



Stretching Exercises to Reduce Symptoms of Postoperative Neck Discomfort after Thyroid Surgery: Prospective Randomized Study

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Abstract. Patients who undergo thyroid surgery frequently suffer from unpleasant symptoms such as a stretching, choking, or pressing feeling or discomfort in the neck for a long time. The usefulness of rehabilitation (i.e., a stretching exercise) for reducing these symptoms after surgery has never been studied. In the present study, attempts were made to evaluate the usefulness of the stretching exercise in reducing disagreeable postoperative symptoms in the patients who had undergone thyroid surgery. A total of 409 patients, including 234 thyroid cancer patients, were randomly divided into a stretching group ($n = 204$) and a control group ($n = 205$). Patients in the stretching group were instructed that the stretching exercise was to be performed three times a day beginning the morning following surgery. A questionnaire survey was performed before surgery and then 1 week, 1 month, 6 months, and 1 year after surgery. Total symptom scores obtained from the questionnaire survey from the control group and the stretching group were compared. The use of analgesics was also investigated. Postoperative neck symptoms declined gradually over the course of a year, and the total symptom scores were significantly ($p < 0.001$) lower in the stretching group than in the control group at all points throughout the year (1 week, 1 month, 6 months, and 1 year). The mean requirement for the use of analgesics during hospitalization was significantly ($p < 0.0001$) less in the stretching group (1.6 ± 2.3 tablets, mean \pm SD) than in the control group (3.1 ± 3.8 tablets). The stretching exercise had effectively reduced postoperative neck symptoms and also reduced the use of analgesics after thyroid surgery.

The prognosis of patients with differentiated thyroid carcinoma is commonly favorable, and the overall 10-year survival rate for middle-aged adults is about 95% for those with papillary carcinomas and about 90% for those with follicular carcinoma [1, 2]. Most of the patients are effectively treated with surgery carried out by surgeons who are experienced in the technique of thyroidectomy [3]. Patients who have undergone thyroid surgery, however, frequently suffer from symptoms of discomfort in the neck. Many patients complain about not only pain in the location of the surgery but also a stretching, choking, or pressing feeling or discomfort in the neck, headache, shoulder stiffness, and difficulty moving the neck or shoulders. These symptoms may continue for a long time after surgery and may even influence the daily life of

the patients. Anxiety, depression, and emotional distress are sometimes present in these patients; and psychological distress may adversely affect their quality of life. To our knowledge, these important issues have never been discussed in any major medical publications.

Based on our clinical observations, patients who did not move their neck or shoulders after surgery tended to report more severe neck symptoms. Our preliminary study of the stretching exercise after surgery suggested that it effected a decrease in neck symptoms during the early postoperative period. Rehabilitation is widely performed after orthopedic surgery and after breast surgery to avoid limitation in shoulder movement or arm swelling [4-6]. However, the usefulness of such rehabilitation for reducing neck symptoms after neck surgery, including thyroid surgery, has never been studied. Therefore, in the present study, we investigated the important issue of the clinical utility of rehabilitation (i.e., stretching exercises) to reduce symptoms of postoperative discomfort in patients who had undergone thyroid surgery.

Materials and Methods

Patients who underwent thyroid surgery at Kuma Hospital from January to May 2002 were recruited for this study. The patients who needed to undergo resection of the trachea, major cervical vessels, or sternocleidomastoid muscle and those who needed recurrent laryngeal nerve (RLN) anastomosis [7, 8] were excluded from this study. The term was divided into four 5-week periods. To achieve randomness, the patients who underwent surgery during the first and third periods were told that they could move their neck and shoulders freely, but the stretching exercise was not revealed to them (control group). The patients who underwent surgery during the second and fourth periods were instructed that the stretching exercise was to be performed from the day following surgery (stretching group). As a result, 409 patients, including 234 patients with thyroid cancer, were enrolled and assigned to either group. There were no significant differences in the clinical features or surgery performed between the control group ($n = 205$) and the stretching group ($n = 204$) (Table 1). Questionnaire surveys (Fig. 1) were obtained from all the patients

Table 1. Patient characteristics.

