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No Vein, No Gain: A Case in which Cancer Treatment was Compromised by a Lack of Venous Access in an Intravenous Drug User

Bold I[1], Gabrovska M[1] and Bruyneel M[1,2]*

[1]Department of Pneumology, CHU Saint-Pierre, Brussels, Belgium and Université Libre de Bruxelles, Belgium

[2]Department of Pneumology, CHU Brugmann, Brussels, Belgium and Université Libre de Bruxelles, Belgium

Abstract

This case reports, for the first time, an unusual cause of death in an Intravenous (IV) drug user. This is the sad and frustrating story of a man suffering from lung adenocarcinoma. He was a good candidate for immunotherapy but we were not able to administer this treatment, as well as other IV supportive therapies, due to a complete inability to obtain adequate venous access. This is sometimes the fate of IV illicit drug users. To avoid this situation, prevention of infective and vascular disorders by specific health programs in people who inject drugs should be broadly encouraged.

Introduction

Drug abuse is a concern worldwide. Intravenous (IV) drug use is a major public health problem, the prevalence of which has increased significantly in the last few years. There are approximately 15.6 million People Who Inject Drugs (PWID) worldwide and this may be an underestimate of the real problem as the use of injection drugs is an illegal and stigmatized practice, making data collection and research challenging [1-3]. The majority of IV drug users are people between 15 and 34 years of age who engage in polytoxicomania (use of multiple toxic substances without apparent preference). Factors such as poverty, psychiatric disorders, homelessness, sex work, incarceration, and other psychosocial challenges influence IV drug use [1,2].

Sharing needles among PWID is a known risk factor for skin and soft tissue infections, infectious endocarditis, bacteremia/septicemia (particularly Staphylococcal in origin), and is a source for viral contamination with Human Immunodeficiency Virus (HIV), Hepatitis B Virus (HBV), and Hepatitis C Virus (HCV). Chronic HCV infection is observed in 16% to 49% of PWID in Europe [4,5]. In Belgium, in 2022, PWID accounted for 4% of new diagnoses of HIV [6].

Vascular complications, such as phlebitis and Deep Venous Thrombosis (DVT), occur with repeated injection of IV drugs, making venous access increasingly difficult. All areas of the body can be used for injection of drugs, but the femoral vein of the groin is a preferred site and this area is associated with complications in the lower limbs (*e.g.*, skin infections, edema) [4,7]. A wide range of substances can be injected (*e.g.*, heroin, cocaine, amphetamines, methadone), and these are associated with various inert additives such as lactose, talcum, silicate, and cotton. However, vascular injury results more from the injection itself than from the properties of the drug or the inert additives [7]. In the vascular bed, thrombosis results from endothelial damage secondary to chemical arteritis, vasospasm, and embolism of septic material. Vessel occlusion leads to venous congestion and distal ischemia, aneurysm formation, arteriovenous fistulation, and destruction of surrounding soft tissues. Management of vascular disorders in PWID is challenging due to delayed presentation, poor IV access, and chronic infection with HIV, HBV, and HCV [7]. In addition, lack of adequate care and cleaning of the injection site can lead to multiple complications after DVT in PWID such as Septic DVT (SDVT), post-thrombotic syndrome, venous leg ulcers, and chronic thromboembolic pulmonary hypertension [8].

SDVT is a common complication affecting large proximal veins and is commonly secondary to *Staphylococcus aureus* infection. SDVT is more prevalent in frequent, long-term drug users [8]. These patients can also develop life-threatening complications such as septic pulmonary embolism and right-sided infective endocarditis [9]. Treatment is based on IV antibiotherapy but also aims to prevent further embolization using different techniques to remove the thrombus including

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Correspondence:
Marie Bruyneel, Department of Pneumology, CHU Saint-Pierre, Brussels, Belgium and Université Libre de Bruxelles, 322 rue haute, 1000 Brussels, Belgium, Tel: +3225354219; Fax: +3225353362;

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catheter-directed thrombolysis, mechanical thrombectomy, surgical thrombectomy, and phlebectomy [7].

Chronic venous leg ulceration results from lower-limb injections, leading to compromised venous access due to collapsed veins, incompetent valves, and DVT. In a recent study, 53% of PWID described themselves as having difficult venous access [10].

In addition to having higher morbidity, PWID have been proven to have a much higher death rate than the general population, especially for heroin use [2,5]. For example, in 2022, opioids were implicated in 74% of deaths in European PWID. This is mainly related to the respiratory depression caused by these drugs (overdose) [5]. In a systematic review of 67 studies, the most common causes of death in PWID were overdose and HIV-related factors [11].

This case reports an unusual cause of death in which cancer care was compromised by factors related to the patient's intravenous drug use.

Case Presentation

A 48-year-old man was admitted for pain and swelling of the left arm. He was an active smoker (14 pack-years), and an active IV drug user (heroin) with a history of drug-related complications such has chronic HCV, repeated episodes of cellulitis (arms and legs), septicemia, and recurrent episodes of phlebitis and DVT. He had also a history of tuberculosis and syphilis.

At admission, a new episode of DVT was diagnosed at a drug injection site. The patient exhibited inflammatory syndrome, inflammatory anemia, and hemoptysis, leading to an extensive work-up. A chest Computed Tomography (CT) was performed and showed bilateral cervical, axillary, and mediastinal adenopathies, associated with bilateral lung condensations and pleural effusion. Heart echography revealed pulmonary hypertension (systolic PAP: 55 mmHg).

