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An Official Publication of
The Asian Congress of Neurological Surgeons (AsianCNS)
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The association between cortisol dynamics and the course of aneurysmal subarachnoid hemorrhage

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ABSTRACT

Context: One of aneurysmal subarachnoid hemorrhage complication is delayed ischemic neurological deficits (DIND). It is postulated that cortisol dynamics might be associated with the severity of this complication.

Aims: The goal of the study is to investigate whether the peak of morning serum cortisol levels are associated with the severity of its complication during the course of the disease.

Settings and Design: This is a prospective cohort study conducted from January 2009 to June 2011, at our institution.

Materials and Methods: The study follows a consecutive cohort of patients for 14 days after the aneurysmal subarachnoid hemorrhage. Serum cortisol, cortisol binding globulin, adrenocorticotropic hormone (ACTH) were measured pre operatively and then on post operative days (POD) 2, 4, 7, and 10. Blood was drawn to coincide with peak cortisol levels between 08.00-09.00 hours. Neurological examinations were conducted at least twice daily and patient outcome were graded according to modified Ranklin Scale. DIND was defined by a decrease in the Glasgow Coma Scale of two or more points compared to the status on POD 1.

Statistical Analysis: All the results were analyzed using statistical software, Statistical Package for Social Sciences (SPSS v6.1; SPSS, Inc., Chicago, IL). Logistic regression analysis was used to compare the relationship between the variables.

Results: Thirty six consecutive patients are collected, but only 28 patients (12 M and 16 F) were eligible for the cohort analysis. Average patient age is 50.75 years old (50.75±12.27), and more than 50% (15/28) arrived with World Federation of Neurologic Surgeons grade 3 or better. Elevated total cortisol levels of more than 24 µg/dl on day 2, 4, and 10 were associated with DIND, and the most significant being on day 4 (P=0.011). These patients also had a higher grade on the modified Ranklin scale of disability.

Conclusions: This study shows that the elevated levels of morning total cortisol in the serum are associated with the onset of DIND during the disease course, and it's also associated with bad outcomes.

Key words: Aneurysmal subarachnoid hemorrhage, clipping, cortisol, delayed ischemic neurological deficits, outcome

Introduction

The cortisol dynamics might be associated with the severity and outcome after aneurysmal subarachnoid hemorrhage.1 It is well known that the cortisol plays an important role as a defense mechanism for stress conditions such as sepsis, fasting, trauma, pain, and tissue ischemic.2 Aneurysmal subarachnoid hemorrhage is a devastating condition which produces severe headache, constitutional symptoms, and neurological deficits. All of those things will precipitate a strong stress response and increase the serum cortisol levels through hypothalamic and autonomic nervous system pathways. Theoretically, cortisol itself may increase the risk of vasoospasm through its up-regulating endothelin-1 (vasoconstriction) and its