Borderline peak plasma cortisol following Synacthen stimulation – single-centre analysis of three years' data

Burn S[1], Colyer S[1], Dimitri PJ[1], Wright NP[1], Krone NP[1,2], Elder CJ[1,2]

[1]Sheffield Children's Hospital, [2]The University of Sheffield, Sheffield UK

Background

- Worldwide, the Short Synacthen Test (SST) is the most frequently performed diagnostic test for adrenal insufficiency (AI) in children.[1]
- Diagnostic cut-offs for peak plasma cortisol may be difficult to determine due to:
  - Non-specific clinical features of AI.[2]
  - Increased sensitivity and specificity of different cortisol assays.[3]
  - "Borderline" results may be interpreted and managed variably by different clinicians.[4]

Aim

To examine cases with borderline peak plasma cortisol following SST to identify aetiological links and common management strategies.

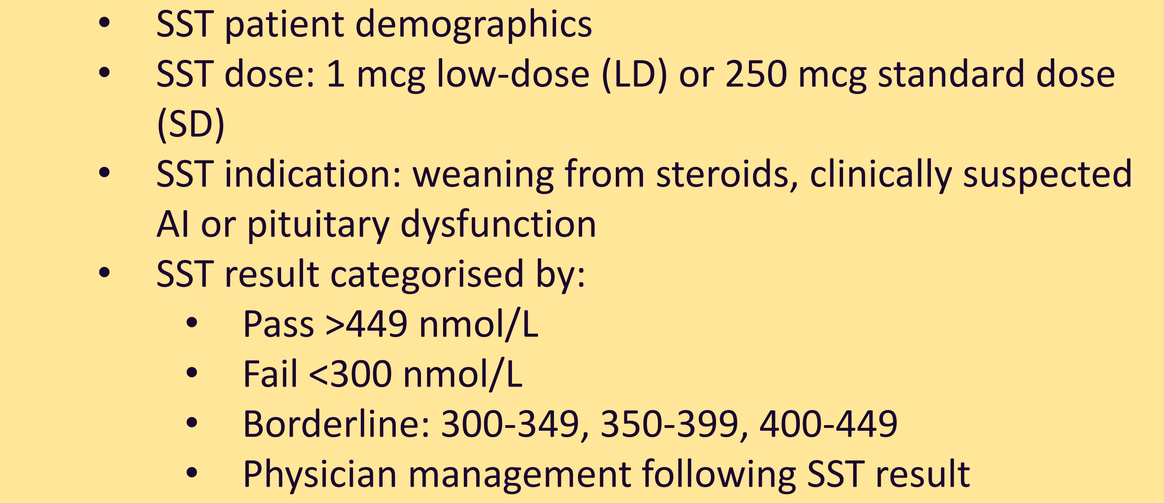
Methods

- Dataset: 433 SSTs from 2014-2017
- "Borderline" cases defined as a peak cortisol following synacthen stimulation of >300 but <450 nmol/L.
- Cortisol assay: Abbott Architect chemiluminescent immunoassay (CVs <5%).
- Data extracted:
  - SST patient demographics
  - SST dose: 1 mcg low-dose (LD) or 250 mcg standard dose (SD)
  - SST indication: weaning from steroids, clinically suspected AI or pituitary dysfunction
  - SST result categorised by:
    - Pass >449 nmol/L
    - Fail <300 nmol/L
    - Borderline: 300-349, 350-399, 400-449
    - Physician management following SST result

Results

- **SSTs categorised as "borderline": 74/433 (17.1%)**
  - M41, F33
  - Age distribution: 0-1yr: 8%, 2-5yrs: 11%, 6-10yrs: 27%, 11-15yrs: 39%, 16+yrs: 15%
  - SD: 60.8%, LD: 31.1%, dose unknown: 8.1%
- **Number of borderline results remained similar over study period despite increasing numbers of SSTs** (*fig 1*)

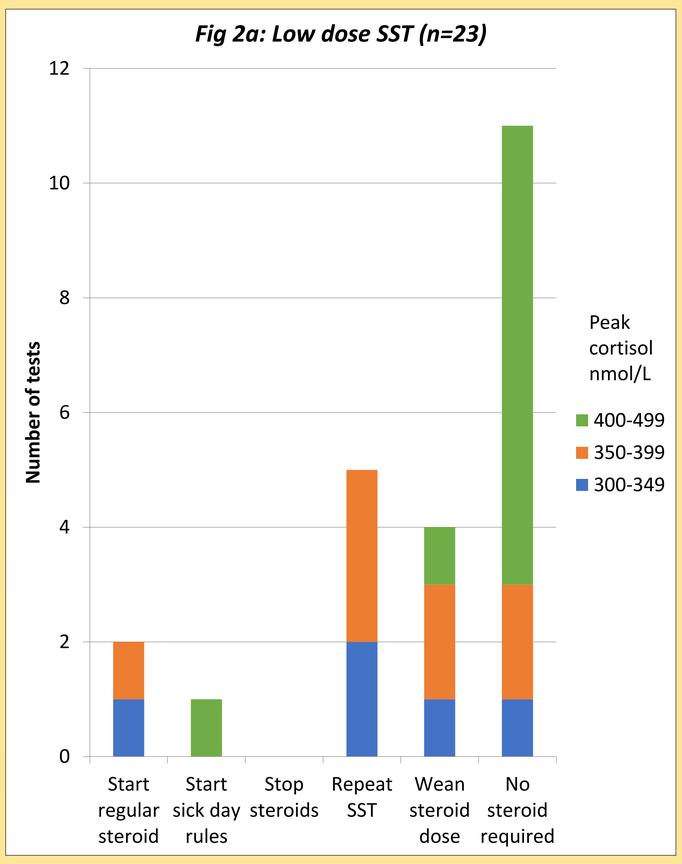
Fig 1: Number and results of SSTs performed by year

