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Original Article

Effect of rapid rehabilitation surgery nursing on patients undergoing radical thyroidectomy

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Abstract: Objective: To determine the effect of rapid rehabilitation surgery nursing on degree of pain and stress response in patients undergoing radical thyroidectomy for thyroid carcinoma. Methods: In this retrospective study, the clinical data of 100 patients who received radical thyroidectomy for thyroid carcinoma in Pingkuang General Hospital between November 2020 and October 2022 were analyzed. Among the patients, 56 who received rapid rehabilitation surgery nursing were assigned to the research group, and the other 44 patients who received routine nursing were assigned to the control group. The two groups were compared for thyroid hormone level, degree of pain, stress response, recovery time, hospitalization time, anxiety and depression, nursing satisfaction, and the incidence of complications. Results: The pain score, recovery time, and hospitalization time in the research group were all lower than those of the control group (all $P < 0.05$). 48 hours after operation, the thyroid stimulating hormone (TSH) level of the two groups was significantly increased, and was higher in the research group than the control group. Triodothyronine (T3) and thyroxine (T4) were significantly decreased, and was lower in the research group than the control group (all $P < 0.05$). One day after operation, the levels of plasma cortisol (Cor) and angiotensin II (Ang II) in both groups were increased, with significantly lower levels in the research group than the control group (all $P < 0.05$). After surgery, the self-rating anxiety scale (SAS) and self-rating depression scale (SDS) scores in both groups decreased ($P < 0.05$), with significantly lower SAS and SDS scores in the research group than the control group (all $P < 0.05$). Additionally, the research group expressed higher nursing satisfaction than the control group ($P < 0.05$), and the research group showed a lower incidence of postoperative complications than the control group ($P < 0.05$). Age, gender, course of disease, pathologic type, and nursing method were risk factors affecting the prognosis. Logistic regression analysis showed that pathologic type and nursing method were independent risk factors affecting prognosis. Conclusion: For patients undergoing radical thyroidectomy, rapid rehabilitation surgical nursing can effectively reduce postoperative pain and anxiety, shorten recovery time and hospitalization time, decrease incidence of complications and stress response, but promote a fasterrecovery after operation, and improve the quality of life.

Keywords: Rehabilitation surgery, nursing, pain degree, stress response, thyroidectomy

Introduction

Thyroid carcinoma (TC) is a malignant tumor that originates from thyroid epithelial cells. It can affect individuals at any age [1, 2]. It can be classified into four types: papillary TC, follicular TC, medullary TC, and undifferentiated TC, among which papillary TC is the most common [3]. According to statistics, in 2013, there were approximately 143,900 patients with TC in China, with an estimated prevalence of 10 cases per every 100,000 people [4]. Over the past few years, the incidence of TC has been growing at an annual rate of 20%, and the incidence is significantly higher among women than men [4]. At the current stage, the etiology of TC is still under investigation, and it is generally believed to be bound up with oncogenes, iodine intake, and heredity [5]. Additionally, certain factors such as irregular diet, lifestyle, life stress, and negative emotion may increase the risk of developing TC. TC is mainly treated by surgery, which may be supplemented by radionuclide, chemotherapy, endocrine therapy, external radiotherapy, and other approaches [6]. Radical thyroidectomy, also known as radi-

cal resection of TC, is a frequently adopted surgical method for TC [7]. However, due to the special location and the stress of the operation, patients often have poor physical and mental state after the surgery and are prone to various complications [8]. Therefore, while clinical practice is committed to surgical treatment, it is also necessary to strengthen postoperative nursing for patients in order to speed up their recovery.

Clinical nursing intervention has been extensively utilized in medicine in recent decades [9]. Routine nursing can no longer meet the nursing needs of patients undergoing radical thyroidectomy, so it is imperative to find a targeted nursing approach that can expedite the recovery process for these patients. Rapid rehabilitation surgery nursing is a comprehensive nursing intervention that gives patients preoperative nursing, postoperative comprehensive nursing, and psychological nursing on the basis of routine nursing [10]. This nursing mode is a comprehensive and humanized nursing mode to meet the targeted nursing needs of patients. According to related research [11], rapid rehabilitation surgery nursing can help promote the perioperative rehabilitation of patients undergoing cardiac surgery and it is more acceptable to patients than routine nursing, because it can reduce the occurrence of complications and improve the quality of life. This suggests the feasibility of rapid rehabilitation surgery nursing for surgical patients.

