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The Effect of Head-Neck Stretching Exercises After Thyroidectomy on Postoperative Level of Pain and Disability

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ABSTRACT

Purpose: To determine the effect of post-thyroidectomy head-neck stretching exercises on postoperative level of neck pain and disability.
Method: This randomized controlled study was conducted between January 2019 and August 2020 in a university hospital in Istanbul. The sample consisted of 82 patients who had thyroidectomy surgery. Head and neck exercises were applied to the intervention group on the first postoperative day, and routine care was applied to the control group. The patient was asked to perform the exercises 3 times a day, in the morning, noon and evening for a month. Only Visual Analog Scale and Neck Pain and Disability Scale were applied to the same ranges in the control group.
Results Most of the patients (79.2%) participating in the study were women. The diagnosis of 62.19% was multinodular goiter. 70.73% of them had undergone total thyroidectomy surgery. The average of the Visual Analogue Scale (VAS) of patients in intervention group on first postoperative day was lower (2.20± 2.22) than in control group (3.00 ± 2.10). There was no significant difference between patients in intervention and control groups in discomfort and pain in the neck after 1 week and 1 month of surgery. However, a significant difference within the groups in neck pain and discomfort at first week and first month was observed (p <0.05).
Conclusion and Suggestions: It was found that the head-neck stretching exercise was an effective nursing intervention in reducing postoperative neck pain and disability in the patients. Head-neck stretching exercise can be used as a non pharmacological treatment method in postoperative nursing care.

Tiroidektomi Sonrası Baş-Boyun Germe Egzersizlerinin Ameliyat Sonrası Ağrı ve Rahatsızlık Düzeyine Etkisi

Makale Bilgileri

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ÖZ

Amaç: Tiroidektomi sonrası baş-boyun germe egzersizlerinin ameliyat sonrası boyun ağrısı ve rahatsızlık düzeyine etkisini belirlemek.
Yöntem: Bu randomize kontrollü çalışma, İstanbul'da bir üniversite hastanesinde Ocak 2019-Ağustos 2020 tarihleri arasında yapıldı. Örneklem, tiroidektomi ameliyatı olan 82 hastadan oluşuyordu. Müdahale grubuna ameliyat sonrası birinci baş-boyun egzersizleri, kontrol grubuna da rutin bakım uygulandı. Hastadan egzersizleri bir ay boyunca sabah, öğle ve akşam olmak üzere günde 3 kez yapması istendi. Kontrol grubunda ise aynı aralıklara sadece Visual Analog Skala ve Boyun Ağrı ve Rahatsızlık Ölçeği uygulandı.
Bulgular: Çalışmaya katılan hastaların çoğu (%79.2) kadındı. %62.19'unun tanısı multinodüler guatrdı. %70,73'ü total tiroidektomi ameliyatı geçirmişti. Müdahale grubundaki hastaların postoperatif birinci gün Görsel Analog Skalası (GAS) ortalaması (2.20±2.22) kontrol grubuna göre (3.00±2.10) daha düşüktü. Ameliyattan 1 hafta ve 1 ay sonra boyunda rahatsızlık ve ağrı açısından müdahale ve kontrol grubundaki hastalar arasında anlamlı bir fark yoktu. Ancak birinci hafta ve birinci ayda boyun ağrısı ve rahatsızlıklarında gruplar arasında anlamlı fark gözlendi (p<0.05).
Sonuç ve Öneriler: Baş-boyun germe egzersizinin hastalarda ameliyat sonrası boyun ağrısını ve rahatsızlığını azaltmada etkili bir hemşirelik girişimi olduğu bulundu. Baş-boyun germe egzersizi postoperatif hemşirelik bakımında farmakolojik olmayan bir tedavi yöntemi olarak kullanılabilir.

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INTRODUCTION

Thyroid disease is one of the most common health problems in Turkey and all over the World. Thyroidectomy is one of the most commonly performed neck surgeries. In this surgery, the patient is placed in a supine position and the neck is brought into hyperextension during the procedure (Park et.al., 2015). Therefore, patients may experience neck pain and disability after surgery and cannot move their head comfortably. These disabilities affect the quality of life of patients for a long time, starting in the early postoperative period (Ayhan et.al., 2016; Han et.al., 2006).

