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Neriman TEMEL AKSU, PT[1]
Abdullah ERDOĞAN, Prof. MD.[2]

EXAMINING THE EFFECTS OF CONNECTIVE TISSUE MASSAGE ON PAIN AFTER THORACOTOMY - RANDOMIZED CONTROLLED TRIAL

ORIGINAL ARTICLE

ABSTRACT

Purpose: The objective was evaluate the effect of a connective tissue massage on pain, applied analgesic amounts and length of hospitalization of the patients.

Method: The study was a prospective, randomized, controlled clinical trial and conducted at a thoracic surgery department of university hospital. The patients were randomly allocated to 1 of 2 groups: a control group (n=27) and the experimental group (n=27). Standard medical treatment, care and pulmonary rehabilitation program were applied to both groups. In addition, a total of 5 sessions of connective tissue massage were applied to the experimental group. Pain level of the patients was evaluated at every 24 hours as of the zeroth postoperative day. VAS was used as a one-dimensional scale for pain assessment. Totally applied analgesic amounts and length of hospitalization of the patients were recorded.

Results: There was no statistically significant difference between the experimental and control groups on the postoperative 0th and 1st days. A statistically significant difference was found between VAS averages on postoperative 2nd, 3rd, 4th, 5th, 6th and 7th days ($p<0.001$). Totally applied analgesic amounts of the the patients decreased significantly from the postoperative 2nd day ($p<0.05$). The length of hospital stay in the experimental group was short.

Conclusions: The pain of the experimental group decreased significantly and their pain on the postoperative 7th day was quite low and therefore the need for analgesic drugs decreased significantly.

Key words: Connective tissue massage, Pain, Quality of life, Thoracotomy.

TORAKOTOMİ SONRASI KONNEKTİF DOKU MASAJININ AĞRI ÜZERİNDEKİ ETKİSİNİN İNCELENMESİ - RANDOMİZE KONTROLLÜ ÇALIŞMA

ARAŞTIRMA MAKALESİ

ÖZ

Amaç: Konnektif doku masajının hastaların ağrılarına, uygulanan analjezik miktarlarına ve hastanede kalış sürelerine etkisinin değerlendirilmesi amaçlandı.

Yöntem: Çalışma prospektif, randomize, kontrollü bir klinik çalışmaydı ve bir üniversite hastanesinin göğüs cerrahisi bölümünde yürütüldü. Hastalar rastgele 2 gruptan 1'ine ayrıldı: bir kontrol grubu (n=27) ve çalışma grubu (n=27). Her iki gruba da standart medikal tedavi, bakım ve pulmoner rehabilitasyon programı uygulandı. Ayrıca çalışma grubuna toplam 5 seans konnektif doku masajı uygulandı. Hastaların ağrı düzeyi postoperatif 0. günden itibaren 24 saatte bir değerlendirildi. Ağrı değerlendirmesi için tek boyutlu bir ölçek olarak VAS kullanıldı. Hastaların toplam uygulanan analjezik miktarları ve hastanede kalış süreleri kaydedildi.

Sonuçlar: Cerrahi sonrası 0. ve 1. günlerde çalışma ve kontrol grupları arasında istatistiksel olarak anlamlı fark yoktu. Postoperatif 2., 3., 4., 5., 6. ve 7. günlerde VAS ortalamaları arasında istatistiksel olarak anlamlı fark bulundu ($p<0,001$). Hastaların toplam uygulanan analjezik miktarları postoperatif 2. günden itibaren anlamlı olarak azaldı ($p<0,05$). Çalışma grubunda hastanede kalış süresi kısaydı.

Tartışma: Çalışma grubunun ağrıları anlamlı olarak azaldı ve postoperatif 7. gün ağrıları oldukça azdı ve bu nedenle analjezik ilaç ihtiyacı önemli ölçüde azaldı.

