Journal Homepage: - www.journalijar.com

INTERNATIONAL JOURNAL OF ADVANCED RESEARCH (IJAR)

Article DOI: 10.21474/IJAR01/18636
DOI URL: http://dx.doi.org/10.21474/IJAR01/18636

RESEARCH ARTICLE

SEVERE HYPOCALCEMIA FOLLOWING THYROIDECTOMY SECONDARY TO A LATE-DIAGNOSIS PAPILLARY CARCINOMA OF THE THYROID: CASE REPORT

Yasmin M. Tohari, Mona H. Tohary and Mona M. Tohari

Manuscript Info

Manuscript History
Received: 28 February 2024
Final Accepted: 31 March 2024
Published: April 2024

Key words:-
Hypocalcemia, Thyroidectomy, Papillary Carcinoma Of The Thyroid, Case Report, Saudi-Arabia

Abstract

Thyroid cancer is considered the most common form of endocrine malignancy that usually affects females in their fifth decade of life. Here, we report a case of a 25-year-Saudi female, who was diagnosed by biopsy as papillary carcinoma of the thyroid following total thyroidectomy. After the surgery, she suffered from severe hypocalcemia that necessitated ICU admission.

Introduction:-

Thyroid cancer is considered the most common form of endocrine malignancy worldwide, and its incidence has been obviously growing over the years [1]. The most predominant type of thyroid neoplasm is papillary thyroid cancer (PTC); accounting for 80-85% of all cases [2]. In Saudi- Arabia, thyroid cancer represents the second most common type of malignancy in females, and the fourth most common treated cancer overall [3]. It is an epithelial form of malignancy that carries a favorable outcome and prognosis compared to the other types of thyroid neoplasm [4]. It usually affects middle-aged adults, with a median age at presentations of 50 years, and tends to affect females more than males [5]. RET proto-oncogene rearrangement, MET gene over expression in addition to BRAF gene mutation are believed to be the main pathophysiological events in PTC [6]. It can be managed medically or surgically. The most commonly encountered complication following thyroidectomy is hypocalcemia.

Here, we report a case of a 25-year-Saudi female, who developed severe hypocalcemia following total thyroidectomy secondary to PTC.

Case presentation

A 28-year-old Saudi female, with clear medical and family background, not married a known case of hypertension for 2 years on amlodipine 5mg tabs OD presented with anterior neck swelling, hand tremors, palpitation, and a very low TSH level (0.01mIU/L). Neck ultrasonography revealed thyroiditis, with a right thyroid nodule and dots of calcification. The initial diagnosis was thought to be thyrotoxicosis and thyroiditis. Consequently, she started on the antithyroid drug neomercazole. However, she showed no clinical signs of improvement (both clinically and laboratory) despite the maximum dosage of neomercazole. Based on this, the decision to do a total thyroidectomy was made.

The biopsy report showed a tumor site that was mainly in the right lobe, uni-focal and measuring about 1.3x0.5 cm. It has a 5mm free margin and without extra thyroidal extension. Therefore, the diagnosis of PTC was established. Importantly, it was a follicular variant, infiltrative, and associated with lymphocytic thyroiditis and right sub-mandibular lymph node. Following thyroidectomy, she was put on thyroid replacement therapy (euthyrox) tabs 100mg OD then increased to 200mg OD. However, the TSH level was very high (44mIU/L). Anti-TPO (thyroid peroxidase antibody) was also very high (450.78IU/ml). As a result, the decision to start radio-active iodine ablation

Corresponding Author:- Yasmin M. Tohari

was made; however, she didn't take the dosages due to social and cultural beliefs, and continued on euthyrox tabs 200mg OD. Please note, she suffered from heavy menstrual bleeding for 7 months that was controlled lastly with dicynone tabs 500mg

Two weeks later, she was presented with slurred speech, difficulty swallowing, left-side focal convulsion along with generalized body numbness and tingling sensation. In addition, she complained of painful dental sensation and fever. On examination, she was severely ill, irritable, and anxious. Importantly, she has a stridor and carpopedal spasm. She had low serum Ca^{2+} and Mg^{2+} levels (4.1 and 1.50 mg/dl respectively), and high WBC (11.6 x 109/L) with normal other serum electrolytes and laboratory tests. She was then admitted to the ICU, received IV then oral calcium supplements, and was discharged after two weeks in good condition on euthyrox tabs 200mg OD, baclofen tabs 20 mg OD, calcium carbonate tabs 3000 mg OD, vit D 5000IU OD and magnesium supplement. At the time of discharge, calcium level was 7.5 mg/dl.

