



Risk of Recurrent COVID-19 Vaccination: Exacerbation of Hyposmia

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ABSTRACT

While COVID-19 immunization improves olfactory ability, it is reported to cause hyposmia. This is described in two patients with the onset of hyposmia after the second dose of mRNA COVID-19 vaccination. However, exacerbation of hyposmia after each of three doses of COVID-19 vaccination has not heretofore been described. A primary immune mechanism has been suggested since the infection-induced olfactory loss is frequently seen in autoimmune diseases and those with antinuclear antibodies and olfactory loss. In addition, spike proteins appear after COVID-19 vaccination that may affect alpha seven nicotinic acetylcholine receptors, deregulating acetylcholine pathways and causing a release of proinflammatory cytokines.

Keywords: Chemosensory dysfunction, COVID-19, Hyposmia

INTRODUCTION

COVID-19 has been identified as a cause of olfactory dysfunction in 47.85% of those infections, anosmia in 35.39%, and hyposmia in 36.15% [1]. In up to 30%, such hyposmia persists for the long term [2]. While COVID-19 immunization has been noted to improve olfactory ability, it has also been reported to cause hyposmia [3, 4]. Two patients with the onset of hyposmia after the second dose of mRNA COVID-19 vaccination have been documented [4]. Exacerbation of hyposmia after each of three doses of COVID-19 vaccination has not heretofore been described. Such a case is presented.

CASE PRESENTATION

This 52-year-old right-handed woman was nasute until two years prior to presentation when she developed cold symptoms and sudden onset of loss of smell and taste, with a positive Reverse Transcription-Polymerase Chain Reaction test for COVID-19. Over three weeks, her smell and taste gradually returned to 85% of normal. However, she could not smell the aroma of bleach or cut grass. One year before the presentation, she received her first Pfizer COVID-19 vaccination. One week after receiving the vaccine, her smell and taste diminished to 60% of normal. She found that she could not smell chemicals or flowers. When eating hamburgers, she could not taste the bun or the hamburger meat but could taste the condiments. Her smell and taste returned to 85%, typically two weeks later. Two months later, she received a second Pfizer vaccination which caused her smell and taste to drop again to 60% and return to 85% of normal after two weeks. Five months later, she received her third vaccination, after which her smell and taste dropped to 30% of normal, which remained diminished for one month and gradually returned to 85% of normal. Five months before the presentation, she developed nasal congestion after exposure to a family member with COVID-19. Her smell and taste dropped to 20%-50% of normal such that Windex had no smell and turkey, and red meat had no taste. Over the next two months, her smell and taste gradually improved but would vary daily, such that on her best days, it would be as high as 85%, and on worst days, it would drop down to 40% of normal. She admitted to palinomia for a few seconds, flavorful eructations, and first taste phenomena for crackers. She denied dysomia, cacosmia, phantosmia, dysgeusia, cacogeusia, phantogeusia and palinageusia. The patient provided informed consent and research reported in this paper adhered to CARE case report guidelines.

RESULTS

Abnormalities in the physical examination:

- General: 2+ Bilateral pedal edema.
- Bilateral palmar erythema

Neurologic examination:

- Cranial Nerve (CN) Examination: CN II: Fundoscopic Examination: Peripapillary Pigmentation OS.
- CN III, IV, and VI: right ptosis.
- Neuropsychiatric testing: Clock Drawing Test: 4/4 (average).
- Animal Fluency Test: 22 (average).
- Go-No-Go Test: 6/6 (standard).
- Chemosensory Testing: Olfaction: Brief Smell Identification Test: 9 (normosmia).
- Alcohol Sniff Test: 3 (anosmia).
- Suprathreshold Amyl Acetate Odor Intensity Test: normosmia.
- Suprathreshold Amyl Acetate Odor Hedonic Test: crossed pattern (abnormal).
- Dirhinus amyl (pentyl) acetate Test: -7.0 (hyperosmia).
- Retronasal Olfaction: Retronasal Index: 8 (normosmia).
- Gustation: Phenylthiocarbamide Taste Test: 10 (normogeusia).
- Waterless Empirical Taste Test: sweet: 7 (normogeusia) sour: 6 (normogeusia) salty: 6 (normogeusia) bitter: 8 (normogeusia) broth: (hypogeusia) total: 39 (normogeusia).

DISCUSSION

These findings of COVID immunization reduced olfactory ability contradict other reports suggesting that COVID-19 immunization improved COVID-19-induced chemosensory dysfunction [3]. Several explanations have been proposed for covid 19 immunization-induced hyposmia [4]. First, a primary immune mechanism has been suggested since infection-induced olfactory loss is frequently seen in those with antinuclear antibodies, and olfactory loss is present in numerous autoimmune diseases [5]. Spike proteins appear after COVID-19 vaccination that may affect alpha 7 nicotinic acetylcholine receptors, deregulating acetylcholine pathways and causing a release of proinflammatory cytokines. These cytokines may induce an inflammatory reflex, which induces neuronal signals that project via the vagus nerve to the brain stem. Efferent nerves from there project to the olfactory epithelium to induce a local inflammatory response [4].

CONCLUSION

While it is unknown whether the recurrent covid infection will also cause a similar olfactory deficit, given the above, in those who have immunization-induced hyposmia, consideration should be given to the risk of re-exacerbation of underlying olfactory loss.

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