

CASE REPORT

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# Hot Dab Associated Pneumonitis - a case report

Ratika Dogra<sup>1,5\*</sup>, Vallabh Dogra<sup>2</sup>, Himani Badyal<sup>3</sup> and Salil Avasthi<sup>4</sup>

## Abstract

**Background** Dabbing is recently getting popular among young adults. It is a new method of using the most active form of marijuana where large amounts of concentrated tetrahydrocannabinol are inhaled. Tetrahydrocannabinol is associated with a feeling of 'High' which makes the user feel joyous and relaxed. With increasing use of such techniques, dabbing becomes an important differential for evaluation of acute respiratory failure with pneumonitis especially in the adult population.

**Case presentation** A Fifty-one years old Caucasian man presented to the hospital with chest pressure and shortness of breath. The patient was noted to be hypoxic, desaturating down to 82–83% on nasal cannula oxygen. Imaging revealed bilateral lung infiltrates. Patient was started on high flow oxygen, broad spectrum antibiotics and intravenous corticosteroids. The patient gradually improved and was able to come off oxygen completely. He was discharged home on prednisone taper.

**Conclusions** Dabbing is a newer technique which has been gaining popularity for marijuana usage. With the legalization of marijuana, newer techniques are getting popular. Our case report emphasizes the importance of keeping dabbing as a differential when a patient presents with respiratory failure and has concerns for pneumonitis. Patients might not reveal until specifically asked about their practices.

**Keywords** Dabbing, Pneumonitis, Hypoxia, Tetrahydrocannabinol

## Background

Dabbing is common in the young population with increasing use of marijuana use. The active form of Marijuana called tetrahydrocannabinol is associated with feeling of pleasure and dabbing results in inhalation of large amounts of this active substance. We present a case of acute respiratory failure caused by dabbing, leading to pneumonitis and lung injury with patient needing high amount of oxygen. We often include e-cigarettes and vaping in our differential diagnosis when we evaluate acute respiratory failure without clear cause. However, some people only reveal dabbing when inquired about. These patients respond fairly well to steroids and timely diagnosis can help in effective treatment.

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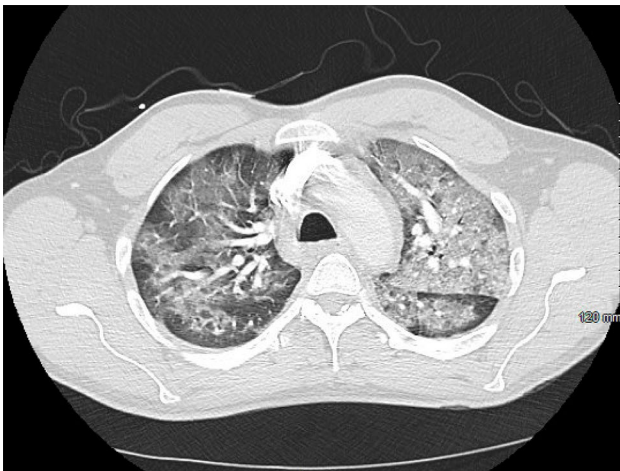
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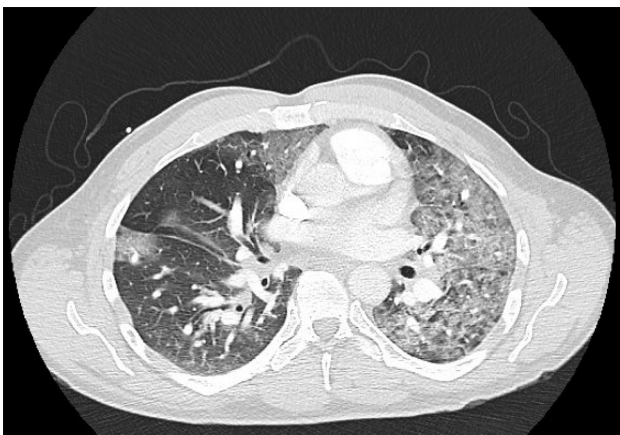
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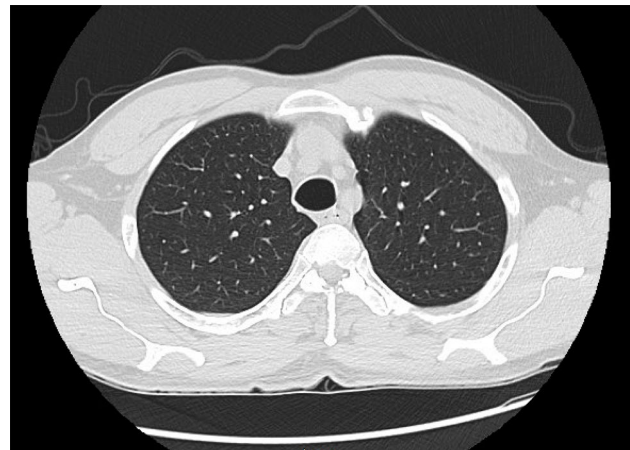
**Fig. 1** CT scan chest shows dense multifocal infiltrates in upper lung zones



