

Pitfalls in Diagnosing the Simultaneous Presentation of Type 1 Diabetes and Thyrotoxicosis in a Pediatric Patient

Tafadzwa Makaya, MBChB, MMedSci (Endocrinology), MRCPCH, Jerry K. H. Wales, DM, MA, BM BCh, MRCP, FRCPC (Hon), DCH (Hon), and Katherine J. Price, MBChB, DCH, MRCP, FRCPC (Hon)

PRESENTATION

C.C., a 13-year-old Muslim girl, presented to the accident and emergency department with a history of polyuria, polydipsia, and weight loss over several weeks. She was noted to have an increased appetite. There was no family history of autoimmune disorders.

On examination, her pulse rate was 146 bpm, and her weight was between the 9th and 25th percentiles, with a height at the 75th percentile. She was dressed with a traditional headscarf, and neck examination was not performed. No documentation of any thyroid symptoms (e.g., tremor or eye signs) was made. However, she was noted to be slightly agitated and had a rapid speech pattern.

Initial biochemical tests showed urine 2+ ketones and 2+ glucose, with a random blood glucose of 462.6 mg/dl. Her pH was 7.39, with a bicarbonate of 406.8 mg/dl. She was managed as having newly diagnosed diabetes without acidosis. Her screening blood samples were collected as per protocol. She was started on subcutaneous insulin, and, after initial diabetes education, she was discharged home the same day and scheduled for follow-up in the outpatient clinic.

Biochemical results confirmed thyrotoxicosis (Table 1). Subsequent examination of her neck revealed a soft, diffusely enlarged goiter,

and she was noted to have a tremor and persistent resting tachycardia. She was started on treatment with carbimazole.

Anti-glutamic acid decarboxylase (GAD) antibodies were strongly positive at > 2,000 U/ml (normal range < 5), and pancreatic cell antibodies were positive. Thyroid peroxidase antibody levels were 42 IU/ml (normal range < 50). Celiac screen was negative. She is currently stable and her biochemical markers and symptoms have improved.

QUESTIONS

1. How common is the simultaneous presentation of thyrotoxicosis with new-onset type 1 diabetes?
2. How are the clinical presentations of the two conditions similar?
3. Why is it important to ensure that patients presenting with newly diagnosed type 1 diabetes receive a full clinical examination?

COMMENTARY

Simultaneous presentation of thyrotoxicosis with new onset type 1 diabetes is rare. The two conditions share several features of clinical presentation, including weight loss, irritability, tachycardia, and thirst. Thus, it can be easy to miss this dual diagnosis.¹

Pediatricians and other primary care providers seeing patients presenting with newly diagnosed type 1 diabetes should perform a

full clinical examination to look for signs of other autoimmune diseases. Examination to exclude thyroid disease should be part of this assessment. In this case, C.C.'s wearing of traditional dress should not have prevented this from happening.

Approximately 1 out of every 700–1,000 children in the United Kingdom has type 1 diabetes.² The pathophysiology of type 1 diabetes has an established autoimmune basis. Therefore, at the time of diagnosis, children with type 1 diabetes should be screened for thyroid disorders and the related disorder of celiac disease.³ By far the most common thyroid autoimmune disorder in children with type 1 diabetes is hypothyroidism, which affects 2–5% of children with diabetes.⁴

Other case reports in the literature have described pediatric patients presenting simultaneously with type 1 diabetes and thyrotoxicosis.^{5,6} In their case reports, Abdullah et al.⁵ suggested that thyrotoxicosis resulted in an insulin-resistant state and accelerated the presentation of the patient with hyperglycemia, whereas Duun et al.⁶ highlighted the fact that life stresses can precipitate either diabetes or thyrotoxicosis. This suggests that previously sub-clinical thyroid disease or diabetes can manifest clinically in the wake of the onset of the other.

Table 1. Serial Thyroid Function Test and A1C Results

Time from Diagnosis (Days)	Thyroid-Stimulating Hormone (mIU/L; normal range 0.51–4.30)	Free Thyroxine (pmol/L; normal range 12.0–22.0)	Free Triiodothyronine (pmol/L; normal range 3.90–7.70)	A1C (%)
Day 0*	N/A	N/A	N/A	10.6
Day 5	< 0.01	> 100	—	—
Day 26	< 0.01	46	20.2	—
Day 54	< 0.01	64.4	—	—
Day 82	< 0.02	30.6	—	9.8
Day 229	< 0.02	12.4	—	8.4

*Initial samples on day of diagnosis were contaminated and could not be processed.

