Early Effects of Kinesio Taping on Clinical Outcomes in Patients With Arthroscopic Rotator Cuff Repair: A Double-Blind, Randomized Controlled Trial

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Background: Kinesio tape (KT) is being applied increasingly in physical therapy and rehabilitation. This trial aimed to examine the effect of KT in terms of functional outcomes in people undergoing arthroscopic rotator cuff repair (ARCR).

Hypothesis: KT after ARCR will reduce pain and edema.

Study Design: A double-blind, randomized controlled trial.

Level of Evidence: Level 1b.

Methods: A total of 45 patients who underwent ARCR were assigned randomly to 1 of 3 groups: KT (n=15), sham taping (ST, n=15), and control (n=15). Participants received a conservative physiotherapy program. The physiotherapy program, which was conservative in nature, covered the first 7 weeks after surgery. In addition to the program, patients in the KT group were also treated with KT, while those in the ST group received ST. Pain levels (visual analog scale), edema, and functional scores (Western-Ontario Rotator Cuff Index, Modified Constant-Murley Shoulder Score, Revised Oxford Shoulder Score, and Shoulder Pain and Disability Index) were evaluated at regular intervals throughout the treatment.

Results: Baseline characteristics of the groups were similar ($P>0.05$). All evaluation parameters showed significant improvement over time in all 3 groups ($P<0.05$). There were no differences between the groups in any of the parameters when analyzed for group×time interactions ($P>0.05$).

Conclusion: This study found no efficacy of KT after ARCR in reducing pain and edema and improving shoulder function in the short- or medium-term.

Clinical Relevance: Clinicians should not expect additional short- or medium-term benefits from KT in reducing pain and edema or improving shoulder function after ARCR.

Keywords: kinesio tape; pain; rotator cuff; shoulder arthroscopy

Rotator cuff tears (RCT) are the most common cause of shoulder injury. RCT cause significant pain and dysfunction. The statistics demonstrate the prevalence and impact of shoulder injuries on people of all ages.[1,2]

Treatment options for people with RCTs vary depending on the severity of the tear. While conservative treatment is typically the first approach, surgery may be necessary if conservative methods fail.[19,27] Surgeons now prefer the standard arthroscopic

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approach for shoulder surgery due to significant advancements in operative techniques and instrumentation.[23,27] Studies show that the rate of arthroscopic repair is increased significantly in RCTs.[3] The process continues with postoperative rehabilitation after surgery.

A comprehensive rehabilitation program is crucial after surgery to optimize the success of the surgical intervention, ensure a return to functional activities, and improve patient quality of life.[7]

The primary goal of postoperative rehabilitation after arthroscopic rotator cuff repair (ARCR) is to promote healing of the repaired rotator cuff tendon and to restore function of the shoulder while minimizing shoulder stiffness and muscle atrophy.[30] Postoperative pain, edema, and stiffness are common complications during the rehabilitation period. The management of these complications is a critical role for the rehabilitation specialist.[30] Pain is managed with various noninvasive and invasive methods such as nonsteroidal anti-inflammatory drugs, paracetamol, oral analgesics, suprascapular or scalene block, and intra-articular catheter.[15] However, physiotherapy applications for pain and edema are limited in the early stages.[26]

Diversification of effective physiotherapy methods to prevent pain and edema in the early postoperative period will increase the success of rehabilitation.

Kinesio tape (KT) is an elastic, waterproof, and breathable tape. Kenzo Kase invented this tape in the 1970s. It can be stretched to 120% to 140% of its original length and can return to its original shape. KT is a cost effective and practical clinical modality that utilizes a specialized elastic band material designed specifically for this technique.[31] This elastic tape applies a tensile force to the skin when adhered to it.[16] KT is thought to provide mechanical correction, increase fluid perfusion, and improve blood and lymph circulation by increasing the interstitial space between the skin and subcutaneous connective tissues. It aims to achieve various therapeutic effects, such as increasing proprioception and activating the analgesic system by stimulating cutaneous mechanoreceptors with KT.[31] In addition, the KT technique is reported to relieve pain by increasing afferent feedback through stimulation of sensory pathways in the nervous system and by reducing input from nerve fibers that transmit pain according to the gate control theory.[20,25,29,31] In addition, KT is said to lift the skin, reducing pressure directly on subcutaneous nociceptors.[31]

Based on the available evidence, it is difficult to make a clinical decision about the effectiveness of KT in postoperative treatment, especially in the early stages of rehabilitation. There is limited research on the use of KT in this patient population. The study aimed to examine the effect of KT on functional outcomes in patients undergoing ARCR. The primary outcomes were a comparison of pain and edema levels between groups, while the secondary outcomes included a comparison of functional scores. Our study is the third study to examine the effectiveness of KT after ARCR. It is the first study to examine early effects.

METHODS

Study Design

This prospective, randomized, controlled clinical trial was registered with the Clinical Trials Registry (NCT06010264). The study was approved as ethically appropriate by the local ethics committee (2022-14/123). CONSORT guidelines were followed.

