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OCCULI DEXTRA PROPTOSIS IN SYMPTOMATIC HIPERTHYROIDISM WITH DIFFUSE GOITRE IN 45-YEAR-OLD-WOMAN: A CASE REPORT WITH LITERATURE REVIEW

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Abstract

Thyroid hormones play a crucial role in iron uptake and transportation, influencing hematopoiesis through their interaction with TSH receptors found in erythrocytes and extrathyroidal organs. The co-occurrence of hypothyroidism and anemia is often attributed to shared underlying causes. This study presents the case of a 45-year-old woman who reported neck swelling accompanied by palpitations. Physical examination revealed a visible and palpable mass in the neck area. Laboratory tests indicated elevated TSH levels (5.6 uIU/mL), high FT4 levels (128 pmol/L), and low hemoglobin (7.7 µg/dL), suggesting an association between thyroid dysfunction and anemia. The patient was administered oral therapy alongside a dietary intervention incorporating Salmon DNA. After one month, follow-up laboratory results showed significant improvement, with TSH levels decreasing to 4.1 uIU/mL, FT4 levels stabilizing at 22 pmol/L, and hemoglobin levels increasing to 10 µg/dL. These findings suggest that targeted dietary modifications may support thyroid function and hematological recovery. This case highlights the potential role of nutritional interventions in managing thyroid-related anemia and underscores the importance of comprehensive treatment strategies integrating endocrinological and hematological considerations. Further studies are needed to explore the mechanisms linking thyroid function, iron metabolism, and dietary interventions for optimal patient outcomes.

Keywords: Occuli Dextra Proptosis, Symptomatic Hiperthyroidism, Diffuse Goitre

Introduction

The median age of thyroid illness in adults in the United States increased from 1999 to 2003, and subsequently rose from 2014 to 2018. The highest rate was observed among older individuals, women, and Europeans of non-Hispanic origin (Zhang et al., 2023). The thyroid gland plays a crucial role in overall body metabolism, including hematopoiesis. Blood abnormalities are commonly observed in people with thyroid diseases due to the essential function of thyroid hormones in the proliferation and metabolism of red blood cells and other blood components (Ahmed & Mohammed, 2020). Thyroid function abnormalities exhibit diverse clinical presentations and represent a prevalent clinical issue. Numerous patients present with subclinical thyroid dysfunctions, diagnosed through thyroid hormone assessments or abnormal findings from other investigations, including blood parameters, lipid irregularities, cardiac dysfunction, atherosclerosis, and various other clinical manifestations. (Wani et al., 2024a) The predominant cause of anemia, was also observed to diminish the activity of thyroid peroxidase, an iron-dependent enzyme essential for the synthesis of thyroid hormones. We report a case of primary hyperparathyroidism and anemia with a TSHs levels were 5.6 uIU/mL, FT4 levels were 128 pmol/L, Hemoglobin 7.7 µg/dL.

Research Method

Case Study

This study employs a case study method to analyze a specific patient case in detail. The case study approach allows for an in-depth examination of the clinical presentation, laboratory findings, and treatment outcomes of a patient presenting with endocrine and metabolic concerns. By focusing on a single case, this method provides valuable insights into the complex interplay of clinical symptoms, diagnostic processes, and management strategies. The case study design is particularly effective in medical research for generating hypotheses, improving understanding of rare or complex conditions, and offering real-world evidence for best practices.

Case Report

A 45-year-old woman came to the Endocrine, Metabolism and Diabetes clinic at Tlogorejo hospital Semarang on August 09, 2024 with complaints of swelling neck and palpitations. The swelling neck is accompanied with palpitations. The patient's swelling has been felt since 1 years ago and has gotten worse in the last 3 months. The patient is also often get anxiety since last month and feels loss of appetite. The patient was not obese, had no history of trauma to the eye and neck. Pain in the epigastric area, nausea, vomiting, and fever were denied by the patient. The patient had a no history of any metabolic disease and only consuming salmon DNA of utsukushi and subarashi.

On physical examination, the patient was found to be active, compost mentis, GCS 15 (E4M6V5), blood pressure 134/95 mmHg, pulse 85 x/minute, temperature 37°C, respiratory rate 20x/minute, SpO2 99%. Local examination in the neck area, when the inspection was carried out there was visible mass with length and width 2.5 cm x 1 cm and on palpation there was soft lump with a size of 2.5 cm x 1 cm which is not painful and not reddened in the neck area. On eye examination, intraoccular tension was found slightly high and there is bulging on both eye.

