

# A Case Study of Multifocal Papillary Carcinoma and Thyrotoxicosis: Hypokalemic Periodic Paralysis

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## Introduction

Thyrotoxic hypokalemic periodic paralysis (THPP) is an uncommon diagnosis presenting with painless, flaccid paralysis, generally provoked through exercise or dietary changes. Diagnosis is made by the demonstration of paralysis, hyperthyroidism and hypokalemia which can lead to fatal arrhythmias.

The typical patient is male and of Asian descent with a 2% incidence. Most cases are inherited in an autosomal dominant pattern, however, acquired cases have been reported.

The definitive treatment of THPP is by pharmacological therapy, radioactive iodine or surgery.<sup>7,8</sup> This case examines a Native American male who developed THPP in the presence of multifocal papillary thyroid carcinoma.

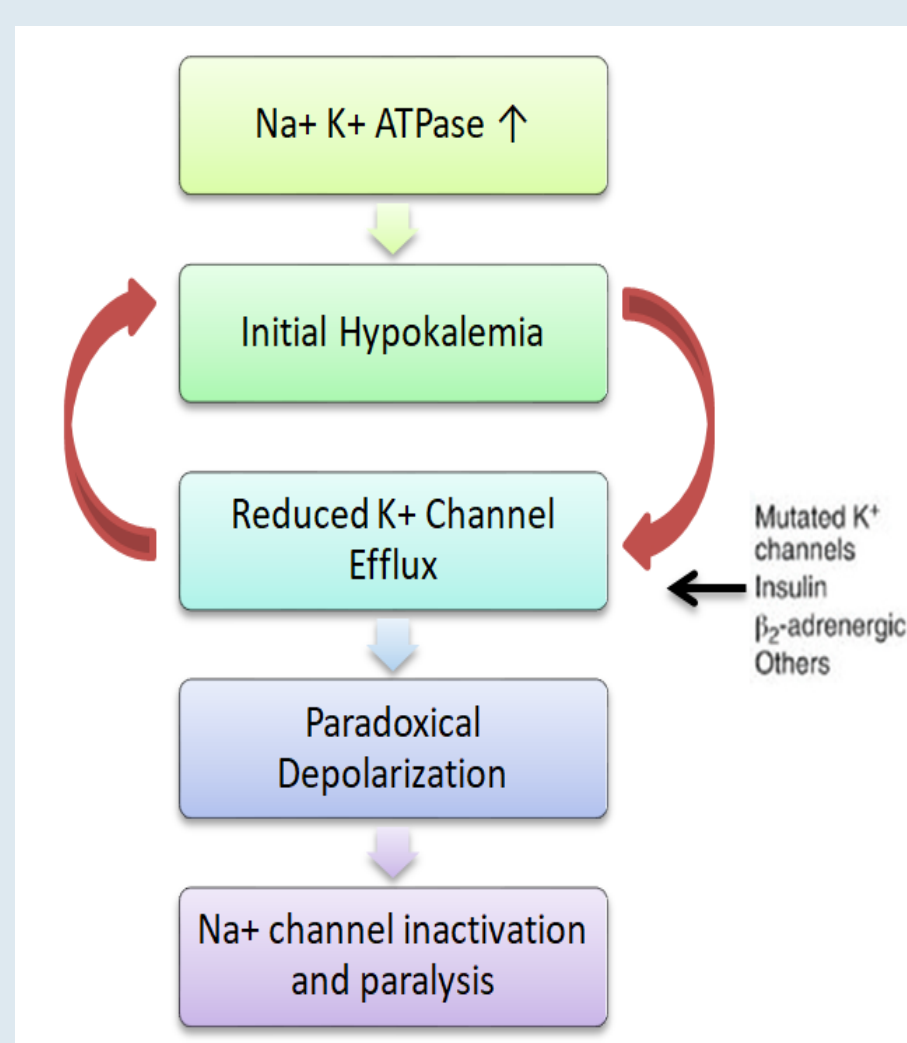


Figure 1. Mechanism of Thyrotoxic Periodic Paralysis. Reproduced from Journal of the American Society of Nephrology. Vol 23. Issue 6. Shih-Hua Lin, Chou-Long-Huang.