Participants

The study population consisted of 45 patients who underwent minor and moderate rotator cuff repair at Kırşehir Ahi Evran University Orthopedics and Traumatology Outpatient Clinic. The study was conducted in the Orthopaedics and Traumatology Outpatient Clinic between July 6, 2022 and December 29, 2022.

Inclusion criteria[13]:

- Age between 18 and 65 years,
- ARCR as a surgical method,
- Diagnosis of a small or medium-sized (<3 cm) RCT by magnetic resonance imaging,
- Score >24 on the Mini Mental State Examination,
- Volunteering to participate in the study.

Exclusion criteria[13]:

- Presence of diabetes mellitus,
- Stage ≥3 according to the Goutallier fatty degeneration classification,
- Presence of a neurological problem,
- Presence of cervical disc herniation,
- Past history of orthopaedic disease on the affected side,
- Presence of osteoarthritis, rheumatoid arthritis, or other systemic inflammatory problem,
- Corticosteroid injection for the affected side within 6 weeks before diagnosis.

Randomization and Blinding

The study randomly assigned each eligible patient to 1 of 3 groups: the KT group (n=15), which received KT in addition to conservative treatment; the sham taping (ST) group (n=15), which received sham tape in addition to conservative treatment; and the control group (n=15), which received conservative treatment only, according to a block randomization method. Therapists performing outcome measures and rehabilitation were unaware of the allocation groups. Before the assessment, the tapes of the patients were removed by the therapist who had applied the tapes. The tapes were renewed after assessment. In this way, the therapist was blinded.

Interventions

Surgical Procedure

All patients were operated on by the same senior surgeon and surgical team in a modified beach chair position. The technique used for rotator cuff repair was a modified suture bridge

Table 1. Conservative treatment program

1-10 days	• Patient education • Pendulum exercises • Active hand and wrist exercises • Cold application
1-6 weeks	• Pendulum exercises are continued • Active hand and wrist exercises are continued • Cold application is continued • Passive arm elevation with opposite hand support in supine position • Elbow flexion/extension exercise at the limit of pain

technique. The procedure was completed with acromioplasty and biceps tenotomy after rotator cuff repair.

Conservative Treatment

The treatment program (Table 1) adhered to the guidelines published by the American Shoulder and Elbow Therapists Association.[30] It involved early physiotherapy applications and was monitored closely by a specialist physiotherapist and a physician specialized in arthroscopic surgery. Patients were prescribed only Parol 500 mg tablets after surgery. Patients were advised to use the medication only as necessary and to avoid taking any additional medication. Early patient education is a fundamental aspect of conservative treatment. The significance of the early recovery period was explained to the patient, as the repaired tissue is susceptible to rerupture. During this time, patients were encouraged strongly to follow the prescribed program diligently. Patients were instructed on the proper use of the shoulder sling (velpeau bandage), including how to put it on and take it off, how to position the bands, and how to clean it. After surgery, patients were immobilized with the shoulder sling for 6 weeks.

KT Application

Patients in the KT group received KT from the first postoperative day in addition to conservative treatment. KT application was performed by a single researcher certified by the Kinesio Taping Association International, after completion of a 2-day accredited training program that includes theoretical instruction and supervised practical sessions.

The technique applied in this study was the circulatory lymphatic correction method, as described by Kenzo Kase. In this method, the tape is stretched between 10% and 20% and applied over the edema area from proximal to distal to facilitate lymphatic drainage. Two fan-cut KT strips were applied to each patient, covering the entire shoulder region from the anterior and posterior aspects. Patients and their caregivers were instructed to remove the tapes within 5 days after application. After removal, reapplication was performed within 2 days. In this routine, new tapes were applied no later than 1 week after the initial application. Before each taping session, patients and their caregivers were informed thoroughly about how to clean the application area and properly remove the tape.

During the first 8 postoperative days—when wound healing is critical—the KT was applied carefully from the wound edges over the sterile dressing. In the subsequent period, when dressings were no longer required, the application continued, with particular attention to the portal wound sites. The KT used in the intervention group was blue. Applications for the 2 groups were performed at different times, and patients in different groups did not see each other. This prevented direct comparison or discussion of treatments between participants (Figure 1).

Sham Tape Application

In the ST group, white medical plasters were applied as sham tape from the first postoperative day in addition to conservative treatment. The sham tapes were cut in the same fan shape as the KT, with 2 fan-cut sham tapes applied starting from the front and back of the shoulder. For the first 8 days, the sham tape was applied from the wound edges before dressing, and this was continued in the following period. While applying the sham taping, care was taken to mimic the same handling and application procedure as with KT, but without therapeutic stretch. Applications for the ST and KT groups were conducted at different times, and participants did not see each other, preventing any exchange of information about their treatments (Figure 2).

Outcome Measures

The study meticulously recorded the demographic characteristics of the participants. The primary outcomes of the study were pain and edema, while the secondary outcomes were functional scores.