On laboratory examination, TSHs levels were 5.6 uIU/mL, FT4 levels were 128 pmol/L, Hemoglobin 7.7 µg/dL, Calcium was 1.25 mmol/L, Natrium 135 mmol/L, Kalium 3.31 mmol/L.



Figure 1. Inspection on Patient neck with swelling on her left neck
Source: Telegorejo Clinic Patient

Results and Discussion

Hyperthyroidism is a disorder characterized by the excessive production and secretion of thyroid hormone by the thyroid gland, potentially resulting in thyrotoxicosis. The incidence of hyperthyroidism in the United States is around 1.2%. Hyperthyroidism has several etiologies, with the most prevalent being Graves' disease, toxic multinodular goiter, and toxic adenoma. (Doubleday & Sippel, 2020)

Deficiency of thyroid hormones diminishes the proliferation of erythrocyte precursors, directly and indirectly through decreased erythropoietin secretion by the kidneys, resulting in anemia. If this anemia persists over the long term, it depletes the body's iron reserves, leading to iron deficiency, which subsequently impacts the hypothalamic–pituitary–thyroid axis, causing altered thyroid hormone levels and a diminished response to thyroid-stimulating hormone. Iron is crucial for the function of thyroid peroxidase, an enzyme that facilitates the iodination of tyrosine residues in thyroglobulin, a precursor protein for thyroid hormone production. (Garofalo et al., 2023)

The concurrent presence of anemia and hypothyroidism presents a complex diagnostic challenge in attributing symptoms to either condition and may also indicate a causative link between thyroid illness and anemia.(Wani et al., 2024b) Relationships between thyroid illness and anemia have been identified in historical experimental animal research.(Alshahrani et al., 2024) Hypophysectomized animals had reduced red blood cell counts, which normalized with the introduction of thyroid hormones. Mice lacking the thyroid hormone receptor TRa have reduced hematocrit levels.(Park et al., 2017)

Current clinical experimental data regarding the causative relationship between hypothyroidism and anemia is restricted to many small case series, wherein levothyroxine treatment for hypothyroidism led to a significant increase in hemoglobin levels and the resolution of anemia. (Brooks et al., 2023)Conversely, consistent with the observational results, a sample of hyperthyroid patients exhibited a significant prevalence of anemia, which normalized subsequent to antithyroid treatment. (Mathew P & Kaur J, 2024)Emerging evidence suggests that both subclinical and overt hypothyroidism may causally contribute to anemia through impaired erythrocyte production, although the precise mechanisms by which thyroid hormones and TSH induce anemia remain inadequately elucidated. (Wopereis et al., 2018) T3, T4, and TSH may directly influence erythropoiesis. T3 and T4 regulate hematopoiesis by affecting the proliferative potential of erythroid precursors. (Maggio et al., 2015)Furthermore, a direct activation of red cell progenitors via β2-adrenergic receptors by T4 has been demonstrated. T4 has been shown to promote the commencement and completion of hemoglobin protein chains in vitro and to facilitate red blood cell production. Thyroid hormones have been demonstrated to enhance erythropoiesis by stimulating the kidneys to produce erythropoietin.(Kuhikar et al., 2020) Moreover, data indicates that thyroid hormones influence iron transport and utilization. Thyroid-stimulating hormone (TSH) may influence hematopoiesis through its interaction with a functional TSH receptor, present in erythrocytes and certain extrathyroidal organs.(Chu & Yeh, 2020) Another rationale for the simultaneous development of hypothyroidism and anemia is the presence of shared etiological factors affecting both conditions. Chronic inflammatory disorders, malnutrition, and malabsorption can lead to diminished thyroid function as an adaptation mechanism to energy deficiencies. Moreover, malnutrition and malabsorption can lead to shortages in essential micronutrients vital for erythropoiesis, such as iron, vitamin B12, and folate, along with iodine insufficiency, which is critical for adequate thyroid function.(Shulhai et al., 2024)