## Differential Diagnosis

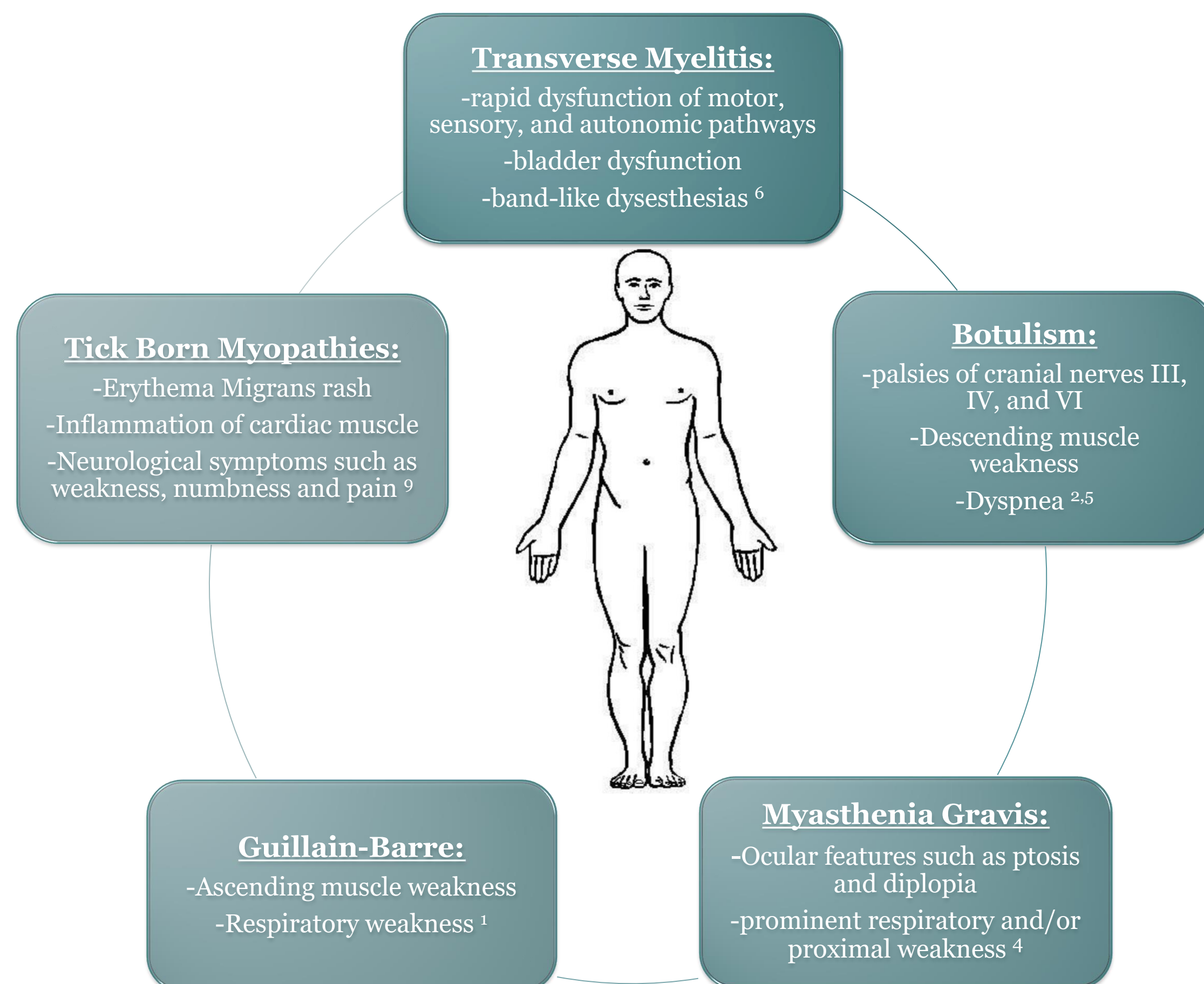


Figure 5. Body Outline. Photo courtesy of Clipart Library. <http://clipart-library.com/clipart/KTMKpjEEc.htm#>