Pain intensity was assessed using the visual analog scale (VAS), and the level of edema was determined by measuring the shoulder diameter, as described by Gülenç et al.[15] The shoulder diameter was measured using 2 reference points: the posterosuperior end of the acromion and the coracoid process.[15] The distance between 2 points on the upper border of the deltoid muscle was measured using a tape measure. Two measurements were taken, with the second being recorded 1 cm lateral to the first, over the middle deltoid.[15]

To evaluate the functional status of the patients, several assessment tools were employed, including the Western-Ontario Rotator Cuff Index (WORC), Modified Constant-Murley Shoulder Score (MCOS), Revised Oxford Shoulder Score (ROSS), and Shoulder Pain and Disability Index (SPADI). Assessments were conducted at regular intervals from the day before the operation until the seventh week postoperation. Functional evaluations were carried out on the first day before the operation, at the

Figure 1. KT application from different angles. KT, Kinesio tape.

Figure 2. Sham tape application from different angles.

end of the sixth week postoperation, and at the end of the seventh week postoperation, taking into account the immobilization process applied during the first 6 weeks after surgery.

Sample Size

The sample size of the study was calculated using G*Power Software (Version 3.1.3.2) based on a similar study in the

Table 2. Participant characteristics

Demographics	KT group (n = 15)	Control group (n = 15)	ST group (n = 15)	*P*
Female/male, %	53.3/46.7	60.0/40	46.7/53.3	0.76
Age, years	54.5 ± 7.9	57.1 ± 6.6	57.2 ± 5.7	0.48
BMI, kg/m^2	28.3 ± 4.3	31.6 ± 5.6	31.8 ± 5.0	0.11
Shoulder diameter, cm	30.7 ± 3.9	33.2 ± 2.6	33.8 ± 3.5	0.03*
Pain, VAS				
Rest	3.8 ± 2.8	3.4 ± 2.8	3.4 ± 2.5	0.88
Activity	7.4 ± 2.9	7.4 ± 1.7	8.0 ± 1.1	0.72
Night	8.1 ± 2.2	7.2 ± 3.6	7.5 ± 2.7	0.67
Hawkins-Kennedy	9.3 ± 0.9	8.5 ± 2.7	8.6 ± 2.7	0.57
Functional scores				
MCOS	23.8 ± 19.1	26.1 ± 16.2	24.9 ± 14.5	0.93
WORC	1382.0 ± 412.5	1336.0 ± 267.9	1320.8 ± 301.9	0.87
SPADI	100.1 ± 19.1	103.1 ± 16.5	104.1 ± 16.0	0.80
ROSS	29.3 ± 10.1	31.6 ± 7.1	30.8 ± 6.6	0.72

Values are mean ± SD. BMI, body mass index; KT, Kinesio tape; MCOS, modified constant-Murley shoulder score; ROSS; revised Oxford shoulder score; SPADI; shoulder pain and disability index; ST, sham taping; WORC, Western-Ontario rotator cuff index; VAS, visual analog score; Hawkins-Kennedy,Pain intensity during the Hawkins-Kennedy test.
*$P < 0.05$.

literature.[15] The effect size ($d = 1.15$) from the similar study was used to determine the necessary sample size of 39 participants with a 5% margin of error and 80% power.[15] The study's potential dropout rate was calculated confidently at 15% of the total number of participants, which was determined to be 45, with 15 per group.

Statistical Analysis

Statistical analysis was conducted using the Statistical Package for Social Sciences Version 21.0 computer software. Normality assumption was tested by interpreting skewness and kurtosis values.[11] Since the data were found to be distributed normally, parametric tests were used to analyze the variables. Continuous variables were expressed using means and standard deviations, while categorical variables were expressed using percentage and number of persons.

The baseline characteristics of each group were compared using a 1-way analysis of variance (ANOVA) test. A mixed model repeated measures ANOVA test was used to compare the results of the study, with the main factors being group (KT, ST, and control) and time (pre-operative day 1, postoperative day 2, postoperative day 9, postoperative day 16, postoperative day 30, postoperative week 6, postoperative week 7). A statistical analysis was conducted using the "intention to treat" method on 5 probabilities for missing data. Statistical significance was determined at $P < 0.05$.

RESULTS

Between July and December 2022, the study enrolled 45 participants, who were distributed equally into 3 groups: KT (age, 54.5 ± 7.9 years; body mass index (BMI], 28.3 ± 4.3 kg/m^2), ST (age, 57.1 ± 6.6 years; BMI, 31.6 ± 5.6 kg/m^2), and Control (age, 57.2 ± 5.7 years; BMI, 31.8 ± 5.0 kg/m^2). Table 2 demonstrates that all demographic characteristics were similar across the groups, while Figure 3 presents the study flowchart and details of adherence to treatment.

Table 3 and Figure 4 present a comparison of primary outcome measures both within and between groups. Table 4 presents a comparison of secondary outcome measures within and between groups.