Accordingly, this study used rapid rehabilitation surgery nursing for patients undergoing radical thyroidectomy to explore its influence on patients' degree of pain and stress response, as well as the application effect in TC, with the purpose of providing more reliable reference for the clinical treatment of this disease.

Methods and data

Clinical data

The clinical data of 100 patients who received radical thyroidectomy in Pingkuang General Hospital between November 2020 and October 2022 were retrospectively analyzed in this study. Among the patients, 56 patients who received rapid rehabilitation surgery nursing were assigned to the research group, and the other 44 patients who received routine nursing were the control group. This study was performed with approval from the Medical Ethics Committee of the Pingkuang General Hospital.

Inclusion and exclusion criteria

Inclusion criteria: Patients who met the diagnostic criteria of TC and had required surgical indications [12]; patients with detailed medical records; patients who had not received surgical treatment for thyroid-related diseases before; patients without communication barriers.

Exclusion criteria: Patients who did not cooperate with this research; patients with low compliance; patients with cognitive dysfunction or mental disorders; patients with infectious or immune comorbid diseases; patients who dropped out from the research halfway; patients during pregnancy or lactation.

Nursing plan

For the control group: Patients underwent radical thyroidectomy and received routine nursing intervention. After admission, the nursing staff provided basic disease education to patients, and formulated the nursing plan based on their individual circumstances, as well as the operation date, process, and matters needing attention, and informed the patients and their families. After the surgery, dezocine (Yangtze River Pharmaceutical Group Co., Ltd., SFDA Approval No. H20184150) was used to maintain the effect through patient-controlled intravenous analgesia. This was administered intravenously once daily at a continuous dose of 1 ml per hour. After surgery, the nursing staff promptly monitored the patients' condition, changed the dressings of the incision regularly, and ensured proper anti-infection treatment. In the case of any abnormality in the nursing process, the nursing staff were required to promptly inform the doctor and take appropriate action.

For the research group: Each patient was given radical thyroidectomy according to of the concept of rapid rehabilitation surgery, and a targeted nursing plan was developed for the patient according to the actual situation. The specific methods were as follows: (1) Preoperative health education: Based on the patient's and their families' level of understanding and education, a targeted health education strategy was developed. Nursing staff were

arranged to introduce knowledge about TC and the related radical operation and nursing precautions to the patient and family in detail. Family members could also assist the nursing staff to take care of the patient, and give spiritual comfort to help the patient relieve anxiety and tension. A correct understanding of the disease among the patient and family should help them comply with the treatment. (2) Preoperative preparation: According to the nursing plan, thorough preparations were made for the patient prior to the operation. The patient was guided to follow necessary preparations before operation, including fasting and water prohibition. Due to the poor nutritional status of the patients affected by cancer, a routine fasting program was not used, in order to avoid excessive consumption and insulin resistance. Therefore, the nursing staff were arranged to instruct the patient to fast from foods during the 6 hours before operation and from water during 2 hours before operation. The patient was provided with a solid diet up to 6 hours before the operation, and water or carbohydrate liquid up to 2 hours before operation. Additionally, the patient received prophylactic antibiotics 30 min before operation to minimize any adverse reactions that may occur as a result of long-term antibiotic use after the operation. (3) Intraoperative nursing: During the operation, the nursing staff were required always to pay attention to the temperature of the operating room, and keep the infusion liquid, washing liquid and surgical instruments at about 37°C, so as to keep the patient warm. During the operation, the amount of infusion liquid was controlled within a reasonable range according to the actual situation of the patient. The amount of infusion liquid could be appropriately reduced in accordance with physiologic needs. The nursing staff accompanied the patient all the time, calmed the patient's emotions and actively cooperated with the treatment. (4) Postoperative nursing: At 2 hours after surgery, the nursing staff were assigned to closely monitor the patient's vital signs and postoperative conditions. Nutritional support was provided to the patient based on their specific needs, gradually progressing as necessary. After the surgery, dezocine (Yangtze River Pharmaceutical Group Co., Ltd., SFDA Approval No. H20184150) was used to maintain the effect by patient controlled intravenous analgesia. It was administered intravenously once daily at a continuous dose of 1 ml per hour. The nursing staff also evaluated the patient's degree of pain after operation, and encouraged and guided the patient to accurately express pain location, pain degree, duration, and accompanying symptoms. The nursing staff took measures based on attention distraction, music, or appropriate analgesic treatment according to the specific situation to relieve any discomfort of the patient. After operation, the nursing staff instructed the patient to carry out activities according to their situation and paid close attention to the surgical site and physical recovery of the patient. In case of any abnormality in the nursing process, the physician was promptly notified.