Characteristic	Control group (n = 205)	Stretching group (n = 204)	Difference (f)
General			
Age (years)	49.9 (19–91)	50.3 (14–87)	NS
Sex (male/female)	30/175	19/185	NS
Operating time (minutes)	126.7 (34–341)	121.0 (21–357)	NS
Preoperative diagnosis (no)			
Malignant tumor	114	120	
Benign tumor	69	61	
Graves' disease	18	20	
Other	4	3	
Surgery performed			
Total or near-total thyroidectomy	61	81	
Less than near-total thyroidectomy	144	123	
Central compartment dissection	34	38	
Lateral compartment dissection	83	76	

Post-operative questionnaires

1) Do you have pain in the location of the surgery?

no	mild	moderate	severe
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2) Do you have a headache?

no	mild	moderate	severe
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3) Do you have a stretching feeling in your neck?

no	mild	moderate	severe
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4) Do you have pain in the back of your head?

no	mild	moderate	severe
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5) Do you have neck or shoulder stiffness?

no	mild	moderate	severe
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6) Do you feel discomfort or pain in your neck?

no	mild	moderate	severe
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7) Do you have difficulty of moving your neck or shoulders?

no	mild	moderate	severe
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Fig. 1. Questionnaire survey. We asked seven questions about neck symptoms, and patients answered each question according to a four-grade system. The severity of the symptom was scored from 0 to 3 points according to each grade: none, 0 points; mild, 1 point; moderate, 2 points; severe, 3 points.

before their operation and 1 week, 1 month, 6 months, and 1 year after their operation.

After surgery, the patients were allowed to take nonsteroidal antiinflammatory drugs (NSAIDs) if they wanted them. The use of NSAIDs, the duration that the drainage tube was left in the location of surgery, and the duration of the hospital stay following surgery were also investigated.

Stretching Exercise

The leaflet (Fig. 2) illustrating the stretching exercise was given to the stretching group. The stretching exercise was performed at least three times a day beginning the morning following surgery. Patients were told that the surgical wound would not open or bleed as a result of the stretching exercise, and thus started the exercise, at first guided by a doctor. It was important to encourage patients to move their neck and shoulders and to stretch their neck slowly and fully. Patients performed the exercise by themselves after the second time during their hospitalization and also after their discharge. Compliance with the stretching exercise was checked by a nurse or doctor during their daily consultations. If unsatisfactory, the stretching exercise was described again for the patients.

Questionnaire Survey

We asked seven questions about neck symptoms, and the patients answered each question based on a four-grade system (Fig. 1). Question 1 was omitted before surgery because the question was relevant only to postoperative wound pain. The extent of the symptoms was scored from 0 to 3 points according to each grade: none, 0 points; mild, 1 point; moderate, 2 points; severe, 3 points. The total scores for the seven questions of the control group and the stretching group were compared before surgery and 1 week, 1 month, 6 months, and 1 year after surgery. In addition, an eighth question about the operative scar (satisfied/average/dissatisfied) was added to the questionnaire survey 1 year after surgery.

Statistical Analysis

Total scores of the symptoms obtained from the questionnaire, the use of NSAIDs, and the duration of drainage and hospitalization of the control group and the stretching group were compared using Student's *t*-test. A value of < 0.05 was considered significant.

Results

The surgery was performed by several surgeons using a similar technique at Kuma Hospital. Patients were placed in the standard thyroid position during surgery; this is, after intubation the patient was positioned with neck extended, a pillow was placed

Stretching exercise after neck operation

Let's move slowly and fully at least three times a day.



1. Relax your shoulders and neck sufficiently.



2. Look down.



3. Turn your face to the right. (Be careful not to move your shoulders.)



4. Turn your face to the left.



5. Incline your head to the right.



6. Incline your head to the left.



7. Turn your shoulders round and round.



8. Slowly raise your hands fully then lower them.

Fig. 2. Leaflet showing the stretching exercise.