All groups demonstrated significant within-group differences with large effect sizes in both primary and secondary outcome

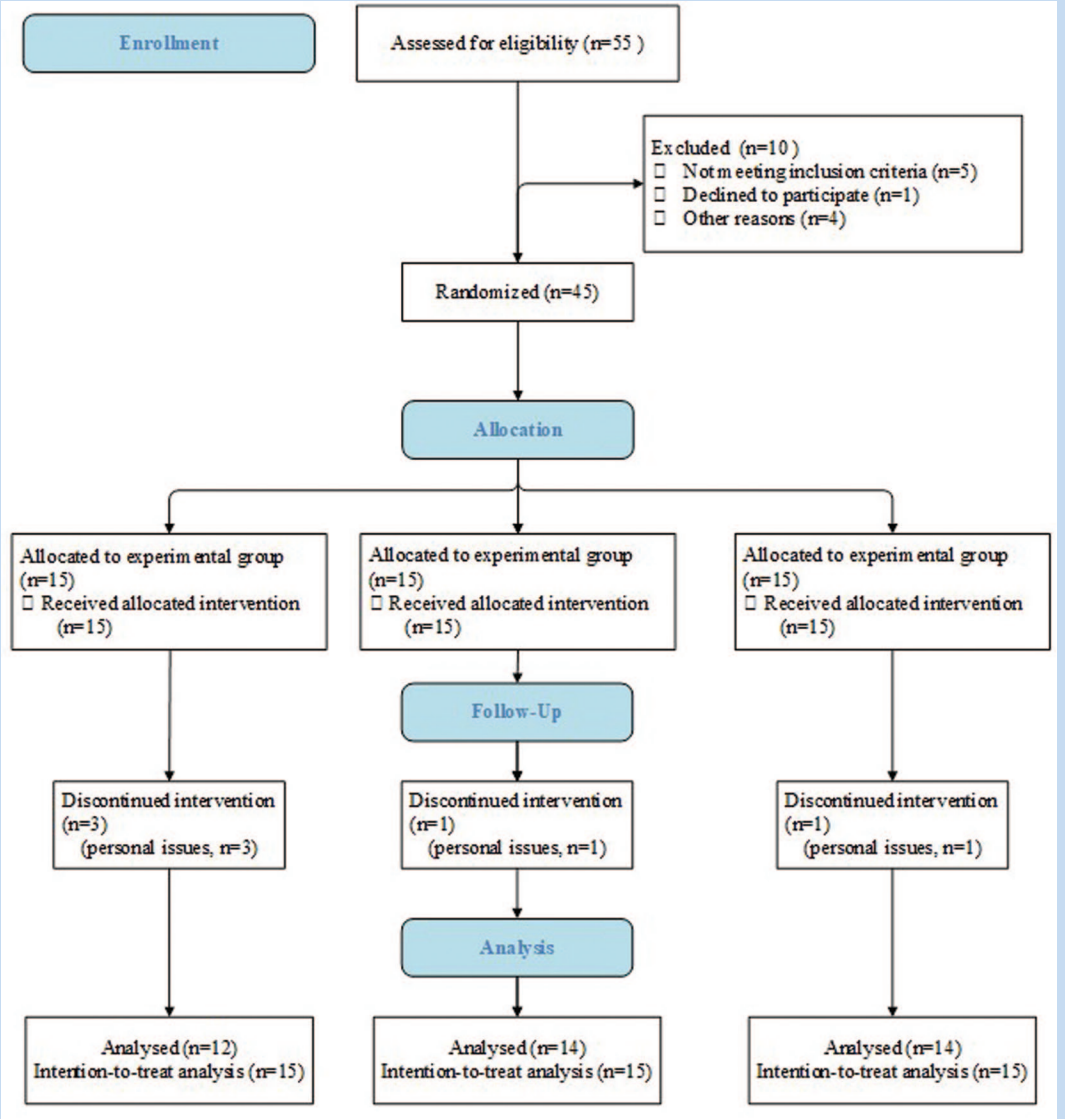

Figure 3. Study flowchart.

measures. However, no differences were observed between study groups.

In all groups, resting, activity, and night pain scores peaked on postoperative day 2 and decreased progressively until week 7. For resting pain, mean values on day 2 were KT, 6.1±3.2; ST, 7.1±2.5; and Control, 6.0±3.5, declining to KT, 1.2±1.9; ST, 1.1±1.9; and Control, 1.0±1.9 at week 7. For activity pain, day 2 means were KT, 7.2±2.4; ST, 7.1±3.7; and Control, 7.0±3.7, decreasing to KT, 3.4±2.8; ST, 4.7±2.5; and Control, 4.5±2.8 by week 7. Night pain scores on day 2 were KT, 8.2±2.1; ST, 8.0±3.0; and Control, 7.8±3.0, declining to KT, 2.5±3.6; ST, 4.5±3.5; and Control, 4.2±3.7 at week 7. Variations in the rate of pain reduction between groups during the first 2 weeks were within approximately 0.4 to 0.9 standard deviations and were not statistically significant (group × time interaction $P > 0.05$).

In all groups, shoulder circumference measurements peaked on postoperative day 2 (KT, 35.4±2.8 cm; ST, 39.0±4.1 cm; Control, 37.9±3.4 cm). From postoperative day 2 to week 7, edema levels decreased in all groups, approaching or falling below preoperative values around week 4 (KT, 30.1±4.0 cm; ST, 33.3±2.9 cm; Control, 33.2±2.6 cm). The rate of reduction during the first 2 weeks varied slightly between groups, with differences within approximately 0.5 to 0.9 standard deviations and not statistically significant (group × time interaction, $P > 0.05$). At week 7, mean shoulder circumference values were 29.3±3.3 cm in the KT group, 32.3±3.3 cm in the ST group, and 32.1±2.5 cm in the control group.

