Stroke in a Young Man Secondary to Paroxysmal Atrial Fibrillation and Thyrotoxicosis: A Case Report

Rodrigo Bazan a  Thiago Dias Fernandes a
Gláucia Maria Ferreira da Silva Mazeto b
Mariângela Esther Alencar Marques c  Gabriel Pereira Braga a
Gustavo José Luvizutto d  Silmêia Garcia Zanati Bazan b

aDepartment of Neurology, Psychology and Psychiatry, Botucatu School of Medicine, Universidade Estadual Paulista Júlio de Mesquita Filho, São Paulo, Brazil; bDepartment of Internal Medicine, Botucatu School of Medicine, Universidade Estadual Paulista Júlio de Mesquita Filho, São Paulo, Brazil; cDepartment of Pathology, Botucatu School of Medicine, Universidade Estadual Paulista Júlio de Mesquita Filho, São Paulo, Brazil; dDepartment of Applied Physical Therapy, Institute of Health Sciences, Federal University of Triângulo Mineiro, Uberaba, Brazil

Keywords
Stroke · Atrial fibrillation · Thyrotoxicosis · Total thyroidectomy

Abstract
We report a case of a male patient with stroke caused by atrial fibrillation (AF) due to thyrotoxicosis. At hospital admission, he presented hypertension and AF. Magnetic resonance imaging confirmed a right-side ischemic area. The thyrotoxicosis was confirmed by thyroid function and thyroid scintigraphy that showed goiter with diffuse hypercaptation. The patient was treated with tapazole and total thyroidectomy, and pathological findings suggested Graves’ disease. Hyperthyroidism is associated with increased supraventricular ectopic activity in patients with a normal heart, and may be an important causal link between hyperthyroidism and stroke.
Bazan et al.: Stroke in a Young Man Secondary to Paroxysmal Atrial Fibrillation and Thyrotoxicosis: A Case Report

Introduction

Thyrotoxicosis is a rare thyroid dysfunction, with an annual incidence of 0.5–1.4 cases/1,000 individuals, and is predominant in women (10:1). It is characterized by a series of adrenergic events, which can affect all organs and body systems, particularly the heart. Atrial fibrillation (AF) is the most common arrhythmia observed in patients with thyrotoxicosis and is reported in 15% of patients [1–2]. We report the case of a male patient who experienced stroke due to paroxysmal AF due to thyrotoxicosis, and previous reports have been summarized in Table 1.

Case Report

Clinical Summary

Forty-five days before admission to the hospital, a Caucasian 41-year-old male patient developed sweating, palpitations, and anxiety. Ten days prior to admission, the symptoms exacerbated with left paresthesia progressing to left hemiparesis, predominantly brachial. He had no relevant personal or family medical history. Upon admission to the hospital, he presented mild hypertension and cardiac rhythm of AF and psychiatric manifestations such as visual hallucinations. Physical examination revealed a slightly increased thyroid size. Brain magnetic resonance imaging confirmed an ischemic area on the right side of the frontoparietal region (Fig. 1), whereas the duplex carotid and magnetic resonance angiography of the cerebrovascular system yielded normal findings. The patient underwent anticoagulation treatment with warfarin (5 mg/day) 1 year after ictus and was investigated for stroke etiology.

Pathological Findings

Tests for inflammatory activity, lipid profile, serology for HIV, syphilis, Chagas disease, as well as cerebrospinal fluid were normal. One month after admission, thyrotoxicosis was confirmed through assessment of thyroid function (TSH: <0.004 μUI/mL) and thyroid scintigraphy that revealed goiter with diffuse hypercaptation. Initially, the patient was treated with tapazole (60 mg/day) and then underwent total thyroidectomy, from which the pathological findings confirmed lymphocytic thyroiditis, suggesting Graves’ disease (Fig. 2). During the monitoring period, the patient partially recovered from the motor and sensitive deficits with a modified Rankin scale (mRS) score of 2, and the cardiac rhythm reversed to sinus rhythm.
Follow-Up and Outcomes

After total thyroidectomy, the patient required continuous T4 replacement therapy. At 1 year of follow-up, the patient was independent in daily life activities (mRS 1), and his Barthel index was 90.

