Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

The Journal of Emergency Medicine, Vol. 63, No. 1, pp. e31–e33, 2022

0736-4679/$ - see front matter

https://doi.org/10.1016/j.jemermed.2022.01.031

Clinical Communications: Adult

Not Feeling Swell: Superior Vena Cava (SVC) Syndrome Falsely Attributed to COVID-19 Vaccine Reaction

Bryan P. McNeilly, MD,* and R. Gentry Wilkerson, MD†

*Department of Emergency Medicine, University of Maryland Medical Center, Baltimore, Maryland, and †Department of Emergency Medicine, University of Maryland School of Medicine, Baltimore, Maryland

Reprint Address: Bryan P. McNeilly, MD, Department of Emergency Medicine, University of Maryland Medical Center, 110 S Paca St., 6th floor, Ste 200, Baltimore, MD 21201.

□ **Abstract—Background: The mass immunization campaign against Coronavirus disease 2019 (COVID-19) has resulted in more patients presenting to the emergency department (ED) with concern for a vaccine reaction. Case Report: A 68-year-old man presented to the ED reporting an allergic reaction to the COVID-19 vaccine. He initially noted swelling of his face, neck, and right arm after receiving the first dose of the vaccine. After his second dose of the vaccine, the swelling became more pronounced and prompted him to seek care. On examination, he had fullness of the neck and engorgement of the left external jugular vein, which were exacerbated when the patient raised his arms above his head, consistent with Pemberton's sign. Apart from the swelling of the head and neck, there were no other findings consistent with an allergic reaction. The presence of Pemberton's sign prompted a computed tomography scan of the chest with contrast, which revealed a paratracheal mass measuring 4.5 × 2.0 cm with marked narrowing of the superior vena cava (SVC). The patient was admitted to the hospital for SVC syndrome, and further workup revealed a non-small cell lung cancer. Why Should an Emergency Physician Be Aware of This?: Patients may misattribute their symptoms to a COVID vaccine reaction when they are, in fact, experiencing a more serious underlying disease. This case highlights the importance of a thorough physical examination and maintaining a broad differential diagnosis. In this case, the presence of Pemberton's sign raised suspicion for SVC syndrome, and prompted further workup. © 2022 Published by Elsevier Inc.**

□ **Keywords—Pemberton's sign; SVC syndrome; non-small cell lung cancer; COVID-19; vaccine reaction**

Introduction

Severe Coronavirus disease 2019 (COVID-19) vaccine reactions are rare; however, with millions of people being vaccinated in the United States, some have presented to the emergency department (ED) with concern for a vaccine reaction, which may be accompanied by high-risk symptoms (1–3). Distinguishing which complaints are truly due to a vaccine reaction as opposed to a more serious underlying disease can be challenging. A thorough history and examination are critical in guiding an appropriate workup. In the case described in this report, a simple physical examination maneuver led to clinical suspicion of an alternate etiology for the patient's symptoms. A computed tomography (CT) scan of the patient's chest led to the diagnosis of superior vena cava (SVC) syndrome and suspicion for an underlying malignancy.

Case Report

A 68-year-old man presented to the ED reporting an allergic reaction to the Pfizer (New York, NY)-BioNTech (Mainz, Germany) COVID-19 vaccine. After receiving his first dose of the vaccine a couple of weeks prior to presentation, he perceived progressive swelling to his face,

Received: 2 January 2022; Final submission received: 14 January 2022;
Accepted: 25 January 2022

Figure 1. Image demonstrating increased facial plethora and engorged left internal jugular vein when the patient raises his arms above his head, consistent with Pemberton's sign.

neck, and right upper extremity. After the second dose, he noted further progression of the swelling, as well as lightheadedness provoked by bending forward at the waist. He denied fevers, chills, chest pain, shortness of breath, cough, difficulty swallowing, and abdominal pain. He is a daily smoker with a 20-pack-year history. He reports smoking crack cocaine three to four times per week but denies a history of intravenous drug use.

On examination, he was in no acute distress, tolerating his secretions and breathing with normal respiratory effort. There was no swelling of his tongue or oral mucosa, his uvula was midline, his breath sounds were clear, and his skin was free of rashes. There was fullness of his neck and an engorged left external jugular vein, which were exacerbated when the patient raised his arms above his head, indicating the presence of Pemberton's sign (Figure 1).

A CT scan of the chest with intravenous contrast was performed, which revealed a right paratracheal mass measuring 4.5 × 2.0 cm with narrowing of the SVC to 2 mm in diameter (Figure 2A), as well as a 1.8 × 1.0 cm spiculated mass in the upper lobe of the right lung (Figure 2B). A venous duplex demonstrated thrombus within the right internal jugular vein with decreased flow in the upper extremities. During the patient's admission to the hospital a transbronchial needle aspirate was performed, revealing adenocarcinoma of the lung. He was started on anticoagulation prior to discharge. Outpatient radiation and chemotherapy was arranged prior to discharge.