Table 3. Primary outcome measures

Outcome measures		Pre	Day 2	Day 9	Day 16	Day 30	Week 6	Week 7	3×7 mixed model repeated measures ANOVA			
									P (time)	Effect size	*P* (group×time)	Effect size
Intergroup comparison of resting pain level												
	KT group	3.8±2.8	6.1±3.2	4.0±2.1	3.0±2.6	1.4±2.6	1.4±2.2	1.2±1.9	0.0001*	0.828	0.34	0.157
	Control group	3.4±2.8	6.0±3.5	1.9±2.7	1.1±1.9	1.0±2.0	0.5±1.3	1.0±1.9				
	ST group	3.5±2.5	7.1±2.5	2.3±2.7	1.2±1.9	1.1±1.9	0.5±1.3	1.1±1.9				
	1-way ANOVA	0.88	0.59	0.07	0.04	0.87	0.26	0.98				
Intergroup comparison of activity pain												
	KT group	7.4±2.9	7.2±2.4	5.8±2.0	4.6±2.8	4.1±2.8	2.4±3.5	3.4±2.8	0.0001*	0.77	0.14	0.244
	Control group	7.4±1.7	7.0±3.7	5.6±2.9	3.7±2.7	3.1±2.9	4.1±2.9	4.5±2.8				
	ST group	8.0±1.1	7.1±3.7	5.5±2.9	3.5±2.6	3.1±2.9	4.9±2.8	4.7±2.5				
	1-way ANOVA	0.72	0.97	0.96	0.49	0.55	0.08	0.36				
Comparison of night pain between groups												
	KT group	8.1±2.2	8.2±2.1	6.4±2.4	5.2±3.8	3.4±3.1	3.4±3.3	2.5±3.6	0.0001*	0.704	0.18	0.186
	Control group	7.2±3.6	7.8±3.0	6.2±3.4	3.4±2.9	3.7±3.9	3.8±3.4	4.2±3.7				
	ST group	7.5±2.7	8.0±3.0	6.3±3.0	4.0±2.6	3.7±3.4	3.7±3.2	4.5±3.5				
	1-way ANOVA	0.68	0.95	0.99	0.30	0.95	0.95	0.28				
Intergroup comparison of shoulder diameter means												
	KT group	30.7±3.9	35.4±2.8	32.6±2.9	30.7±4.4	30.1±4.0	29.5±3.3	29.3±3.3	0.0001*	0.924	0.91	0.074
	Control group	33.2±2.6	37.9±3.4	35.9±2.6	34.4±2.7	33.2±2.6	32.4±2.2	32.1±2.5				
	ST group	33.8±3.5	39.0±4.1	35.7±2.6	34.2±2.9	33.3±2.9	31.8±3.4	32.3±3.3				
	1-way ANOVA	0.04*	0.02*	0.003*	0.008*	0.02*	0.03*	0.02*				

ANOVA, analysis of variance;
Day 2, postoperative day 2; Day 9, postoperative day 9; Day 16, postoperative day 16; Day 30, postoperative day 30; Week 6, postoperative week 6; Week 7, postoperative week 7; KT, Kinesio tape; PRE, pre-operative day 1; ST, sham taping.
*$P < 0.05$.