Anahtar kelimler: Ağrı, Konnektif doku masajı, Torakotomi, Yaşam kalitesi

1 *Department of Physical Therapy and Rehabilitation, Akdeniz University, Antalya, Turkey*
2 *Department Of Thoracic Surgery, Akdeniz University Faculty Of Medicine, Antalya, Turkey*

Correspondence (İletişim):

Neriman TEMEL AKSU
Department of Physical Therapy and Rehabilitation, Akdeniz University, Antalya, Turkey
nerimantemelaksu@akdeniz.edu.tr
ORCID:0000-0001-7455-8697

Abdullah ERDOĞAN
E-mail:abdullaherdogan@akdeniz.edu.tr
ORCID: 0000-0002-5299-441X

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INTRODUCTION

Acute postoperative pain continues as refractory pain after a major surgery such as thoracic surgery. Massage is a manual therapy method with proven efficiency in reducing pain in the postoperative period. Connective tissue massage, which is one of the massage types, can provide relief in the patient due to its effects (1).

Today, the most preferred method for the patients undergoing thoracotomy is seen as multimodal analgesic methods in addition to the traditional analgesic medications and it is considered as the golden standard (2).

Non-pharmacological methods can be classified as physical, cognitive, behavioral, other complementary methods or invasive and non-invasive methods (3).

Massage is an adjuvant therapy that can be safely applied to relieve pain in the acute postoperative period after major operations. Massage reduces anxiety, stabilizes the condition of the patient and improves the coping skill to in the intensive care unit (4,5).

Connective tissue massage was developed by the German physiotherapist Elizabeth Dicke in 1935. Connective tissue massage is a manual therapy technique performed by stretches on connective tissue. The stretches are made on the places where the fascia adheres to the bone or where the fascia is superficial (6). Connective massage is slightly different from classical manipulative treatment approaches in terms of its application technique and physiological effects. It is thought that classical massage acts as presynaptic inhibitions and connective tissue massage as postsynaptic inhibitions on pain. (7,8).

Massage changes the blood flow, causing psychological relaxation and reduction of pain. Tactile information from massage can stimulate large-fast nerve fibers and then block smaller-slow nerve fibers that detect pain. This effect is likely due to local lateral inhibition in the spinal cord, which may explain why touching a painful area is an effective strategy for relieving pain (9).

Connective tissue massage is a type of massage that focuses on stretching the connective tissue layers. There are various theories about connective tissue massage. One theory is that tension applied to connective tissue may stimulate cutaneous-visceral reflexes via the autonomic nervous system and produce healing effects on internal organs that share the same innervation as dermatomes in the skin. At the same time, connective tissue massage reduces pain, increases collateral circulation and mobility, and affects the autonomic nervous system by reducing muscle spasms (6,7).

The aim was to evaluate the effect of connective tissue massage after thoracotomy on patients' pain, the amount of analgesics applied, and their hospital stay.

METHODS

Study design

This study was planned as a randomized controlled prospective study on "The Effects of Connective Tissue Massage Application on Pain After Thoracotomy".

This research was conducted in Akdeniz University Hospital Thoracic Surgery Intensive Care Unit and Thoracic Surgery Service between August 2017 and January 2018. The research was approved by Akdeniz University Clinical Research Ethics Committee (dated 03.05.2017, numbered 70904504/170-6). The written informed consent was signed by every participant. The study was conducted in accordance with the principles ofthe Declaration of Helsinki.

Participant selection

Inclusion Criteria of the Study

• Applying to Thoracic Surgery Department of University Hospital and undergoing thoracotomy via posterolateral thoracotomy incision,

• Being in age range of 20-75 years,

• Being stable in terms of hemodynamics,

• Having no metastatic dissemination,

• Having no cognitive impairment that may inhibit communication,

• Agreeing to participate in the study.

Exclusion Criteria for the Study

• Having cardiovascular diseases,

• Having more than 200 cc bleeding per hour from the drainage tubes,

• Having an intubation period longer than 24 hours.

Randomization

The patients were randomly divided into two groups as the control group and the experimental group by using the Microsoft Excel program. The first group of the study consisted of the patients in the control group and the second group consisted of the connective tissue massage group.

Sample size calculation

The sample of the study was determined by the PS Power and Sample Size Calculations Version 3.0 program. Accordingly, the number of patients targeted to be reached in the sample with the power of 95% and 0.05 Type I error was planned a total of 54 patients including at least 27 controls (11).

