Retrospective Analysis of Cortisol Measurement in Neonates

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Background and Objectives

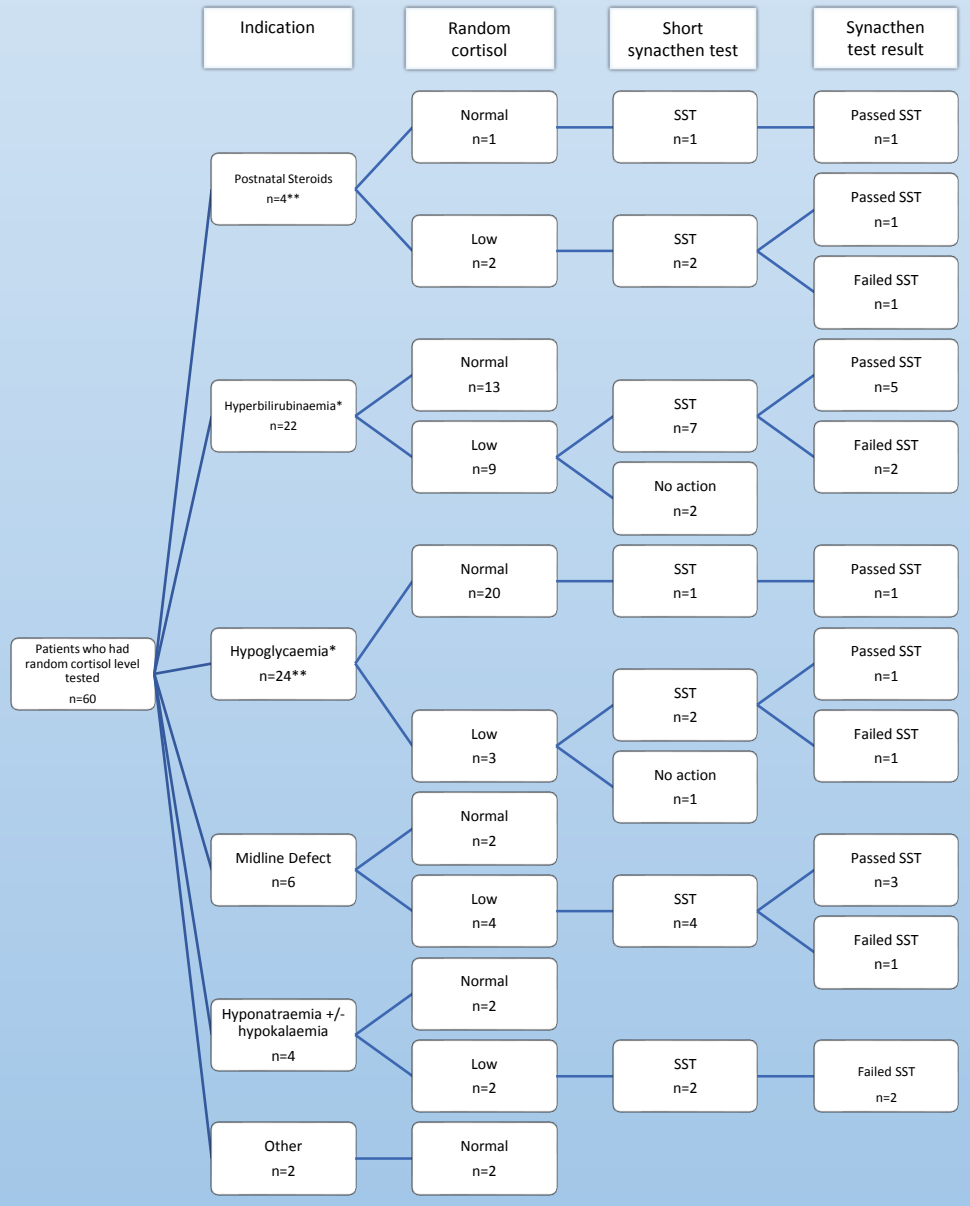
The predictive value of random cortisol measurement in the neonatal population with suspected adrenal insufficiency is unknown.
The purpose of this study was to:
-Determine the indications for measuring cortisol
-Review susequent management
-Establish predictors for adrenal insufficiency

Method

A laboratory database search identified cortisol results in babies <1yr from two neonatal units in the West of Scotland between Sept 2010 - May 2013.
Gender, gestational age, birthweight, time of test, CRIB II score and sodium level were investigated as potential predictive factors.
A random cortisol level of >100nmol/l was accepted as normal.
A short synacthen test (SST) peak cortisol >450nmol/l indicated an adequate response.
Comparison was made between babies who passed and failed short synacthen tests in order to establish predictive factors.