Index detection

Fasting venous blood (6 ml) was respectively collected from each patient one day before operation, one day after operation, an and 48 hours after operation, and centrifuged at a rate of 3000 r/min for 15 min to acquire the supernatant that was then stored at low temperature for later analysis. The levels of plasma cortisol (Cor) and angiotensin II (Ang II) were detected by enzyme-linked immunosorbent assay with automatic biochemical analyzer (Hitachi High-Technologies (China) Co., Ltd.). Time-resolved fluorescence immunoassay was used to determine thyroid stimulating hormone (TSH), triiodothyronine (T3), and thyroxine (T4). The kit was purchased from Wuhan Moshak Biotechnology Co., LTD.

Outcome measures

Primary outcome measures: The visual analogue scale (VAS) was adopted for evaluation of degree of pain in the two groups before and after nursing [13]. The scale has a total score of 10 points, with a higher score for more serious pain. The levels of stress response indexes, including Cor and Ang II, were compared between the two groups one day before operation and one day after operation.

Secondary outcome measures: The changes in thyroid hormone levels (TSH, T3 and T4) before and after operation were compared between the two groups. The self-rating anxiety scale (SAS) and self-rating depression scale (SDS) were adopted for evaluation of patients' anxiety and depression [14]. Each scale has a total

Table 1. Comparison of clinical data between the two groups

Factor	Control group (n=44)	Research group (n=56)	χ^2 value	*P* value
Age				
≤ 66 years old	17	23	0.061	0.805
> 66 years old	27	33		
Gender				
Male	14	16	0.124	0.725
Female	30	40		
Course of disease				
≤ 2 years	16	27	1.412	0.235
> 2 years	28	29		
Education level				
Below junior college	26	34	0.027	0.869
Junior college or above	18	22		
Residential environment				
Urban area	28	40	0.688	0.407
Rural area	16	16		
Nationality				
Han	33	45	0.412	0.521
Ethnic minorities	11	11		

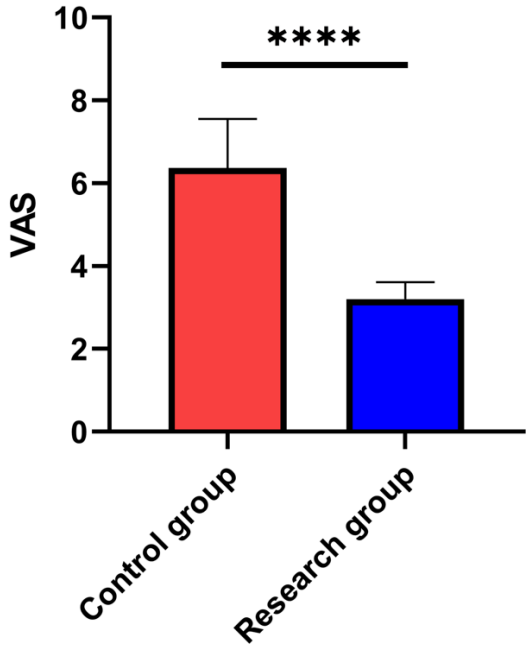

Figure 1. Comparison of pain scores between the two groups after nursing. Note: ****, P < 0.0001.

score of 100 points, with a higher score for more serious anxiety/depression. The self-made Nursing Satisfaction Questionnaire was used for evaluating the patient' nursing satisfaction. It has a total score of 100, with score < 60 points for dissatisfaction, score between 60-89 points for basic satisfaction, and score ≥ 90 points for satisfaction. Satisfaction = (the number of cases satisfied with nursing + that of cases basically satisfied with nursing)/total cases ×100%. The recovery time, hospitalization time, and complications of the two groups were compared.

