Graston Technique Versus Kinesiotaping on Myofascial Pain Syndrome After Neck Dissection Surgery: A randomized control trail

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Abstract

Aim: Graston Technique (IASTM) and Kinesiotaping (KT) will be compared for their efficacy in controlling myofascial pain syndrome (MPS) after neck dissection surgery (NDS). **Materials and Methods:** A total of 52 patients (both genders) aged 30–50 years diagnosed with cervical (MPS) post (NDS) and randomly assigned into two equal groups. Group A received Graston Technique (IASTM) plus a traditional physical therapy program, three times per week for four weeks. Group B received Kinesiotaping (KT) twice weekly for eight sessions over four weeks, in addition to the same traditional physical therapy program performed three times weekly. Pre- and post-four-week intervention the Pressure Pain Threshold (PPT), Visual Analogue Scale (VAS), and cervical range of motion (lateral flexion and rotation) were used for assessment. **Results:** The results revealed a significant reduction in VAS scores and a significant increase in PPT and cervical range of motion (bending and rotation) towards and away from the operated side in Group A compared to Group B ($p < 0.05$). **Conclusion**: IASTM yield more improvement in range of motion and neck discomfort on patients with myofascial pain syndrome (MPS) following neck dissection surgery.

Keywords: Graston Technique, Kinesiotaping, Myofascial Pain Syndrome, Neck Dissection Surgery

Introduction

Neck dissection (ND) is a surgical procedure primarily performed to manage cervical lymphatic metastases in patients with head and neck cancer [1] . Radical Neck Dissection (RND) is the most extensive form of the procedure, requiring the removal of all lymph nodes on one side of the neck, along with the sternocleidomastoid muscle (SCM), internal jugular vein (IJV), and spinal accessory nerve [2] . In contrast, Modified Radical Neck Dissection (MRND) preserves one or more non-lymphatic structures, such as the SCM, IJV, or spinal accessory nerve, while still removing all lymph nodes typically excised in RND [3].

Persistent neck morbidity, including impaired sensation, restricted ROM, and chronic neck pain, remains a common issue after ND . Studies have reported that 46% of patients experience myofascial pain, 32% neuropathic pain, while 37% and 33% of participants reported ongoing shoulder and neck complaints, respectively [4].

Myofascial Pain Syndrome (MPS) is a prevalent condition among ND patients as localized or referred pain patterns, and clinical examination frequently reveals trigger points (TrPs) [5]. Non-invasive strategies for treatment MPS are medical therapy, electrotherapy, cold spray/stretching, and ischemic compression, while invasive methods encompass local anesthetic injections, dry needling (DN), and acupuncture [6]. Additionally, therapeutic modalities such as traction, mobilization, manipulation, electrotherapy, and patient education are commonly employed in MPS management[7].

Instrument-Assisted Soft Tissue Mobilization (IASTM) has gained popularity as an effective treatment modality for myofascial restrictions. Rooted in the principles introduced by James Cyriax, IASTM utilizes specially designed stainless steel tools instead of traditional finger massage. These tools generate controlled micro-trauma in soft tissues, aiming to reduce pain, release myofascial adhesions, and improve range of motion (ROM) and overall functional performance [8].

Kinesio Taping (KT) is another widely used intervention, developed by Kenzo Kase, a Japanese chiropractor. This elastic tape, when applied with a 15% stretch, creates a lifting effect on the skin, which is believed to improve circulation, reduce inflammation, and support muscular

function [9]. KT has gained prominence for treating musculoskeletal injuries, postoperative complications, and athletic strain [10]. It is a non-invasive approach that activates inactive myofascial trigger points (MTrPs) and promotes the body's natural healing mechanisms [11].

Several studies have investigated the effectiveness of IASTM and KT myofascial pain and discomfort in many disorders but they effect on cases of oncology post-surgery as HNCS has not been investigated yet, we aimed to explore these impacts on pain relief, discomfort and cervical range of motion post-HNCS.

Subjects, and Methods

Design

A randomized control trail conducted between February 2024 and August 2024 the at level up physical therapy outpatient clinic, patients enrolled from Cairo University Hospitals, The study was authorized by the Physical Therapy Faculty Ethical Committee, Cairo University [No. P.T.REC/012/003499] and Clinical Trials Registry [ID: NCT06598826]. The study followed the Helsinki Declaration, and the participants were instructed about the study characteristics, aims, and benefits before participation, and they signed informed consent.