It is seen that the majority of patients experience neck pain and complain of cervical range of motion (ROM) limitation. However, it is seen that studies mostly focus on pain originating from the surgical site (Han et.al., 2006; Park et.al., 2015). Analgesics are routinely used for the treatment of incisional area and other discomfort such as pain and difficulty in movement but their effects are not clear (Barua et.al., 2016; Kalmovich et.al., 2010; Park et.al., 2015). Various treatment models are applied to relieve these disorders, one of them is post-operative neck stretching exercises (Ayhan et.al., 2016; Takamura et.al., 2005).

It is stated that patients who do not move their necks after thyroidectomy tend to report more severe neck symptoms (Takamura et.al., 2005). Ayhan et.al., (2016) stated that exercises applied to patients with thyroidectomy can reduce neck pain and discomfort and suggested that these exercises should be started in the early period. Neck stretching exercises which include basic movements of the neck are simple and effective exercises. It provide neuromuscular coordination and flexibility in patients by reducing pain and muscle weakness (Nakamura et.al., 2014). These excercises should be performed in early postoperative period and a nurse should teach the patient these excercises and ensure the patient's comfort after thyroidectomy.

When the literature is examined, it is seen that when planned and regular stretching exercises can reduce the pain level and neck disability of patients in many types of surgery (Ayhan et.al., 2016; Chung et.al., 2007; Jang et.al., 2014). Although there are limited studies on the subject, these studies show that early and regular exercise will reduce the level of pain and discomfort of patient (Jang et.al., 2014). So, this study aimed to determine the effect of post-thyroidectomy head-neck stretching exercises on postoperative level of neck pain and disability.

METHOD

Research Design

It was a randomized controlled study that was conducted between January 2019 to August 2020 in Turkey.

Research Sample

Sample size was calculated with repeated measures ANOVA test. G Power Version 3.1.9.2 was used in the sample size calculation. To find a significant difference according to the results of by Ayhan et. al., (2019), with the 95% confidence interval ($\alpha = 0.05$), the medium effect size of $f = 0.25$, and Cohen at 0.80 power, the sample size was calculated as 82 patients. The inclusion criteria were patients who consented verbally and written, were 18 years of age and over, could understand the information, as well as being able to read, write and speak in Turkish. Patients who suffer from cervical problems before surgery were excluded from the study. The sample was selectedbased on the operation protocol by the same surgeon.

Research Instruments and Processes

Patients meeting the research criteria were divided into intervention and control groups by using a computerized randomization program (https://www.randomizer.org/). The head-neck exercises

developed by the researchers in line with the literature (Takamura et.al., 2005) were applied to the experimental group on the first day after operation. The stretching exercise group learned from the primary researcher how to perform neck stretching exercises. The pain level of the patient on the first postoperative day was evaluated using Visual Analog Scale (VAS). For further evaluations, the patient was called by phone at the first week and first month and the neck pain and discomfort status was evaluated with the "Neck Pain and Disability Scale" (NPDS). Follow-up program of the patients with the scales were also performed to the control group at the same intervals. The study design according to the Consort diagram is shown in Figure 1.