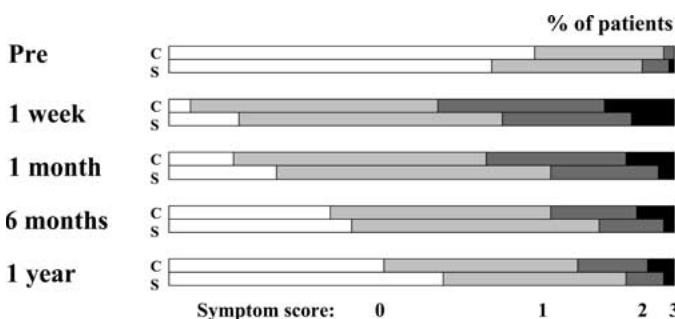


Fig. 3. Comparison of changes in discomfort or pain in the neck (questionnaire no 6) between the control group and the stretching group. The percentage of patients who complained about neck discomfort or pain is shown. C: Control group; S: stretching group. Symptom score indicates the severity of the symptoms obtained from the questionnaire survey: open area, 0, none; light gray area, 1, mild; dark gray area, 2, moderate; black area, 3, severe.

under the shoulders, and a donut was put under the head for adequate head support [9]. Total, near-total, or subtotal thyroidectomy or hemithyroidectomy was performed depending on the disease. In addition, central and ipsilateral neck lymph node resection was performed for clinical papillary thyroid cancer patients (tumor size ≥ 1.0 cm), and central neck lymph node resection was performed for micropapillary thyroid cancer (tumor size < 1.0 cm). Drainage tubes were placed in most patients, and a light pressure dressing was not placed over the incision.

Progress of Symptoms

Questionnaires were collected from 409 patients (100%) before, 1 week, and 1 month after surgery; from 371 patients (77.5%) 6 months after surgery, and from 376 patients (91.9%) 1 year after surgery. Some patients complained about neck symptoms before

surgery, and many patients suffered from several neck symptoms after surgery. For example, changes in the discomfort or pain in the neck (question 6) are shown in Figure 3. The percentage of patients who complained about neck discomfort or pain [symptom score 2 (moderate) or 3 (severe)] was 2.4% before surgery, which increased to 46.8% 1 week after surgery and then gradually decreased to 37.6%, 26.0%, and 19.4% at 1 month, 6 months, and 1 year after surgery, respectively, in the control group. By contrast, the percentages were 6.9% before surgery and 35.3%, 25.0%, 14.1%, and 10.0% at 1 week, 1 month, 6 months, and 1 year after surgery, respectively, in the stretching group. Similar results were obtained with regard to the other six questions (data not shown).

The progression of the total symptom score for the control and stretching groups was compared (Fig. 4). Preoperative neck symptoms were not significantly different between the two groups, but the postoperative neck symptoms declined gradually over the course of a year, and the total symptom scores were significantly ($p < 0.001$) lower in the stretching group than in the control group at all points throughout the year (1 week, 1 month, 6 months, 1 year). This indicated that postoperative neck symptoms were somewhat less severe in the stretching group than in the control group. Figure 5 shows the change in total symptom score. The vertical axis demonstrates the difference in the total symptom score before and after surgery (i.e., preoperative score subtracted from the postoperative score), which is to say the degree to which the neck symptoms worsened after surgery. The change in total symptom score was also significantly ($p < 0.0001$) lower in the stretching group than in the control at all points throughout the year (1 week, 1 month, 6 months, 1 year). The mean operating time was significantly longer for those with malignant disease (158.0 ± 73.4 minutes) than for those with benign disease (87.1 ± 39.6 minutes). There was a significant correlation ($p < 0.001$) between the operating time and the degree of postoperative symptoms at all points throughout the year (1 week, 1 month, 6 months, 1 year) (data not shown).