Discussion:-

Papillary thyroid cancer is the most common type of thyroid neoplasm. A recent study in Saudi Arabia revealed that the median age of presentation is 29-49 years; pointed to the fourth and fifth decade of life, and tends to affect females more than males with a ratio of 3:1[3]. Previous ionizing radiation exposure especially to the head and neck during childhood, environmental exposure, and living in areas with high iodine intake have been linked with increased incidence of PTC [7, 8]. In addition, hereditary medullary thyroid cancer, syndromic and non-syndromic familial non-medullary thyroid cancer, and Gardner syndrome are highly associated with PTC [9]. Importantly, our patient is a 25-year-old female with a clear medical and family background.

Detailed history and physical examination along with laboratory investigations and imaging are crucial for the diagnosis. Both benign and malignant thyroid nodules could be associated with the presence of calcification. However, thyroid nodules with micro-calcification (1mm and less) were associated with thyroid malignancy in the majority of cases [10]. Our patient who was initially diagnosed with thyrotoxicosis and thyroiditis received the maximum dosage of neomercazole before being discovered late to have PTC after total thyroidectomy. Following, surgery, numerous complications can arise; and hypocalcemia is one of them.

Hypocalcemia following thyroidectomy is due to devascularization or removal of the parathyroid glands. It can lead to transient or permanent hypoparathyroidism in 0.3% to 49% and 0% to 13%, respectively according to a recent study [11]. Alqahtan et. al and his colleague from Saudi Arabia concluded that transient or temporal hypocalcemia was statistically associated with total thyroidectomy. Other risk factors such as age, gender, and type of thyroid disease were not linked with post-operative hypocalcemia in their study [11]. Patients with low calcium levels before surgery are prone to develop temporal hypocalcemia after surgery. Temporal hypocalcemia is defined as a low calcium level lasting from 6-12 months following thyroidectomy, while permanent hypocalcemia lasts for more than 12 months; our patient developed hypocalcemia following total thyroidectomy [12]. Parathyroid gland injury during the surgery can lead to impaired gland secretion; and consequently, post-operative hypocalcemia through multiple mechanisms. These mechanisms include reduced renal synthesis of 1, 25- di-hydroxyvitamin D synthesis, decreased bone resorption, and intestinal calcium absorption [13].

Severe hypocalcemia present with numbness, paresthesia, spasm, seizures, and tetany such as developed in our patient. Symptomatic patients need urgent attention and treatment. Patients with hypocalcemia (less than 8.5 mg/dl) following surgery are recommended to prescribe early oral calcium supplementation. A dosage of 400–1200 mg per day of elemental calcium is usually sufficient. The most common forms are calcium carbonate and calcium citrate. Important to note that calcium can reduce and limit thyroxine inhibition; therefore, levothyroxine has to be taken one hour before or three hours after calcium supplements. Calcitriol; the active form of vitamin D is added when serum calcium continues to decline despite calcium supplements [13]. Low magnesium level leads to reduced PTH release; thus, decreasing the calcium level. As a result, managing hypomagnesiumia can enhance recovery.

Conclusions:-

Knowledge of the risk factors associated with post-operative hypocalcemia is crucial to prevent post-operative catastrophic events. Administration of calcium supplements, 1, 25- dihyroxyvitamin D are fundamental in the majority of cases.

Declaration:

Consent for publication:

Written informed consent was obtained from the patient for participation and publication of this case report and accompanying images.

Availability of data and materials

Not applicable

Competing interests

None.

Funding

None.

Acknowledgment:-

None.

