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Study to Determine the Effectiveness of Unilateral Total Lobectomy Plus Isthmectomy and Bilateral Total Lobectomy in Treating Thyroid Micropapillary Carcinoma Treated with Euthyrox

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Abstract: Objective: To examine the effect of bilateral total lobectomy and unilateral total lobectomy on improving thyroid function in patients with thyroid micropapillary carcinoma treated with euthyrox. **Methods:** The study was conducted on 68 patients with thyroid micro papillary carcinoma treated with euthyroxwho had been surgically treated with euthyrox in our hospital between January 2018 and December 2019. On the basis of random number grouping, they were divided into control groups (n = 34, bilateral total lobectomy) and observation groups (n = 34, unilateral total lobectomy plus isthmectomy). Thyroid function, free triiodothyronine (FT3), thyroid hormone (TSH), and voice function (VHI score) of the two groups were compared. **Results:** In comparison to the control group, the observation group had shorter incision lengths, shorter operation times, and shorter hospital stays, as well as less intraoperative bleeding and drainage volume, and the difference was statistically significant ($P < 0.05$); As compared with the control group, the observation group had higher FT4 and FT3 levels as well as lower TSH levels, a statistically significant difference ($P < 0.05$). VHI scores of emotions, function, physiology, and other voice functions were significantly lower among the observation group than those of the control group ($P < 0.05$). **Conclusion:** A unilateral total lobectomy with adjacent isthmus resection in patients with thyroid micro papillary carcinoma can yield ideal results, accelerate the time taken for surgical rehabilitation, improve thyroid function, thereby improving voice quality, as well as improve the overall prognosis of the patient.

Keywords: thyroid papillary carcinoma; bilateral total lobectomy; unilateral total lobectomy plus isthmectomy; thyroid function; treatment efficacy

Introduction

A tumor of the thyroid gland known as papillary thyroid carcinoma (PTMC) has a high incidence among thyroid conditions. It is more common among females. The disease is primarily characterized by small size and insidious onset [1]. The pathogenic factors of small papillary thyroid cancer have not been elucidated in clinical practice. However, the disease is considered to be closely related to factors such as exposure to radiation, Hashimoto's thyroiditis, and low iodine levels within the body [2].

Presently, PTMC is primarily treated by surgery, and ideal results can be obtained by surgically resecting the diseased tissue. A bilateral total lobectomy is a common surgical method. However, due to the necessity of removing a large area, the patient's stress response will be increased, and the recovery time is long, which can result in complications [3]. Studies have shown that a unilateral lobectomy combined with isthmus resection can not only promote complete resection of diseased tissue, but also significantly minimize surgical resection [4]. And the euthyrox is a widely used drug for postoperative treatment of small papillary thyroid carcinoma ,To explore the overall treatment effects of small papillary thyroid carcinoma, the patients in this study were treated with bilateral total thyroid lobectomy, unilateral lobectomy combined with isthmus resection, and the results are summarized as follows.

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1. Data and methods

1.1. General data

From January 2018 to December 2019, a total of 68 elderly patients with papillary thyroid cancer treated with euthyrox were randomly selected. According to the different surgical methods used, the 68 patients were divided into two groups, the control group (n=34 cases) and the observation group (n=34 cases). In the control group, there were 17 males and 17 females, aged 31 to 78 years, with an average age of (45.97±7.12) years, in 18 cases, lesions were located on the left side and in 16 cases, on the right side. There were 16 males and 18 females in the observation group, ranging in age from 32 to 80 years, with an average age of 46.23±7.74 years. In 20 instances, lesions were found on the left side, and in 14 instances, on the right side. There were no significant differences between the general data of the two groups (P>0.05).

1.2. Inclusion and exclusion criteria

Inclusion criteria (patients who met the following criteria were included in this study):

(1) All patients met the criteria for PTMC in the Chinese translation of the "Guidelines for the Diagnosis and Treatment of Differentiated Thyroid Cancer" [5].

(2) FNAC and high-frequency color Doppler ultrasound were conducted prior to surgery to confirm PTMC disease

(3) The patient has been clinically diagnosed with PTMC, which meets the requirements for surgical repair.

(4) The patient's mental condition is satisfactory, and he is able to cooperate with the medical staff.

(5) The primary tumor is less than 4 cm in diameter and there are no distant lymph node metastases.

(6) Informed consent was obtained from patients and their families following their voluntary participation in the study and approval by the ethics committee.

Exclusion criteria (the following patients were excluded from the study):

(1) Patients with a history of neck surgery.

(2) Patients with other malignant tumors.

(3) Patients with distant metastases.

(4) Patients with coagulation disorders.

(5) Patients with mental illness.