Statistical analyses

This study used SPSS 21.0 for statistical analyses, and GraphPad Prism 7 for visualization of the acquired data into figures. The data were analyzed using the t test, and inter-group and intra-group comparisons were carried out using the independent-samples t test and paired t test, respectively. The counted data were analyzed by the chi-square test. Logistic test was used to analyze the risk factors affecting the prognosis of patients. P < 0.05 was considered a significant difference.

Results

Comparison of clinical data

According to a comparison of clinical basic data between the two groups, the two groups were similar in age, gender, course of disease, education level, residential environment, and nationality (all P > 0.05, **Table 1**).

Comparison of pain scores after nursing

According to comparison of degree of pain between the two groups after nursing, the research group had lower VAS scores than the control group (P < 0.05, **Figure 1**).

Comparison of thyroid hormone levels

The thyroid hormone levels were compared before and after operation between the two groups. Before surgery, the two groups were similar in the levels of TSH, T3, and T4 (all P > 0.05), while 48 hours after operation, the research group showed a higher level of TSH and lower levels of T3 and T4 than the control

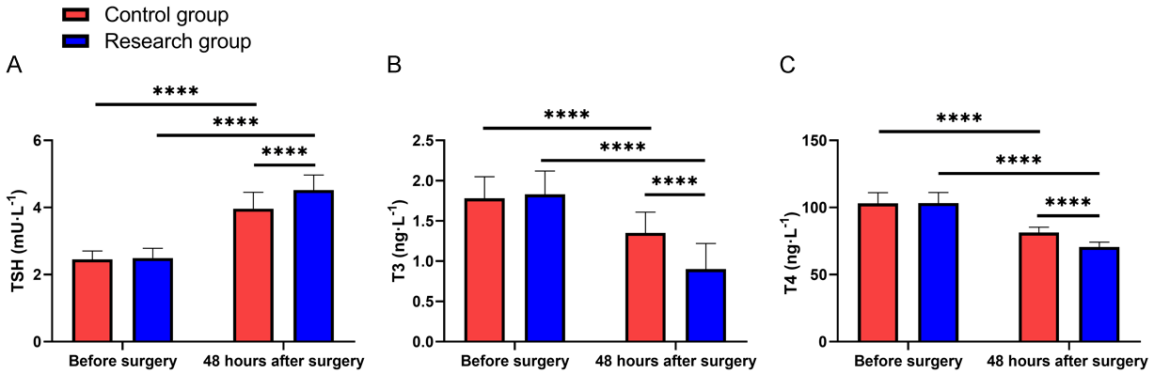

Figure 2. Comparison of thyroid hormone levels between the two groups before and after the treatment. A: Changes in TSH before and after nursing. B: Changes in T3 before and after nursing. C: Changes in T4 before and after nursing. Notes: ****, P < 0.0001. TSH: thyroid stimulating hormone; T3: triiodothyronine; T4: thyroxine.

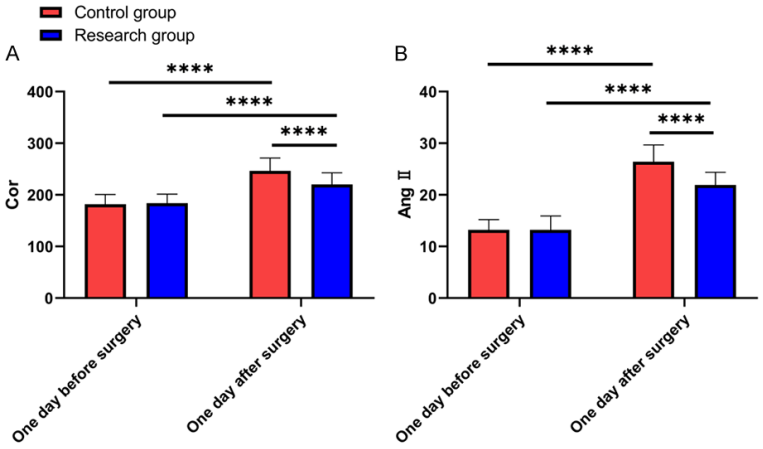

Figure 3. Comparison of stress response indicators between the two groups before and after treatment. A: Changes in cortisol (Cor) level before and after nursing; B: Changes in angiotensin II level before and after nursing. Note: ****, P < 0.0001.