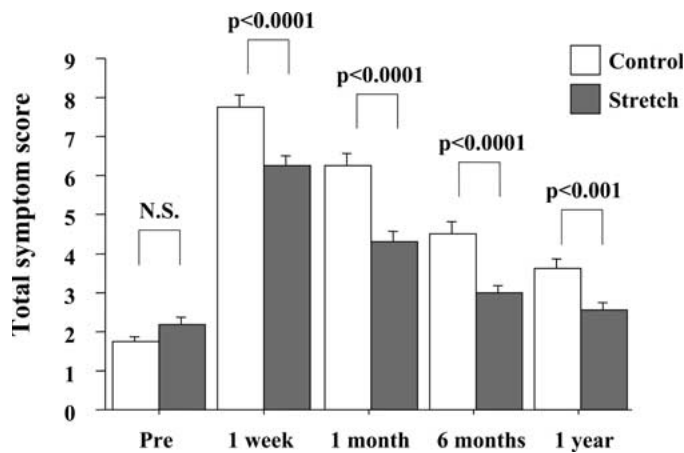


Fig. 4. Serial change in the total symptom score and comparison between the control and stretching groups. The vertical axis indicates the mean of the total symptom score.

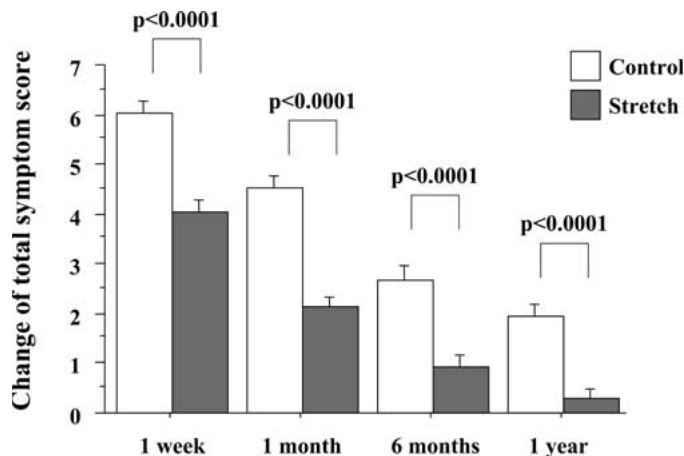


Fig. 5. Change in the total symptom score compared with that before surgery. The vertical axis demonstrates the difference in total symptom score before and after surgery (i.e., preoperative score subtracted from the postoperative score), which indicate the degree to which the neck symptoms worsened after surgery.

Use of NSAIDs, Duration of Drainage, and Hospitalization Days

Use of NSAIDs and the duration of drainage and hospitalization are summarized in Table 2. The mean requirement for the use of NSAIDs during hospitalization was significantly ($p < 0.0001$) less in the stretching group (1.6 ± 2.3 tablets, mean \pm SD) than in the control group (3.1 ± 3.8 tablets). In addition, focusing on the thyroid cancer patients, the mean requirement for the use of NSAIDs was also significantly ($p < 0.001$) less in the stretching group (1.9 ± 2.7 tablets) than in the control group (3.7 ± 4.4 tablets). The amount of time before the removal of the drainage tube was not significantly different between the controls and the stretching group among all cases (2.4 ± 0.9 and 2.4 ± 0.7 days, respectively) or in cancer patients (2.8 ± 1.1 and 2.6 ± 0.8 days, respectively). Patients were allowed to leave the hospital when their general condition and wound became stable. The duration of hospitalization was not significantly different between the control and stretching groups for all cases; but focusing on the

Table 2. Postoperative treatment.