**Fig. 2** CT scan chest shows dense multifocal infiltrates in lower lung zones, denser on left side

### Case report

A fifty-one years old Caucasian male with a past medical history of anxiety, previous motor vehicle accident with a right below knee amputation presented to the hospital with shortness of breath, chest pressure and cough. The patient had no previous pulmonary issues. Symptoms started around a week before the hospital presentation. The patient initially went to urgent care where he was noted to have hypoxia down to 80%. He was transferred to the hospital emergency room. He did report chills with subjective fever and pinkish colored phlegm. He reported worsening shortness of breath even at rest with pressure in the chest which was non-radiating. The patient reported that symptoms were worsening over the course of seven days. He denied any recent viral illness, no occupational exposure, no use of vaping or e-cigarettes. On further questioning and digging in the history the patient revealed that he had been dabbing with his friends. Initial vitals showed a Pulse rate of 56 beats/min, T<sub>max</sub> 97.7 E,



**Fig. 3** Ct Chest shows significant improvement in bilateral infiltrates in upper lung zones

blood pressure of 109/60 mmHg. Labs showed normal creatinine of 0.8 mg/dl, hypokalemia with potassium 3.5 mmol/L. Blood counts showed elevated white count of 13.4 k/microt, hemoglobin 13.6 gm/dl, normal platelets 176 k/microt. Troponin was 33 ng/l, trended down to 22 ng/l. The viral panel including Covid, Influenza, Parainfluenza and Rhino virus were negative. Sputum cultures were negative. Mycoplasma, Streptococcus pneumoniae, Legionella Antigen were all negative. 2 sets of blood culture were negative as well.

The patient required high flow oxygen at 40% FiO<sub>2</sub> to keep his saturations above 90%. Chest Xray showed bilateral infiltrates. The CT scan of the chest was concerning for bilateral dense infiltrates with ground glass opacities. Refer to Fig. 1 for upper lung zones and Fig. 2 for lower lung zones.

The patient was started on broad spectrum antibiotics Ceftriaxone and Azithromycin, corticosteroids Methylprednisolone 40 mg every 8 h and breathing treatments with albuterol and ipratropium. The patient showed significant improvement. Since all infectious workups were negative, antibiotics were stopped on Day 3 and steroids were continued. The patient was able to come off high flow oxygen and was discharged home on oral prednisone 40 mg tapering down 10 mg every week for 4 weeks. Repeat Ct imaging 3 months later showed significant improvement in bilateral infiltrates as shown in Fig. 3 with upper lung zones and Fig. 4 with lower lung zones.

### Discussion

The term *dabbing* is jargon that refers to the inhalation of vapors derived from marijuana-based oils, concentrates, and extracts [1]. Smoking or inhaling through joints or bongs, or ingesting through eating, remain common ways of marijuana use but another delivery method, dabbing, is undergoing scrutiny as more and more young person engage in it [2]. Dabbing is increasingly getting popular



**Fig. 4** Ct Chest shows significant improvement in bilateral infiltrates in lower lung zones

in teenagers and young adults. Cannabis dabbing is a mode of recreational use of marijuana where extremely concentrated tetrahydrocannabinol (THC) vapors are inhaled [3]. These preparations are made by extracting TCH from cannabis through a process that uses butane gas. These preparations are called butane hash oil (BHO) and are more potent than flower cannabis [4]. THC is the ingredient responsible for the “high” associated with marijuana use—feelings of euphoria, increased insightfulness, heightened sociability, sexual pleasure, and relaxation that many users say that they experience and enjoy [5]. Term “dab” refers to an amount of BHO product associated with a single use while “dabbing” refers to the act of administering that product [6].

The exact underlying pathophysiological mechanism behind dabbing induced pneumonitis is unclear, but it could be related to direct inhalation injury and maladaptive host immune response induced by butane or other impurities [7]. Chemical induced pneumonitis is frequently associated with vacuolated pneumocytes and lipid laden macrophages [8]. Homemade dabs and/or dabs obtained from an undependable source may contain residual solvents and other toxic substances including butane, pesticides, and conceivably carcinogenic contaminants [9]. Few case reports have been reported in the literature showing Dabbing induced lung injury. The temporal relationship between BHO exposure and the development of hypersensitivity pneumonitis is suggestive of a causal relationship [10]. One of the case report by Anderson et al. showed severe pneumonitis secondary to Butane hashoil inhalation in an 18 year old female [11]. The mechanism of the injury is unclear in most case reports and is suspected to be secondary to hypersensitivity pneumonitis [7].