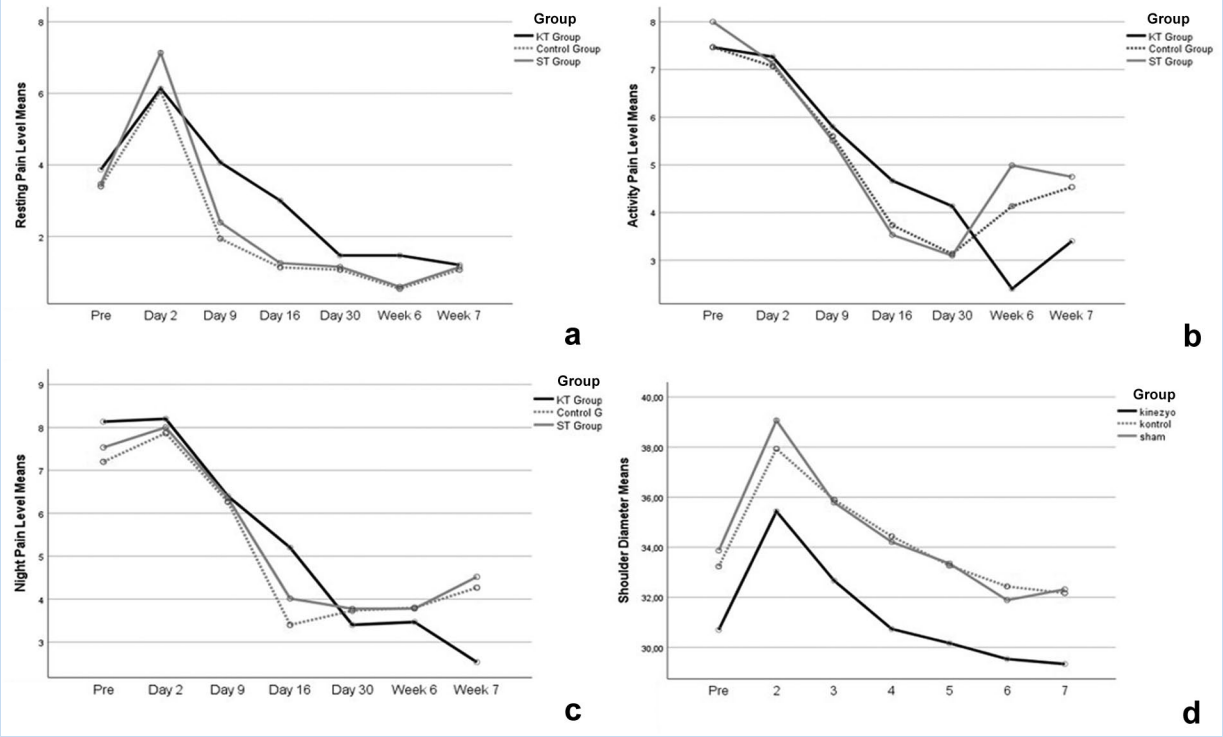

Figure 4. Graphs depicting progression of primary outcome measures taken at 7 different times throughout the study. (a) Resting pain level. (b) Activity pain level. (c) Night pain level. (d) Shoulder edema. KT, Kinesio tape; ST, sham taping; Pre, pre-operative.

For all secondary outcome measures (MCOS, WORC, SPADI, ROSS), scores improved over time in all groups, with no statistically significant differences between groups (group × time interaction, $P>0.05$).

DISCUSSION

The study was designed as a randomized, controlled clinical trial. The objective of the present study was to examine the effects of KT in the first 7 weeks after ARCR. The results obtained demonstrated that patients in all groups experienced a significant improvement in resting pain, activity pain, night pain, edema, and functional levels during the treatment period. However, no significant differences were observed between the groups.

Pain

Gülenç et al[15] found KT effective on pain in the first week after arthroscopic shoulder surgery. However, no significant difference was observed after the 16th day. According to the 6-week results of Gülenç et al[15] after arthroscopic shoulder surgery, there was no difference between KT and the control group. The 6-week study results of Gülenç et al[15] seem to be consistent with our results. However, the second day and eighth day results of Gülenç et al[15] are not consistent with the first week results of our study. Gülenç et al[15] found in their study that KT significantly reduced pain on the second and eighth days. In our study, no significant difference was found between the groups in the first week. When we examine the means, it is seen that the pain reductions in the ST and control groups were greater than in the KT group. These reductions in our study emerged as significant differences between the groups in the measurements we made on the 16th day after surgery. According to our results, we found that KT applied in the first 2 weeks delayed the improvement in resting pain. In the 30th day measurements, the pain levels in the groups decreased to similar levels and the difference disappeared. We think that this situation is due to the fact that KT stimulates the mechanoreceptors in the first weeks and facilitates the feeling of pain. In contrast to the study of Gülenç et al,[15] KT caused undesirable effects on resting pain in the early period in our study. This situation may be due to different conditions. In their study, Gülenç et al[15] included 6 different patient groups who underwent arthroscopic shoulder repair. Our study included only patients with medium-sized rotator cuff repairs. In addition, the average age of our patient group was 57, while the average age of the patient group examined by Gülenç et al[15] was 47. We think that the difference in the average ages between the studies will cause differences in the healing processes.

Gülenç et al[15] found KT effective for pain relief in the first week after arthroscopic shoulder surgery, with significant reductions on days 2 and 8. However, no differences were

Table 4. Secondary outcome measures

Outcome measures		Pre	Week 6	Week 7	3×3 mixed model repeated measures ANOVA			
					P (time)	Effect Size	*P* (group × time)	Effect size
MCOS	KT group	23.8±19.19	23.2±11.3	35.0±13.0	0.0001*	0.715	0.96	0.007
	Control group	26.1±16.2	25.2±11.5	39.4±14.9				
	ST group	24.9±14.5	25.1±10.4	38.7±14.6				
	1-way ANOVA	0.93	0.85	0.66				
ROSS	KT group	29.3±10.1	27.2±12.0	16.7±9.9	0.0001*	0.775	0.53	0.37
	Control group	31.6±7.1	27.3±7.4	18.9±8.2				
	ST group	30.8±6.6	25.5±7.3	19.2±8.3				
	1-way ANOVA	0.73	0.85	0.71				
WORC	KT group	1382.0±412.5	1190.6±449.3	938.6±415.7	<0.001*	0.603	0.38	0.049
	Control group	1336.0±267.9	1197.3±340.8	1042.6±319.0				
	ST group	1320.8±301.9	1130.1±428.4	1044.2±297.2				
	1-way ANOVA	0.87	0.89	0.64				
SPADI	KT group	100.1±19.1	81.2±37.5	56.4±29.3	<0.001*	0.751	0.71	0.026
	Control group	103.1±16.5	83.6±25.5	66.0±26.0				
	ST group	104.1±16.0	83.1±25.5	67.8±24.9				
	1-way ANOVA	0.81	0.97	0.46				

