findings on videomacroscopy of the tongue surface. A, × 25. B, × 200.

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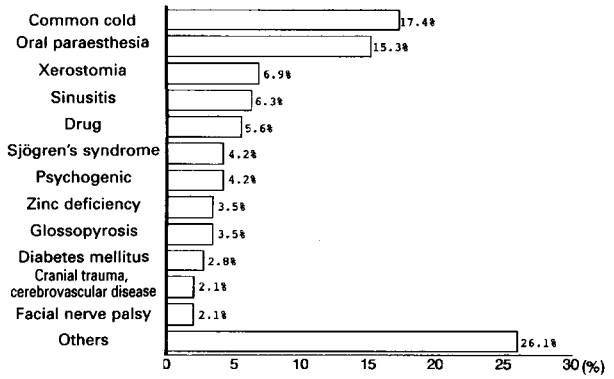

FIG. 2

Causes of depressed gustatory acuity among 395 cases seen at the Smell and Taste Clinic of the Kagoshima University.

A wide variety of drugs have been reported to cause taste loss and/or dysgeusia, including antimicrobial agents, antineoplastic agents, cardiovascular drugs, antipsychotics, tranquilizers and antidepressants, and many others (Mott and Leopold, 1991). At our clinic, only about six per cent of cases were drug-related (Figure 2).

The role of divalent cations in chemosensory disorders was reported for the first time in 1967. (Henkin *et al.*, 1967). After this, the studies in animals such as the rat and mouse (Brosvic *et al.*, 1992; Kondo *et al.*, 1987) and double-blind study of the therapeutic efficacy of zinc gluconate on taste disorder (Yoshida *et al.*, 1991) were performed to examine the relationship between taste acuity and zinc deficiency. The results suggested that zinc deprivation induced decreased gustatory sensitivity and that zinc played an important role in taste.

It has been hypothesized that the major salivary zinc-containing protein (Shatzman and Henkin, 1980) directly influences taste sensitivity. This is because the amount of zinc in the protein in hypogeusic patients is decreased. Upon zinc repletion in one case, taste acuity became normal as the zinc content of the protein improved (Shatzman and Henkin, 1981).

The association between overall body stores of zinc and taste acuity does not provide evidence for a direct role of zinc. When zinc levels change, so must the distribution of other cations, such as copper, iron, nickel, manganese, and magnesium, because of their mutual affinity for common binding sites (Morgan *et al.*, 1986). Similarly, binding sites normally associated with metals, such as sulphydryl groups, will be free in states of metal deficiency. These sites often have effects on biological systems. For instance, sulphydryl groups are reducing agents that can alter protein structures. Thus, the effects of zinc on taste perception may be indirect. Indeed, copper and nickel appear to be as effective as zinc in restoring normal taste acuity in zinc-sensitive hypogeusic patients. The main reason that zinc is administered rather than copper is that copper salts are unpleasant to take once normal taste sensitivity has been restored. Mechanisms by which oral $ZnSO_4$ may work to restore taste are uncertain; conclusions cannot be made from studies in which it is fed to patients or animals (Price, 1986).

Carbamazepine is known to cause dissociated ageusia. Although the patient's serum level of zinc was within normal limits, we treated her with $ZnSO_4$, 300 mg a day. The zinc may have helped her gustatory sensitivity especially if the latent deficiency of intracellular zinc had returned to normal.

About eight per cent of cases of dysgeusia involve psychogenic factors (Tomita and Endo, 1988). A form of mental stress similar to anorexia nervosa was found in the present case.

Chemical substances that are soluble in saliva become the basis for a taste solution. When the taste solution comes into contact with a receptor cell, the sense of taste is perceived. Under mental stress, there is continuous stimulation of the autonomic nervous system, so that salivation may decline. This is supported by the presence of an autonomic nervous reflex loop that participates in metabolism at the brain stem level, in the nucleus solitarius. Abnormal salivation occurs with the hypersympathicotonus induced by mental stress. Psychosomatic dysgeusia usually occurs in conjugation with local factors such as disordered salivation. As there are many possible causes in patients with taste dysfunction, we need to consider how each factor relates to the condition and how it affects each other factor. In the present case, when we consider the time at which the depressed gustatory acuity occurred, when the patient started dieting, and when she was medicated with carbamazepine, we conclude that the depressed gustatory acuity was the result of poor nourishment, which arose from a psychogenic factor. A cold may have acted as the trigger. Although a white coating was seen on her tongue by the naked eye, the shape of the papillae was nearly normal under high magnification. Therefore, gustatory function could recover dramatically with conservative therapy, mainly dietary, in a short period.

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