The significance of dual diagnosis cannot be overemphasized. In 2007, Mercer et al.⁷ postulated that thyrotoxicosis is a potential precipitant for diabetic ketoacidosis (DKA). In 2004, Lim et al.⁸ described a patient who presented with simultaneous type 1 diabetes and thyrotoxicosis and who had atrial fibrillation. These reports are in keeping with previous literature demonstrating that, even in established diabetes, the onset of hyperthyroidism can worsen glycemic control and precipitate DKA.^{9,10} In addition, in 2007, Yeo et al.¹¹ described a case in which simultaneous presentation of thyrotoxicosis and DKA resulted in sudden cardiac arrest.

This raises the importance of ensuring that clinicians maintain a high index of suspicion for thyroid disorders presenting simultaneously with DKA, and this is particularly challenging in the newly presenting pediatric patients.

CLINICAL PEARLS

- Without performing a complete clinical examination to look for signs of other autoimmune diseases, clinicians can easily miss a diagnosis of thyrotoxicosis in pediatric

patients with newly presenting type 1 diabetes.

- Although it is rare for thyrotoxicosis or hypothyroidism to present simultaneously with newly diagnosed diabetes, the implications of this are important. Therefore, it is essential for clinicians to document the presence or absence of signs of thyroid disease.

REFERENCES

¹Singh PK, Mattar M, Macleod A, Moulik PK: Simultaneous initial presentation of type 1 diabetes and Graves disease: pitfalls in recognition and management. *Diabet Med* 27:92–93, 2010

²Diabetes UK: Diabetes in the UK 2010: key statistics on diabetes [article online]. Available from http://www.diabetes.org.uk/Documents/Reports/Diabetes_in_the_UK_2010.pdf. Accessed 6 September 2011

³National Institute for Health and Clinical Excellence: Diagnosis and management of type 1 diabetes in children, young people and adults [article online]. Available from www.nice.org.uk/CG15. Accessed 6 September 2011

⁴Mohn A, Di Michele S, Di Luzio R, Tumini S, Chiarelli F: The effect of subclinical hypothyroidism on metabolic control in children and adolescents with type 1 diabetes mellitus. *Diabet Med* 19:70–73, 2002

⁵Abdullah N, Al-Khalidi O, Brown KJ, Reid J, Cheetham TD: Prolonged honeymoon phase in an adolescent with diabetes and thyrotoxicosis provides support for the accelerator hypothesis. *Paediatr Diabetes* 4:417–419, 2008

⁶Duun EH, Nygaard, Nerup J: Thyrotoxicosis at the onset of diabetes

mellitus: report of five cases. *Ugeskr Laeger* 160:4327–4330, 1998

⁷Mercer V, Burt V, Dhatariya KK: New onset type 1 diabetes presenting as ketoacidosis simultaneously presenting with autoimmune hyperthyroidism: a case report. *J Diabetes Complications* 25:208–210, 2011

⁸Lim D, Lunt H, Ojala R, Turner J: Simultaneous presentation of type 1 diabetes and thyrotoxicosis as a medical emergency. *N Z Med J* 117:U775, 2004

⁹Sola E, Morillas C, Garzon S, Gomez-Balaquer M, Hernandez-Mijares A: Association between diabetic ketoacidosis and thyrotoxicosis. *Acta Diabetol* 39:235–237, 2002

¹⁰Bhattacharyya A, Wiles PG: Diabetic ketoacidosis precipitated by thyrotoxicosis. *Postgrad Med J* 75:291–292, 1999

¹¹Yeo KF, Yang YS, Chen KS, Peng CH, Huang CN: Simultaneous presentation of thyrotoxicosis and diabetic ketoacidosis resulted in sudden cardiac arrest. *Endocrinol J* 54:991–993, 2007

Tafadzwa Makaya, MBChB, MMedSci (Endocrinology), is a specialist registrar in the Department of Endocrinology and Diabetes at Sheffield Children's Hospital, Western Bank in Sheffield, U.K. Jerry K.H. Wales, DM, MA, BM BCh, MRCP, FRCPCH (Hon), DCH (Hon), is a senior lecturer in pediatric endocrinology, and Katherine J. Price, MBChB, DCH, MRCP, FRCPCH (Hon), is a consultant pediatrician in the Department of Pediatric Diabetes at Sheffield Children's Hospital.