Discussion

It is well established that AF increases the risk of stroke. In the Framingham study, chronic AF was associated with an elevated risk of stroke; AF in the absence of rheumatic heart disease was associated with a >5-fold increase in stroke occurrence. Hyperthyroidism is associated with augmented supraventricular ectopic activity in patients with healthy hearts, and the activation of arrhythmogenic foci by elevated thyroid hormones may be an important causal link between hyperthyroidism and AF [3, 4]. In relation to psychiatric manifestations, studies suggest complex interactions between thyroid hormones and neurotransmitter circuits of the central nervous system [5]. This report aims to emphasize the importance of thyropathy screening examinations even in young men.

Conclusions

We have reported the case of a male patient with stroke due to paroxysmal AF due to thyrotoxicosis. We suggest that the thyroid crisis may be a determining factor in cerebrovascular diseases.

Statement of Ethics

All patients included in this study consented to the publication of the case report.

Disclosure Statement

The authors declare no conflicts of interest.

References

1. Bielecka-Dabrowa A, Mikhailidis DP, Rysz J, Banach M: The mechanisms of atrial fibrillation in hyperthyroidism. Thyroid Res 2009;2:4.
2. Siu CW, Pong V, Zhang X, Chan YH, Jim MH, Liu S, Yiu KH, Kung AW, Lau CP, Tse HF: Risk of ischemic stroke after new-onset atrial fibrillation in patients with hyperthyroidism. Heart Rhythm 2009;6:169–173.
3. Faber J, Wiinberg N, Schifter S, Mehlsen J: Haemodynamic changes following treatment of subclinical and overt hyperthyroidism. Eur J Endocrinol 2001;145:391–396.
4. Petersen P, Hansen JM: Stroke in the thyrotoxicosis with atrial fibrillation. Stroke 1988;19:15–18.
Fig. 1. T1 (a), FLAIR (b), and T2 (c) magnetic resonance imaging confirmed the ischemic area in the right frontal and parietal lobe.
Fig. 2. a Thyroid with follicles showing hyperplastic epithelium, filled with colloid with intense vacuolization in the periphery evidencing morphological signs of hyperfunction. HE. ×100. b Details of the lymphocytic infiltrate that diffuses through the follicles. HE. ×200. c Follicular epithelium with a hyperplastic appearance, with cells showing granular and oxyphylic cytoplasm and colloid fluid and vacuolated at the periphery. Presence of lymphocytes in the interstitium. HE. ×200. d Details of the hyperplastic epithelium and its papillary projection. HE. ×200.
### Table 1. Previous studies on stroke and thyroid dysfunction

| First author [Ref], Study year | Study design | Population | Thyroid dysfunction | Outcomes and conclusions |
|--------------------------------|--------------|------------|---------------------|--------------------------|
| Tanabe [6], 2017               | Case report  | A 49-year-old Japanese female patient with cerebral venous thrombosis (CVT) | Thyroid crisis | Clinicians should consider CVT when they encounter a stroke in a patient with hyperthyroidism |
| Shi [7], 2014                  | Retrospective | 351 first-onset ischemic stroke patients | Elevated thyroid autoantibodies | Thyroid autoantibodies may be associated with the presence of intracranial stenosis in young patients after stroke |
| Wollenweber [8], 2013          | Single-center cohort | 165 patients with ischemic stroke | Hyperthyroidism: 11.5% Hypothyroidism: 13.9% | Hyperthyroidism is a risk factor for poor outcome 3 months after ischemic stroke |
| Selmer [9], 2012               | Cohort       | 586,460 adults who had their thyroid function evaluated for the first time and who were without previously recorded thyroid disease or atrial fibrillation (AF) | Thyrotoxicosis | The risk of AF was closely associated with hyperthyroidism |
| Sheu [10], 2010                | Cohort       | 3,176 patients with hyperthyroidism and 25,408 without hyperthyroidism | Hyperthyroidism | Hyperthyroidism is associated with an increased risk for ischemic stroke in young adults |
| Rastogi [11], 2008 Experimental | Euthyroid (n = 15) and thyrotoxic (n = 60) | Thyrotoxicosis | High mortality in hyperthyroid animals after stroke |
| Squizzato [12], 2005 Literature review | Studies on the relationship between thyroid diseases and cerebrovascular diseases | Hyperthyroidism and hypothyroidism | In subclinical hyperthyroidism, the incidence of AF is increased, and in overt hyperthyroidism, cardioembolic stroke is associated with thyrotoxic AF |
| Rocha [13], 2001               | Case report  | Report of 2 patients with cerebral vasculitis and Basedow-Graves disease | Basedow-Graves disease | There is a possible pathogenic link between Graves’ disease and cerebral vascular disorders, possibly through a common autoimmune mechanism |