Participants

Fifty-two convenience nonprobability sample of both genders with age ranged from 30 and 50 years diagnosed with cervical myofascial pain syndrome (MPS) in the upper trapezius muscle (UTM), 3 to 5 months post-unilateral Modified Radical Neck Dissection (MRND. recruited from the National Cancer Institute, Cairo University. The inclusion criteria for participation included individuals aged 30 to 50 years, both genders, and those with moderate to severe pain (VAS score >4) diagnosed with MPS in the upper trapezius muscle following unilateral MRND surgery. Participants also had a history of MPS lasting between 3 to 5 months, and all had provided informed consent before inclusion in the study[12] . The exclusion criteria eliminated participants with open wounds in the treatment area, cervical disc lesions, myelopathy, or radiculopathy, cervical spine fractures or spondylolisthesis, rheumatoid arthritis, epilepsy, psychological disorders, coagulation disorders, hemophilia, hypertension, or those with contraindications to IASTM or Kinesio Taping [13].

Sampling and Randomization

Employing G*POWER statistical software (version 3.1.9.4 Franz Faul, Universität Kiel, Germany), we calculated the sample size from a previous study of Mahgoub et al. [14] to prevent type II errors. The sample size was 52 patients, the power was 85%, and the effect size was 0.4. The patients were equally assigned to two groups (n = 26/group) with a two-sided 5% significant level.

The demographic data was recorded after the participants signed the consent form. Subsequently, 52 participants were equally assigned to two groups: A and B. An unbiased and independent research assistant performed the assignment randomly by uncovering sealed envelopes containing computer-generated randomization cards. The participants were unaware of their group allocation, Figure 1

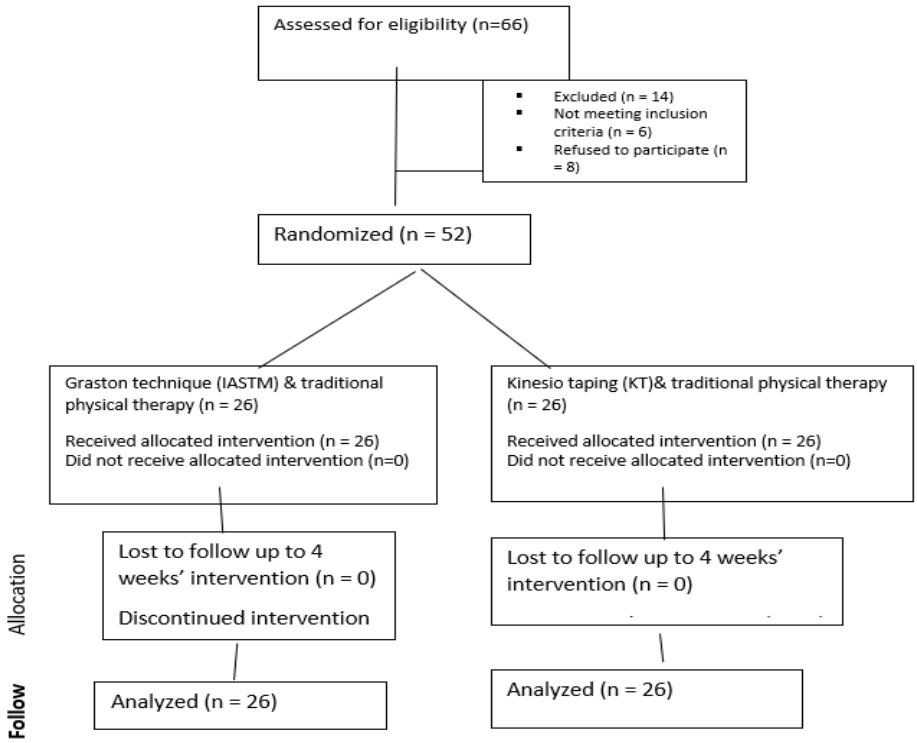

Figure 1. flow chart of the patients

Interventions

Participants with myofascial pain syndrome in group A received the Graston technique (IASTM), and in group B received kinesio taping (KT), both group underwent a traditional physical therapy program

Procedures

A- Graston Technique (IASTM)

Participants in Group A received the Graston Technique (IASTM) in combination with traditional physical therapy exercises. During the sessions, patients were seated comfortably, and the restricted treatment area was identified, cleaned, and lubricated. The IASTM tool was applied at a 30–60° angle with light, controlled strokes lasting 40–120 seconds per lesion. Post-treatment care included the application of ice packs to manage hyperemia if observed [15].

