Case Report

Pulmonary embolism in anticoagulated burn patient: A case report

ABSTRACT

Venous thromboembolism (VTE) represents a continuous threat to burn patients. While many thromboprophylaxis regimens exist, the best prevention protocol remains indefinable. We report a case of a burn patient who developed pulmonary embolism despite receiving VTE prophylaxis.

Key words: Burn; cardiac arrest; pulmonary embolism; thromboembolic prophylaxis

Introduction

Burn patients have all the three components of Virchow's triad that may predispose to the development of venous thrombosis namely hypercoagulability, stasis, and endothelial injury.[1] Hypercoagulability from increased fibrinogen, coagulation factors level and platelet count; stasis from prolonged immobilization and multiple surgical procedures; endothelial injury from the systemic inflammatory response and mechanical trauma from central venous catheters.[2]

We report a case of a 54% total body surface area (TBSA) burn patient who developed pulmonary embolism two times despite receiving chemical and mechanical venous thromboembolism (VTE) prophylaxis.

Case History

A 43-year-old female patient (height 160 cm, weight 98 kg, BMI 38.3), transferred to the burn unit with 54% second- and third-degree flame burn in her upper limbs, lower limbs, and trunk before 2 weeks during which she was admitted in another hospital where she had burn escharotomy. She has a medical history of type 2 diabetes mellitus and her chest X-ray showed pneumonia, but she was maintaining good oxygen saturation on nasal cannula. Routine management for burn patients was started including deep venous thrombosis prophylaxis with subcutaneous unfractionated heparin.

Two days after admission the patient was taken to the operating room for debridement and skin grafting. During intubation she had an unexplained drop in oxygen saturation to less than 90% which improved gradually, and the patient was kept intubated and mechanically ventilated postoperatively. A computed chest tomography was done on the same day which showed acute right middle lobe segmental pulmonary embolism. Heparin infusion started and an inferior vena cava filter was placed. The patient was extubated after 10 days and maintained good oxygen saturation. A right sided peripherally

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inserted central catheter (PICC line) was done in the interventional radiology department 3 days after admission then removed and replaced in the left side due to right axillary vein thrombus and arm swelling. She underwent multiple excision and debridements with skin grafting under general anesthesia and heparin infusion was temporary suspended before each procedure. During bilateral lower limbs and back change of dressing under conscious sedation and almost after completion of the procedure the patient started to have respiratory distress and oxygen desaturation to less than 90% not responding to increasing the oxygen flow on the face mask, bag mask ventilation with 100% oxygen was started but the oxygen saturation did not improve, intubation was done and confirmed with carbon dioxide color conversion and chest auscultation. The airway pressure was high with sever bilateral wheezes which progressed to a silent chest inspite of giving salbutamol puffs through the endotracheal tube. She rapidly became bradycardic and hypotensive, intravenous atropine 1 mg and ephedrine 5 mg boluses were given but she deteriorated to pulseless electrical activity. Cardiopulmonary resuscitation was started and return of spontaneous circulation was successfully achieved after 2 cycles with one dose of epinephrine 1 mg given intravenously. Chest computed tomography was done which revealed new incidence of acute right upper, middle, and lower lobe segmental pulmonary embolism and enoxaparin was started. The patient stayed on mechanical ventilation and inotropic support for five days then she was extubated and maintained stable hemodynamics.

Discussion

The incidence of VTE in burn patients varies widely depending on many factors like age, obesity, wound infection, pneumonia, central venous access, TBSA percentage of burn, length of intensive care unit stay, and the number of surgical interventions.[3]

Unfortunately there is no solid evidence from randomized controlled trials for VTE prophylaxis in burn patients, as a result there is no guidelines section specific for burn patient in the VTE guidelines, expect the American College of Chest Physicians Evidence-Based Clinical Practice Guidelines 8th Edition published in 2008, and this was removed from the further updates[4] probably for the same reason. This could also be the reason for VTE management inconsistency between burn centers.

In a survey of the American burn association verified burn centers it was found that 23.9% of the centers do not routinely use either chemical or mechanical prophylaxis against VTE. Of those using VTE prophylaxis, 78% use chemical prophylaxis and 22% use mechanical prophylaxis.[5]

A retrospective cohort study of 1111 burn patients comparing unfractionated heparin and enoxaparin given for the prevention of VTE, 5 patients (0.45%) experienced a symptomatic venous thromboembolic event and all five events occurred in the unfractionated heparin group.[6]

Although there is a trend to use enoxaparin over unfractionated heparin for VTE prophylaxis in burn patients, standard dosing may be inadequate and dose adjustment achieved by measurement of anti-factor Xa levels or using certain dosing formulas that include patient weight and TBSA is recommended.[7]

Intermittent pneumatic compression devices offer a considerable benefit whether combined with chemoprophylaxis in high-risk patients or when used alone if the patient clinical condition precludes chemoprophylaxis.[8] The use of IVC filters in burn population is controversial as it was found to be associated with more resource utilization and higher mortality.[9]

The diagnosis of PE can become difficult due to the non-specific signs and symptoms like dyspnea, tachypnea, hemodynamic instability, right ventricular dysfunction, and PE is known as "the great masquerader". Bronchospasm and wheezes like the case presented can occur in PE as the initial presentation in some patients. The mechanism of bronchoconstriction in PE is not clear. It could be related to serotonin released from platelets of the clot. Another mechanism of bronchoconstriction could be due to reduction in PaCo2 in the affected areas of lung. Cardiac arrest in PE and in acute severe asthma will follow the standard advanced cardiopulmonary life support (ACLS) guidelines.[10-12]

A big number of VTE in burn patients can be clinically occult and about 25% of burn fatalities had autopsy evidence of small pulmonary emboli, so an early decision to provide prophylaxis should be made when the patient is admitted with daily assessment considering changes in the patient's clinical condition implementing predictive models and risk scores.[8,13]

Conclusion

Burn patients have multiple risk factors for VTE. Early risk assessment, high index of suspicion and early start of appropriate VTE prophylaxis can result in a dramatic improvement in patient outcome.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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