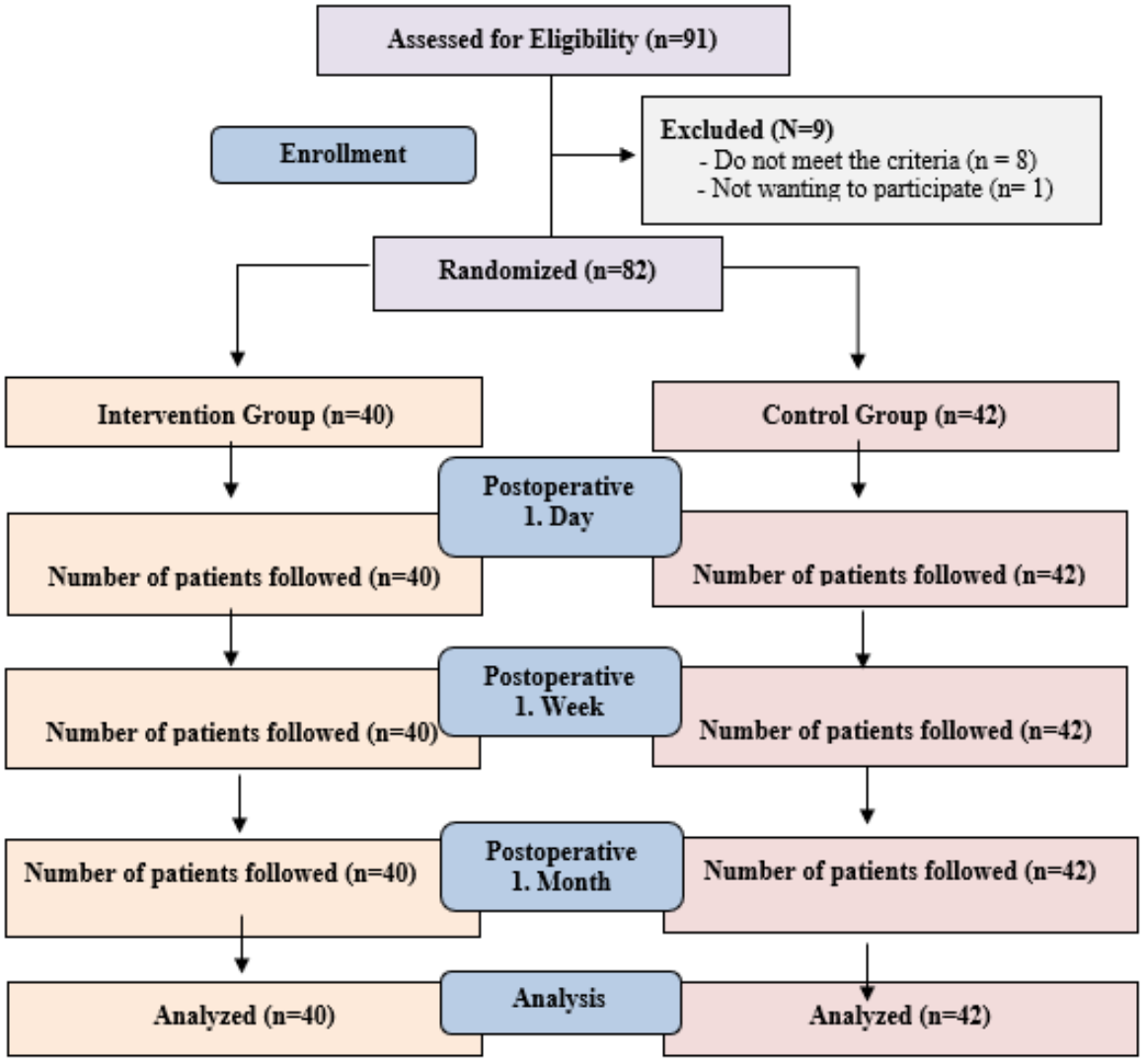

Figure 1.Consort Diagram of Participants

Exercise Program: Since the surgery day was determined, the exercises were taught to the patients on the first postoperative day. A brochure was developed in line with the literature regarding head-neck stretching exercises (Takamura et.al., 2005) (Figure 2). These exercises includ relaxing shoulders and neck sufficiently, turning face to the right and left, tilting head to the right and left, turning shoulders around, and slowly moving hands up and down. The excercises took approximately 10-15 minutes. The patient was asked to perform the exercises 3 times a day, in the morning, noon, and evening for a month, and each movement reapeted for 5 times.

Head and Neck Stretching Exercises After Neck Surgery	
	1. Relax your shoulder and neck enough
	2. Look below
	3. Turn your face to right
	4. Turn your face to the left
	5. Tilt your head to the right
	6. Tilt your head to the left
	7. Turn your shoulders around
	8. Slowly raise your arms up and down

Figure 2. Head and Neck Stretching Exercises After Neck Surgery

Visual Analog Scale (VAS): Its was developed by Price et. al., (1983) for assesing pain that cannot be measured numerically. It is a simple, effective, reproducible and minimal tool that can assess pain intensity and provides rapid measurement of pain severity in clinical and laboratory conditions.