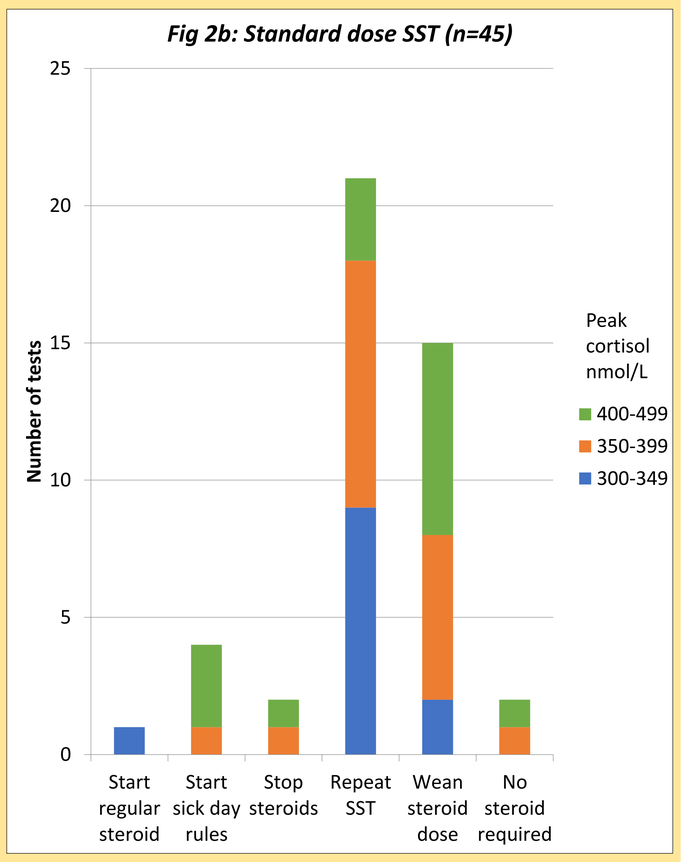


There are no conflicts of interest and the authors have nothing to declare

- **There was an increasing trend towards using SD over LD SST** (47.4% SD 2014-15 vs 87.5% SD 2016-17)
- **Following SST physician management strategies differed** depending on:
  - The dose of synacthen used for the test
  - Which category of "borderline" the result fell into
  - Whether the child was already on replacement steroids
  - The index of suspicion for AI
- **23% of 'borderline' cases were managed with "sick day rule" steroid cover only (59% previously on daily oral steroid, 41% not)**
- **Steroid dose was more likely to be weaned after standard dose SST (33.3%) compared to low-dose SST (17.4%)** *(fig 2a+b)*

Figure 2: Management of "borderline" cortisol results following SST





- 83% of SST performed in patients not already on daily oral steroids were done for clinical suspicion of AI. Following a 'borderline' result 29% of these were commenced on steroids (daily replacement or sick days rules only).
- **Overall 6 new cases of AI were identified from 'borderline' cortisol results over 3 years (8.1% of borderline SSTs)**

Discussion

- Our local practice has changed – more tests are being performed, a greater proportion use the standard dose, but the numbers of results between 300-449 nmol/L has remained static.
- There is variation in the interpretation of an SST depending on the indication of the test, dose of Synacthen used and whether the patient is already on steroids.
- Provision of 'sick day rules' for children with "borderline" results may provide a more pragmatic management approach but the efficacy & safety of this approach requires further study.

References

1. Cross AS *et al*. International survey on high and low-dose synacthen test and assessment of accuracy in preparing low-dose synacthen. Clinical Endocrinology 2018; 88: 744-751.
2. Park *et al*. The diagnosis and treatment of adrenal insufficiency during childhood and adolescence. Archives of Disease in Childhood 2016; 101(9): 860-865.
3. Kline *et al*. Clinical implications for biochemical diagnostic thresholds of adrenal sufficiency using a highly specific cortisol immunoassay. Clinical Biochemistry 2017; 50(9): 475-480.
4. Hawcutt DB *et al*. Adrenal responses to Low Dose SST in children with asthma. Clinical Endocrinology 2015; 82: 648-656.

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Adrenals and HPA Axis

Charlotte Elder

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