

Case study

Thyrotoxic valvulopathy in a 7-year-old child: Case report and literature review

Abstract

Introduction

Children with thyrotoxicosis may present rarely with valvulopathies. A very high index of suspicion is crucial to making diagnosis.

Case Reports

O.C, a 7-year-old female child presented with abdominal pain that started seven days ago, passage of loose stool that started five days ago and weight loss that started five days ago. Salient findings at presentation were tachycardia, anterior neck swelling that moves with swallowing with a grade 3/6 pan-systolic murmur maximal at the apex. A diagnosis of hyperthyroidism at risk of thyrotoxicosis was made based on supported laboratory evidence. Echocardiography done showed severe mitral regurgitation. She is on Tabs Carbimazole and Propranolol. She has improved remarkably and has been on follow up

Conclusion

Hyperthyroidism affects multiple organ systems in the body and the heart is not spared. Most of the cardiac manifestations are functional and occur as a result of the hyperfunctioning gland. A high index of suspicion is required, as many of the patients present with only the consequences of hyperthyroidism

Keywords: Valvopathy; echocardiography; murmurs; hyperthyroidism; child

Introduction

Hyperthyroidism is a disease with multisystemic manifestations. [1] The heart is an organ which is highly susceptible to thyroid hormones and therefore cardiac manifestations are observed even in subclinical cases of hyperthyroidism. [2] Thyroid hormones have a significant impact on cardiac function and structure, with an attendant de novo cardiac condition or could uncover an underlying cardiac pathology. [2] The cardiovascular manifestations of hyperthyroidism include tachycardia, palpitations, bounding peripheral pulses, wide pulse pressure, hyperactive precordium, and murmurs. [3] The most common cardiac complications of hyperthyroidism are arrhythmias (mainly atrial fibrillation), valvulopathies, heart failure and hypertension. [3] From a US based study, the incidence of pediatric hyperthyroidism and thyrotoxicosis is about 0.44 cases per 1000 population for children aged 0-11 years and 0.59 cases per 1000 for those aged 12-17 years, therefore showing increasing incidence throughout childhood. [4] Despite the cardiovascular symptoms and effects being one of the major clinically significant features of thyrotoxicosis, there is paucity of data on the true incidence of thyrotoxic heart disease in children compared to adults. No data on the incidence or prevalence of thyrotoxic valvulopathy in children has been reported. This rarity necessitated the presentation of the case reports.

Case presentation

O.C, a 7-year-old female presented with abdominal pain that started seven days ago, passage of loose stool that started five days ago and weight loss that started five days ago. She was then taken to a Teaching Hospital in Cotonou, Benin Republic where some investigations and

medications were given with persistence of symptoms necessitating her return to Nigeria. She was then referred to UNTH from a private hospital at Nsukka. She was first seen by the Gastroenterology team at UNTH where she had a colonoscopy done. Following an incidental finding of a systolic murmur at the apex, she was referred to the cardiology team for further evaluation. She is the first child in a monogamous family setting with 4 children. Other siblings are alive, with no history of similar complaints. Parents are of the lower socio-economic class. Salient findings at presentation were tachycardia, anterior neck swelling that moves with swallowing, spherical in shape, not tender, no differential warmth and smooth to touch, wide pulse pressure, first and second heart sounds with a grade 3/6 pan-systolic murmur maximal at the apex.

A diagnosis of hyperthyroidism at risk of thyrotoxicosis was made. Complete blood count and serum electrolyte, urea and creatinine showed normal parameters. Thyroid function test (TFT) done showed elevated Free T3 and T4 of 36.05 and 61.34pmol/L respectively and low TSH of 0.010LmiU/L. Thyroid USS showed diffuse enlargement of the thyroid gland and isthmus with increased echogenicity and heterogeneous texture. Echocardiography done showed severe mitral regurgitation. She is currently being managed by the Paediatric Endocrinology team, and is on Tabs Carbimazole and Propranolol. Awaiting repeat of thyroid function tests and Echocardiography. She has improved remarkably and now on follow up.

Discussion

Children with thyrotoxicosis may present rarely with valvulopathies as seen in our index case. Birrell [5] et al reported that children with undiagnosed thyrotoxicosis in the northern region of England have initially been referred to cardiologists with a heart murmur, gastroenterologists with diarrhoea and failure to thrive, as well as to psychiatric/psychology services because of

challenging behaviour and school refusal. Griffith [6] et al also reported a 16-year-old girl with complaint of chest pains, palpitations and a new onset heart murmur with bilateral exophthalmos and thyromegaly.

There may be a link between race and MR in children with thyrotoxicosis. For instance, Lester [7] et al studied 18 hyperthyroid children (9 black and 9 white), six out of the 9 black children had findings of mitral regurgitation while none of the white children had MR. Our index patient is of a black race. [7]

There may be some genetic link with thyrotoxic valvopathy. A study done in Canada by Stefani Doucette [8] et al of a 36-year woman who had been treated for thyrotoxicosis in pregnancy and was eventually delivered of a neonate who had features of thyrotoxicosis. Further examination revealed a systolic murmur at the lower sternal border and echocardiography finding of moderate to severe tricuspid valve regurgitation. We could not follow up the siblings and parents of our index patient for financial reasons. [8]

The clinical features range from an asymptomatic presentation to overt signs of cardiac decompensation as seen in our patient. In a study by Ertek [9], the most frequent clinical features were palpitation, tachycardia, exercise intolerance, exertional dyspnoea and orthopnoea. Saxena et al reported Tachycardia, elevated blood pressure with wide pulse pressure, precordial apical systolic murmur. It could also be asymptomatic.

The investigations for diagnosing a hyperfunctioning thyroid gland; Echocardiography and ECG are important for the diagnosing CVS pathology in thyrotoxicosis. Echocardiography findings range from demonstrating regurgitant flow in the valves (especially mitral valve) to structural

changes in the valve (prolapse). [2] This was also reported in our index case ECG can show fibrillatory waves indicative of atrial fibrillation.

Treatment of thyrotoxic valvopathy include the use of diuretics and anti-failure medications and rarely valve replacement surgeries. [1-3] The prognosis is good especially in the paediatric population Most of the valvular manifestations are “functional”. They resolve entirely or become less problematic with treatment of the hyperthyroidism Resolution is within weeks to months of starting the antithyroid medications. [2-4] The index case has improved remarkably and has been on follow up.

Conclusion

Hyperthyroidism affects multiple organ systems in the body and the heart is not spared. Most of the cardiac manifestations are functional and occur as a result of the hyperfunctioning gland. A high index of suspicion is required, as many of the patients present with only the consequences of hyperthyroidism

Declaration

Ethical approval: Not applicable

Consent to participate:

Patients and parents or caregivers were duly informed in detail about the disease.

Written Consent for publication: This was obtained for the purpose of publication of this article.

Availability of data and materials: Data are however available from the authors upon reasonable request and with permission of the corresponding Author

Code availability (software application or custom code): Not Applicable

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