Unanticipated Acute Adrenal Insufficiency During Emergency Thoracotomy Re-Exploration

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Introduction

For the last 50 years there has been a debate over the management of corticosteroid supplementation in the context of surgical or critically ill patients. At a minimum, clinicians agree that chronic corticosteroids should be continued in the perioperative or ICU setting, however in patients without a history of steroid use, acute adrenal insufficiency as the cause of hemodynamic compromise can be an elusive diagnosis.

Case Report

We present the case of a 68-year-old male with squamous cell carcinoma of the right lower lobe. The patient had a 200-pack-per-year history of tobacco use and severe COPD requiring 2 L continuous home oxygen therapy by nasal cannula. Home medications included montelukast, simvastatin, and combivent inhaler. The patient underwent a bronchoscopy and mediastinoscopy for diagnostic purposes 12 days prior without complications.

A right thoraectomy with right lower lobectomy was performed after induction and maintenance of anesthesia using etomidate, propofol, fentanyl, vecuronium, and sevoflurane with a left-sided 39 fr double lumen ETT. Emergence was uneventful and the patient was transferred to the ICU in stable condition. Four hours later, the patient developed 200 cc/hr bloody chest tube output and a persistent air leak, so an exploratory thoracotomy was performed. The patient was aggressively resuscitated with crystalloid and blood products and the source of bleeding was located and controlled, however the patient became hypotensive and was unresponsive to vasopressors and inotropes.

A random cortisol level was drawn and corticosteroid therapy was immediately instituted with hydrocortisone 100 mg IV q 8 hours. All vasopressor and inotropic support was withdrawn within 12 hours. The cortisol level was 3 mcg/dL.

Discussion

The zona faciculata of a normal adrenal gland can secrete up to 100 mg/m² of cortisol per day during the perioperative period. A random plasma cortisol level >19 mcg/dL indicates normal adrenal function during periods of stress, with a further increase in direct proportion to the amount of stress.

Acute Adrenal Failure, also known as “Addisonian Crisis,” is defined as circulatory shock resulting from cortisol deficiency. There are multiple etiologies, however primary adrenal failure most commonly occurs in patients with chronic adrenal insufficiency after severe stress from surgery, trauma, or infection. Vascular and myocardial unresponsiveness to endogenous or synthetic catecholamines and hypovolemic shock are characteristic. The American College of Critical Care Medicine Task Force recently described the term “critical illness-related corticosteroid insufficiency” as signs and symptoms of adrenal insufficiency which respond to steroid therapy, but do not meet classic criteria for adrenal dysfunction.

Summary

The anesthesiologist or critical care physician should consider acute adrenal insufficiency as a possible etiology of unexpected refractory hypotension that presents during surgery in patients exposed to physiologic stress with no antecedents of adrenal dysfunction or suppression. Our case demonstrates a patient who rapidly responded to treatment with “stress-dose” steroids, when all other treatments were ineffective.