Interventions

Standard medical treatment, care and pulmonary rehabilitation program were applied to both groups. In addition, a total of 5 sessions of connective tissue massage were applied to the experimental group as 1 session a day on the postoperative 1st day, 2nd day, 3rd day, 4th day, 5th day. The connective tissue massage was started from the lumbosacral region (baseline) and was applied to the lower thoracic, scapular, inter-scapular and cervico-occipital region according to the vascular response of the connective tissue (12).

Outcome measures

VAS (Visual Analogue Scale) was used as a one-dimensional scale for pain assessment. The scale is 10 centimeters long. A value of 0 at the left end of the scale indicates no pain, and a value of 10 at the right end indicates unbearable pain. The patient is asked to mark a point on a vertical or horizontal line that matches his or her pain level. The distance between the marked point and the far left end of the line is measured in centimeters and the obtained value is recorded. This value shows the patient's pain intensity. 0 indicates no pain, 1-3 indicates mild pain, 4-6 indicates moderate pain, and 7-10 indicates severe pain (13). Sensitivity and selectivity evaluations of VAS were made and it was decided that it could be used (14). On postoperative 0th day, 1st day, 2nd day, 3rd day, 4th day, 5th day, 6th day and 7th day (before the massage in the experimental group) (between 8:00 and 9:00 in the morning); in other words, pain level of the patients (n=54) was evaluated at every 24 hours as of the zeroth postoperative day.

Totally applied analgesic amounts of the patients were recorded on the postoperative 0th day, 1st day, 2nd day, 3rd day, 4th day, 5th day, 6th day, and 7th day. In addition, length of hospitalization of the patients was recorded.

Statistical analysis

The data were analyzed in the SSPS (Statistical Package for Social Sciences) (IBM Electronics, ABD) 21.0 program. Shapiro Wilks Test was used to determine the suitability of the variable for normal distribution in the study and control groups. When $p<0.05$, it was decided that the normal distribution of the data was not appropriate and nonparametric tests were applied.

In order to analyze the difference between the mean values of the numeric data between two groups, Mann Whitney-U Test were used. In the evaluation of the difference between the pre-test and post-test mean values of the data, Wilcoxon T Test were used. The Friedman test was used to examine the changes in the amount of pain and analgesic drugs used by the groups according to the days. Correlation coefficients were calculated in order to determine the relationship between demographic, clinical characteristics demographic characteristics of patients and VAS scores, applied analgesic amounts of the patients.

RESULTS

Baseline characteristic

65 patients who were hospitalized before the surgery were evaluated. 6 patients were not eligible for study and 5 patients did not want to participate in the study. Trial flow is presented in Figure 1. There was no significant difference between the groups in terms of age, gender, BMI, marital status, educational status, smoking, chronic diseases, type of surgery, duration of mechanical ventilation,