Thyroid function tests in peripheral blood are used to detect thyroid status. Thyroid-stimulating hormone (TSH), which is generated by the pituitary gland, as well as the thyroid hormones thyroxine (T4) and triiodothyronine (T3), may be easily tested using well-established assays. Subclinical hyperthyroidism is defined as unusually low TSH values with normal free T4 and total or free T3 concentrations. Observational studies, on the other hand, commonly diagnose subclinical hyperthyroidism using just TSH and free T4 levels since T3 levels are usually within the reference range if free T4 levels are. T3 toxicosis is a rare type of overthyroidism in which free T4 levels are normal but T3 levels are excessive.(Van Uytfanghe et al., 2023) In the patient that underwent laboratory examination it was found that TSHs levels were 5.6 uIU/mL, FT4 levels were 128 pmol/L, Hemoglobin 7.7 µg/dL, Calcium was 1.25 mmol/L, Natrium 135 mmol/L, Kalium 3.31 mmol/L. Decrease amount of TSHs is found on this laboratory examination which mean there is an abnormality of excessive amount of thyroid production.

The therapy of Hyperthyroid with anemia is determined by the patient's symptoms and severity, and includes basic, medicinal, and surgical therapies. The optimum treatment objective is to reduce increase the eritropoesis process, In hyperthyroidism, blood volume increases by roughly 6%, which may partially offset the erythropoiesis generated by thyrotoxicosis. Moreover, the lifespan of red blood cells may be diminished, and certain thyrotoxic patients may have inefficient erythropoiesis.(Gianoukakis et al., 2009)

Comparison of Active Ingredient antara SOP with Human Placenta

Amino acids	S O P	Human Placenta	Deer Placenta
Asparagine acid	7.25	4.91	5.25
Threonine	4.00	3.39	2.13
Serine	5.96	4.09	4.86
Glutamine acid	10.11	5.84	8.27
Proline	7.49	4.58	9.27
Glycine	21.38	9.34	36.52
Alanine	10.58	5.18	11.35
Cysteine		0.55	
Valine	3.59	3.00	1.73
Methionine	2.06	1.16	1.58
Isoleucine	2.79		1.05
Leucine	5.13	4.23	1.95
Tyrosine	1.81	1.19	0.28
Phenylalanine	1.90	1.52	1.29
Histidine	1.32	1.30	0.98
Lysine	5.34	3.61	2.62
Arginine	5.44	2.88	5.22
Hydroxyproline	3.08		5.00
Tryptophan	0.32	0.45	
Carnosine	0.33		
Ornithine	0.39		
Taurine			
Phosphoserine			
Hydroxyrysine	0.66		

in mol%

Japan Food Research Laboratories

Figure 2. Inspection on Patient neck with swelling on her left neck
Source: Japan Food Research and Laboratories

In Alternative to treat Inflamation that cause by hormone distubance, Salmon Ovary peptide that contain Glycine, Proline and Polydeoxyribonucleotide, a composite of DNA fragments closely resembling human DNA, is utilised for scar and ulcer treatment, as well as postoperative tissue regeneration, due to its capacity to enhance cellular regeneration and reduce inflamation. (Ra et al., 2018) The principal fatty acids of the Salmon DNA and lipids that contained by Salmon Ovary Peptide were as follows (% w/w): DHA, 18.8%; EPA, 11.1%; palmitic acid, 14.7%; and oleic acid, 16.8%.(Maeda et al., 2013) That can help enhancing effects health on human body as in this patient after 3 month

comsumtion utsukushi that contain Salmon Ovary Peptide there is improvement in her hemoglobin that increase as the result below TSHs levels were 4,1 uIU/mL, FT4 levels were 22 pmol/L, Hemoglobin 10 µg/dL. Additionally Salmon Ovary Peptide help activates growth factors and extracellular matrix (ECM) turnover through the purinergic adenosine A2A receptor in compromised cells or tissues. Prior research on polydeoxyribonucleotide's effects has demonstrated that the activated A2A receptor inhibits pro-inflammatory cytokines and facilitates wound healing by producing pro-fibrotic cytokines.(Choi et al., 2024)

Conclusion

Hyperthyroid is a disorder of the thyroid glands in which there is excessive secretion of thyroid hormone from one or more thyroid glands which ultimately causes large amount of triiodothyronine and thyroxine production, thereby inducing thyroid growth and vascularization. These mechanisms cause hyperthyroidism symptoms that cause Cytokine production and inflammation that affect the eritropoetin hormone disturbance which cause anemia. To diagnose, it is necessary to carry out laboratory tests such as Hemoglobin, TSHs, FT4, and electrolyte levels in the blood. For management, Basic therapies such as antithyroid, and reducing risk factors are often advised with additionally Salmon ovary peptide consumption may help those who have visible symptoms and active illness.

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