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

Burn S1, Colyer S1, Dimitri PJ1, Wright NP1, Krone NP1,2, Elder CJ1,2

1Sheffield Children’s Hospital, 2The 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
- 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)

Results

- 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)

Discussion

- 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)

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
- 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)

Results

- 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)

Discussion

- 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)

References