

RELATIVE ADRENAL INSUFFICIENCY IN ACUTE ISCHAEMIC STROKE

Norasyikin AW¹, Nani Zalinda AR², Amiliyatun MR¹, Suehazlyn Z¹, Norlela S¹, Norlaila M¹, Wan Nur Nafisah WY³, Nor Azmi K¹

¹Endocrine Unit, Department of Medicine, Faculty of Medicine, Universiti Kebangsaan Malaysia, Malaysia

²Hospital Terendak, Ministry of Defense, Malaysia

³Neurology Unit, Department of Medicine, Faculty of Medicine, Universiti Kebangsaan Malaysia, Malaysia

Introduction

- In 2020, stroke will be the second leading cause of death and disability in developed regions of the world.¹
- Acute ischaemic stroke is a stressful condition in which there is marked increase in the production of cortisol.²
- In the past adrenal insufficiency in critically ill patients had been shown to be associated with significant morbidity and mortality.
- To date there is no study performed to determine its prevalence among patients with acute ischaemic stroke.

Objectives

The aim of this study is to determine the prevalence of relative adrenal insufficiency in acute ischaemic stroke by utilizing the low dose (LD) and standard dose (SD) synacthen tests and to correlate it with inpatient hospital morbidity and mortality.

Method

- All patients who fulfilled the diagnosis of acute ischaemic stroke within 72 hours onset of a stroke were subjected to LD (1µg) synacthen test (LDST) and two hours later SD (250 µg) synacthen test (SDST).
- The serum cortisol were drawn at 0 min (0_{LD}), 30 min (30_{LD}), 60 min (60_{LD}), 120 min (0_{SD}), 150 min (30_{SD}), 180 min (60_{SD}) and 210 min (90_{SD}).
- Baseline investigations such as full blood count, fasting blood sugar, HbA1c, liver and renal function tests taken prior to synacthen tests.
- The diagnosis of relative adrenal insufficiency is based on increment of cortisol levels less than 250 nmol/L following synacthen tests.³

Results

- Fifty eight patients recruited and baseline demographic data is shown in table 1.
- The median baseline serum cortisol and ACTH levels were 427.5 nmol/L (272.5-626.0) and 16.8 pg/mL (6.94 - 25.18) respectively.
- The cortisol response following synacthen tests showed in figure 1.
- Based on an increment of less than 250 nmol/L after LDST, 38 (65.5%) patients had relative adrenal insufficiency.
- However using similar criteria with the SDST, only 18 (31.0%) patients had relative adrenal insufficiency.
- Three patients died during the study period and they had a tendency to have high baseline cortisol levels (figure 2).
- Interestingly the non-survivors failed to mount any significant cortisol responses to both LDST and SDST but not in survivals (figure 2 and 3).
- The non-survivors had a significant higher fasting blood sugar (p= 0.006) and poorly controlled diabetes (table 2).
- The diagnosis of relative adrenal insufficiency in general was not associated with any other significant clinical outcomes.

Table 1. Baseline demographic data

Parameter	No. of patient (%)
Age (years)	66.62 ± 10.41 ‡
Sex	
Male	41 (70.7)
Female	17 (29.3)
Ethnicity	
Chinese	35 (52.2)
Malay	14 (20.9)
Indian	14 (20.9)
Other	4 (6.0)
Co-morbidity	
Hypertension	47 (81)
Diabetes mellitus	33 (56.9)
Dyslipidaemia	29 (50)
Smoker	26 (44.8)
Vascular disease	17 (29.3)
Frequency of stroke	
First stroke	42 (72.4)
Recurrent stroke	16 (27.6)
Duration of stroke (hours)	31.5 (23.75-53.5)*
Severity of stroke based on Scandinavian Stroke Scale (SSS)	
Mild to moderate (>30)	46(79)
Severe (≤30)	12(21)

‡Data was express in mean ± SD and * data was express in median (IQR)