B- Kinesio Tape (KT)

Participants in Group B received Kinesio Taping (KT) in combination with traditional physical therapy exercises. Before tape application, the target area was cleaned, and any obstructive hair was removed. Kinesiotape was applied from the acromion process to the occiput with a 15–25% stretch, following appropriate taping techniques to ensure secure adhesion and prevent peeling. Participants were positioned to maximize the tape's effectiveness by flexing and rotating their neck appropriately during the application process [16]

Traditional physical therapy program

Both groups underwent a traditional physical therapy program performed three times per week for one month. This included Range of Motion (ROM) exercises, where participants performed guided neck lateral flexion and rotation movements. Stretching exercises targeted the upper trapezius muscle using low-load, long-duration stretching techniques, and post-isometric relaxation (PIR) methods, where mild isometric resistance was applied before static stretching. Strengthening exercises were incorporated using manual resistance applied during lateral flexion and neck rotation movements to enhance muscle strength and stability [17].

Outcome measures

Every patient underwent an evaluation both before and after the four-week intervention:

Visual Analogue Scale (VAS)

Pain intensity was assessed using the Visual Analogue Scale (VAS), a validated and reliable tool consisting of a 100 mm horizontal or vertical line labeled with endpoints denoting "no pain" and "worst imaginable pain." Participants marked their perceived pain level along the scale, and the distance from the starting point was measured to quantify pain severity [18]

Pressure Pain Threshold (PPT)

Pressure Pain Threshold (PPT) was measured using a pressure algometer (BASELINE PUSH PULL/FORCE GAUGE). Trigger points (TrPs) in the trapezius muscle were identified through palpation and marked before assessment and During evaluation, the algometer was applied perpendicularly to the identified point with gradually increasing pressure. Participants were instructed to indicate when the pressure became intolerable, and the average value of three consecutive readings was recorded [19].

Cervical range of movement (*ROM*)

Cervical Range of Motion (ROM) was measured using a universal goniometer to assess lateral flexion and cervical rotation. Participants were seated upright with their arms resting and backs straight to minimize compensatory movements. For lateral flexion, the goniometer’s fulcrum was placed over the C7 spinous process, with one arm aligned along the thoracic vertebrae and the other along the dorsal midline of the head. For neck rotation, the fulcrum was positioned at the cranial center, with one arm aligned between the acromial processes and the other following the participant’s nose tip. The final positions for both lateral flexion and rotation were measured in degrees [20].

Statistical Analysis

The scores were statistically evaluated employing SPSS for Windows, version 22 (SPSS Inc., Chicago, IL, USA). Using the Shapiro-Wilk test, we were able to determine that the data followed a normal distribution ($p > 0.05$). For this reason, we used the paired t-test for data within each group and the unpaired t-test for data between groups. We calculated the means and standard deviations.

The analysis of the study results focused on subject characteristics, intra-group comparisons, and inter-group comparisons, specifically evaluating pain intensity (VAS), pressure pain threshold (PPT), and cervical range of motion (ROM).

Results

Participants Characteristics:

Table (1) presents the baseline characteristics of participants in Group A (Graston Technique) and Group B (Kinesio Taping). There were no statistically significant differences between the two groups in terms of age, sex, or the side of neck dissection (ND) ($p > 0.05$), indicating homogeneity between groups at baseline.

Table I: Comparison of subject characteristics between group A and B:

	Group A	Group B		
	Mean ± SD	Mean ± SD	t- value	p-value
Age (years)	39.69 ± 6.10	38.04 ± 4.81	1.09	0.28
Weight (kg)	80.69 ± 4.63	80.08 ± 3.91	0.52	0.61
Height (cm)	171.38 ± 3.15	171.35 ± 3.41	0.04	0.97
BMI (kg/m²)	27.49 ± 1.74	27.29 ± 1.52	0.43	0.66
Sex, N (%)				
Females	16 (61.5%)	18 (69%)	(χ^2 = 0.34)	0.56
Males	10 (38.5%)	8 (31%)		
Side of ND, N (%)				
Right	14 (54%)	12 (46%)	(χ^2 = 0.31)	0.57
Left	12 (46%)	14 (54%)		

SD, Standard deviations; χ^2, Chi squared value; p value, Probability value

Effect of Treatment on VAS, PPT, and Neck ROM:

Within-Group Comparison:

Both Group A and Group B showed statistically significant improvements in pain intensity (VAS) and pressure pain threshold (PPT) following the intervention ($p < 0.001$). In Group A, the percentage of change for VAS and PPT was 54.17% and 102.39%, respectively. In Group B, the percentage of change for VAS and PPT was 43.02% and 53.85%, respectively (Table 2).