1.3. Methods

An allergy test, cervical lymph node color Doppler ultrasound, an ultrasonography, a cardiopulmonary function test, and a thyroid function test were performed on the day of admission for each group. All patients were threated with euthyrox (50ug once a day). One day before surgery, patients were advised not to consume any food or beverage after dinner. The control group received bilateral total lobectomy; the position of the patient was supine. Following the application of shoulder pads and anesthesia, an arc incision was performed. In the case of thyroid glands, begin with the lower part of the gland, separate the inner and outer connective tissues, and then proceed to the top of the gland; cut off each branch of the superior thyroid artery along the capsule, dissociate the branches of the superior thyroid artery and vein, and then separate the thyroid lobe.

Similarly, the contralateral lobe is completed in the same manner as the gland lobectomy intervention, sutures are applied and bandaged after the operation, and a drainage tube is inserted routinely.

A unilateral lobectomy and isthmic resection were performed on the patients in the observation group in an attempt to assist them in choosing the supine position. With the help of thyroid surgery shoulder pads, the head ring was placed under the head, the neck was exposed, and the venous access was established, apply general anesthesia, make a 2cm surgical incision at 1.5cm above the sternum

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notch, expose the Linea alba, and cut the Linea alba by electrocautery to separate the upper cervical muscles so that the thyroid can be dissociated from the outside along the true and false dorsal intermembranes. By using an ultrasonic knife, the small blood vessels and veins of the thyroid are destroyed, the thyroid is pulled down, and the blood vessels of the upper thyroid are freed to determine the parathyroid glands. After coagulation, the upper thyroid branches and blood vessels are cut to maintain the upper and lower paragons, and operations such as cutting, coagulation, and dissociation of the lower thyroid vessels are performed. A drainage tube was used for routine placement after suture dressing after dissociating to the dorsal position of the thyroid, cutting the Berry ligament, pulling out the thyroid lobe at the location of the incision, and cutting off the isthmus.

1.4. Observational indicators

(1) Surgical indicators:

The length of the incision, blood loss during surgery, hospital stay, operation time and drainage volume of the two groups of patients were recorded.

(2) Thyroid function:

The patient's cubital venous blood was collected on the day of admission and one month after the operation and centrifuged to determine thyroid function, mainly free thyroxine (FT4) and free triiodothyronine (FT3), thyroid hormone (TSH), among others.

(3) Voice Handicap Index (VHI):

Evaluation of the voice function of the two groups of patients was completed one week and one month after the operation, primarily evaluating emotion, function, physiology, and other items. There are ten items in each category. The scores for each item range from 0 to 4, with higher scores representing more severe voice disorders.

1.5. Statistical analysis

SPSS 22.0 software was used as the data analysis software, measurement data was expressed as ($\bar{x} \pm s$), and independent t-test samples were used; enumeration data was expressed as the number of cases (%), and the X^2 test was used. Statistical significance was deemed at P<0.05.

2. Results

2.1. Comparison of surgical indicators between the two groups of patients

The period of incision, operation time, and hospital stay in the observation group were shorter than those in the control group, and intraoperative blood loss and drainage volume were lower than those in the control group, with statistically significant differences (P<0.05), as shown in Table 1.

Table 1. Comparison of surgical indicators between the two groups [$\bar{x} \pm s$].

Groups	Incision length (cm)	Intraoperative blood loss (ml)	Operation time (min)	Drainage volume (ml)	Hospital stay (d)
Control group (n=34)	8.95±0.12	73.25±2.25	119.25±10.25	78.12±2.02	6.08±0.25
Observation group (n=34)	6.01±0.21	50.21±1.25	73.25±6.32	47.25±1.25	4.12±0.12
t	12.325	13.325	14.254	15.235	16.231
P	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001

2.2. Comparison of thyroid function before and after surgery between the two groups

There was no discernible difference between the two groups in thyroid function on the day of admission (P>0.05). In the observation group, the levels of FT4 and FT3 were significantly higher than

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those in the control group, and the level of TSH was significantly lower than that of the control group. The significance level (P<0.05) is provided in Table 2.

Table 2. Comparison of thyroid function before and after surgery between the two groups [$\bar{x} \pm s$].

Groups	Time	FT_4 (pmol/L)	FT_3 (pmol/L)	TSH (mIU/L)
Control group (n=34)	Day of admission	13.25±1.72	4.12±0.12	2.40±0.21
	1 month after surgery	11.02±0.92	3.61±0.09	10.29±1.22
t	-	15.254	14.251	13.324
P	-	< 0.001	< 0.001	< 0.001
Observation group (n=34)	Day of admission	13.28±1.71	4.13±0.13	2.38±0.15
	1 month after surgery	13.92±0.12	4.71±0.07	1.54±0.19
t	-	14.235	13.254	12.952
P	-	< 0.001	< 0.001	< 0.001

2.3. Comparison of the changes in voice function based on the VHI score between the two groups

On week one following the operation, there was no substantial difference in voice function between the observation group and the control group, the difference did not reach statistical significance (P>0.05); 1 month after the operation, the VHI scores of the observation group were significantly lower than those of the control group, and the difference showed statistical significance (P<0.05); see Table 3 for further details.

