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Correspondence

1-Microgram-cosyntropin test for the evaluation of adrenal insufficiency in critically ill surgical patients

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EDITOR:

Recently interest in examining the role of the adrenal axis in sepsis has been renewed. Briegel and colleagues [1] reported that septic patients have an attenuated response to corticotropin stimulation testing during their acute illness. Furthermore, Annane and Bellissant [2] demonstrated that a high cortisol level and an attenuated response to corticotropin stimulation indicate relative adrenal insufficiency during sepsis that may increase mortality. A meta-analysis by Minneci and colleagues [3] confirmed that although short courses of high-dose glucocorticoids decreased survival during sepsis, a 5–7-day course of physiological hydrocortisone doses with subsequent tapering increased survival rate and shock reversal in patients with vasopressor-dependent septic shock. Based on these findings, the diagnosis and treatment of adrenal insufficiency is recommended in the surviving sepsis guidelines. Whether a high-dose, intermediate-dose or low-dose cosyntropin stimulation test is superior in the diagnosis of adrenal insufficiency and relative adrenal insufficiency remains controversial. Many hospitals have adopted the 1-μg low-dose cosyntropin stimulation test as a more physiologic stimulant compared to the 250-μg high-dose test in the critical care setting [4]. Several case reports and clinical experience also indicate that adrenal insufficiency might be a problem not only for the septic patient but also for patients with severe trauma, following high-dose steroid treatment for spinal cord injury [5] or systemic inflammatory response syndrome and ARDS [6–9]. However, the incidence in the general surgical ICU population is not known.

With approval of the Institutional Review Board of the University of Iowa, we conducted a retrospective chart review for all patients admitted to the Surgical Intensive Care Unit at the University of Iowa Hospitals and Clinics from 1 June 2004 to 10 April 2005 who had an admission diagnosis of volume refractory shock (as defined by a mean arterial pressure below 60 mmHg or systolic pressure below 90 mmHg with no systolic pressure variation or stroke volume variation indicative of hypovolaemia) and received a 1-μg cosyntropin stimulation test (cortisol levels taken at baseline and 60 min after cosyntropin). Statistical analysis was undertaken to determine the incidence of adrenal insufficiency (baseline cortisol less than 25 $\mu g\,dL^{-1}$ and increase after cosyntropin less than 9 $\mu g\,dL^{-1}$) and relative adrenal insufficiency (baseline cortisol above 25 $\mu g\,dL^{-1}$ but increasing after cosyntropin to less than 9 $\mu g\,dL^{-1}$), the response rate (defined as reduction of vasopressor requirements by more than 50% after 24 h) to hydrocortisone treatment (100 mg 8 hourly). Admission diagnosis and comorbidities of patients were analysed descriptively.

Of the 1709 admissions, 142 patients met the criteria for inclusion in the study. A total of 23 patients with volume refractory shock were excluded secondary to long-term steroid treatment or initiation of hydrocortisone treatment before ICU admission.

The mean ± SD age was 63.1 ± 14.4 and APACHE II score was 15.0 ± 5.4. Of the total, 64.8% of the patients were male. Seventy-three patients tested positive for adrenal insufficiency and 68 were treated, 50 patients tested positive for relative adrenal insufficiency and 30 were treated based on the decision of the attending physician. Nineteen patients had a normal baseline cortisol and an increase of more than 9 $\mu g\,dL^{-1}$ after stimulation and were not treated.

The incidence of adrenal insufficiency among the tested patients was 51.4% (4.3% of total ICU admissions) and relative adrenal insufficiency among tested patients was 35.2% (2.9% of total ICU admissions). The response rates to hydrocortisone treatment for adrenal insufficiency and relative adrenal insufficiency were 92.6% and 80.0%, respectively. Only 57.9% of patients that did not have any adrenal insufficiency improved over 24 h.

In the group of 20 patients with relative adrenal insufficiency who were not treated for various reasons (fear of wound infection or anastomotic

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leak), only 35% showed improvement over 24 h, which was significantly different ($P < 0.01$, Wilcoxon rank sum test) from the treatment group.

Cancer (22 patients), primary sepsis (15 patients), multiple trauma (11 patients), intracranial bleeding (11 patients), subarachnoid haemorrhage (11 patients) and aortic aneurysm rupture/repair (11 patients) were among the more common admission diagnosis in patients with adrenal and relative adrenal insufficiency. Patients with a history of hypertension, coronary artery disease, diabetes mellitus, chronic obstructive pulmonary disease and/or vascular disease seem to be at higher risk for these conditions although our study size was too small for logistic regression analysis. Etomidate use for intubation could be identified in only one patient.

Overall, our findings support the notion that adrenal insufficiency diagnosed with a 1-μg cosyntropin test is common in surgical patients with volume refractory shock and responsive to hydrocortisone substitution independent of confirmed sepsis.

Larger scale epidemiologic and prospective studies are warranted to determine whether patients should be routinely tested with low-dose or high-dose cosyntropin tests or empirically treated with hydrocortisone and classified as clinical responders or non-responders after 24 h.

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Fatal outcome during anaesthesia induction in a patient with amiodarone-induced thyrotoxicosis

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EDITOR:
Amiodarone is a class III anti-arrhythmic drug which has been used in Europe since 1967 to treat angina and refractory arrhythmias of supraventricular, junctional and ventricular origin [1]. It is an iodinated benzofuran derivative with a molecular structure that is similar to thyroxine and triiodothyronine [2]. It has a high iodine content (37% per weight). A significant amount of iodine is liberated during drug metabolism [3]. The large iodine load has been implicated as the main factor in the pathogenesis of amiodarone-induced thyroid

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