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Role of TSH Inhibition Therapy in the Postoperative Management of Patients with Differentiated Thyroid Cancer

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Abstract: *Objective:* To investigate the effect of TSH inhibition therapy in the postoperative management of patients with differentiated thyroid cancer. *Methods:* Seventy patients diagnosed with differentiated thyroid cancer were selected for the study. TSH inhibition therapy was administered to the research group, while thyroxine replacement therapy was provided to the control group during the postoperative management phase. This allowed for a comparative analysis between the two groups. *Results:* In comparison with the control group, the research group exhibited significant decreases in serum TSH, T3, and T4 levels after treatment, while FT4 and FT3 levels significantly increased ($P < 0.05$). Additionally, significant decreases in Tg, VEGF, TSGF, CD44V6, and sIL-2R levels were observed in the research group after treatment ($P < 0.05$). No significant differences were found in pre-treatment thyroid function between the two groups ($P > 0.05$). *Conclusion:* The application of TSH inhibition therapy in the postoperative management of patients with differentiated thyroid cancer demonstrates promising outcomes.

Keywords: TSH inhibition therapy; Differentiated thyroid cancer; Postoperative management; Effect

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1. Introduction

Thyroid cancer is a prevalent malignant tumor that is typically managed through surgical resection, radiation therapy, and thyroid hormone replacement therapy. Differentiated thyroid cancer (DTC) represents the most common subtype [1], and patients commonly undergo postoperative treatment following surgical resection. Thyroid-stimulating hormone (TSH) suppression therapy has emerged as a pivotal therapeutic approach in postoperative management. This paper aims to explore the role of TSH suppression therapy in the postoperative management of patients with DTC.

2. General information and methods

2.1. Data

Fifty patients diagnosed with DTC, selected between January 2018 and December 2019, were divided into two groups of 25 cases each. In the research group, there were 10 males and 15 females with an age range of 29 to 58 years (mean age 45.26 ± 5.29 years), while in the control group, there were 11 males and 14 females with an age range of 25 to 57 years (mean age 45.21 ± 5.22 years). A comparison of data between the two groups revealed no significant difference ($P > 0.05$).

2.2. Methods

During the postoperative management period, the control group received thyroxine replacement therapy at a dosage of 1.5–2.5 μg/kg of thyroxine per day. In the postoperative management period, the research group underwent TSH suppression therapy, using levothyroxine sodium tablets at a dosage of 1.5–2.5 μg/kg per day to achieve the desired level of control, with this dosage maintained throughout. The criteria for suppression were as follows: postoperative TSH suppression recommended to be below 0.1 mIU/L in patients with high-risk DTC, below 0.1–0.5 mIU/L in patients with intermediate-risk DTC, and between 0.5–2.0 mU/L in patients with low-risk DTC. Both groups received treatment for a duration of 1 year.

2.3. Observation indexes

(1) Comparison of serum TSH, triiodothyronine (T3), thyroxine (T4), free T4 (FT4), and free T3 (FT3) levels between the two groups.

(2) Comparison of thyroglobulin (Tg), vascular endothelial growth factor (VEGF), tumor-specific growth factor (TSGF), CD44 containing variable exon 6 (CD44V6), and soluble interleukin-2 receptor (sIL-2R) levels between the two groups.

2.4. Data analysis

This study utilized SPSS 25.0 software to conduct χ^2 tests and *t*-tests, with results presented in the form of percentage and mean ± standard deviation (SD), and statistical significance indicated by $P < 0.05$.

3. Results

Table 1 shows that the serum TSH, T3, and T4 levels were significantly reduced in the research group after treatment, while the serum FT4 and FT3 levels were significantly increased after treatment, as compared to the control group ($P < 0.05$). **Table 2** shows that the research group had significantly reduced levels of Tg, VEGF, TSGF, CD44V6, and sIL-2R after treatment as compared to the control group ($P < 0.05$). There were no significant differences in all the indicators between the two groups ($P > 0.05$).