Table 3. Comparison of the changes in voice function based on the VHI score between the two groups [$\bar{x} \pm s$, points].

Groups	Time	Emotions	Functions	Physiology
Control group (n=34)	One week after surgery	23.32±5.21	31.25±5.65	32.18±5.74
	One month after surgery	20.12±4.25	25.32±4.12	26.32±4.02
t	-	12.254	13.254	14.254
P	-	< 0.001	< 0.001	< 0.001
Observation group (n=34)	One week after surgery	23.15±5.32	31.12±5.61	32.18±5.14
	One month after surgery	16.32±3.24	20.12±3.92	21.23±3.25
t	-	13.254	14.254	14.245
P	-	< 0.001	< 0.001	< 0.001

3. Discussion

Despite its malignant nature, papillary thyroid microcarcinoma is a disease with a good prognosis. The disease demonstrates a mild biological behavior. In most cases, patients will not experience symptoms such as persistent tumor progression and tumor deterioration throughout their lifetime, but clinical development still requires active participation. The prognosis of patients can be significantly improved by treatment [6]. Presently, patients with papillary thyroid microcarcinoma are primarily treated by surgery, however, there is no unified clinical conclusion regarding the surgical resection method.

Surgical treatment for papillary thyroid microcarcinoma often involves bilateral total lobectomy. The expansion of surgical resection can greatly reduce the postoperative recurrence rate, but it is also easy to increase secondary operations, unclear anatomical levels, and problems such as tissue adhesion, coupled with the expansion of surgical resection, can lead to an increased postoperative

stress response, which will affect the patient's voice to a certain extent and may have a negative impact on quality of life later on in life [7]. Recently, due to the rapid development of thyroid surgery, the combination of ipsilateral unilateral lobectomy and isthmic resection has been widely used in the treatment of thyroid disease. This procedure does not cause recurrence and can preserve normal thyroid function [8].

Moreover, a unilateral thyroidectomy combined with an isthmectomy can also protect the other recurrent laryngeal nerve, thus reducing the occurrence of postoperative recurrent laryngeal nerve damage in patients with papillary thyroid microcarcinoma [9]. As patients undergoing partial thyroidectomy or total thyroidectomy may experience symptoms such as hypothyroidism after surgery, thyroid hormone supplementation can be prescribed following surgery to help them achieve normal thyroid function. A significant difference was observed between the observation group and the control group in terms of incision length, intraoperative blood loss, hospitalization, surgery time, drainage volume, etc., with statistical significance; indicating that unilateral lobectomy coupled with isthmectomy can increase and speed up patient recovery from surgery. Considering that the total thyroid incision is typically 6-8 cm in length, the incision is generally enlarged, and the field of view is enlarged for better development during bilateral thyroidectomy so as to create a wider operating area. There may be patient discomfort, which may adversely affect surgical satisfaction and aesthetics. Further, bilateral total lobectomy will result in a greater amount of intraoperative blood loss, which will result in increased postoperative drainage and a longer hospital stay. A unilateral lobectomy combined with an isthmectomy is considered a unilateral procedure. It is a short and straightforward procedure. The procedure involves less damage to the body and a milder stress response, resulting in a faster recovery. Unilateral resection of the thyroid lobe reduces bleeding, prevents damage to contralateral thyroid tissue, and speeds up patient recovery [11]. Comparing thyroid function, there was a significant difference in FT4, FT3 and TSH levels between the observation and control groups, indicating that unilateral lobectomy and isthmic resection are both able to maintain good thyroid function. Since a bilateral resection involves the removal of more thyroid tissue, it is presumed that the thyroid will take a long time to heal. For patients with bilateral thyroid resections, thyroid hormone replacement therapy may need to be maintained for a longer period of time, thereby causing the thyroid gland to slow down. It is recognized that the speed of functional recovery is enhanced by the choice of unilateral glandular lobe combined with isthmus resection; this method reduces the postoperative drug dosage after surgery, and normal glandular tissue can have a good compensatory effect, which in turn improves the patient's thyroid function [12]. The recurrent laryngeal nerve may not be damaged in all patients during surgery, and abnormal changes in voice function are the main postoperative manifestations. Consequently, the score was significantly lower, and the difference was statistically significant; this indicated that unilateral lobectomy and isthmus resection can significantly reduce early postoperative functional impairment in papillary thyroid microcarcinoma. There is a consensus that unilateral gland lobectomy and isthmus resection shall not cause injury to the contralateral thyroid gland, reduce the surgical trauma, and significantly reduce the impact of trauma on the vocal cord tension. In a better state, the influence of this factor on pitch may be reduced, and the voice function may slowly return along with the healing of the postoperative wound and the subsidence of swelling [13,14].

Therefore, compared with bilateral total lobectomy, unilateral lobectomy combined with isthmus resection may provide more ideal results with papillary thyroid carcinoma, which may speed up surgical recovery, improve thyroid function, and enhance thyroid function. As a technology, it offers obvious advantages in terms of voice functions and should be fully promoted and applied.

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