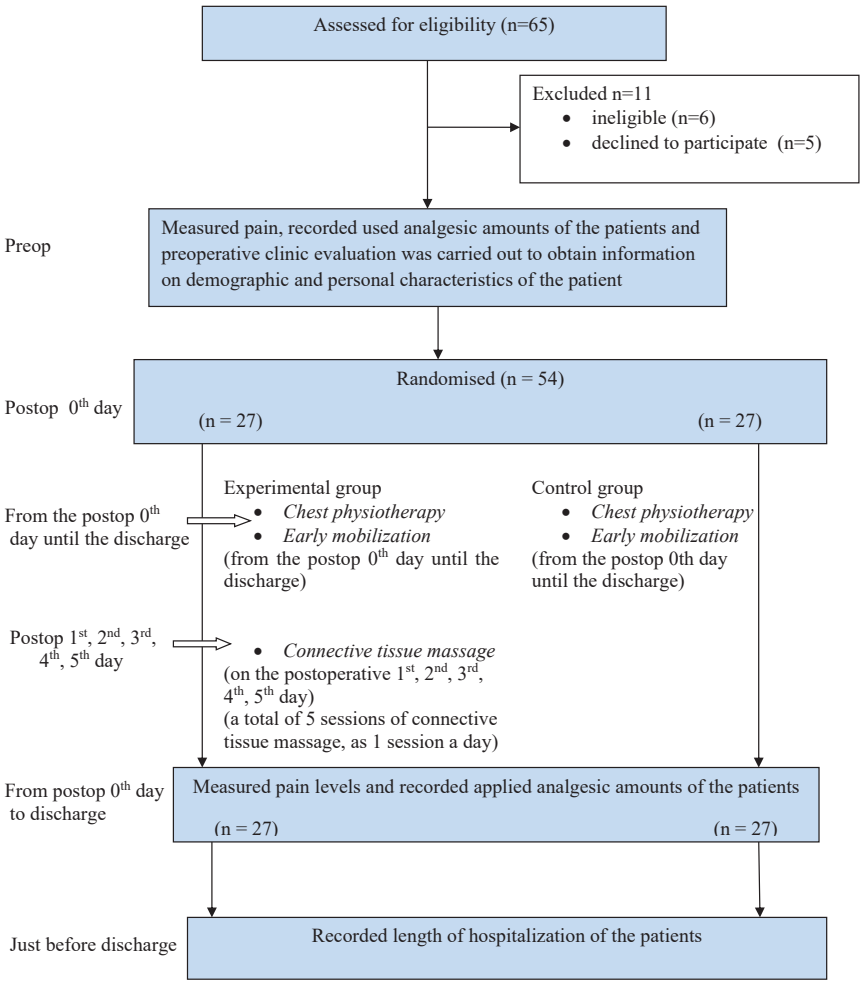

Figure 1. CONSORT Flow Diagram

duration of stay in intensive care unit, preoperative pain level and preoperative applied analgesic amounts of the patients (p>0.05) (Table 1).

Outcome measures

As seen in Figure 2 VAS scores of the patients in the experimental group was statistically lower than the control group on the postoperative 2nd day, 3rd day, 4th day, 5th day, 6th day and 7th day (p<0.001). There was a statistically significant improvement in intra-group change analysis VAS scores in the both group (p<0.001) (Figure 2).

The applied tramadol amounts of the patients in the experimental group was statistically lower than the control group on the postoperative 2nd day, 3rd day, 4th day, 5th day, 6th day and 7th day (p<0.005) (Table 2).

The length of hospitalization of the patients in the experimental group was 8.07 ± 0.27 days and in patients in the control group was 8.74 ± 0.98 days. The length of hospitalization of the patients was significantly higher in the control group (p=0.001) (Table 2).

Pain level of the patients

Patients with longer hospitalization had more pain scores on the 5th and 7th postoperative days (p<0.005) (Table 3).

The applied analgesic amounts of the patients

The applied tramadol and diclofenac amounts of the patients on postoperative 0th day was higher in patients with higher BMI (p<0.005). Patients with more hospitalization in the intensive care unit had higher tramadol use on postoperative 5th and

Table 1. Demographic and Clinical Characteristics of the Patients

	Experimental Group		Control Group		p
	n	%	n	%	
Gender					1.000
Female	7	25.9	7	25.9	
Male	20	74.1	20	74.1	
Marital status					0.704
Married	22	81.5	24	88.9	
Single	5	18.5	3	11.1	
Educational status					0.500
Primary Education	5	18.5	5	18.5	
Secondary Education	17	63	18	66.7	
University	5	18.5	4	14.8	
Smoking					
Not Smoke	16	59.3	18	66.7	0.779
Less Than One Pack a Day	5	18.3	5	18.3	
More than One Pack a Day	6	22.2	4	14.8	
Chronic Diseases					
Hypertension	18	66.7	20	74.1	
Chronic Pulmonary Disease	24	88.9	24	88.9	
Diabetes	22	81.5	21	77.8	
Hyperlipidemia	22	81.5	20	74.1	
Surgery					
Wedge Resection	11	40.7	10	37	
Segmentectomy	2	7.4	2	7.4	
Lobectomy	10	37	10	37	
Bilobectomy	1	3.7	2	7.4	
	Mean ± SD		**Mean ± SD**		
Body Mass Index (kg/m²)	24.44±0.85		24.46±0.80		0.910
Duration of Mechanical Ventilation (minutes)	127.04±22.33		127.22±27.43		0.978
Age (years)	55.37±2.01		55.78±2.25		0.782
VAS Preop	0.04±0.09		0.05±0.09		0.808
Tramadol Preop (mg)	0.00±0.00		0.00±0.00		1.000
Diklofenac Preop (mg)	0.00±0.00		0.00±0.00		1.000
Morfin Preop (mg)	0.00±0.00		0.00±0.00		1.000
Paracetamol Preop (mg)	0.00±0.00		0.00±0.00		1.000

kg: Kilogram, m: Meter, mg: Milligram, n: Number of patients, SD: Standart deviation.