Discussion

Adverse effects due to COVID-19 vaccines occur, but according to one study, only 5/803 (0.62%) required evaluation and treatment in the ED (1). Although this rate is low, the vast number of people being vaccinated has resulted in concern for COVID vaccine reaction being a not-infrequent presentation. The incidence of severe reactions is extraordinarily rare—only 2.5–11.1 cases per million vaccines administered (2). In a brief report by Fertel et al., the rate of admission for patients who presented to the ED with concern for an adverse reaction to a COVID vaccine was 17.9% (3)(). Most of these patient's had high-risk symptoms accompanying their chief concern, such as shortness of breath (12.6%) or chest pain (10.8%). Notably, the median hospital stay was 2.72

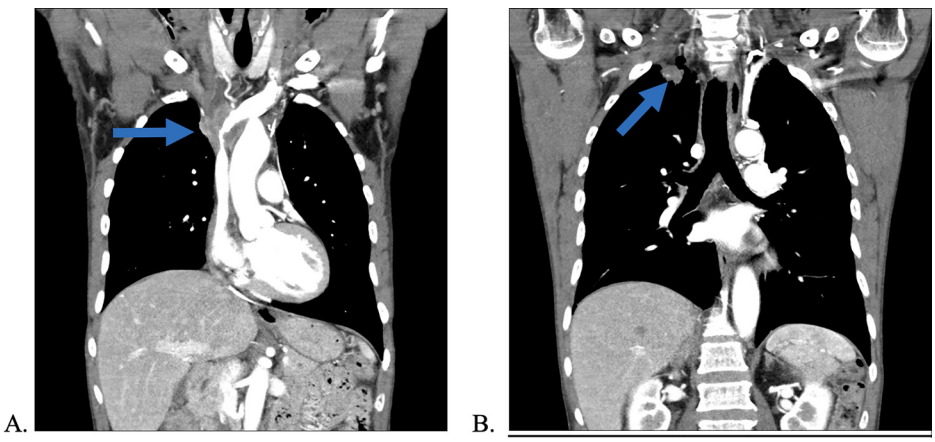

Figure 2. Computed tomography scan of the chest with i.v. contrast revealing (Panel A) a 4.5 × 2.0-cm mass causing narrowing of the superior vena cava to 2 mm in diameter (arrow) and (Panel B) a 1.8 × 1.0-cm spiculated mass in the right upper lobe of the lung (arrow).

days, significantly longer than a brief observation period. This suggests that these patients may misattribute their symptoms to the COVID vaccine when they are, in fact, experiencing a more serious underlying disease. Alternatively, a mild vaccine reaction could be drawing their attention to subtle symptoms of undiagnosed disease. Either way, this is yet another reminder of the importance of obtaining a thorough history and physical examination and maintaining a broad differential, regardless of the chief complaint.

For the patient presented, a thorough examination was critical in detecting this patient's underlying disease. The presence of Pemberton's sign prompted the CT imaging that revealed SVC syndrome and led to the diagnosis of lung cancer. Pemberton's sign is described as facial plethora and venous congestion developing when a patient places their arms above their head (4). It is thought to arise from a "nutcracker" effect, caused by the clavicles compressing a mass lying near the thoracic inlet. This can be caused by very large goiters as well as by masses within the thoracic cavity (5). Intrathoracic malignancy, most commonly non-small cell lung cancer, is responsible for most unprovoked SVC syndrome cases. It is the initial presenting symptom in 60% of these cases (6–8).

Why Should an Emergency Physician Be Aware of This?

The mass immunization campaign against COVID-19 has resulted in more patients presenting to the ED with concern for a vaccine reaction. It is important to remember that some patients may misattribute their symptoms to a COVID vaccine reaction when they are, in fact, experiencing a more serious underlying disease. In this case, the patient's diagnosis of lung cancer was made as a result of Pemberton's sign being found on physical examination, demonstrating the importance of a comprehensive examination and consideration of a broad differential diagnosis.

References

1. Kadali RAK, Janagama R, Peruru S, Malayala SV. Side effects of BNT162b2 mRNA COVID-19 vaccine: a randomized, cross-sectional study with detailed self-reported symptoms from healthcare workers. Int J Infect Dis 2021;106:376–81.
2. Blumenthal KG, Robinson LB, Camargo CA. Acute allergic reactions to mRNA COVID-19 vaccines. JAMA 2021;325:1562–5.
3. Fertel Baruch, Milk Jason, Simon Erin, McKinsey Muir, Smalley Courtney. COVID-19 vaccine adverse reactions bring patients to emergency departments. Am J Emerg Med 2021. doi:10.1016/j.ajem.2021.05.013.
4. Pemberton HS. Sign of submerged goitre. Lancet 1946;248:509.
5. De Filippis EA, Sabet A, Sun MR, Garber JR. Pemberton's sign: explained nearly 70 years later. J Clin Endocrinol Metab 2014;99:1949–54.
6. Rice TW, Rodriguez RM, Light RW. The superior vena cava syndrome: clinical characteristics and evolving etiology. Medicine (Baltimore) 2006;85:37–42.
7. Yellin A, Rosen A, Reichert N, Lieberman Y. Superior vena cava syndrome. The myth–the facts. Am Rev Respir Dis 1990;141:1114–18.
8. Schraufnagel DE, Hill R, Leech JA, Pare JA. Superior vena caval obstruction. Is it a medical emergency? Am J Med 1981;70:1169–74.