

# Cardiovascular system abnormalities in patients with Cushing's syndrome

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## INTRODUCTION

Patients with Cushing's syndrome (CS) have a lot of complications due to chronic exposure of cortisol. Changes in cardiovascular system lead to increased cardiovascular morbidity in these patients.

## AIM

Aim of the study was to reveal specific changes of cardiovascular system in patients with CS.

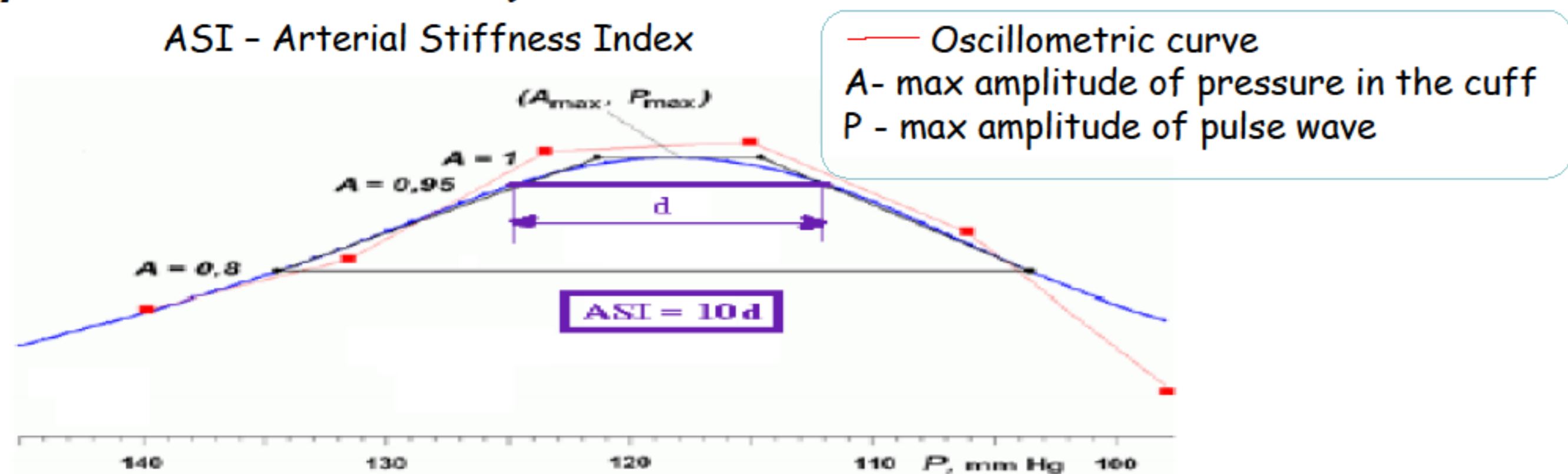
## MATERIAL AND METHODS

We investigated 3 groups of patients:

- 1) Patients with CS:
  - 6 patients: 5 female, 1 male,
  - Mean age at the time of diagnosis of CS - 47.1 ± 1.5 y.o.,
  - Duration of CS - 3.4 ± 1.2 years, none of the patients had a hypokalemia
- 2) Patients with ischemic heart disease (IHD):
  - 10 patients: 7 male, 3 female, 48.2 ± 3.1 y.o.,
- 3) Healthy volunteers:
  - 19 healthy men, 48.1 ± 3.0 y.o.

Assessments of cardiovascular system were performed to all of them:

1. Echocardiography;
2. 24-hours Holter monitoring (HM) and
3. 24-hours ambulatory blood pressure monitoring (ABPM) in bifunctional mode with program assessment of hemodynamic parameters and arterial stiffness (total peripheral vascular resistance (TPVR), index of arterial stiffness (ASI), heart rate variability, circadian index):



Donald E. Rediker, M.D., F.A.C.C., Medical Advisor, IMDP, Inc., recommends the following ASI / Coronary Artery Disease Risk (CAD) Factor Correlation:

| ASI Range | CAD Risk Factor |
|-----------|-----------------|
| 0-80      | None            |
| 81-209    | Moderate        |
| 210-309   | High            |
| ≥310      | Very High       |

4. To all patients with IHD coronarography was performed.
5. To all patients with CS standard laboratory and clinical evaluation for CS were performed (1)

## RESULTS

Arterial hypertension were diagnosed in all patients with CS:
 

- Mean daily BP were 176 / 81 / 100 ± 6 mmHg,
- Systolic pressure-time index - 67.7 ± 8.7%, diastolic pressure-time index - 89.3 ± 10.5%,
- 24-h rhythms of BP were disturbed in 67%, with prevalence of non-dippers and night-pickers in CS-patients.

 Strong correlations were found between cortisol levels (08.00 and 23.00) and systolic (sBP) and diastolic (dBP) day and night pressure:
 

- for 08.00 cortisol: sBP r=0.75, dBP r=0.8 (p<0.05);
- 23.00 cortisol: sBP r=0.9, p=0.01, dBP r=0.9, p=0.03).

 On Echocardiography of patients with CS some changes were revealed:
 

- In 67% of patients - left atrial expansion - 4.2 ± 1.1cm,
- in 50% - diastolic disfunction.

## RESULTS (cont.)

ASI and TPVR were significantly higher in patients with CS, than in patients with IHD:

| Parameter                          | IHD         | CS             | p    |
|------------------------------------|-------------|----------------|------|
| TPVR, dyne x sec x cm <sup>5</sup> | 1285,0±45,1 | 2259,0 ± 535,8 | 0,01 |
| ASI                                | 91,5±16,3   | 227,3 ± 63,5   | 0,01 |

In patients with CS strong positive correlations were found between:

- ASI and TPVR,
- ASI and diastolic pressure-time index at night,
- TPVR with diastolic pressure-time index at night.

On the contrary, in patients with IHD, ASI did not depend on TPVR and levels of Blood Pressure (BP).

In patients with CS, ASI did not depend on patient's age and cholesterol levels (r=0.7 p=0.06).

### Results of 24-hours Holter monitoring (HM) :

In patients with CS both, day and night mean heart rate were higher than in other groups.

| Results    | Healthy volunteers | CS       | p      |
|------------|--------------------|----------|--------|
| Heart rate | day                | 75.1±2.1 | 0.0001 |
|            | night              | 60.1±2.1 | 0.04   |

The tendency to decrease in heart rate variability with a predominance of the sympathetic nervous system, with simultaneous increased parasympathetic effects was seen.

Most (83.3%) of CS-patients had cardiac rhythm abnormalities that shows predominance of activity of sympathetic nervous system.

## CONCLUSION

All tests revealed significant predominance in activity of sympathetic nervous system in combination with increased activity of parasympathetic nervous system. These all leads to high prevalence of Arterial Hypertension, and disturbance of 24-h rhythm of BP.

Index of arterial stiffness and total peripheral vascular resistance in patients with CS were higher than in patients with IHD. Probably the activity of sympathetic nervous system can influence on these two parameters. These all changes lead to increase risk of serious cardiovascular events in patients with CS.

The study is in the progress.

## REFERENCES & CONTACT INFORMATION

<sup>1</sup>The Diagnosis of Cushing's Syndrome: An Endocrine Society Clinical Practice Guideline. Journal of Clinical Endocrinology & Metabolism, May 2008, 93(5): 1526-1540

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