

The Effect of Arthroscopic Rotator Cuff Repair on Sleep in Degenerative Full-Thickness Tears

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ABSTRACT **Aims and Background:** Shoulder pathologies are frequently linked to sleep disturbances. The aim of this study is to investigate the effect on sleep disorders in patients with arthroscopic rotator cuff repair. **Materials and Methods:** Thirty-three patients who underwent arthroscopic rotator cuff repair due to a full-thickness rotator cuff tear were prospectively analyzed. The Pittsburgh Sleep Quality Index (PSQI), the American Shoulder and Elbow Surgeons Shoulder Score (ASES), visual analog scale (VAS), and Constant and Murley shoulder scores before surgery and at 6 months postoperatively. Preoperative clinical and radiological parameters of the patients were also evaluated. **Results:** The study analyzed 33 patients with a median age of 59.79 ± 9.0 years. There was a significant difference preoperatively versus postoperatively in terms of all PSQI global scores and subdivisions ($P < 0.001$). A statistically significant improvement was determined by the simple shoulder test, the Constant and Murley shoulder scores, and VAS ($P < 0.001$). **Conclusion:** Sleep disturbance is common in patients with symptomatic rotator cuff tear, and sleep disturbance can resolve after arthroscopic rotator cuff repair.

KEYWORDS: Rotator cuff repair; rotator cuff tear; shoulder arthroscopy; sleep disruptions

INTRODUCTION

Orthopedic pathologies are important diseases that seriously affect a person's quality of life and even cause sleep problems.^[1] Although post-traumatic or degenerative conditions in the musculoskeletal system can be partially tolerated during the day, it prevents the patient from getting quality sleep during the night and results in the inability to provide adequate rest for the physical activity needed during the day.^[1,2] This leads to a negative vicious circle both mentally and physically. Ongoing sleep disorder is a condition that can be serious enough to impair physical, emotional, social, and mental functioning and cause anxiety.^[2,3] Shoulder pathologies are one of the important orthopedic problems that can lead to the above-mentioned conditions.^[4] The most common cause of shoulder pain is rotator cuff tears. Along with pain and functional limitation, sleep disorders affect the daily life of patients. However, rotator cuff tears are still insufficient to explain the causal factors

of sleep disorders. One of the most obvious complaints of the patients is the increase in night pain and the disruption of their sleep.^[5] Although the patient tries to keep his arm in the most painless position during the day, uncontrolled movements during sleep at night may be one of the reasons for this. For these reasons, the evaluation of sleep before and after treatment can be a marker for the success of the treatment. In this study, we investigated the effect of rotator cuff tear repair on pre- and postoperative sleep disturbance.

MATERIALS AND METHODS

The data of patients who underwent double-row repair with degenerative full-thickness rotator cuff tear in

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the orthopedics and traumatology clinic between 2020 and 2021 were prospectively recorded. All patients underwent shoulder arthroscopy in the beach chair position, and double-row repair and acromioplasty were performed. Ethical approval was obtained from the local ethics committee by determining the study steps before the study (approval number: 103544421-2021/02-11). A signed informed consent form was obtained from all patients, and all stages of the study were performed according to the Declaration of Helsinki.

Study population

The inclusion criteria were determined as small- and medium-size degenerative rotator cuff tears that were repaired with the arthroscopic double-row technique. Revision surgery patients and those with previous shoulder and elbow surgery history, glenohumeral joint arthritis, and other shoulder pathologies, patients with neurological deficit, patients with obstructive sleep apnea syndrome, and patients who are already under medical therapy due to sleep disorders were excluded from the study.

Study protocol

All patients completed the Pittsburgh Sleep Quality Index (PSQI) test preoperatively and at 6 months postoperatively. VAS (visual analog scale) score, DASH (disabilities of the arm, shoulder, and hand), and score and constant score of the patients were completed by the surgeon together with the patient. Patients' age, gender, smoking or alcohol use, body mass index, affected side, duration of complaints, and medications used were recorded. The dimensions of the tear obtained from the preoperative magnetic resonance images were confirmed by the surgical measurements obtained during the operation. All patients underwent routine acromioplasty. The same physical therapy protocol was applied to the patients in the postoperative period. The PSQI is a scoring system consisting of 19 items that questions the patients' subjective disturbances, quality, latency, duration of sleep and also habitual sleep efficiency, use of sleep medication, and daytime dysfunction. If the PSQI score is below 5, it indicates that sleep quality is impaired.^[6]

