Chronic Piscine Diet Induced Metallic Phantogeusia, Dysgeusia and Hypogeusia

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Objective

Classic arsenic poisoning includes rash, weakness, paresthesia, hoarseness, and gastrointestinal problems (Morton & Caron, 1989). Consuming fish contaminated by mercury induces ataxia, dysarthria, and constriction of visual fields (Takeuchi, Eto, & Eto, 1979). Amongst these other symptoms, metallic taste has been reported in both conditions (Hartman, 1995). A detailed description of chemosensory dysfunction as a primary complaint in an individual exposed to both heavy metals through ingestion of seafood has heretofore not been described.

Methods

Case Study: A 54 year-old male academician with a past history of hypothyroidism, after adhering to a fish for one year. This diet consisted of fish and only fish but without consumption of tuna or swordfish. He complained of two and a half months of a yellow tongue coincidence with onset of metallic sensation, primarily on the posterior tongue, and excessive saliva which had a bad taste. Since onset, there has been no change in the intensity of the metallic taste, 3/10 in severity. Tongue scraping improved the metallic taste for approximately six hours. Eating carrot soup with ginger intensified the taste, while blueberries masked it. The metallic taste combined with food, making the food and even water tasted metallic. He denied any other chemosensory problems and could easily detect salt, sour, sweetness, and bitterness. He also denied any peripheral or central nervous or psychiatric symptoms. In particular, there was no numbness, weakness, paresthesias, rash, dysarthria, or cognitive, psychiatric, gastrointestinal, or visual symptoms.

Results

Abnormalities in Physical Examination: General: 1 + bilateral pedal edema, tongue anteriorly bifid and scalloped with a light yellow tint, decreased blink frequency. Neurological Examination: Mental Status Examination: Normal including clock drawing test and semantic fluency test. Cranial Nerves: IX, X: Uvula deviated to right, XII: tongue deviated to right on protrusion. Motor: Drift testing revealed left abductor digiti minimi sign and left cerebellar spooning. Gait: Gait with decreased arm swing. Reflexes: 2+ both upper extremities, 3+ both lower extremities with pendular bilateral quadriceps femoris reflexes. Chemosensory Testing: Quick-Smell Identification Test: 2/3 (Jackman & Doty, 2005) Brief Smell Identification Test: 10/12 (Normal for Age and Sex) (Doty, Marcus, & Lee, 1996). Retro-nasal smell: Jelly bean difference test: 5/9 (Hirsch, 2013). Propylthiouracil Disc: 10/10 (DeVere & Calvert, 2010). Taste Testing Threshold: Normogeusia to salt, HCl, and PTC; Ageusia to sucrose and urea (DeVere & Calvert, 2010). Urine: inorganic arsenic: normal, Organic arsenic: 39 mcg/L, predominately arsenobetaine (found in seafood). Mercury: Normal. Vanadium: Normal Blood: Arsenic 21 ng/mL (normal less than 12) Mercury: 15 ng/mL (normal less than 9). Vanadium: Normal. With continuation of seafood, symptoms gradually resolved.

Discussion

While phantogeusia has been observed after industrial exposure to mercury, taste thresholds have not been assessed (Henkin, 1975). Ambient exposure to arsenic in dust and water has also been demonstrated to be associated with chemosensory deficit (Hirsch, 1995). A postulated mechanism for the taste findings is concentration of metals in saliva which then acts to disrupt taste transduction, reception, or a dysfunction in the central gustatory pathways (Halpern, 1982) (Cowart, B.J., Young, I.M., Feldman, R.S., & Lowry, L.D., 1997). While it has been considered that arsenobetaine is non-toxic, the findings in this patient questions its benign nature (Francesconi, Tanggaar, McKenzie, & Goessler, 2002). In fact, psychosis resembling schizophrenia has been reported with intoxication with organic arsenic (Windebank, McCall, & Dyck, 1984). In other cases, exposure to arsenic has led to a significant neurological and physiological impairment (Kilburn, 1998). Other possible origins for this patient's chemosensory problems warrant consideration. While hypothyroidism has been associated with hyposmia, its effects on taste are less clear (Beard & Mackay-Sim, 1987). Some studies suggest elevated taste thresholds and other suggest no effect, suggesting the taste deficit is a result of the loss of retronasal smell (Doty, 2005). While hypothyroidism has been associated with dysgeusia (McConnell, Menendex, & Smith, 1975), patient complained of metallic phantogeusia has not been reported.

The yellow tongue has been reported with anemia and jaundice (Beaven, 1988). Amongst, reports of yellow tongue in metal toxicity, vanadium is the only agent to produce tongue discoloration (green) levels of which were normal in this patient (Venkataraman & Sudha, 2005). Tellurium (yellow and metallic taste) (yarema). While Tellurium was not tested for because of the low concentrations, Vanadium was tested and was normal. Tongue scraping subjectively improved the metallic taste sensation of the patient. Tongue cleaning, which involves the use of a tongue scraper, has shown to improve taste sensation (Quiryen, Avontroodt, Soers, Zhao, Pauwels, & Steenberghe, 2004). However, this taste improvement has been attributed to reduction in bacteria rather than physiological change. Along with jaundice, the tongue appeared scalloped, meaning irregularly shaped and half-circles indentations around the tongue. These irregularities are caused by the tongue pressing against the teeth due to swelling. Swelling of tongue may occur because of nutrient deficiency and hypothyroidism (Ji, Zubkov, Wijdicks, Manno, Rabinstein, & Kotagal, 2008). As previously stated, the patient exhibited hypothyroidism as well as significant weight loss, possibly attributed to nutrient deficiency.

The patient displayed other physical anomalies such as decreased blink frequency and arm swing. The blinking mechanism is controlled by the dopaminergic pathway in the nervous system, so reduction in blinking can be attributed to a deficiency in dopamine (Karson, 1988). As a result, many patients that suffer from Parkinsonism show a decrease in blink frequency. The onset of Parkinsonism can explain the reduction in arm swing as a slight loss of motor function. The reduction in pendular reflexes lends further support to the notion, and from exposure to these hard chemicals, the development of Parkinsonism is possible (Bain, 1993).

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