

E-Cigarette Vaping-Related Vocal Fold Injury: A Case Report

*[†]Jérôme R. Lechien, [‡]Jean-François Papon, [§]Christelle Pouliquen, and *[†]Stéphane Hans, *^{†‡§}Paris, France

Summary: E-cigarettes heat a solution into an aerosol that is inhaled. This paper demonstrates that vaping can cause vocal fold injury such as the mucosal burn seen in the case presented.

Key Words: Dysphonia—Electronic—E-Cigarette—Vaping—Vocal Fold—Injury.

Vaping products, also known as e-cigarettes, are battery-operated devices, which heat a solution into an aerosol (vapor) that is inhaled. These products have been present in the U.S. for more than a decade¹ and may help patients to reduce or stop tobacco consumption. Although worldwide use is increasing, many questions remain about the impact of vaping on the vocal folds. In this letter, we report the history of a female who developed vaping-related vocal fold injury.

A 55-year-old female was evaluated to our Laryngology Department for a 2-month history of persistent aphonia, throat pain and globus sensation. The patient had consulted the ear, nose and throat emergency department 2 months previously for sudden dysphonia that occurred within hours after the misuse of a vaping product (e-cigarette). The patient explained that she forgot to fill the water chamber of the e-cigarette and, therefore, inhaled very hot vapor. She did not report swallowing dysfunction. She did not have dysphonia before this episode. The neurological and general examinations were unremarkable. The emergency otolaryngologist observed vocal fold erythema and left vocal fold ulceration (Figure 1A). The physician prescribed twice daily pantoprazole and referred the patient to a laryngologist. At the time of the laryngology consultation, the patient explained that the dysphonia persisted. Despite history revealed that she occasionally complained of throat clearing, sticky mucus and globus sensation. She had a tobacco history (20 pack-year), which led surgeon to perform a laryngoscopy to exclude malignancy that may present as erythroplakia lesion. This management respected the oncological guidelines of French Society of Otolaryngology.² Clinical examination showed a lesion on the left vocal fold and findings of laryngopharyngeal

reflux (ie, anterior pillar erythema, coated tongue, base of tongue hypertrophy, posterior commissure hypertrophy, left arytenoid erythema, and left laryngeal edema; Figure 1B & C). The patient sleeps on the left side, explaining the asymmetry of the vocal fold and laryngeal irritation. The dysphonia was perceived as severe (G3R2B3) and the voice handicap index was 60. A biopsy revealed reactive scar vocal fold and none of the following antibody markers: AE1/AE3, PS100, MUC4, Beta-catenin, STAT6, EMA, P63, HMGA2, SOX10, Desmin, and ALK1 (Figure 1D). The diagnosis of a vaping-related vocal fold injury was made. Three-month anti-reflux treatment, combining diet modification, pantoprazole (20 mg, once daily) and post-meal gaviscon (three times daily) was prescribed to enhance vocal fold healing by treating the laryngopharyngeal reflux (LPR) diagnosed clinically. The voice quality improved progressively but after the incident, moderate dysphonia persisted after 3 months of treatment (G2R2B2, VHI=10). Over 3 to 9-month, the patient progressively recovered, and she did not report vocal fold abnormalities at 9 months.

Vocal fold tissue is known to be impaired by tobacco³ and cannabis⁴; but, to the best of our knowledge, there was no report of vocal fold injury related to the misuse of vaping. In the present case, the inhalation of the hot vapor led to a mucosal burn, which appeared as erythema and an ulcerative lesion on the vocal fold. The mechanisms of such lesion remains poorly understood. According to the Hirano model,⁵ it is conceivable that the hot vapor burned the epithelium and damaged the Reinke space, leading to the ulceration. Both ulceration and related inflammatory reaction led to modifications of the biomechanical properties of the vocal fold and dysphonia. Interestingly, the patient had a unilateral vocal fold lesion and asymmetric laryngeal edema. The asymmetric lesion might be related to asymmetric protective and healing mechanisms. LPR is one of the most important condition that may alter protective and healing mechanisms of the vocal folds, including reduction of the carbonic anhydrase activity, mucin production and cell dehiscence healing.⁶ Moreover, LPR may present with asymmetric findings following sleep in the lateral recumbent position,⁷ and may predispose unilateral injury. This case may show a potential negative impact of e-cigarettes when misused. Even vaping correctly may prove unhealthy for vocal folds, however, patients who vape must be very careful to use vaping products

Accepted for publication June 23, 2021.

From the *Young-Otolaryngologists of the International Federations of Oto-rhinolaryngological Societies (YO-IFOS), Paris, France; †Department of Otorhinolaryngology and Head and Neck Surgery, Foch Hospital, School of Medicine, UFR Simone Veil, Université Versailles Saint-Quentin-en-Yvelines (Paris Saclay University), Paris, France; ‡Department of Otorhinolaryngology and Head and Neck Surgery, Le Kremlin-Bicêtre Hospital, APHP, Paris Saclay University, Paris, France; and the §Department of Pathology, Foch Hospital, School of Medicine, UFR Simone Veil, Université Versailles Saint-Quentin-en-Yvelines (Paris Saclay University), Paris, France.