Statistical analysis

SPSS 25.0 (IBM SPSS Statistics 25 software (Armonk, NY: IBM Corp.) was used for statistical evaluation of data. Continuous variables were defined by the mean $\pm$ standard deviation, median (IQR: interquartile range, 25th–75th percentiles), and minimum–maximum values, and categorical variables were defined by frequencies and percent. Shapiro–Wilk tests were used

for determination of normal distribution. For dependent group comparisons, we used the paired sample t-test when parametric test assumptions were provided; the Wilcoxon signed rank test was used when parametric test assumptions were not provided. Statistical significance was determined as $P < 0.05$.

RESULTS

A total of 33 patients were included in this study. The mean age was found as 59.79 ± 9.0 years and there were 22 (66.7%) females. The demographical variables are summarized in Table 1.

According to the Pittsburgh Sleep Quality questionnaire, preoperative sleep quality, latency, duration, disturbance of sleep, habitual sleep efficiency, and daytime dysfunction were found as 1.94 ± 0.56 , 1.82 ± 0.77 , 1.61 ± 1 , 1.79 ± 0.65 , 1.52 ± 0.8 , and 1.39 ± 0.83 respectively. The improved scores were found ($P: 0.0001$) in the postoperative group as follows: sleep quality (0.33 ± 0.6), sleep latency (0.88 ± 0.6), sleep duration (0.73 ± 0.72), habitual sleep efficiency (0.52 ± 0.51), sleep disturbance (0.58 ± 0.56), and daytime dysfunction (0.61 ± 0.7). The total PSQI level was significantly improved in the postoperative group (3.64 ± 2.41) when compared with preoperative values (9.91 ± 3.43). Table 2 shows the Pittsburgh Sleep Quality questionnaire scores in groups.

The ameliorated functional and pain scores were detected for the postoperative constant (53.85 ± 7.64), DASH (79.67 ± 3.49), and VAS (6.97 ± 0.73) scores when compared with preoperative values ($P: 0.0001$). The comparison of scores is demonstrated in Table 3.

Table 1: Demographic findings

	Mean $\pm$ S.D.	min-max
AGE	59.79 $\pm$ 9	45-79
GENDER (n/%)		
Female/male	22/11.	66.7/33.3
BMI	29.27 $\pm$ 3.83	21-37
Cigarettes (n/%)		
None/smoker	28/5	84.8/15.2
Alcohol (n/%)		
$\pm$	32/1	97/3
Side (n/%)		
left/right	9/24	27.3/72.7
Dominant (n/%)		
non-dominant/ dominant	9/24	27.3/72.7
Complain duration	936 $\pm$ 1.97	6-15
Follow-up duration	9.42 $\pm$ 1	8-12
Nocturnal pain	30/33	90/100

S.D: Standard deviation; min-max: minimum and maximum values

Table 2: PSQI

	Preoperative			Postoperative			Intra-group <i>P</i>
	Mean±S.D.	Med (IQR)	min-max	Mean±S.D.	Med (IQR)	min-max	
Sleep quality	1.94±0.56	2 (2-2)	1-3	0.33±0.6	0 (0-1)	0-2	0.0001* (<i>z</i> =-4.849)
Sleep latency	182±0.77	2 (1-2)	0-3	0.88±0.6	1 (0.5-1)	0-2	0.0001* (<i>z</i> =-5.07)
Sleep duration	1.61±1	2 (1-2)	0-3	0.73±0.72	1 (0-1)	0-2	0.0001* (<i>z</i> =-4.604)
Habitual sleep efficiency	1.52±0.8	2 (1-2)	0-3	0.52±0.51	1 (0-1)	0-1	0.0001* (<i>z</i> =-4.823)
Sleep disturbance	1.79±0.65	2 (1-2)	1-3	0.58±0.56	1 (0-1)	0-2	0.0001* (<i>z</i> =-4.906)
Daytime dysfunction	1.39±0.83	1 (1-2)	0-3	0.61±0.7	0 (0-1)	0-2	0.0001* (<i>z</i> =-4.914)
PSQI	9.91±3.43	11 (7.5-12)	2-16	3.64±2.41	4 (2-5)	0-11	0.0001* (<i>z</i> =-5.02)