Treatment	Control group	Stretching group	Difference (f)
All patients ($n = 409$)			
NSAIDs ^a (tablets)	3.1 ± 3.8	1.6 ± 2.3	< 0.0001
Drainage tube (days) ^b	2.4 ± 0.9	2.4 ± 0.7	NS
Hospitalization (days) ^c	8.2 ± 3.3	7.7 ± 1.9	NS
Patients with malignant disease ($n = 234$)			
NSAIDs (tablets)	3.7 ± 4.4	1.9 ± 2.7	< 0.001
Drainage tube (days)	2.8 ± 1.1	2.6 ± 0.8	NS
Hospitalization (days)	9.1 ± 4.0	8.0 ± 2.0	< 0.01

Results are means \pm SD.

NSAIDs: nonsteroidal antiinflammatory drugs.

^aAmount of NSAIDs a patient used during hospitalization.

^bDays before the drainage tube was removed.

^cHospitalization duration after operation.

cancer patients, it was significantly ($p < 0.01$) shorter in the stretching group (8.0 ± 2.0 days) than in the control group (9.1 ± 4.0 days).

Postoperative Hemorrhage and Wound Healing

Postoperative hemorrhage that required exploration and having the bleeding stopped occurred in seven cases (1.7%). The morbidity was not different between the control group ($n = 3$) and the stretching group ($n = 4$).

A postoperative hyperplastic scar or keloid formation occurred in 13 cases (3.3%). The morbidity was not different between the control group ($n = 6$) and the stretching group ($n = 7$). In addition, based on evaluation of the questionnaire survey, the proportion of patients who were dissatisfied with their operative scars was not different between the control group (4.3%) and the stretching group (4.8%).

Discussion

Patients who have undergone thyroid surgery suffer from various neck complaints, and these symptoms and discomfort may continue for a long time after surgery. Patients also suffer mental anguish, which may influence their daily life. It is difficult to evaluate these symptoms, and these important issues have never been discussed. In the present study, we evaluated the severity of these symptoms using a questionnaire survey and investigated the use of NSAIDs. According to the results of the questionnaire survey, postoperative symptoms in thyroid malignant and benign disease patients declined gradually with time, but some symptoms remained for a long time. It seemed to take almost a year for the symptoms to stabilize. Especially in the control group, the patients were seldom free of postoperative symptoms. The patients with malignant diseases complained much more than patients with benign diseases after surgery (data not shown). This is a reasonable result considering the extent of the surgery required. Thyroid surgeons may have trouble with these complaints in their usual postoperative practice. The stretching exercise effectively reduced symptoms of postoperative discomfort in patients with both benign and malignant diseases. At first, we planned this study with the expectation of short-term efficacy of the stretching exercise to reduce postoperative neck symptoms according to our preliminary study, but to our surprise the efficacy lasted longer than

a year. Moreover, after 1 year the stretching exercise reduced neck symptoms to a degree close to that experienced before surgery.

One may be concerned about postoperative hemorrhage or wound healing in relation to the stretching exercise. Postoperative hemorrhage occurred in seven cases (1.7%) in the whole group. Because all seven cases of hemorrhage occurred before the morning following surgery, this was before the stretching exercise was commenced; therefore the postoperative hemorrhage in these patients was not due to the stretching exercise. In our experience, during the past 5 years (almost 5000 operations), only one postoperative hemorrhage occurred after the morning following the operation; therefore it is considered reasonable to start the stretching exercise from the morning following surgery. We expect that the earlier the stretching exercise was started, the easier it was to relieve the various symptoms. In addition, wound healing was not different between the control group and the stretching group according to the physical examination and questionnaire survey; we therefore concluded that the stretching exercise does not affect the cosmesis of the operative scar.

Conclusions

We have reported on a newly established method to take care of patients who have undergone thyroid surgery. Because most patients are afraid to move their neck and shoulders after neck surgery, and rigidity is thought to be one of the causes of the postoperative neck symptoms, it is important to inform them that the surgical wound is not affected by the stretching exercise and thus reassure them sufficiently. Recently, to obtain greater effi-

cacy, we instructed the patients in the practice of the stretching exercise and made them practice prior to surgery. Lastly, we recommend this procedure to every institution where thyroid surgery is frequently performed, not only to help with curing thyroid disease but to improve the patients' quality of life.

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