Table 1. Comparison of thyroid function between the two groups before and after treatment

Groups	TSH (mU/L)		T3 (nmol/L)		T4 (nmol/L)		FT4 (ρmol/L)		FT3 (ρmol/L)	
	Before	After	Before	After	Before	After	Before	After	Before	After
Research group ($n = 25$)	2.33 ± 0.52	0.15 ± 0.04	1.81 ± 0.15	0.62 ± 0.26	106.72 ± 3.77	74.75 ± 4.72	16.55 ± 0.52	27.17 ± 0.03	4.71 ± 0.13	6.72 ± 1.65
Control group ($n = 25$)	2.34 ± 0.66	1.62 ± 0.15	1.83 ± 0.44	1.25 ± 0.53	107.35 ± 3.74	89.77 ± 3.91	16.62 ± 0.45	7.66 ± 0.65	4.66 ± 0.14	1.85 ± 0.04
t	0.06	47.35	0.22	5.34	0.59	12.25	0.51	149.92	1.31	14.75
P	> 0.05	< 0.05	> 0.05	< 0.05	> 0.05	< 0.05	> 0.05	< 0.05	> 0.05	< 0.05

Table 2. Comparison of Tg, VEGF, TSGF, CD44V6, and sIL-2R levels between the two groups before and after treatment

Groups	Tg (ng/mL)		VEGF (pg/mL)		TSGF (μg/mL)		CD44V6 (ng/mL)		sIL-2R (μg/mL)	
	Before	After	Before	After	Before	After	Before	After	Before	After
Research group (n = 25)	45.77 ± 11.75	12.77 ± 2.52	27.55 ± 5.65	13.66 ± 2.42	73.65 ± 6.84	50.51 ± 4.72	520.68 ± 23.62	306.51 ± 13.51	552.75 ± 28.36	372.28 ± 67.88
Control group (n = 25)	45.25 ± 11.61	19.76 ± 6.55	27.42 ± 5.33	20.62 ± 4.51	72.82 ± 7.85	64.25 ± 6.75	523.66 ± 22.37	399.62 ± 15.26	550.61 ± 25.27	458.26 ± 35.22
t	0.16	4.98	0.08	6.80	0.40	8.34	0.46	22.84	0.28	5.62
P	> 0.05	< 0.05	> 0.05	< 0.05	> 0.05	< 0.05	> 0.05	< 0.05	> 0.05	< 0.05

4. Discussion

TSH inhibition therapy has the potential to diminish the stimulation of residual thyroid tissue or thyroid cancer cells [2-4], thereby reducing the risk of cancer recurrence. This study's analysis indicates that TSH inhibition therapy presents an optimal approach in the postoperative management of patients with DTC:

(1) Decreased recurrence rate: TSH inhibition therapy mitigates the risk of cancer recurrence by diminishing the stimulation of residual thyroid tissue by TSH. Studies have demonstrated that TSH inhibition therapy significantly lowers the likelihood of postoperative recurrence in high-risk patients [5-8].

(2) Enhanced survival: Several studies have indicated that patients with DTC undergoing TSH inhibition therapy exhibit superior long-term survival rates [9-12]. This outcome is attributed to the therapy's inhibition of residual thyroid tissue function, thereby reducing the probability of cancer cell recurrence [13,14].

The experimental findings revealed:

(1) Alterations in thyroid hormone levels: Following treatment, serum TSH, T3, and T4 levels in the research group significantly decreased, while FT4 and FT3 levels significantly increased ($P < 0.05$). This suggests that TSH inhibition therapy notably influences patients' thyroid hormone levels post-treatment, primarily by reducing TSH levels and increasing FT4 and FT3 levels.

(2) Changes in tumor markers and growth factors: Tg, VEGF, TSGF, CD44V6, and sIL-2R levels significantly decreased in the research group after treatment ($P < 0.05$). This indicates that TSH inhibition therapy exerts an inhibitory effect on the tumor markers and growth factors of thyroid cancer patients, thereby aiding in the inhibition of cancer cell growth and proliferation [15].

(3) Pre-treatment comparison: Comparative analysis of thyroid function, tumor markers, and growth factors before treatment between the two groups yielded $P > 0.05$. This suggests no significant difference in these indicators between the two groups before treatment.

In conclusion, the application of TSH suppression therapy in the postoperative management of patients with DTC is deemed optimal, resulting in significant improvements in thyroid function, tumor markers, and growth factors.

Disclosure statement

The authors declare no conflict of interest.

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