7th days (p<0.001) (Table 4). The applied tramadol amounts of the patients on the postoperative 3rd day decreased in patients with prolonged mechanical ventilation (r=-0.280 p=0.041). In addition, the applied tramadol amounts of the patients on postoperative 5th day and 7th day was higher in patients with longer hospitalization (p<0.005) (Table 4).

DISCUSSION

This is the first randomized controlled trial investigating the effects of connective tissue massage applied after thoracotomy. Our results showed that connective tissue massage had a positive effect on pain, analgesic drug use, and hospital stay. Although analgesics are necessary in the treatment of postoperative pain, they may not always relieve pain sufficiently.

New drugs and methods for postoperative pain control have been developed in the last 20 years. However, some studies have found these new drug treatments inadequate. Additionally, analgesics may have undesirable side effects. Therefore, non-drug treatment methods may be preferred in the treatment of acute pain after surgery. This situation makes complementary treatments and interventions more important and necessary (15).

In connective tissue massage, a short-term and painful stimulus applied from the periphery activates large-diameter A fibers. These higher-level inputs can inhibit pain through presynaptic inhibition. In other words, connective tissue massage can prevent the feeling of pain from reaching the conscious level (16,17). Celenay et al. They stated that connective tissue massage was more effective than placebo massage in reducing pain in patients

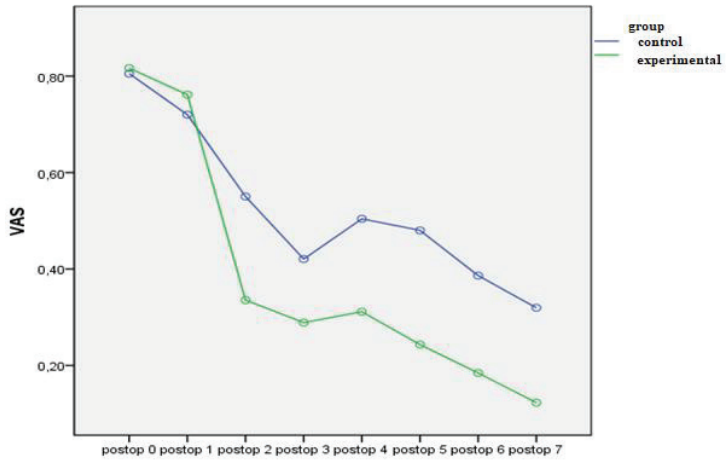

Figure 2. Time-dependent VAS Change During Rest in the Study and Control Groups

Table 2. Applied Analgesic Amounts of the Patients for Both Groups During the Trial