Neck Pain and Disability Scale (NPDS): The scale was developed by Wheeler et. al., (1999) for evaluation of pain intensity. Its Turkish validity and reliability study were conducted by Biçer et. al., in 2004. The scale consists of twenty items. Each item measures the severity of pain, and evaluates the interaction of professional, social and functional aspects of life, and the presence and extent of emotional factors. Each item has a 10 cm visual analog scale ranging between 0 (normal function) and 5 (severely limited function). It is divided into 6 sections at equal intervals by vertical bars. The total score ranges from 0 to 100. Higher scores indicate stronger effects of the neck pain. It is stated that the NPDS is not suitable to be used on the first postoperative day. So, postoperative pain was evaluated with VAS in the study. In the analysis, Cronbach's alpha coefficient of the NPDS was 0.952, and the test-retest reliability coefficient was 0.929.

Data Analysis

The data was evaluated by using SPSS Statistics 21 program *(IBM SPSS- Statistical Package for the Social Sciences for Windows, Version 22.00, Armork, NY).* In analysis, descriptive statistical such as mean, standard deviation, median, frequency, ratios, minimums, and maximum were used. Also, analytic statistical test such as Student t-Test, Mann Whitney U test, and Kruskal-Wallis H test were used. Pearson Correlation Analysis and Spearman's Correlation Analysis were used to evaluate the relationships between parameters. The statistical significance level was considered at $p<0.05$ and at 95% confidence intervals.

Ethic

Before starting the study, informed consent was obtained from the patients according to the Helsinki Decleration. Also, the institutional permission (10/01/2019-7470) was obtained from the ethics committee (2018/1763). The protocol of the study was registered in clinicaltrials.gov (NCT04680754). The work has been reported in line with Consolidated Standards of Reporting Trials (CONSORT) Guidelines.

RESULTS

Our analysis showed that the demographic charactristics of the intervention and control groups were homogeneous ($p>0.05$) (Table 1).

Table 1. *Table 1. Distribution of Demograghic Characteristics (n = 82)*

Characteristics		Intervention Group (n=40)		Control Group (n=42)		Total (n=82)		Test	
		Mean±SD		Mean±SD		Mean±SD		ρ	p
Age (year)		46.10±13.124		47.17±13.670		46.65±13.335		0.360	0.720
		n	%	n	%	n	%	ρ	p
Gender	Female	29	72.50	36	85.71	65	79.27	2.177	0.140
	Male	11	27.50	6	14.29	17	20.73		
Marital status	Married	35	87.50	29	69.05	64	78.05	6.295	0.098
	Single	2	5	7	16.67	9	10.97		
	Divorced	0	0	3	7.14	3	3.66		
	Widow	3	7.50	3	7.14	6	7.32		
Educational status	Literate	7	17.50	5	11.90	12	14.63	2.408	0.492
	Primary school graduate	17	42.50	23	54.76	40	48.79		
	High school graduate	11	27.50	7	16.67	18	21.95		
	University and senior	5	12.50	7	16.67	12	14.63		
Working condition	Working	12	30	14	33.33	26	31.71	0.241	0.971
	Housewife	20	50	21	50	41	50		
	Retired	5	12.50	4	9.53	9	10.98		
	Other	3	7.50	3	7.14	6	7.31		
Economic situation	Low	11	27.50	5	11.91	16	19.51	3.235	0.198
	Middle	27	67.50	35	83.33	62	75.61		
	High	2	5	2	4.76	4	4.88		

ρ: Pearson Correlation Test, $\boldsymbol{\rho}$ = Pearson Chi-Square Test

The average age of the intervention group was 46.10 ± 13.124, and the average age of the control group participants was 47.17 ± 13.670. In the study, 72.50% (n = 29) of the intervention group and 85.71% (n = 36) of the control group participants were women; 42.50% (n = 17) of the intervention

group, 54.76% (n = 23) of the control group were primary school graduates; 30% (n = 12) of the intervention group participants, 33.33% (n = 14) of the control group participants were working actively and 67.50% (n = 27) of the intervention group and 83.33% (n = 35) of the control group was determined to have a medium economic level (Table 1).