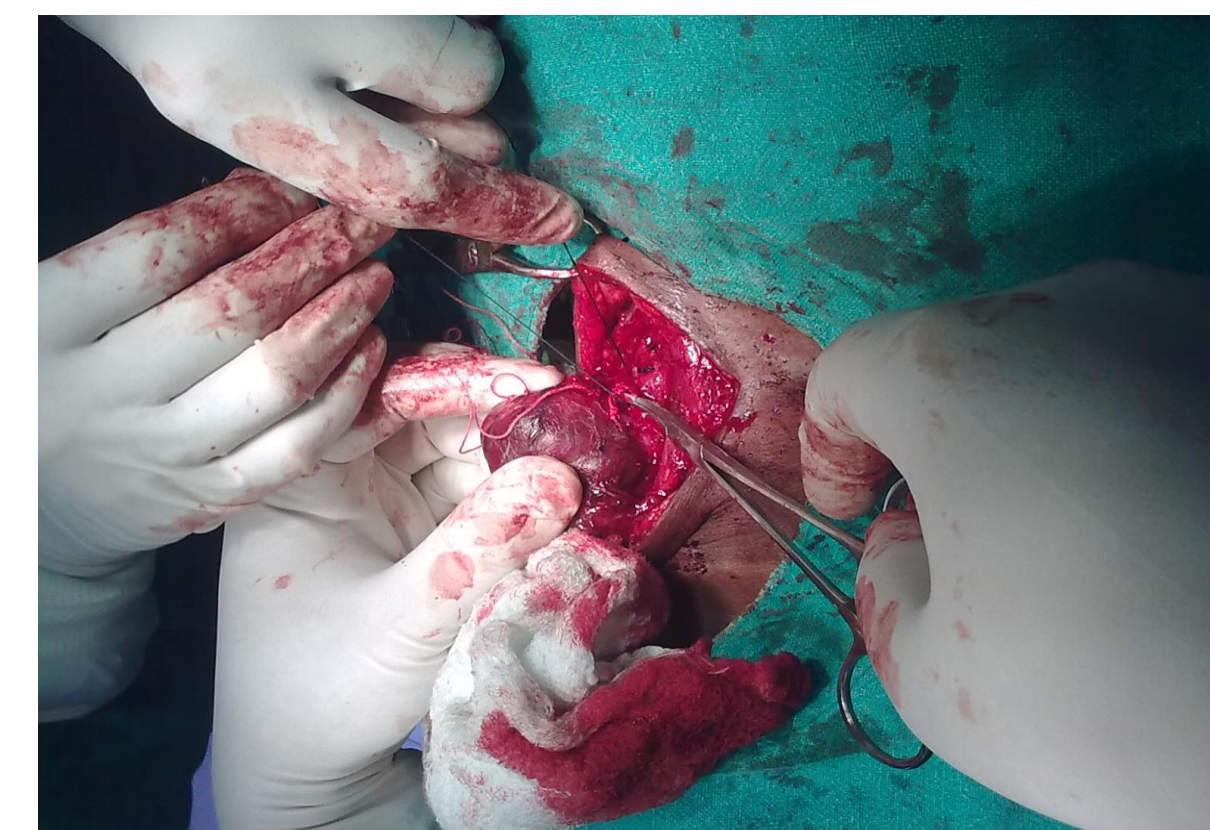


Figure 3. Total Thyroidectomy. Photo courtesy of N.raveender, CC BY-SA 3.0. Wikimedia. [https://commons.wikimedia.org/wiki/File:Thyroid\\_Surgery.jpg](https://commons.wikimedia.org/wiki/File:Thyroid_Surgery.jpg)