Applied Analgesic Amounts (mg)	Experimental Group	Control Group	Inter-Group Changes	Intra Group Changes	
	Mean ± SD	Mean ± SD	p	Experimental Group p	Control Group p
Tramadol 0	296.30±19.25	296.30±19.25	1.000		
Tramadol 1	288.89±32.03	288.89±32.03	1.000		
Tramadol 2	92.59±67.52	233.33±82.21	**<0.001***		
Tramadol 3	50.26±97.11	100.00±103.77	0.088	**<0.001****	**<0.001****
Tramadol 4	14.81±36.20	59.26±57.24	**0.002***		
Tramadol 5	7.41±26.69	51.85±57.98	**0.001***		
Tramadol 6	3.70±19.25	51.85±50.91	**<0.001***		
Tramadol 7	3.70±19.25	48.15±50.92	**<0.001***		
Diclofenac 0	138.46±3.,81	138.89±40.03	0.692		
Diclofenac 1	86.54±62.54	113.89±56.47	0.072		
Diclofenac 2	28.85±52.29	83.33±56.33	**<0.001***		
Diclofenac 3	20.19±40.01	108.33±52.35	**<0.001***	**<0.001****	**<0.001****
Diclofenac 4	28.85±56.43	108.33±66.87	**<0.001***		
Diclofenac 5	34.62±57.04	111.11±63.67	**<0.001***		
Diclofenac 6	17.31±32.23	105.56±69.80	**<0.001***		
Diclofenac 7	17.31±48.88	77.78±76.38	**0.001***		
Morfin 0	4.44±1.33	4.44±3.20	0.950		
Morfin 1	0.00±0.00	0.37±1.33	0.153		
Morfin 2	0.00±0.00	0.00±0.00	1.000		
Morfin 3	0.00±0.00	0.00±0.00	1.000	**<0.001****	**<0.001****
Morfin 4	0.00±0.00	0.00±0.00	1.000		
Morfin 5	0.00±0.00	0.00±0.00	1.000		
Morfin 6	0.00±0.00	0.00±0.00	1.000		
Morfin 7	0.00±0.00	0.00±0.00	1.000		
Paracetamol 0	0.00±0.00	111.11±211.83	0.010		
Paracetamol 1	18.52±96.23	55.56±160.28	0.303		
Paracetamol 2	0.00±0.00	55.56±160.13	0.077		
Paracetamol 3	18.52±96.23	129.63±223.29	**0.023***	0.744	0.456
Paracetamol 4	18.52±96.23	111.11±211.83	**0.045***		
Paracetamol 5	18.52±96.23	74.07±181.01	0.077		
Paracetamol 6	0.00±0.00	55.56±160.13	0.163		
Paracetamol 7	0.00±0.00	55.56±160.13	0.077		
Length of Hospitalization (days)	8.07±0,27 (8-9)	8.74±0.98 (8-12)	**0.001***		

Abbreviation: mg: Milligram, SD: Standard deviation. *p<0.05, Mann Whitney-U Test: Difference between experimental and control group. **p<0.05, Friedman Test: The Changes in the amount of pain and analgesic drugs used by the groups according to the days.

Table 3. Pain Level of the Patients According to Their Demographic and Clinical Characteristics

		VAS			
		Postop 0	**Postop 3**	**Postop 5**	**Postop 7**
Age *Statistical evaluation*		r:-0.205 p:0.137	r:-0.144 p:0.298	r:-0.146 p:0.684	r:-0.146 p:0.293
Gender					
	Kadın	0.81±0.07	0.35±0.15	0.35±0.11	0.23±0.13
	Erkek	0.81±0.09	0.36±0.11	0.37±0.16	0.22±0.14
Statistical evaluation		p:0.883	p:0.987	p:0.600	p:0.648
Body mass index *Statistical evaluation*		r:-0.180 p:0.194	r:0.078 p:0.574	r:-0.025 p:0.857	r:0.015 p:0.913
Surgery					
	Wedge resection	0.84±0,09	0.36±0,12	0.35±0,14	0.20±0,14
	Segmentectomy	0.81±0,07	0.39±0,13	0.42±0,25	0.28±0.22
	Lobectomy	0.80±0.08	0.35±0.11	0.36±0.15	0.23±0.12
	Bilobectomy	0.77±0.09	0.42±0.27	0.33±0.12	0.12±0.13
	Pneumonectomy	0.79±0,07	0.31±0,11	0.38±0,09	0.27±0,11
Statistical evaluation		p:0.163	p:0.719	p:0.962	p:0.731
Duration of stay in intensive care unit *Statistical evaluation*		r:-0.068 p:0.624	r:0.147 p:0.287	r:0.058 p:0.679	r:0.144 p:0.299
Duration of mechanical ventilation *Statistical evaluation*		r:0.063 p:0.651	r:0.154 p:0.268	r:-0.030 p:0.831	r:-0.108 p:0.436
Length of hospitalization *Statistical evaluation*		r:-0.235 p:0.121	r:0.191 p:0.167	**r:0.399 p:0.003***	**r:0.374 p:0.005***

Abbreviation: postop: Postoperative, VAS: Visual analog scale. * p<0.05; test: pearson correlation coefficient.