Disseminated enlarged lymph nodes led to a suspicion of lymphoma and endobronchial ultrasound was performed with cytopuncture of area 7 and 4R lymph nodes, leading to a diagnosis of lung adenocarcinoma with PDL-1 expression of 100%, and without oncogenic driver mutations. To rule out lymphoma and another active infection (*e.g.*, tuberculosis, syphilis), a surgical biopsy of the axillary lymph node was performed and also demonstrated lung adenocarcinoma metastasis. Fluorodeoxyglucose Positron Emission Tomography (FDG-PET) scan revealed disseminated uptake in lymph nodes and in apical nodules of the right lung (Figure 1). The patient was determined to have an Eastern Cooperative Oncology Group (ECOG) performance status of 2 and stage cT1cN3M1c cancer. Treatment with pembrolizumab was decided upon.

An attempt was made to place a peripheral catheter to administer a blood transfusion and pembrolizumab monotherapy. No veins were available. A port-a-Cath was preferred but the anesthesiologist's faced difficulties related to numerous bilateral cervical adenopathies and bilateral jugular vein thromboses. A Peripherally Inserted Central Catheter (PICC) line was finally placed into the left basilic vein. Thrombosis occurred two days later, despite Low Molecular Weight Heparin (LMWH) therapy. A new attempt to place a venous catheter was conducted by vascular surgeons. This resulted in successful placement of three venipunctures (cephalic veins and right femoral vein) but in all three cases a guidewire could not be passed through. The left femoral vein was occluded.

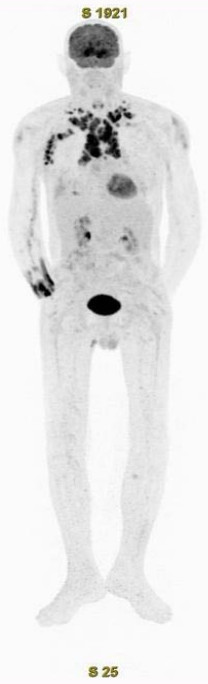

Figure 1: FDG-PET scan of the patient. An intense reuptake of FDG is observed at the level of the axillary, mediastinal, cervical lymph nodes, and on the right pleura, the lower lobe of the right lung, and the apex of the right lung.

Unfortunately, the patient deteriorated rapidly and developed severe thoracic pain. Palliative care was decided upon in the face of this therapeutic impasse. Morphine and midazolam were administrated subcutaneously and the patient died a few weeks later.

Discussion

This case reports, for the first time, an unusual cause of death in an IV drug user related to disseminated vascular complications, resulting in a complete inability to obtain adequate venous access to administer recommended lung cancer treatment.

This was the first experience of this type of difficulty in this tertiary public hospital. Hospital staff here are accustomed to caring for PWID but this complication was a first and it was disappointing to find that no similar cases have been reported. The literature on infective and vascular complications in PWID is abundant, and it is well known among physicians that, in emergency settings, some PWID die due to the inability to rapidly place a venous line.

Intravenous drug use is an epidemic that contributes to the poor physical, psychological, social, and economic well-being of millions throughout the world [1,5]. Currently, particularly in urban and multicultural settings, physicians try to offer equitable healthcare to PWID and to avoid/reduce stigmatization by routine multidisciplinary management, prescription of medication treatment for opioid use disorder, and use of appropriate language [9]. This is a work in progress, even if we are still far from the ideal situation. Unfortunately, the majority of health services are not designed to meet the needs of PWID, and this frequently results in premature termination of inpatient care, noncompliance, and treatment failure. For example, in patients with bacteremia, there is a high risk of incomplete treatment and premature termination of inpatient care [12]. The same has been observed for DVT treatment. First-

line treatment for DVT in PWID remains LMWH for 12 weeks [4]. However, accurate assessment of compliance with LMWH is complex, and one study showed that treatment lasted, on average, 6.5 weeks in real-life settings [13].

Withdrawal symptoms, aggressivity, and psychiatric conditions are also obstacles to care in PWID. Moreover, placing an IV access in these patients facilitates drug use during their hospital stay or outside, as reported in dialysis patients wearing a dialysis catheter [14]. This can be perceived by healthcare workers as a barrier to starting IV therapies.

In the present case, the compromised care the patient received was not related to either the patient's behavior or to inadequate care but was related to direct, severe, generalized complications of long-term IV heroin use, leading to a failure to achieve effective central line insertion.

This situation was particularly frustrating. The patient was young and had lung adenocarcinoma with high PDL-1 tumor expression (> 50%). In this potentially difficult-to-manage patient, we were able to make the diagnosis, to determine the appropriate treatment, and to obtain healthcare insurance reimbursement, but were ultimately unable to administer treatment for reasons related to poor vascular access that were not related to the patient's general condition.

Better overall management of PWID through specific health programs that aim to decrease infective and vascular injuries (*e.g.*, supervised injection facilities, needle exchange programs), to offer appropriate first-line care, and to propose medication treatment for opioid use disorder would help to avoid the severe vascular destruction that was observed in the present case [15].

Conclusion

This is an ethical lesson for the community. In this case, we faced an unprecedented situation in which venous damage prevented us from providing any form of medical support, and almost prevented us from administering palliative treatment.

Repeated IV drug injections killed this patient, not because of overdose or infection or DVT, but because of widespread venous damage. As we face a worldwide illicit drug epidemic, we, as health care workers, should develop and implement specific health programs that aim to avoid infective and vascular injuries in PWID and the subsequent harms and costs.

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