There was no statistically significant difference between the health status characteristics (postoperative use of analgesics, diagnosis, chronic disease status, movement status, status of having neck surgery) of the two groups before the study (p> 0.05) (Table 2).

Table 2. *Distribution of Characteristics Regarding Health Status and Surgical Intervention (n=82)*

Characteristics		**Intervention Group (n=40)**		**Control Group (n=42)**		**Total (n=82)**		**Test**	
		n	**%**	**n**	**%**	**n**	**%**	***ρ***	**p**
Diagnosis	Multinoduler goiter	25	62.50	26	61.90	51	62.19	0.971	0.914
	Cancer	13	32.50	13	30.96	26	31.71		
	Hyperthyroidism	1	2.50	1	2.38	2	2.44		
	Graves disease	1	2.50	1	2.38	2	2.44		
	Planjuan goiter	0	0	1	2.38	1	1.22		
Chronic disease status	Yes	10	25	17	40.48	27	32.93	2.222	0.136
	No	30	75	25	59.52	55	67.07		
Existing chronic diseases	None	30	75	25	59.52	55	67.07	9.308	0.97
	Diabetes mellitus	4	10	5	11.90	9	10.98		
	Hypertension	1	2.50	7	16.68	8	9.76		
	Heart failure	5	12.50	2	4.76	7	8.53		
	Asthma	0	0	1	2.38	1	1.22		
	All of	0	0	2	4.76	2	2.44		
Movement status	Active	25	62.50	29	69.05	54	65.85	0.748	0.688
	Medium moving	10	25	10	23.81	20	24.39		
	Motionless	5	12.50	3	7.14	8	9.76		
Status of having neck surgery	Yes	5	12.50	5	11.90	10	12.19	0.007	0.934
	No	35	87.50	37	88.10	72	87.81		
Type of surgery	Total thyroidectomy	27	67.50	31	73.81	58	70.73	3.277	0.194
	Partial thyroidectomy	10	25	11	26.19	21	25.61		
	Lobectomy	3	7.50	0	0	3	3.66		

ρ = Pearson Chi-Square Test

The diagnosis of 62.50% (n = 25) of the intervention group and 61.90% (n = 26) of the control group was multinoduler goiter. It was observed that 25% (n = 10) of the intervention group had chronic disease, 12.50% (n = 5) of the patients with chronic disease had heart failure and 62.50% (n = 25) were active in daily life. It was noted that 40.48% (n = 17) of the control group had chronic disease, 16.68% (n = 7) of the patients with chronic disease had hypertension and 69.05% (n = 29) were active in daily life (Table 2). Total thyroidectomy was performed to 67.50% (n = 27) of the intervention group and 73.81% (n = 31) of the control group (Table 2).

On the first postoperative day, the average VAS of the intervention group and control group was 2.20 ± 2.22 and 3.00 ± 2.10 respectively and there was no statistically significant difference (p>0.05) (Table 3). Also, there was no statistically significant difference between the mean NPDS scores of the patients in the intervention and control groups at first week and first month after surgery (p = 0.316>0.05) (p = 0.104>0.05) (Table 3). Furthermore, Wilcoxon signed-rank test was conducted to examine whether there was a difference between the first week and first month after surgery in the patients of intervention and control group in terms of NPDS. The result showed a statistically significant difference between the mean scores of NPDS in the first week and first month after surgery in the

intervention and control groups (p <0.05). While the mean NPDS score of the intervention group patients in the first week after surgery was 28.5 ± 20.18, the mean NPDS score in the first month after surgery was 11.35 ± 16.66. The mean NPDS score of the control group patients in first week after surgery was 32.78 ± 19.89, while the mean NPDS score first month after surgery was 14.00 ± 13.84. (Table 3).

