The relationship of baseline, incremental & peak cortisol following Short Synacthen Test – single-centre analysis of three years' data

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Background

- Worldwide, the Short Synacthen Test (SST) is the most frequently performed diagnostic test for adrenal insufficiency.[1]
- There is evidence that an early morning plasma cortisol (EMC) below ~<160 nmol/L is predictive of failing the SST and the corollary with an EMC above ~ >340 nmol/L.[2-7]
- We analysed our institutions SST data, following the introduction of a new cortisol assay, to derive screening thresholds for SST and examine the relationship between basal, incremental and peak plasma cortisol.

Aim

- **To determine positive predictive value (PPV) and negative predictive value (NPV) of EMC in the SST, using different EMC cut offs.**

Methods

- Dataset: 393 SSTs from 2014-2017
- Data extracted:
  - Baseline cortisol (used as a surrogate for EMC)
  - Peak cortisol
- Cortisol assay: Abbott Architect chemiluminescent immunoassay (CVs <5%)
- Cortisol threshold to "pass" SST >430nmol/L
- Statistical analysis:
  - Correlation coefficients with increment and peak
  - Subgroup analysis: gender & pubertal status surrogates (pre-pubertal: 0-9 years old & post-pubertal: 10-16 years old)
  - PPV & NPV of "passing" or "failing" SST calculated using different thresholds for EMC

Results

- 393 SSTs: 209M, 184F, 175 pre-pubertal, 218 post-pubertal
- Baseline cortisol & peak cortisol correlation coefficient = 0.63 (*fig 1*)

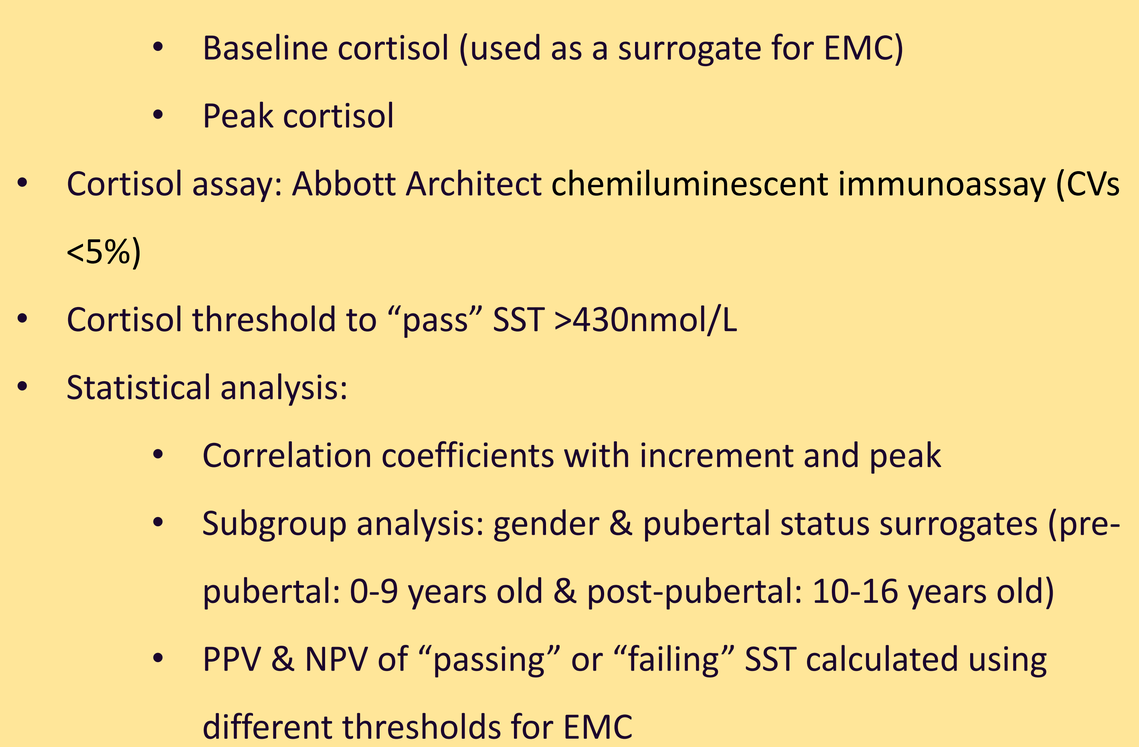

Fig 1: Correlation of baseline cortisol with peak cortisol

- Subgroup analysis (Pearson's correlation coefficients (ρ)):
  - Males = 0.62, females= 0.63
  - Pre-pubertal= 0.65, post-pubertal= 0.66
- **No correlation between baseline cortisol & increment** (ρ = - 0.061)
- **Patients with a baseline cortisol <160 nmol/L**
  - 31% of cohort (N= 123)
  - 58% of whom "failed" SST
  - **PPV = 0.58**
- **Patients with a baseline cortisol >339 nmol/L**
  - 13% of cohort (N = 53)
  - 0% of whom "failed" SST
  - **NPV= 1**
- **PPV & NPV with different EMC cut offs**
  - Reducing the threshold of baseline cortisol to >320 as a screening test for SST would result in 3 patients "missed" (*table 1*):

Baseline cortisol	Number	Passed SST	Failed SST	PPV	NPV
<160 nmol/L	123	52 (42%)	71 (58%)	**0.58**	/
≥ 340 nmol/L	53	53 (100%)	0 (0%)	/	**1**
≥ 320 nmol/L	71	68 (96%)	3 (4%)	/	**0.96**
≥ 300 nmol/L	83	80 (96%)	3 (4%)	/	**0.96**
≥ 275 nmol/L	106	99 (93%)	7 (7%)	/	**0.93**
≥ 250 nmol/L	140	130 (93%)	10 (7%)	/	**0.93**

Table 1: Percentage of patients failing or passing SST if the baseline cortisol (surrogate for EMC) used as a screening test. Serum cortisol >430 nmol/L requires to "pass" SST.

Discussion

- A relatively strong relationship was found between baseline and peak cortisol on the SST.
- Subgroup analysis (sex and pubertal status) did not significantly strengthen correlation.
- No relationship was found between baseline and incremental cortisol.
- No patient with a baseline cortisol of >339nmol/L "failed" the SST.
- A baseline cortisol of <160nmol/L has a high PPV (0.58) for failing the SST

There are no conflicts of interest and the authors have nothing to declare

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