Results

60 infants (M40:F20) had cortisols analysed, 58 had random cortisol and 2 a SST directly.
Indications included: prolonged postnatal steroid use (n=4), conjugated hyperbilirubinaemia (n=22), hypoglycaemia (n=24), midline defect (n=6), hyponatraemia (n=4) and 'other' (n=2); 2 patients had 2 risk factors (Fig 1).
Patients who had cortisols tested for prolonged steroid use had three or more courses of steroids, with each course being at least 10 days in length.
In total 86 random cortisol levels were analysed (Fig 2); 46 were normal (209.0nmol/l [138.3-340.8]), and 40 were low (50.5nmol/l [30.0–71.5]).
Twenty four SST were carried out in 20 infants (Table 1); 10 infants (41.7%) had suboptimal cortisol peaks.
In 8/10 cases, hydrocortisone was commenced, 1/10 hydrocortisone when unwell and 1/10 no plan for unclear reasons.
Mann Whitney U testing indicated that there were no statistically significant predictive factors found to identify babies more likely to fail SST.



* Two patients had been tested due to both conjugated hyperbilirubinaemia and hypoglycaemia
** One in group had no random cortisol level checked
Fig 1 Indications for cortisol testing and further investigation

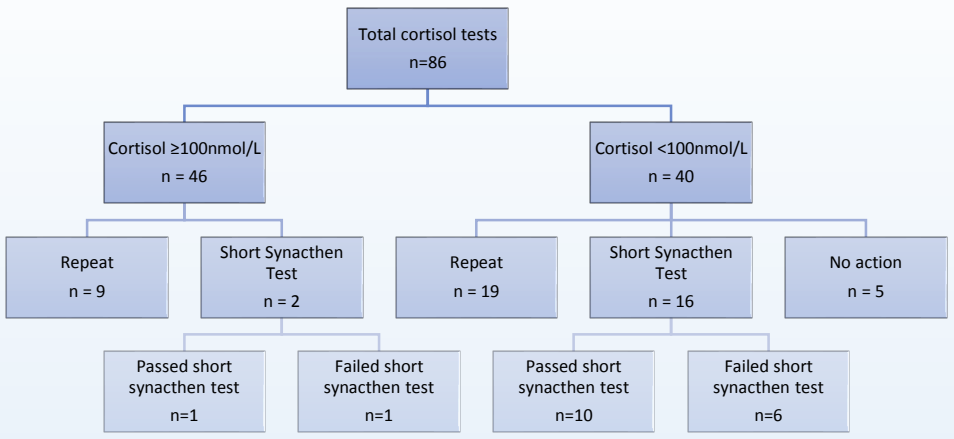


Fig 2 Total random cortisol tests and outcomes

	All Short Synacthen Tests Median (Interquartile Range[IQR])	Normal Short Synacthen Test Median (IQR)	Abnormal Short Synacthen Test Median (IQR)**
Total Patients (M:F)	24 (19:5)	14 (10:4)	10 (9:1)
Gestation at birth (weeks)	36.1 (28.6 – 39)	38.2 (33.5 – 40.9)	31.9 (27.9 – 36.1)
Birthweight (g)	1960 (790 – 3215)	2520 (1687.5 - 3373)	1220 (520 – 1960)
Corrected Gestational Age (weeks)	42.5 (40 – 44.3)	44 (42.5 – 45.5)	40 (35.8 – 40.3)
Weight at test (g)	3080 (2120 – 3455)	3340 (2715 – 3850)	2175 (1815 – 2800)
CRIB II Score n=8	8 (7.75 – 8)	8 (n=3)	8 (n=5)
Postnatal Steroids	4	3	1
Hyperbilirubinaemia*	7	5	2
Hypoglycaemia*	8	4	4
Midline Defect	4	3	1
Hyponatraemia	2	0	2
Na	138 (136 – 139)	139.5 (35.5 – 139)	137.5 (136 – 139)
Average Random Cortisol	49 (33 – 79)	45.5 (32 – 67.8)	43.5 (32.5 – 50.6)
Peak cortisol level (nmol/l)	574 (340.3 – 848.3)	825 (622.5 – 858.5)	301.5 (183.5 – 354.3)

*One patient had both conjugated hyperbilirubinaemia and hypoglycaemia
**One failed SST represented a baby who had not had a random cortisol level checked; two others were repeat SST on babies who had initially failed their SST
Table 1 Comparison between normal and abnormal short synacthen tests

Conclusion

No statistically significant predictive factors for adrenal insufficiency were found from this study.
There was a trend for lower gestational age, weight at birth and at corrected gestational age, and male sex (9/10 infants), suggesting potential predictive factors.
There is no difference in the value of the average random cortisol between infants who passed and failed SST, suggesting that random cortisol levels are of little value.
There is a need for clear guidelines for the management of sub-optimal cortisol levels in neonates.

Reference

G. Parry et al. CRIB II : an update of the Clinical Risk Index for Babies score. Lancet 2003;361(9371):1789-91