Table 3. *Evaluation of the VAS and NPDS Score Average After Surgery (n =82)*

Evaluation Time	**Intervention Group (n=40)**	**Control Group (n=42)**	**Test**	
	Mean±SD	**Mean±SD**	**t**	**p**
VAS score on the first postoperative day	2.20±2.22	3.00±2.10	-1.674	0.099
NPDS SCORE	**Intervention Group (n=40) Mean±SD**	**Control Group (n=42) Mean±SD**	**Z**	**p**
NPDS- One week after surgery	28.50±20.18	32.78±19.89	-1.002	0.316
NPDS- One month after surgery	11.35 ± 16.66	14.00 ± 13.84	-1.627	0.104
^{1}t	**-4.65**	**-4.80**		
p	**0.000**	**0.000**		

t: Independent Samples Test, ^{1}t: Wilcoxon Signed Ranks Test, Z: Mann-Whitney U Test

DISCUSSION

This study aimed to determine the effect of post-thyroidectomy head-neck stretching exercises on postoperative level of NPDS. Our results showed that head and neck stretching exercises were an effective therapeutic nursing intervention, and patients who exercise experienced less neck pain and discomfort.

Gender is one of the unchangeable risk factors in thyroid diseases. In this study, it was found that women experienced more thyroid problems. Studies have reported that women experience more thyroid-related problems and neck pain than men (Al Qubaisi & Haigh 2019; Chung et.al., 2007; Çağlayan et.al., 2010; Genç et.al., 2019; Ha et.al., 2018; Jang et.al., 2014; Lang et.al., 2015; Li et.al., 2018; Worni et.al., 2008).

Thyroidectomy is the most commonly used surgery method in the treatment of diseases related to thyroid gland (Ryu et. al., 2013). As in present study, previous studies also stated that total thyroidectomy is mostly performed surgical intervention in thyroid diseases (Al Qubaisi & Haigh 2019; Brown et.al., 2011; Chung et.al., 2007; Ha et.al., 2018; Haunch et.al., 2014; Lang et.al., 2015; Sosa et.al., 2006; Spanheimer et.al., 2011; Worni et.al., 2008).

Post-thyroidectomy neck pain is one of the most common and significant problems seen in the first 36 hours after surgery. Patients usually recover quickly after surgery, but may experience discomfort. Similar to this study, in other studies it was observed that the neck pain level experienced by the patients on the first day after surgery was below a VAS level of 5 (Atasayar & Güler Demir 2019; Barua et.al., 2016; Cahi et.al., 2016; Ha et.al., 2018; Miccoli et. al., 2010; Ryu et.al., 2013). According to the results of this research, it can be said that early head and neck exercises reduce neck pain and discomfort.

During thyroidectomy surgery, due to hyperextension applied to the neck, nociceptive stimuli originating from anatomical structures in the cervical region may cause neck pain. In this study, we did not find a significant difference in terms of pain and disability between the groups in which we did and did not exercise head-neck stretching, but the average pain and disability scores of the group who did not exercise were higher. When the literature is reviewed, it is stated that head-neck stretching exercises increase the flexibility of the neck and reduce neck pain (Chai et.al., 2016). In other studies, it was stated that patients who underwent thyroidectomy experienced NPDS after surgery and this pain negatively affected their daily life (Takamura et.al., 2005; Rodríguez-Torres et.al., 2019; Roerink et.al., 2017). It was stated that there was a significant relationship between the neck pain levels of the patients who

exercised in the postoperative first week and the first month, and the neck pain of the patients was decreased significantly in the first month (Takamura et.al., 2005). It was found that the rate of NPDS at 1 week and 1 month after thyroidectomy was less in the group of patients who performed stretching exercises (Ayhan et.al., 2016); it was reported that in the first 3 months after surgery, the stretching group was experienced less NPDS than those who did not (Haunch et.al., 2014).

CONCLUSION AND SUGGESTIONS

The results of this study showed that head and neck stretching exercises were an effective therapeutic nursing intervention for neck pain after thyroidectomy and patients who exercise experienced less neck pain and discomfort. In the postoperative period, patients experience more neck pain because they do not want to move their neck. To prevent this, neck exercises should be started in the early postoperative period. Head-neck stretching exercise can be used as a non pharmacological treatment method in postoperative nursing care.

LIMITATIONS

The most important limitation of this study was that the exercises could not be given in the preoperative period, because the patients were taken into surgery with a short-term and rapid decision of surgeons.

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Conflict of Interest

No conflict of interest.

Author Contributions

Design: A.T., İ.Ç., Data collection or processing: A.T., Analysis or interpretation: A.T., İ.Ç., N.A., Literature search: A.T., İ.Ç., Writing: A.T., İ.Ç.

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