Regarding cervical range of motion (ROM), significant improvements were observed in lateral bending and rotation towards and away from the operated side in both groups ($p < 0.001$). In Group A, the percentage of change for bending toward the operated side, bending away from the operated side, rotation toward the operated side, and rotation away from the operated side was 36.97%, 39.57%, 19.17%, and 23.61%, respectively. In Group B, the corresponding percentage changes were 24.46%, 28.04%, 11.74%, and 11.80%, respectively (Table 3).

Between-Group Comparison:

No significant differences were observed between Group A and Group B before treatment ($p > 0.05$), confirming comparable baseline values. However, post-treatment comparisons revealed statistically significant improvements in Group A compared to Group B in both VAS and PPT scores ($p < 0.01$) (Table 2).

Table II: Mean VAS and PPT pre and post treatment of group A and B:

	Group A	Group B			
	Mean ± SD	**Mean ± SD**	**MD**	**t- value**	**p value**
VAS					
Pre treatment	6.96 ± 0.96	6.88 ± 0.95	0.08	0.29	0.77
Post treatment	3.19 ± 0.90	3.92 ± 0.98	-0.73	-2.81	0.007
MD	3.77	2.96			
% of change	54.17	43.02			
t- value	20.21	16.49			
	p = 0.001	***p = 0.001***			
PPT (kg)					
Pre treatment	2.09 ± 0.40	2.21 ± 0.35	-0.12	-1.19	0.23
Post treatment	4.23 ± 0.63	3.40 ± 0.51	0.83	5.23	0.001
MD	-2.14	-1.19			
% of change	102.39	53.85			
t- value	-21.62	-12			
	p = 0.001	***p = 0.001***			

SD, Standard deviations; χ2, Chi squared value; p value, Probability value

In terms of cervical ROM, Group A demonstrated significantly greater improvements in bending and rotation towards and away from the operated side compared to Group B ($p < 0.01$) (Table 3).

Table III: Mean neck ROM pre and post treatment of group A and B:

ROM (degrees)	Group A	Group B			
	Mean ± SD	Mean ± SD	MD	t- value	p value
Bending toward side of operation					
Pre treatment	29.46 ± 7.91	29.88 ± 7.23	-0.42	-0.20	0.84
Post treatment	40.35 ± 3.01	37.19 ± 2.37	3.16	4.20	0.001
MD	-10.89	-7.31			
% of change	36.97	24.46			
t- value	-8.99	-6.52			
	p = 0.001	***p = 0.001***			
Bending away from side of operation					
Pre treatment	29.54 ± 9.43	29.92 ± 9.42	-0.38	-0.15	0.88
Post treatment	41.23 ± 2.47	38.31 ± 2.96	2.92	3.93	0.001
MD	-11.69	-8.39			
% of change	39.57	28.04			
t- value	-7.80	-6.11			
	p = 0.001	***p = 0.001***			
Rotation toward side of operation					
Pre treatment	67.62 ± 14.11	66.50 ± 14.31	1.12	0.28	0.77
Post treatment	80.58 ± 7.48	74.31 ± 9.88	6.27	2.58	0.01
MD	-12.96	-7.81			
% of change	19.17	11.74			
t- value	-7.74	-7.69			
	p = 0.001	***p = 0.001***			
Rotation away from side of operation					
Pre treatment	66.62 ± 18.13	67.19 ± 16.82	-0.57	-0.12	0.91
Post treatment	82.35 ± 9.95	75.12 ± 10.54	7.23	2.54	0.01
MD	-15.73	-7.93			
% of change	23.61	11.80			
t- value	-7.26	-5.60			
	p = 0.001	***p = 0.001***			

SD, Standard deviations; χ^2, Chi squared value; p value, Probability value

Discussion

The results of the current study revealed statistically significant improvements in both groups for VAS, PPT, and cervical ROM post-treatment. In Group A (Graston Technique), the percentage of improvement in VAS was 54.17%, while PPT increased by 102.39%. For Group B (Kinesio Taping), the improvements were 43.02% for VAS and 53.85% for PPT.