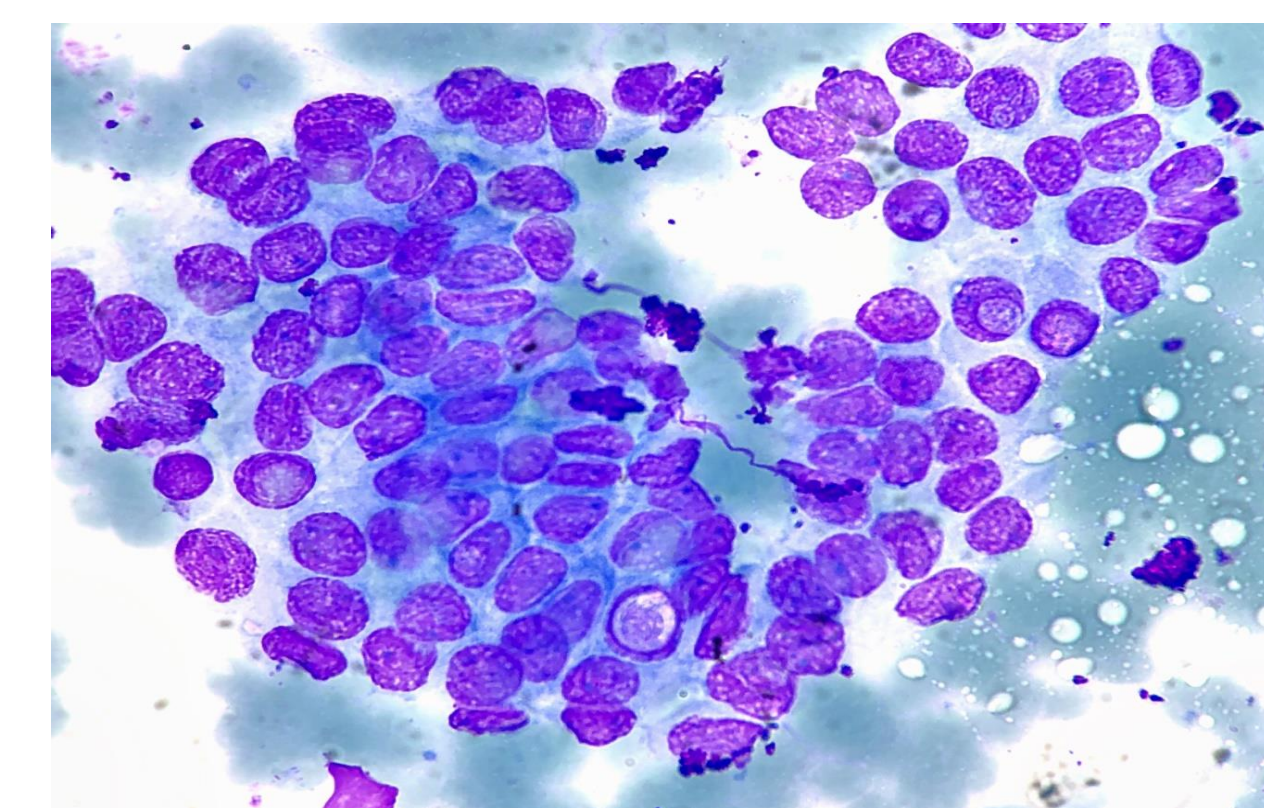


Figure 4. Papillary Thyroid Carcinoma, FNA, Giemsa Stain. Photo courtesy of Ed, Uthman. Wikimedia. [https://commons.wikimedia.org/wiki/File:Papillary\\_Thyroid\\_Carcinoma\\_FNA\\_Giemsa\\_stain\\_\(40700344115\).jpg](https://commons.wikimedia.org/wiki/File:Papillary_Thyroid_Carcinoma_FNA_Giemsa_stain_(40700344115).jpg)

## Results

- Laboratory revealed low TSH (<0.03), high freeT4 (2.91), low potassium levels (1.7) and negative cardiac enzymes which in the presence of paralysis is consistent with THPP. Initially the patient was treated with potassium replacement and propranolol which over time corrected his paralysis.
- Thyroid ultrasonography revealed a diffusely heterogeneous thyroid texture with innumerable, tiny, hypoechoic foci bilaterally. Due to suspected thyroid cancer, a total thyroidectomy was performed. The surgical pathology revealed multifocal papillary thyroid carcinoma.
- Two months after the thyroidectomy, the patient underwent radio-iodine ablation to ensure complete eradication of any thyroid cells not removed during the surgical procedure. The patient's paralysis abated shortly after surgery and potassium values returned to normal. As the patient's thyroxine values fell after thyroidectomy, he was placed on Levothyroxine. No recurrence of periodic paralysis occurred after surgery.

## Case Description & Physical Exam

- A 52 year old Native American male without significant past medical history presented to the emergency department with abrupt paralysis of the lower extremities bilaterally. He denied similar prior episodes. Although he did mention experiencing cramping in his lower extremities bilaterally several months ago which resolved spontaneously. A review of the patient's medical record revealed long-standing treatment with Methimazole 10 mg and Metoprolol 25 mg for hyperthyroidism. He denied family history of thyroid disorders.
- Upon review of systems patient denied fever, dyspnea, chest pain and palpitations. Patient denied nausea, abdominal pain, constipation and diarrhea.
- Physical examination demonstrated the patient to be alert and oriented with proximal muscle group weakness of the lower extremities bilaterally with hyporeflexia. No swelling or deformities noted to the lower extremities bilaterally. Cardiovascular exam revealed regular rate and rhythm. Lungs clear to auscultation with no accessory muscle use. Intact extraocular movements.
- The patient was admitted for further workup and treatment. Diagnostic studies were ordered including TSH, T4, chemistry panel and thyroid ultrasonography.

