A case of complete atrioventricular block after initiation of methimazole in a patient with Graves' disease associated with Down's syndrome previously undergoing cardiac surgery

K. Sawano[1], S. Hiroshima[1], N. Shibata[1], H. Nyuzuki[1], Y. Ogawa[1] and K. Nagasaki[1]

1. Department of Pediatrics, Niigata University Medical and Dental Hospital

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BACKGROUND

Arrhythmias associated with hyperthyroidism are mainly tachyarrhythmias, such as sinus tachycardia and atrial fibrillation. In comparison, hypothyroidism shows several electrocardiographic changes, including sinus bradycardia, low amplitude QRS complexes, QT interval prolongation. There are few reports of bradyarrhythmia with hyperthyroidism, and it remains unclear.

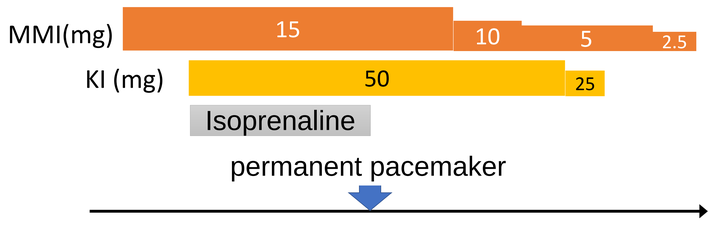
CASE

The patient is a 13-year-old girl with Down's syndrome.

She underwent surgical closure of ventricular septal defect (VSD) at the age of 7 months. She had a postoperative complete atrioventricular block (CAVB), which required temporary pacing, and currently has first-degree atrioventricular block.

She had been diagnosed with thyrotoxicosis at a nearby pediatrician since losing 6 kg of weight for 4 months. Her free T3 was > 20 pg/ml, free T4 was > 5.0 ng/dl, TSH was <0.03 μIU/ml, TRAb was 23.9 IU/ml, and sonography showed diffuse swelling of the thyroid gland and increased blood flow.

She was diagnosed with Graves' disease and started methimazole (MMI) 15 mg/day（0.5 mg/kg/day）.



	admission					discharge						
	-3d	0	3d	4d	5d	13d	1m	2m	3m	4m	5m	6m
FT3	>20	13.2	6.1	4.7	3.4	2.3	2.1	2.8	2.5	4.3	3.9	3.5
FT4	>5.0	5.47	3.13	2.51	2.11	0.91	0.59	0.66	0.35	0.86	0.81	0.81
TSH	<0.03	<0.01	<0.01	<0.01	<0.01	<0.01	2.28	7.88	28.78	1.71	6.32	8.48
TRAb	23.9		24.9			26.2	24.0	29.8	34.9	32.4	25.1	15.8

On the third day after initiating MMI, she suddenly lost consciousness and was diagnosed as CAVB and referred to our hospital.

Continuous intravenous infusion of isoprenaline was started, and her heartbeat stabilized and her state of consciousness improved.

At the time of admission to our hospital, the free T3 and T4 levels were 13.2 pg/ml and 5.47 ng/dl, respectively, with a marked improvement trend. MMI was continued, and 50 mg of potassium iodide (KI) was added.

On the fifth day of hospitalization at our hospital, she was implanted with a permanent pacemaker, discontinued isoprenaline. After that, she has tapered off MMI and KI and currently continuing with MMI 5mg every other day.

DISCUSSION

This case presented a patient with Graves' disease associated with Down's syndrome who had first-degree atrioventricular block after surgery for VSD and had CAVB 3 days after MMI treatment.

- Post-surgical heart block occurs in 1–3% cases of congenital heart surgeries[1)].
- Incidence of late-onset AV block has been reported with a rate of 0.3 to 0.7%.111–113 Late-onset AV block may be due to progressive fibrosis and sclerosis involving specialized conduction pathways which are fragile in CHD[1)].

Bradyarrhythmias are extremely rare as a complication of thyrotoxicosis.

Previous cases of thyrotoxicosis causing CAVB were associated with other coexisting factors, such as infection[2)] or coadministration of cardiac medications[3)], as well as our case.

Graves' disease associated with Down's syndrome is more responsive to treatment than non- Down's syndrome[4)], and rapidly improved hyperthyroidism may result in relative hypothyroidism.

We speculated that a postoperative atrioventricular block and rapid recovery from thyrotoxicosis were the cause of the CAVB in this case.

CONCLUSIONS

Bradyarrhythmia in the early stages of treatment should also be noted in the treatment of Graves' disease with atrioventricular block after cardiac surgery.

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CONTACT INFORMATION

Kentaro Sawano

sawano@med.niigata-u.ac.jp

Department of Pediatrics, Niigata University Medical and Dental Hospital
757 Ichibancho, Asahimachi-dori, Chuo Ward, Niigata City 951-8510