**P*<0.05 statistically significant; S.D: standard deviation; min-max: minimum and maximum values; Med (IQR): median (25th-75th percentiles); *z*: Wilcoxon signed rank test

Table 3: Preoperative and postoperative score

	Preoperative			Postoperative			Intra-group <i>P</i>
	Mean±S.D.	Med (IQR)	min-max	Mean±S.D.	Med (IQR)	min-max	
Constant	53.85±7.64	53 (48-60)	42-69	82.18±6.92	84 (80-86)	50-90	0.0001* (<i>t</i> =-21.41)
Dash	79.67±3.49	79 (76.5-82)	74-86	20.97±11.35	18 (16-21)	13-80	0.0001* (<i>z</i> =-5.015)
VAS	6.97±0.73	7 (7-7)	5-8	1.82±1.26	2 (1-2)	1-8	0.0001* (<i>z</i> =-5.043)

**P*<0.05 statistically significant; S.D: standard deviation; min-max: minimum and maximum values; Med (IQR): median (25th-75th percentiles); *t*: paired sample *t*-test; *z*: Wilcoxon signed rank test

DISCUSSIONS

We found that sleep disturbance is common in patients who underwent arthroscopic double-row rotator cuff repair due to full-thickness rotator cuff tear. Arthroscopic rotator cuff repair showed a statistically significant improvement in the sleep quality of the patients (*P* < 0.001). The effect of surgical treatment on sleep disturbance was found to be correlated with the reduction of patients' pain. In the recent reviews, there are a limited number of studies related to prospective rotator cuff tears and sleep disorders. There is a high prevalence of poor sleep quality in patients with rotator cuff tear (RCT).^[7] Even patients' positions during sleep have been shown to be associated with rotator cuff tendinopathy.^[8] Austin *et al.*^[9] evaluated the PSQI, simple shoulder test, and VAS scores of 56 patients with full-thickness tears in their prospective study. At the end of the 6th month, it was shown that 38% of the patients continued to have sleep disorders. In their study, Khazzam *et al.*^[10] investigated the effect of rotator cuff problems on sleep quality, and they associated the patient's gender being female, diabetes mellitus, depression, and high body mass index with sleep disorder. However, they stated that the PSQI scores of the patients with full-thickness rotator cuff tears were correlated with the VAS scores, but they did not find a correlation with the ASES score. In their study, Serbest *et al.* reported that there was an improvement in sleep quality with the improvement in shoulder functions after rotator cuff repair. They found the preoperative PSQI score to be 15 (7-17), while the postoperative PSQI score was 6 (3-1).^[11] Cho *et al.*

^[12] evaluated 47 patients after rotator cuff repair on the American Shoulder and Elbow Surgeons' Scale, the UCLA scale, VAS, and PSQI scores before and after surgery. They presented the results of 1-year follow-up. They stated that the PSQI scores and functional scores improved. In their prospective study, Glogovac *et al.*^[13] reported that although rotator cuff tear repair provided a significant improvement in PSQI scores, narcotic drug use had no effect. In their prospective study, Giuseppe Longo *et al.*^[14] investigated the relationship between the simple shoulder test, the American Shoulder and Elbow Surgeons Shoulder Score, the Oxford Shoulder Score, the constant score, and PSQI scores, which they looked at before and after the surgery. The preoperative PSQI was 7.19 ± 3.91, and it was 9.91 ± 3.43 in our study. Whereas the PSQI was 3.81 ± 3.32 for the postoperative 6th month, it was 3.64 ± 2.4 in our study. Whereas the preoperative constant score was 41.6 ± 15.58, in our study, it was 53.85 ± 7.64; whereas the postoperative constant score was 64.59 ± 9.85, in our study, the constant score was 82.18 ± 6.92. Similar to this study, our study showed significant improvement in both shoulder scores and PSQI scores. Although the cause of the pain in rotator cuff tear is the ongoing inflammatory process, the fact that none of the patients included in our study used narcotic drugs is among the limitations of our study.

CONCLUSION

Our main result in this study is the improvement in sleep quality and shoulder functions after arthroscopic double-row repair and acromioplasty in patients with

full-thickness rotator cuff tears. Another result is that improvement in shoulder functions and pain scores correlated with improved sleep quality.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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