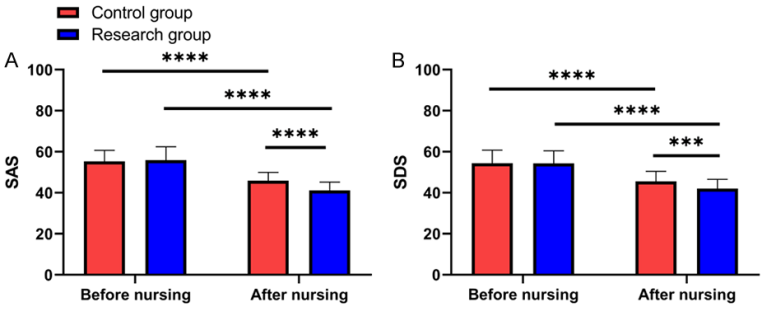

Figure 4. Comparison of anxiety and depression scores between the two groups before and after treatment. A: Changes of SAS scores in patients before and after nursing. B: Changes of SDS scores in patients before and after nursing. Notes: ***, P < 0.001, ****, P < 0.0001. SAS: self-rating anxiety scale; SDS: self-rating depression scale.

group (all P < 0.05). Additionally, further comparison revealed that 48 hours after surgery, the TSH increased significantly, and T3 and T4 decreased significantly in both groups (P < 0.05, **Figure 2**).

Comparison of patients' stress response

The stress responses of the two groups were compared before and after nursing. One day before surgery, the two groups were similar in the levels of Cor and Ang II (all P > 0.05), while 1 day after the surgery, both groups showed a significant increase in the levels of Cor and Ang II, but the research group showed lower levels than the control group (P < 0.05, **Figure 3**).

Comparison of anxiety and depression

The changes of anxiety and depression were compared between the two groups before and after nursing. Before nursing, the SAS and SDS scores of the two groups were not greatly different (P > 0.05), while after nursing, both groups showed a significant decrease in SAS and SDS score, with the research group havinglower SAS and SDS scores than the control group (P < 0.05, **Figure 4**).

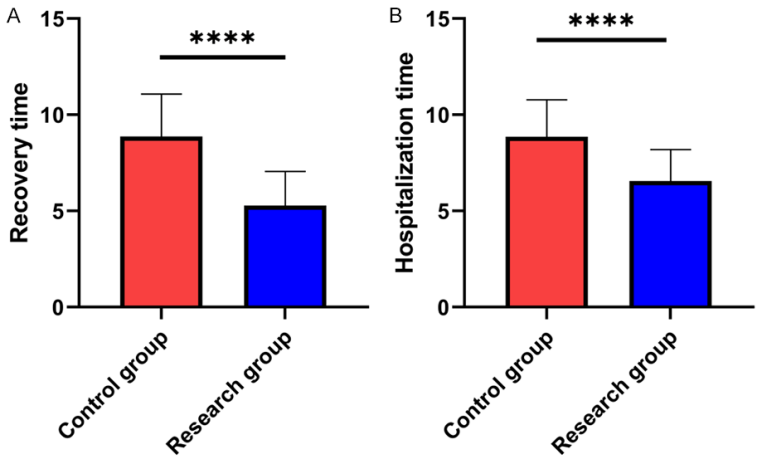

Figure 5. Comparison of postoperative conditions between the two groups. A: Comparison of recovery time; B: Comparison of hospitalization time. Note: ****, P < 0.0001.

Comparison of postoperative conditions

According to comparison of postoperative conditions between the two groups, the recovery time and hospitalization time in the research group were both shorter than those of the control group after nursing (P < 0.05, **Figure 5**).

Comparison of nursing satisfaction

A comparison of nursing satisfaction reveale lower satisfaction in the control group than the research group (P=0.020, **Table 2**).

Comparison of complications

Comparison of the incidence of complications revealed a higher incidence of complications in the control group than in the research group (P=0.002, **Table 3**).