Abbreviations

PTC: Papillary thyroid cancer
RET: Rearranged during transfection
MET: Mesenchymal epithelial transition
OD: once per day
TSH: Thyroid stimulating hormone
WBC: White blood cell
ICU: Intensive care unit

References:-

1. Siegel, K. D. Miller, and A. Jemal, “Cancer statistics, 2016,” CA: a Cancer Journal for Clinicians, vol. 66, no. 1, pp. 7–30, 2016.
2. Limaiem F, Rehman A, Anastasopoulou C, et al. Papillary Thyroid Carcinoma. [Updated 2023 Jan 1]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2023 Jan-.
3. Ali S. Alzahrani, Haneen Alomar, Nada Alzahrani, "Thyroid Cancer in Saudi Arabia: A Histopathological and Outcome Study", International Journal of Endocrinology, vol. 2017, Article ID 8423147, 7 pages, 2017.
4. Vuong HG, Le HT, Le TTB, Le T, Hassell L, Kakudo K. Clinicopathological significance of major fusion oncogenes in papillary thyroid carcinoma: An individual patient data meta-analysis. Pathol Res Pract. 2022 Dec;240:154180
5. Lim H, Devesa SS, Sosa JA, Check D, Kitahara CM. Trends in Thyroid Cancer Incidence and Mortality in the United States, 1974-2013. JAMA. 2017 Apr 04;317(13):1338-1348.
6. Tao Y, Wang F, Shen X, Zhu G, Liu R, Viola D, Elisei R, Puxeddu E, Fugazzola L, Colombo C, Jarzab B, Czarniecka A, Lam AK, Mian C, Vianello F, Yip L, Riesco-Eizaguirre G, Santisteban P, O'Neill CJ, Sywak MS, Clifton-Bligh R, Bendlova B, Sýkorová V, Zhao S, Wang Y, Xing M. BRAF V600E Status Sharply Differentiates Lymph Node Metastasis-associated Mortality Risk in Papillary Thyroid Cancer. J Clin Endocrinol Metab. 2021 Oct 21;106(11):3228-3238.
7. Mao XC, Yu WQ, Shang JB, Wang KJ. Clinical characteristics and treatment of thyroid cancer in children and adolescents: a retrospective analysis of 83 patients. J Zhejiang Univ Sci B. 2017 May;18(5):430-436.
8. Kim K, Cho SW, Park YJ, Lee KE, Lee DW, Park SK. Association between Iodine Intake, Thyroid Function, and Papillary Thyroid Cancer: A Case-Control Study. Endocrinol Metab (Seoul). 2021 Aug;36(4):790-799.
9. Bogović Crnčić, T., Ilić Tomaš, M., Girotto, N. & Grbac Ivanković, S. (2020). Risk Factors for Thyroid Cancer: What Do We Know So Far?. Acta clinica Croatica, 59. (Supplement 1), 66-72.
10. Na DG, Kim DS, Kim SJ, Ryoo JW, Jung SL. Thyroid nodules with isolated macrocalcification: malignancy risk and diagnostic efficacy of fine-needle aspiration and core needle biopsy. Ultrasonography. 2016 Jul;35(3):212-9. doi: 10.14366/usg.15074. Epub 2015 Dec 27. PMID: 26810196; PMCID: PMC4939718.
11. Alqahtani SM, Alatawi AS, Alalawi YS. Post-Thyroidectomy Hypocalcemia: A Single-Center Experience. Cureus. 2021 Nov 29;13(11):e20006. doi: 10.7759/cureus.20006. PMID: 34987897; PMCID: PMC8716130.

12. Predictors of postoperative hypocalcemia occurring after a total thyroidectomy: results of prospective multicenter study. Eismontas V, Slepavicius A, Janusonis V, et al. BMC Surg. 2018;18.
13. 13. Lisa A. Orloff, Sam M. Wiseman, Victor J. Bernet, Thomas J. FaheyIII, Ashok R. Shaha, Maisie L. Shindo, Samuel K. Snyder, Brendan C. StackJr., John B. Sunwoo, Marilene B. Wang, and for the American Thyroid Association Surgical Affairs Committee Writing Task Force.American Thyroid Association Statement on Postoperative Hypoparathyroidism: Diagnosis, Prevention, and Management in Adults.