The Graston Technique (IASTM) is an effective approach for managing myofascial pain syndrome (MPS), primarily due to its positive effects on muscle tissues and surrounding fascia [21]. The controlled micro-trauma induced during soft tissue mobilization is believed to stimulate fibroblast proliferation, enhancing the tissue repair process [22]. On the other hand, Kinesio Taping (KT) is widely recognized for treating musculoskeletal and neuromuscular disorders, offering benefits such as muscle support, improved blood circulation, pain reduction, joint alignment correction, and enhanced proprioception through mechanoreceptor stimulation [23].

Research by Elagamawy et al. compared Muscle Energy Technique (MET) and IASTM for managing upper trapezius myofascial trigger points (TrPs). The study demonstrated that both methods effectively reduced pain intensity, increased PPT, and improved ROM, with significant reductions in neck disability levels [24]. Similarly, Agarwal et al. compared IASTM with manual myofascial release (MFR), concluding that while both approaches significantly reduced pain and improved functional outcomes, IASTM demonstrated superior pain relief outcomes [25].

Similarly, significant improvements in neck bending and rotation ROM were noted in both groups, with Group A showing superior percentage changes in all ROM parameters. Post-treatment comparisons between the two groups revealed that Group A (IASTM) achieved significantly better results in reducing pain and improving PPT and cervical ROM compared to Group B (KT).

Physiologically, IASTM enhances soft tissue extensibility by addressing tissue restrictions and generating localized heat through friction, which reduces tissue viscosity and improves range of motion (ROM [26]. Similarly, Kinesio Taping (KT) alleviates myofascial trigger points by

increasing the space between inflamed fascial layers. This mechanism enhances blood circulation, which helps eliminate inflammatory byproducts, and reduces nociceptive pressure, contributing to pain relief [27].

A study by Erden et al. also supports the efficacy of IASTM in managing MPS, where eight treatment sessions combined with conventional physiotherapy led to improvements in pain severity, functional status, emotional well-being, and range of motion (ROM) [28]. Further supporting evidence comes from Elsayed et al. who compared IASTM and extracorporeal shock wave therapy (ESWT) in treating upper trapezius myofascial pain syndrome, demonstrating the effectiveness of both methods in improving pain scores and PPT [29].

In the context of Kinesio Taping (KT), Mahmoud et al. explored the effects of KT combined with traditional physical therapy in managing MPS post-neck dissection surgery. Their results highlighted significant improvements in pain intensity, ROM, and functional outcomes, with no adverse effects reported [30]. Additionally, Dheerajha et al. performed a systematic review demonstrating that KT is effective in managing pain and improving quality of life in MPS patients, emphasizing its painless application and quick execution as notable advantages [31].

The comparative effectiveness of KT and dry needling (DN) was analyzed by Ibrahim et al. revealing significant improvements in VAS, PPT, and cervical ROM with both interventions. However, no statistically significant differences were observed between the two groups [32]. Similarly, Yasar et al. found KT and DN to be equally effective in reducing pain and improving functional outcomes. They highlighted KT's non-invasive nature as a key advantage for patients hesitant about needle-based therapies [33].

Lastly, Yilmaz et al. demonstrated that KT combined with posture and stretching exercises effectively reduced pain, improved quality of life, and enhanced physical function in MPS patients. These effects were sustained for over two months, further supporting the long-term efficacy of KT [33]. The primary objective of this study was to compare the effectiveness of Graston Technique (IASTM) and Kinesio Taping (KT) in treating myofascial pain syndrome (MPS) following neck dissection surgery. The findings align with previous research, demonstrating significant improvements in pain intensity, pressure pain threshold (PPT), and cervical range of motion (ROM) with both interventions.

Conclusion

The findings of this study demonstrated significant improvements in pain intensity (VAS), pressure pain threshold (PPT), and cervical range of motion (ROM) in patients with myofascial pain syndrome (MPS) following neck dissection surgery using both Graston Technique (IASTM) and Kinesio Taping (KT). However, the Graston Technique (IASTM) proved to be more effective in enhancing these parameters. These results suggest that IASTM should be considered a primary intervention for managing MPS in post-neck dissection patients, with Kinesio Taping serving as a viable alternative where applicable. Future studies should aim to standardize treatment protocols and explore long-term outcomes for both therapeutic techniques.

Authors' contributions:

Authors' contributions	AMS	WOAA	SMM	ASMS
Research concept and design	√		√	√
Collection and/or assembly of data	√	√	√	
Data analysis and interpretation	√	√		√
Writing the article	√		√	√
Critical revision of the article	√			√
Final approval of article	√	√	√	√
Statistical analysis	√	√		√
obtaining funds.	√			

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Conflict of interest

No conflicts of interest.

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