Analysis of prognostic factors

After 4 weeks of treatment, patients with persistent or worsening symptoms, delayed wound healing, or complications were classified into a poor prognosis group (n=24). Conversely, patients who showed significant improvement in symptoms, normal wound healing, and a smooth recovery were classified into a good prognosis group (n=76). Then, we compared the differences in clinical data between the two groups, and found that age, gender, course of disease, pathologic type, and nursing method were risk factors affecting the prognosis of patients (**Table 4**), which were then included in further multivariate analysis (**Table 5**). The logistic regression analysis showed that pathologic type and nursing method were independent risk factors affecting the prognosis of patients (**Table 6**).

Discussion

In recent years, thyroid cancer (TC) incidence has increased, particularly in women [15, 16]. It has no obvious symptoms in the early stage, but it may cause symptoms such as painless lumps, hoarseness, dysphagia, and dyspnea when it develops further, and it may show metastasis to distant organs such as lung and bone when it develops to a late stage [16-18]. The disease will destroy the normal thyroid cells of patients and lead to abnormal thyroid function. Patients without timely treatment and with distant metastasis, will experience worse safety and health [19]. Radical thyroidectomy is a commonly utilized surgical treatment treatment for TC and iseffective in achieving a high survival rate for patients [20]. According to statistics, the 5-year survival rate of patients following radical thyroidectomy can reach 97%, while the 10-year survival rate can reach 92%. Because of these favorable outcomes, radical surgery is often considered the primary treatment option for patients with TC. However, when affected by cancer, surgical treatment, and other factors, patients will suffer different degrees of anxiety, tension, agitation, and other negative emotions, which will seriously hinder treatment, so nursing work is of particular importance. Currently, most of the clinical nursing work is based on simple nursing practice and may fall short of meeting patient needs in many aspects. Rapid rehabilitation surgery nursing is a nursing mode that optimizes various measures during the perioperative period. It mainly emphasizes a series of nursing measures before, during, and after the operation, with the aim of reducing the trauma or stress reaction from the operation to the body as much as possible and helping patients recover quickly after the operation [21].

In this study, the postoperative status of patients after nursing was evaluated. According

Table 2. Comparison of nursing satisfaction between the two groups

Group	Satisfied	Basically satisfied	Dissatisfied	Degree of satisfaction
Control group (n=44)	11 (25.00)	18 (40.91)	15 (34.10)	29 (65.91)
Research group (n=56)	23 (41.07)	25 (44.64)	8 (14.29)	48 (85.71)
χ^2				5.457
P				0.020

Table 3. Comparison of complications between the two groups

Group	Recurrent laryngeal nerve injury	Thyroid crisis	Postoperative hemorrhage	Incidence of complications
Control group (n=44)	4 (9.09)	3 (6.82)	4 (9.09)	11 (25.00)
Research group (n=56)	0 (0.00)	0 (0.00)	2 (3.57)	2 (3.57)
χ^2				10.00
P				0.002

Table 4. Univariate analysis of factors affecting patients' prognosis

Factor	Poor prognosis group (n=24)	Good prognosis group (n=76)	χ^2 value	*P* value
Age				
≤ 66 years old (n=40)	5	35	4.834	0.028
> 66 years old (n=60)	19	41		
Gender				
Male (n=30)	12	18	6.015	0.014
Female (n=70)	12	58		
Course of disease				
≤ 2 years (n=43)	6	37	4.174	0.041
> 2 years (n=57)	18	39		
Pathological type				
Papillary thyroid carcinoma (n=78)	10	68	24.29	< 0.001
Follicular thyroid carcinoma (n=22)	14	8		
Nursing method				
Routine nursing (n=44)	17	27	9.228	0.002
Rapid rehabilitation surgery nursing (n=56)	7	49		
Education level				
Below junior college (n=60)	15	45	0.082	0.774
Junior college or above (n=40)	9	31		
Residential environment				
Urban area (n=68)	14	54	1.356	0.244
Rural area (n=32)	10	22		
Nationality				
Han (n=78)	17	61	0.945	0.331
Ethnic minorities (n=22)	7	15		

to the results, the pain score, recovery time, and hospitalization time of the research group were all shorter than those of the control group. The results indicate that rapid rehabilitation surgery nursing can effectively reduce the pain experienced by patients, leading to faster rehabilitation, shorter hospitalization time, and improved quality of life. This approach utilizes techniques such as diversion therapy and pain medication to help patients alleviate their pain,