Address correspondence and reprint requests to Jérôme R. Lechien, Department of Otorhinolaryngology and Head and Neck Surgery, Foch Hospital, School of Medicine, UFR Simone Veil, Université Versailles Saint-Quentin-en-Yvelines (Paris Saclay University), Worth Street, 40, F92150 Suresnes (Paris), Paris, France. E-mail: Jerome.Lechien@umonts.ac.be

Journal of Voice, Vol. 38, No. 1, pp. 195–196
0892-1997

© 2021 The Voice Foundation. Published by Elsevier Inc. All rights reserved.
<https://doi.org/10.1016/j.jvoice.2021.06.034>

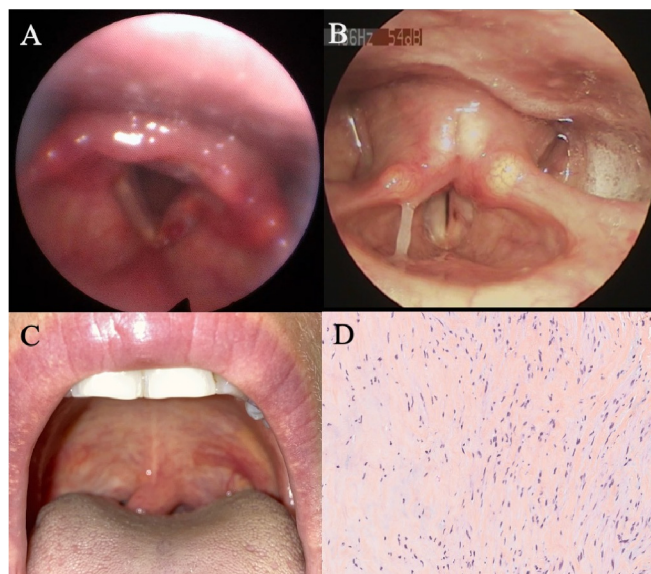


FIGURE 1. Clinical and histopathological of vocal fold injury. Erythema and ulceration of the left vocal fold was found at the initial clinical examination, a few hours after inhalation of the hot vapor (A). Laryngostroboscopic examination of the larynx showed a left vocal fold lesion (B). The patient reported that she sleeps on her left side, explaining the asymmetry of the anterior pillar, vocal fold and laryngeal irritation (B, C). Erythema of the left arytenoid was more important than erythema of the right. Biopsy of the left vocal fold was consistent with a reactive scar (vocal fold tissue fibrosis).

correctly, in accordance with the instructions of the manufacturers. In the present paper, the causal relationship cannot be established with certainty; the fact

that her voice was normal prior to vaping and dysphonic immediately following inadequate vaping suggests that possibility, and further study is recommended.

ACKNOWLEDGMENTS

Dr Morgan Tourne for the histopathological images.

CONFLICT OF INTEREST

Authors have no conflict of interest.

REFERENCES

1. Vickerman KA, Carpenter KM, Raskob MK, et al. Vaping and E-cigarettes within the evolving tobacco quitline landscape. *Am J Prev Med.* 2021;60(3S2):S142–S153. <https://doi.org/10.1016/j.amepre.2020.07.013>.
2. Vergez S, Morinière S, Dubrulle F, et al. SFORL. Initial staging of squamous cell carcinoma of the oral cavity, larynx and pharynx (excluding nasopharynx). Part I: locoregional extension assessment: 2012 SFORL guidelines. *Eur Ann Otorhinolaryngol Head Neck Dis.* 2013; 130:39–45. <https://doi.org/10.1016/j.anorl.2012.09.004>.
3. Zhang H, Wang Y, Bai X, et al. Cyclic tensile strain on vocal fold fibroblasts inhibits cigarette smoke-induced inflammation: implications for Reinke edema. *J Voice.* 2015;29:13–21. <https://doi.org/10.1016/j.jvoice.2014.06.001>.
4. Meehan-Atrash J, Korzun T, Ziegler A. Cannabis inhalation and voice disorders: a systematic review. *JAMA Otolaryngol Head Neck Surg.* 2019. <https://doi.org/10.1001/jamaoto.2019.1986>.
5. Hirano M. *Psycho-Acoustic Evaluation of Voice.* New York: Springer-Verlag; 1981.
6. Lechien JR, Saussez S, Harmegnies B, et al. Laryngopharyngeal reflux and voice disorders: a multifactorial model of etiology and pathophysiology. *J Voice.* 2017;31:733–752. <https://doi.org/10.1016/j.jvoice.2017.03.015>.
7. Urban MJ, Sataloff RT. Asymmetric laryngopharyngeal reflux findings following sleep in the lateral recumbent position. *Ear Nose Throat J.* 2020;99. <https://doi.org/10.1177/0145561319838406>. NP44–NP45.