Table 4. The Applied Analgesic Amounts of the Patients According to Their Demographic and Clinical Characteristics

	Tramadol				**Diklofenac**			
	Postop 0	**Postop 3**	**Postop 5**	**Postop 7**	**Postop 0**	**Postop 3**	**Postop 5**	**Postop 7**
Age *Statistical evaluation*	r:-0.003 p:0.982	r:-0.061 p:0.659	r:-0.079 p:0.569	r:-0.022 p:0.876	r:0.013 p:0.926	r:-0.106 p:0.446	r:0.128 p:0.355	r:-0.037 p:0.790
Body mass index *Statistical evaluation*	**r:0.302 p:0.026**	r:-0.061 p:0.662	r:-0.014 p:0.918	r:-0.122 p:0.379	**r:0.422 p:0.002***	r:0.103 p:0.458	r:0.194 p:0.160	r:0.160 p:0.248
Duration of stay in intensive care unit *Statistical evaluation*	r:0.174 p:0.208	r:-0.108 p:0.438	**r:0.558 p<0.001***	**r:0.742 p<0.001***	r:-0.083 p:0.552	r:0.026 p:0.849	r:-0.033 p: 0.813	r:-0.108 p:0.435
Duration of mechanical ventilation *Statistical evaluation*	r:0.006 p:0.964	**r:-0.280 p:0.041***	r:-0.217 p:0.115	r:-0.027 p:0.845	r:-0.005 p:0.974	r:-0.145 p:0.295	r:-0.109 p:0.434	r:-0.034 p:0.805
Length of hospitalization *Statistical evaluation*	r:-0.132 p:0.341	r:0.095 p:0.505	**r:0.280 p:0.040***	**r:0.326 p:0.016***	r:-0.230 p:0.094	r:0.063 p:0.650	r:0.020 p:0.883	r:-0.098 p:0.480

Abbreviation: postop: Postoperative. * p<0.05; test: pearson correlation coefficient.

with chronic low back pain (18). After thoracotomy, the pain is quite severe due to the wide distribution of the intercostal nerves and the cutting of more muscle mass (19). Pain control not only reduces the feeling of pain but also reduces the complications and accelerates the healing process. Patients with chronic postoperative pain after traditional thoracotomy received insufficient pain treatment during hospitalization (20,21).

Various techniques providing post-thoracotomy pain management have been described, but there has been still no internationally accepted best strategy. Opioid is easy to use and is the most common method used to provide analgesia. However, this may have some unwanted side effects such as respiratory depression, vomiting, nausea, ileus and urinary retention (22). Epidural analgesia can be an ideal method for thoracotomy pain management. However, it has not been proven to reduce pulmo-

nary function and pulmonary complications (23).

Non-pharmacological applications are included in routine patient care. In 2007, it was observed that 37.4% of the hospitals in the United States of America were using one or more non-pharmacological therapies. Most of these therapies focus on pain and anxiety. Therefore, these therapies aim to help the needs that cannot be met by traditional approaches in the postoperative period. Especially, massage therapy seems a rational choice in the postoperative period. Massage is effective in significantly reducing postoperative pain in patients with major thoracoabdominal surgeries and cholecystectomy, appendectomy (24,25).

Massage has gained widespread popularity for pre-operative anxiety management and pain management in hospitalized patients. However, massage is mostly used for pain relief. Massage relieves anxiety and pain, but the mechanism of action is not yet understood. Many scientists have suggested that massage works to alleviate anxiety by promoting relaxation and working on the subconscious to encourage positive emotions. Similarly, massage can relieve pain by producing a localized effect on the muscles and activating unmyelinated C fibers that block the perception of pain. Despite the popularity of massage for pain management among postoperative patients who have had heart surgery and thoracic surgery, only a few types of massage have been used to treat pain in women who have had breast surgery (26).

One study shows that massage therapy can be successfully integrated into thoracic surgery practices. Based on these findings, massage therapy has been shown to provide both subjective and objective benefits to thoracic surgery patients in terms of improved pain management. In a hospital setting, massage therapy needs to focus on individual patient symptoms, and then therapy is individualized based on these symptoms, medical condition, and position tolerance. There are potential benefits to adding complementary therapies, such as massage and potentially other mind-body therapies, to a pain management program in the hospital setting (27).

Although there is evidence to support the pain-relieving effects of massage in cardiac surgery patients, few studies have been conducted in the intensive care unit where pain intensity is highest. Given the complexity and severity of pain in the ICU, future rigorous randomized controlled trials are needed to evaluate the effect of massage on the pain intensity of critically ill adults. In addition, studies are needed to evaluate the effects of massage such as pain distress and pain interference, which are other dimensions of pain, and the use of opioids during hospitalization. Reducing opioid use may improve patients' recovery by reducing opioid-related side effects (28).