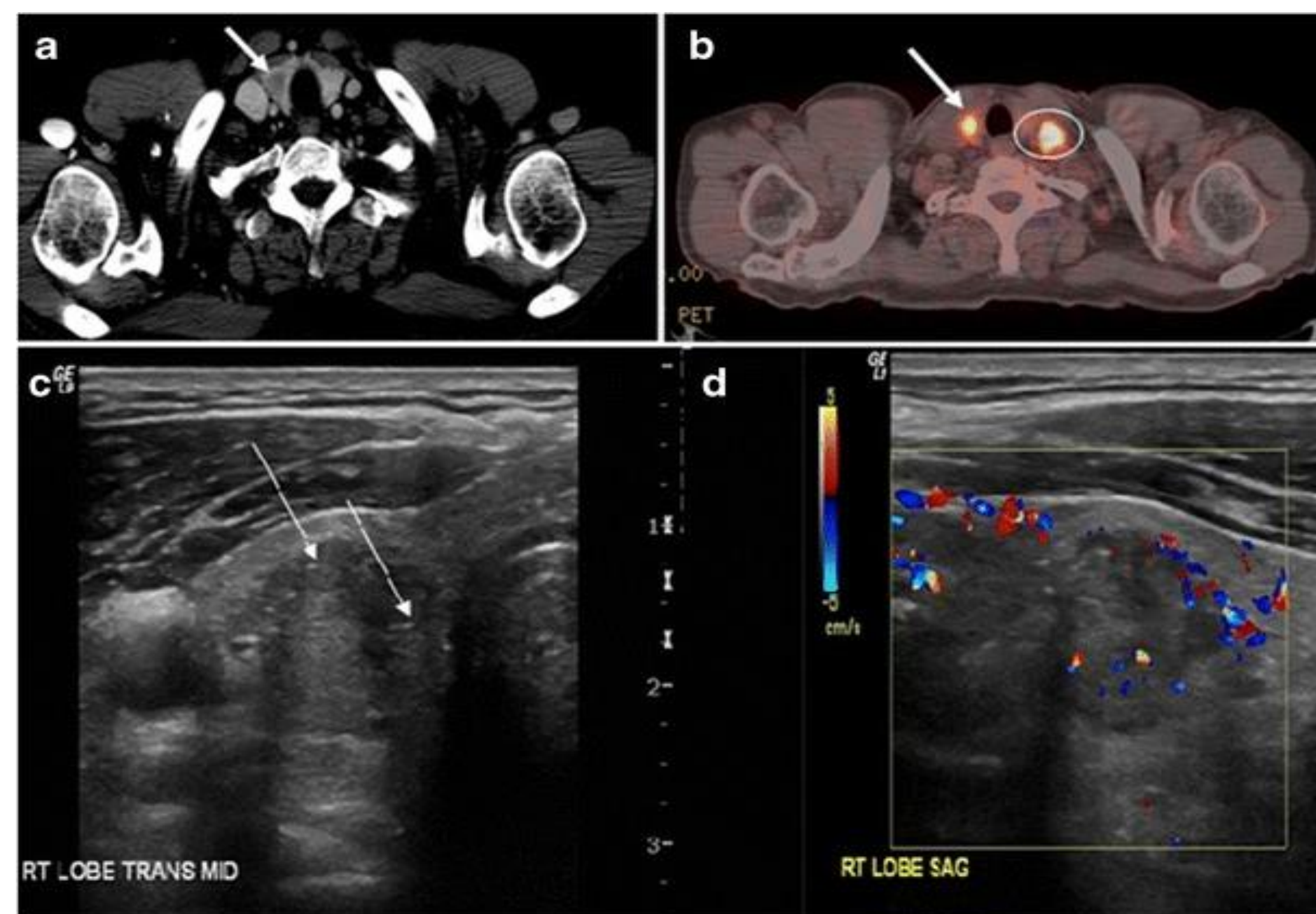


Figure 2. Papillary Thyroid Carcinoma on CT, PET CT and Ultrasonography. Photo courtesy of Mnahi Bin Saeedan, et al. Wikimedia. [https://commons.wikimedia.org/wiki/File:Papillary\\_thyroid\\_carcinoma\\_on\\_CT,\\_PET\\_CT\\_and\\_ultrasonography.jpg](https://commons.wikimedia.org/wiki/File:Papillary_thyroid_carcinoma_on_CT,_PET_CT_and_ultrasonography.jpg)

## Discussion & Conclusion

- THPP is an uncommon, but important and potentially life-threatening diagnosis to recognize. This case is an unusual presentation of a non-Asian patient with acquired THPP due to papillary thyroid carcinoma. Familial cases may require electromyography and muscle biopsy to confirm the diagnosis. Treatment is potassium supplementation, correction of hyperthyroidism and avoidance of precipitating events such as strenuous exercise and carbohydrate-rich diets. Patients who do not respond to potassium replacement can be placed on IV propranolol.<sup>3</sup>
- In this particular patient, correction of potassium and thyroidectomy with adjuvant radio-ablative therapy was warranted due to the presence of multifocal papillary carcinoma.

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