Table 5. Assignment table

Factor	Assignment
Age	≤ 66 years old =0, > 66 years old =1
Gender	Male =0, Female =1
Course of disease	≤ 2 years =0, > 2 years =1
Pathologic type	Papillary thyroid carcinoma =0, Follicular thyroid carcinoma =1
Nursing method	Rapid rehabilitation surgery nursing =0, Routine nursing =1
Prognosis	Good prognosis =0, Poor prognosis =1

Table 6. Multivariate analysis of factors affecting patients' prognosis

	B	S.E.	Wals	df	Sig.	Exp (B)	95% C.I. of the EXP (B)	
							Lower limit	Upper limit
Age	1.36	0.709	3.675	1	0.055	3.896	0.97	15.645
Gender	-1.164	0.643	3.278	1	0.07	0.312	0.089	1.101
Course of disease	1.203	0.706	2.905	1	0.088	3.331	0.835	13.292
Pathologic pe	2.287	0.686	11.102	1	0.001	9.842	2.564	37.779
Nursing method	2.146	0.693	9.599	1	0.002	8.548	2.2	33.218

facilitating a quicker healing process. As a result, patients benefit from enhanced overall well-being and a more expedited recovery. In addition, according to evaluation of the changes in patients' emotions, after nursing, the SAS and SDS scores of both groups decreased significantly, with the research group having lower scores than the control group. The findings suggest that rapid rehabilitation surgery nursing is superior to routine nursing. Under rapid rehabilitation surgery nursing, the nursing staff deepen patients' and their families' understanding and cognition of diseases and operations, and guide patients to make psychological self-adjustment, which can effectively alleviate patients' negative psychological state, so that they can cooperate with treatment with a positive attitude. Research by Song et al. [22] showed that the application of rapid rehabilitation nursing in patients after laparoscopic myomectomy could minimize the physical and mental stress of patients and improve their quality of life, which is similar to this study.

The comparison of thyroid hormone levels showed that 48 hours after operation, the TSH level of the two groups was significantly increased, with the research group being higher than the control group. T3 and T4 were significantly decreased, and the research group was lower than the control group, indicating that the thyroid function of the patients was significantly improved after radical thyroidectomy with rapid rehabilitation surgery nursing. Cortisol (Cor) is an important anti-stress hormone in the body that can protect the body from excessive stress [23]. Ang II is a hormone that regulates water and salt metabolism and blood pressure, affecting on blood pressure, heart, and kidney [24]. Under normal circumstances, the levels of Cor and Ang II in human body are maintained within the normal range, but when the body is damaged, the levels of stress indicators such as Cor and Ang II will increase. In this study, levels of Cor and Ang II in both groups increased one day after operation, but their levels in the research group were lower than those of the control group. The results indicate that the stress level increases notably after radical thyroidectomy, but was obviously relieved after rapid rehabilitation surgery nursing, which is beneficial to the patients' later recovery.

Finally, this study compared the complications of patients before and after nursing. The research group showed a lower incidence of complications after operation than the control group. Similarly, research by Huang et al. [25] revealed that rapid rehabilitation nursing reduced the adverse reactions after laparoscopic radical resection of primary liver cancer. Analysis of factors affecting the prognosis showed that pathologic type and nursing method were independent risk factors affecting the prognosis. In addition, satisfaction with nursing

was significantly higher in the research group than the control group. The results indicate that, compared to single routine nursing, rapid rehabilitation surgery nursing is more acceptable to patients, resulting in more cooperation and better disease treatment.

This study has verified the benefits of rapid rehabilitation surgery nursing in patients undergoing radical thyroidectomy, but it has some limitations. For example, there are some differences in the work experience of nurses that may impact the nursing quality of the two groups; secondly, the small sample size of this study may cause bias of experimental results. Therefore, we hope to carry out more follow-up studies to improve the research conclusions.

To sum up, for patients undergoing radical thyroidectomy, rapid rehabilitation surgery nursing can effectively contribute to less pain, milder anxiety, shorter recovery time, and hospitalization time, lower incidence of complications, less stress response, faster recovery process after operation, and higher quality of life. Due to these positive outcomes, it should be valuable in clinical practice.

Disclosure of conflict of interest

None.

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