Figure 1: Cortisol response following synacthen tests in study population

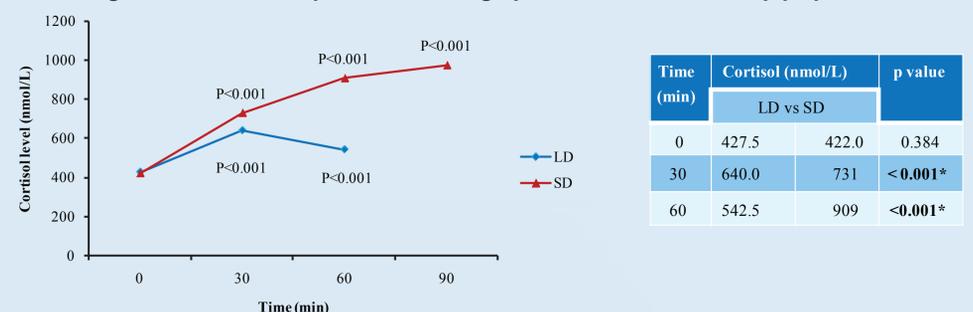


Table 2: Characteristics Among Survivors & Non-Survivors

	Survivors	Non-survivor	p value
Age	66.8±10.4	63.7±12.1	0.67
Duration of hospital stay	5.65 ± 3.86	14.33 ± 10.69	0.296
Eosinophils (x 10 ⁹ /L)	0.1 (0.1 - 0.3)	0.2 (0.0 - 0.3)	0.97
Albumin (g/L)	42 (38 - 44)	40 (40 - 40)	0.738
Sodium (mmol/L)	137 (134 - 139)	136 (134 - 138)	0.41
Fasting sugar (mmol/L)	6.3 (5.3 - 9.3)	19.5 (13.3 - 27.6)	0.006*
HbA1c (%)	6.2 (5.6 - 8.8)	11.7 (6.7 - 12.3)	0.068

Cortisol response following synacthen tests in non-survivals

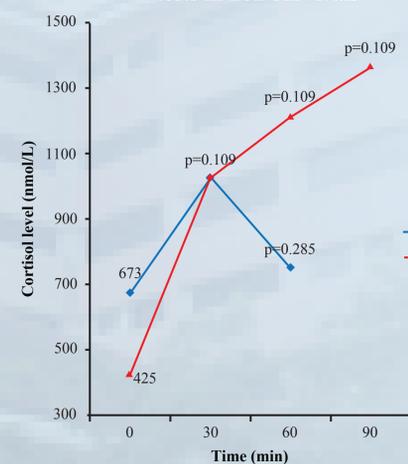


Figure 2

Cortisol response following synacthen tests in survivals

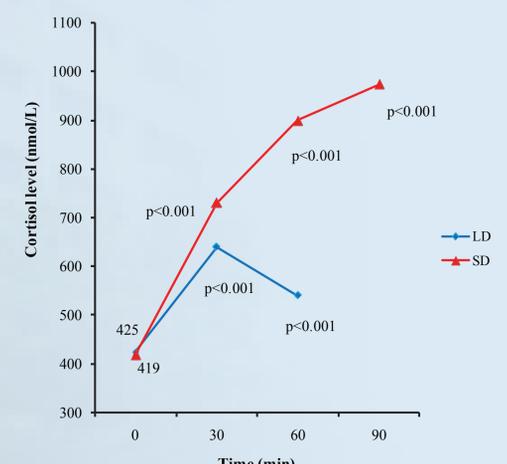


Figure 3

Conclusions

- This is the first study demonstrating the prevalence of relative adrenal insufficiency amongst acute ischaemic stroke patients.
- Utilizing the LDST, relative adrenal insufficiency was found in 65.5% of patients admitted with acute ischaemic stroke in which more sensitive compared to SDST.
- Mortality in our cohort of stroke patients was associated with failure to mount a cortisol response to both LDST and SDST.

References

- Murray CJ, Lopez AD. Lancet 1997
- Feibel JH, Hardy PM, Campbell RG, et al. JAMA 1977
- Bourne RS, et al. Anaesthesia 2003