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Neonatal thyrotoxicosis- a single centre case series

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Introduction

Neonatal thyrotoxicosis is rare [1] and occurs with transfer of Thyrotropin Receptor Antibodies (TRAb) across the placenta in a mother with a history of Grave's disease . The neonatal mortality rate can be as high as 20%, usually secondary to cardiac failure [1]. Therefore prompt diagnosis and early treatment is essential

Methodology

We report a series of seven infants diagnosed with neonatal thyrotoxicosis seen in the Endocrine clinic between 2011-2015. Clinic letters and nurse held records were reviewed for clinical and biochemical status, antibody status, type and length of treatment and complications .

Results

Table 1 shows the initial biochemistry and thyroid antibody status in the babies. Five babies presented with low TSH concentrations and all babies had raised Free T4 concentrations. TPO antibodies were raised in three babies and TRAb antibodies raised in five babies.

Baby No.	Initial Free T4	Initial TSH	TPO antibodies	TRAb	Anti Thyroglobulin	Maternal Grave's Disease confirmed
1	21.8 H	10.26 H	<10 (0-50)	Not done	Not done	Yes
2	25.7 H	0.63 L	<60 (neg)	11.8 (0-1.5)	Not done	Yes
3	95.9 H	<0.05 L	16 (neg)	6.89 (0-0.4)	Not done	No
4	40.2 H	0.08 L	55 (pos)	17 (<10)	Not done	Yes
5	27 .0 H	3.27	947 (pos)	Not done	653	No
6	40.6 H	<0.01 L	86 (pos)	33.5	Not done	Yes
7	>77 H	<0.01 L	not done	12.1	Not done	Yes

Table 1 Presenting biochemistry

Maternal Grave's disease was confirmed as the cause of hyperthyroidism in 5 of the cases . In baby 3, TRAb results were positive and in baby 5 Thyroglobulin antibodies were positive. We note that in baby 1 the initial TSH was elevated, presumably due to the presence of both stimulating and blocking thyroid antibodies.

Signs and symptoms recorded were varied (see table 2), however the most commonly noted sign was that of tachycardia (4/5 babies). Agitation and poor weight gain were seen in 2/5 babies. One baby was asymptomatic.

Baby No.	Tachycardia	Poor weight gain	Agitated	Tachypnoea	Cardiomegaly	Temperature instability	Diarrhoea	Palpable spleen
1	NK	NK	NK	NK	NK	NK	NK	NK
2	Yes	Yes	No	Yes	Yes	No	No	No
3	Yes	Yes	No	No	No	Yes	Yes	Yes
4	No	No	No	No	No	No	No	No
5	NK	NK	NK	NK	NK	No	No	No
6	Yes	No	Yes	No	No	No	No	No
7	Yes	No	Yes	No	No	No	No	No

Table 2 Signs and Symptoms

Five babies were treated with Propranol for control of thyrotoxic symptoms and four babies were also treated with Carbimazole . Treatment with Propranolol was on average required for 16 days (range 7-37 days). Treatment with Carbimazole was required for a longer period of time , with the minimum number of days noted to be 40 and the maximum up to 6 months (see table 3).

Baby No.	Carbimazole daily dose (mg/kg/day)	Age at start of treatment	Length of treatment	Propranolol	Length of treatment
1	None	N/A	N/A	None	0 days
2	1mg bd	25 days	40 DAYS	0.25mg/kg BD	37 days
3	0.5mg bd (0.56mg/kg/d)	21 days	Not known	0.25mg/kg TDS (0.88mg TDS)	7 days
4	None	N/A	N/A	0.25mg/kg/TDS	Not known
5	None	N/A	N/A	None	0 days
6	1mg BD ((0.75mg/kg/d)	4 days	73 days	0.7mg BD	7 days
7	1.7mg OD (0.5mg/kg/d)	3 days	6 months	0.5mg/kg BD (1.7mg BD)	14 days

Table 3 Length of treatment with Carbimazole and Propranolol

In those babies who were treated with both Propranolol and Carbimazole, time to normalise Free T4 concentrations was after an average of 23 days of treatment. TSH concentrations took over three times as long to normalise (on average within 10 weeks) with treatment but up to 30 weeks without treatment. (table 4)

Baby No.	Time to normalise Free T4	Time to normalise T4 and TSH
1	7 days	50 weeks
2	44 days	12 weeks
3	27 days	5 weeks
4	1 day	9 weeks
5	0 Days	10 weeks
6	56 days	11 weeks
7	6 days	11 weeks

Table 4 Time to normalise thyroid function

Carbimazole can cause side effects: two babies developed a florid, macular-papular rash and one baby had documented neutropenia with a neutrophil count of <1. Carbimazole was immediately discontinued in this instance.

Discussion

Propranolol and Carbimazole treatment is effective, with improvement in clinical and biochemical status. Despite FT4 normalisation, TSH takes many weeks longer to respond. Carbimazole side effects do occur and neonates should be monitored closely with appropriate parental counselling and team contact details provided.

References

1. Ogilvy-Stuart, AL, Neonatal thyroid disorders. *Arch Dis Child Fetal Neonatal Ed* 2002; 87: F165-171