Chest imaging can reveal bilateral diffuse lung opacities with picture of possible pneumonia. Chest CT images

show diffuse centrilobular nodules and tree-in-bud pattern and a histopathologic pattern of organizing pneumonia with or without patchy acute alveolar damage [12].

The treatment strategy involves complete avoidance of trigger, supportive care with oxygen till lungs get time to recover. Steroids play the mainstay for treatment for induced pneumonitis. Although the general goal is to aim for the lowest-possible dose and shortest duration of corticosteroids. The dosage and duration of treatment have not been determined in any study [13].

## Conclusion

Dabbing is a new recently becoming popular means for marijuana use. Dabbing can cause hypoxic respiratory failure with pneumonitis. It can be confused with possible multifocal pneumonia. Dabbing should be considered whenever we are suspecting substance associated lung injury like E-cigarette or Vaping use-associated lung injury (EVALI). These cases respond well to corticosteroids and thus timely diagnosis by keeping it in the differential is very important.

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Not applicable.

## Author contributions

Ratika Dogra MD: Primary author, did chart review, analyzed, interpreted data, collected images, wrote the case presentation, edited the case discussion. Vallabh Dogra MD: Analysed and interpreted the data, wrote the case presentation, helped in writing the pathophysiology, evaluation and treatment. Himani Badyal: Helped in writing abstract, discussion part. Salil Avasthi MD: Helped in chart review, writing abstract, treatment strategy, final editing of report.

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## Data availability

No datasets were generated or analysed during the current study.

## Declarations

### Ethics approval and consent to participate

Not applicable.

### Consent for publication

Written informed consent for publication was obtained from the participant of the case report.

### Competing interests

The authors declare no competing interests.

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## References

- Centers for Disease Control and Prevention. Marijuana and public health. How is marijuana used? 2018.
- Nierengarten MB. Dabbling in ‘dabbing’: a potent new delivery system for cannabis poses heightened risks for adolescents who use marijuana. *Contemp Pediatr.* 2016;33(2):34–6.

3. Miller BL, Stogner JM, Miller JM. Exploring butane hash oil use: a research note. *J Psychoactive Drugs*. 2016;48(1):44–9.
4. DualDiagnosis.org. BHO and butane toxicity. 2020. <https://dualdiagnosis.org/marijuana-treatment/bho-butane-toxicity/>
5. Murray RM, Quigley H, Quattrone D, Englund A, Di Forti M. Traditional marijuana, high-potency cannabis and synthetic cannabinoids: increasing risk for psychosis. *World Psychiatry*. 2016;15(3):195–204.
6. Stogner JM, Miller BL. The dabbing dilemma: a call for research on butane hash oil and other alternate forms of cannabis use. *Substance Abuse*. 2015;36(4):393–5.
7. McMahon MJ, Bhatt NA, Stahlmann CG, Philip AI. Severe pneumonitis after inhalation of butane hash oil. *Annals Am Thorac Soc*. 2016;13(6):991–2. <https://doi.org/10.1513/AnnalsATS.201602-101LE>.
8. Layden JE, Ghinai I, Pray I, Kimball A, Layer M, Tenforde MW, Navon L, Hoots B, Salvatore PP, Elderbrook M, Haupt T, Kanne J, Patel MT, Saathoff-Huber L, King BA, Schier JG, Mikosz CA, Meiman J. Pulmonary illness related to E-Cigarette Use in Illinois and Wisconsin - Final Report. *N Engl J Med*. 2020;382(10):903–16. <https://doi.org/10.1056/NEJMoa1911614>.
9. Alzghari SK, Fung V, Rickner SS, Chacko L, Fleming SW. (2017). To dab or not to dab: rising concerns regarding the toxicity of cannabis concentrates. *Cureus*, 9(9).
10. Haddad I, Al-Ghzawi F, Karakattu SM, Musa R, Hoskere G. Dabbing-Induced Hypersensitivity Pneumonitis *Cureus*. 2021;13(7):e16333. <https://doi.org/10.7759/cureus.16333>.
11. Anderson RP, Zechar K. Lung injury from inhaling butane hash oil mimics pneumonia. *Respiratory Med case Rep*. 2019;26:171–3. <https://doi.org/10.1016/j.rmcr.2019.01.002>.
12. Berkowitz EA, Henry TS, Veeraraghavan S, Staton GW Jr, Gal AA. Pulmonary effects of synthetic marijuana: chest radiography and CT findings. *AJR Am J Roentgenol*. 2015;204(4):750–7. <https://doi.org/10.2214/AJR.14.13138>.
13. Kokkarinen JI, Tukiainen HO, Terho EO. Effect of corticosteroid treatment on the recovery of pulmonary function in farmer's lung. *Am Rev Respir Dis*. 1992;145(1):3–5. <https://doi.org/10.1164/ajrccm/145.1.3>.

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