ANOVA, analysis of variance; KT, Kinesio tape; MCOS, modified constant-Murley shoulder score; Pre, pre-operative day1; ROSS, revised Oxford shoulder score; SPADI, shoulder pain and disability index; ST, sham taping; WORC, Western-Ontario rotator cuff index.
*$P < 0.05$.

observed between the KT and control groups by day 16 or week 6, consistent with our study. In contrast, our results showed no significant pain reduction in the KT group during the first week, with the ST and control groups showing greater pain relief. By day 16, significant differences emerged, suggesting KT delayed improvement in resting pain during the first 2 weeks. By day 30, pain levels across groups equalized. This delay may be due to KT stimulating mechanoreceptors early on, increasing pain perception. Unlike Gülenç et al,[15] who studied 6 diverse patient groups with an average age of 47 years, our study focused on medium-sized rotator cuff repairs in patients averaging 57 years old, potentially affecting healing processes and outcomes. In patients with RCTs, the minimal clinically important difference (MCID) for pain has been reported to be approximately 1.4 cm.[28] In our KT group, activity pain decreased by 1.7 points between day 30 and week 6. Although this reduction was not statistically significant, it exceeded the MCID threshold, indicating clinical relevance. While KT may appear to prolong resting pain during early immobilization, it could contribute to clinically meaningful reductions in activity pain toward the end of the immobilization period, possibly due to enhanced proprioceptive feedback once active motion is initiated.

There are very few studies in the literature examining the application of KT after surgery. Jarecki et al[18] found no effect of KT on pain in the first week of patients undergoing total knee arthroplasty. The technique and homogeneous patient group applied by Jarecki et al[18] are similar to our study. The study results of Jarecki et al[18] are statistically similar to those of our study.

Reynard et al[26] compared KT and sham taping after rotator cuff repair in their study. However, Reynard et al[26] conducted the study between 6 and 12 weeks after surgery. This makes it difficult to compare the study results. Reynard et al[26] ultimately found no effect of KT on pain. These results are consistent with our early results.

A meta-analysis conducted in 2020 on the effectiveness of KT on shoulder pain reported that KT had no significant effect on pain.[12] In a Cochrane systematic review conducted in 2021 on rotator cuff pathologies, it was shown that KT applied to shoulder pain had no superiority over sham taping.[13] Our study results seem to be consistent with the literature. Our study is valuable because it is one of the first studies in the literature to examine the early effects of KT after ARCR.[26]

Edema

During shoulder arthroscopy, high water pressure applied to prevent intra-articular bleeding and improve view unfortunately causes edema.[8] Edema gradually reduces over time and the rate of decrease in edema may affect the healing results and pain intensity.[9] In our study, in accordance with the literature, no difference was found in the edema level between the KT group, control group, and ST groups.[15] The edema level increased significantly on the second day in the postoperative period due to the surgical procedure. Edema levels decreases from the first postoperative week and reaches pre-operative levels. In addition, when shoulder diameter averages were examined, they were observed to decrease below the initial level after the 30th day. We think that this situation is due to muscle atrophy caused by immobilization.

Gülenç et al[15] reported that KT had no effect on edema at the sixth postoperative week after arthroscopic shoulder surgery, while significant between-group differences were observed on postoperative days 8, 16, and 24.These results are partially consistent with our findings. In our study, mean values indicated that, although not statistically significant, the KT group returned to baseline by day 16—similar to the findings of Gülenç et al[15]—and earlier than the other groups. We believe that the differences in outcomes may be related to the heterogeneous participant group in the study by Gülenç et al.[15]

Our study found that KT had no significant effect on pain or edema after ARCR, consistent with existing literature. Although the mechanisms of KT action are not fully understood, it is theorized to reduce edema and pain by enhancing blood and lymphatic circulation through skin folds that elevate the epidermis, thereby relieving pressure on mechanoreceptors. This reduces nociceptive input, improves circulation, and may alter muscle activation. In our study, KT was applied during the early immobilization phase post-ARCR. Limited joint movement during this period prevented adequate skin fold formation, despite correct taping technique. This restriction, rather than application error, likely reduced the effectiveness of KT in managing edema.

Functional Status

In our study, we evaluated functionality using different scales. We found that early application of KT did not contribute to functionality. This situation seems normal when pain and edema results are taken into account. When we examined the literature, we did not find any study examining the effect of KT on functional status after rotator cuff repair. There were studies in the literature examining the effects of KT on functionality in people with shoulder pain. In our study, when we examined the results of the MCOS in accordance with this literature, no significant difference was found between the groups.[6,12,21,22,30] However, in our study, when the MCOS averages of all groups were examined over time, a significant improvement was observed. Devereaux et al[6] reported that KT had no effect on the constant score in their study on patients with subacromial impingement. Koçyiğit et al[21] reported that KT had no effect on the constant score in patients with subacromial impingement.