Massage therapy has been studied in many clinical settings and found to be valid. It has been proven that the massage applied to cancer patients has symptomatic benefits. Massage was applied to 605 postoperative patients for 20 minutes per day for 5 days. As a result of the study, the pain intensity, short-term anxiety, opioid use, and hospitalization periods of the patients decreased. However, no effect was observed on long-term anxiety (5).

It has been proven that postoperative massage in the patients undergoing cardiac surgery has provided physical and psychological benefits during their hospitalization periods. Massage therapy significantly reduces pain, anxiety and muscle strain and provides relaxation and satisfaction (29,30,31).

Post-cesarean massage significantly reduces anxiety and pain. Massage is recommended to reduce pain and anxiety due to the simplicity, efficacy, reliability, low cost and lack of side effects of the application (32).

Massage was applied to the patients, who underwent abdominal colorectal surgery, on the postoperative 2nd and 3rd days and pain, tension, and anxiety changes before and after massage were observed. It has been proven that massage has a significant role in the postoperative recovery process of the patients undergoing colorectal surgery. It has been proven that post-mastectomy massage therapy is effective in reducing pain, anxiety, and tension and increasing relaxation (33).

Massage is included in the traditional treatment at various cancer treatment centers because it increases the levels of relaxation, sleep, immune system response quality, and reduces the fatigue, pain,

anxiety, and nausea levels of the patients. Massage is quite effective in reducing the surgery-related pain in patients with cancer. Foot reflexology massage is more effective than aromatherapy or body massage for reducing cancer pain (34,35).

Massage therapy can be a significant additional procedure that relieves pain in the recovery process after thoracic surgery. Despite improved efforts and innovations, most patients experience post-operative pain and discomfort. Massage therapy was applied to 160 patients, who were operated by general thoracic surgical methods including pulmonary resection, esophageal resection, and reconstruction due to benign and malign disease and through various pleural, chest wall, and mediastinal methods and had an average age of 60.7 of these women were female. Their pain levels before and after the massage were compared. It was found that there was a significant decrease in the pain level before and after the massage (36). In the present study, it was found that massage therapy can be performed safely in the hospital setting and can have significant clinical benefits.

In another study, 3-day kinesiologic taping before menstruation was applied to 20 out of 40 women suffering from primary dysmenorrhea; whereas, 20-minute connective tissue massage was applied to 20 women for 3 days before menstruation. At the end of the study, it was found that connective tissue massage and kinesiologic banding reduced the cramps in the lower abdominal region. Because the mechanical distortion induced by the connective tissue massage stretches helps to have the connective tissue mobilized. This leads to release histamine from the mast cells that cause local swelling and arteriolar dilatation. Thus, regional blood flow increases and inflammation decreases. Chemicals causing pain are removed from the tissue. Hence, inflammation and pain decrease (27).

Conclusion

In conclusion, the patients who decreased pain due to the connective tissue massage used less analgesic drugs, the patients in the experimental group experienced less nausea, vomiting, sleepiness and digestive and renal dysfunction problems. Due to all these reasons, the duration of discharge shortened in the patients having less complaints and the length of hospitalization decreased. It was thought that less use of analgesic drugs and decrease in the hospitalization time would decrease the cost rate.

Limitations

In our study, we examined the short-term changes of variables such as pain, quality of life, analgesic drug requirement and hospitalization period after thoracotomy, and the effects of connective tissue massage on these variables. But we did not examine the long-term consequences. In diseases such as cancer and osteoarthritis, massage should be applied for a long time. Osteoarthritis is a chronic condition and is different from the post-surgical period. For this reason, it is not necessary to apply long-term massage after surgery. However, the evaluation of the effectiveness of massage therapy after discharge may be the subject of further studies. Surgical incision often prevents patients from lying down and may require an alternative position. In our study, we applied connective tissue massage while the patients were sitting in a chair. The ideal application dose and duration of massage are not clear. Therefore, their effectiveness can be evaluated at different times and doses. In addition, the effects of connective tissue massage on respiratory functions were not evaluated objectively with spirometric measurements or blood gas results in our study. Future work can focus on this issue.

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