When the ROSS results of our study were examined, there was no significant difference between the groups. When the ROSS averages of all groups were examined over time, a significant improvement was observed. Frassanito et al[10] reported that the KT they applied to patients with rotator cuff calcific tendinopathy had no effect on the Oxford shoulder score. The ROSS results of our study appear to be consistent with the literature.

In line with the literature, when we examined the WORC and SPADI results in our study, no significant difference was found

between the groups. When the WORC and SPADI averages of all groups were examined over time, a significant improvement was observed.[5,12,14,22,24]

De Oliveira et al[5] reported no clinically significant difference in WORC results in their study examining the effectiveness of KT in patients with rotator cuff-related shoulder pain. Kul and Ugur[22] reported that KT had no effect on WORC in their study examining patients with shoulder impingement syndrome. In addition, according to the WORC results of Kul and Ugur,[22] conventional physiotherapy was found to be superior to KT in the early period.

In the meta-analysis conducted by Ghozy et al,[12] no significant difference was reported between KT and sham taping applications in SPADI results. In addition, the same meta-analysis showed that the underlying shoulder pathology did not affect this situation. The SPADI results of the meta-analysis conducted by Ghozy et al[12] are consistent with our results. However, the studies included in the meta-analysis did not include KT applications after surgical applications.

In the literature, the MCID values for the functional outcome measures used after rotator cuff repair are reported as follows: 5.3 for the Ross score, 16.4 for MCOS, 282 for WORC, and 14 for SPADI.[4,17] In our study, when the week 7 results were examined, the improvement in SPADI scores in the KT group exceeded the MCID threshold. This finding indicates a clinically meaningful change, even though it was not statistically significant. Changes in WORC and MCOS scores in the KT group approached, or partially exceeded, the MCID values, suggesting a potential contribution of KT to functional recovery. Conversely, changes in Ross scores remained below the MCID threshold, failing to reach clinical significance. Another notable point is the high standard deviation observed in SPADI scores (56.4±29.3), reflecting considerable heterogeneity in patient responses to treatment. This large variability suggests that, while some people experienced substantial improvement, others showed only minimal change. High variance reduces statistical power, potentially underestimating the true group-level effect of KT. In our opinion, evaluating the efficacy of KT should not rely solely on statistical significance but should also consider clinical meaningfulness, as defined by MCID thresholds. The findings of this study suggest that KT may contribute to functional improvement in certain subgroups of patients, particularly during early-stage rehabilitation protocols. However, given the high variability in responses, further studies with larger, more homogeneous patient cohorts and analyses of individual response profiles are warranted to clarify the role of KT in functional recovery.

In our study, no harmful effects of KT were found. When the literature is examined, it is seen that the majority of the studies on KT in the shoulder region are related to subacromial impingement syndrome. The scarcity of existing studies on ARCR makes it difficult to compare our study with the literature. In addition, the use of different techniques in the application of KT does not allow for standardization of studies. However, our study examining the effects of the KT technique, which is frequently used in the field, after ARCR is extremely important as it contributes to addressing a deficiency in the literature.

Study Limitations

- Long-term results of KT were not analyzed, and examining long-term tendon healing with methods such as ultrasonography or magnetic resonance imaging may provide more objective results.
- In addition, one of the important issues encountered during the study was the difficulty of taping in the early period of immobilization, which was true for both KT and sham taping. Patients should avoid moving their arms as much as possible during this period. The taping procedure was difficult due to the presence of the shoulder strap for immobilization and the bandage protecting the wound sites during the first week.
- Although the sample size calculation indicated that 15 participants per group would be sufficient to achieve adequate statistical power for detecting significant differences, this number still represents a relatively small sample size for a clinical trial. Small sample sizes can limit the generalizability of findings, particularly in heterogeneous clinical populations, and may increase the risk of type 2 error for secondary outcomes. In addition, the high variability observed in certain measures, such as the SPADI scores, suggests that a larger cohort might better capture the true effect of KT by reducing the influence of individual outliers. Future studies with larger, more homogeneous samples would help confirm the present findings and clarify the potential clinical benefits of KT in post-ARCR rehabilitation.

Study Strengths

- It is one of the first studies to investigate KT in the early period after ARCR.
- The homogeneity of the study group enhances the internal validity.
- The randomized controlled design of our study is a strength as it minimizes potential side effects.
- Including an ST group in our study provides a clearer understanding of the placebo effect.

CONCLUSION

Based on our results, clinicians should not anticipate any additional short- or medium-term benefits in reducing pain and edema or improving shoulder function with Kinesio taping after ARCR. Due to the differences in methodology among studies on KT, further research with similar methods is necessary to gain a clearer understanding of its effects on people with ARCR and to ensure generalizability. This study addresses this need in the literature. Furthermore, the literature reports the effectiveness of KT when used in conjunction with other physiotherapy methods. Future studies could explore the combined impact of KT and other physiotherapy techniques.

ETHICAL APPROVAL

This study was approved by Ahi Evran University Medical Faculty Clinical Research Ethics Committee (2022-14/123). Clinical trial registration number: NCT06010264.

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