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Fibromyalgia symptoms before and after septoplasty

A cross-sectional study

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Abstract

This study aimed to investigate the impact of septoplasty on fibromyalgia symptoms in patients with septum deviation. Patients who were over 18 years of age, had been diagnosed with nasal septum deviation, and indicated for septoplasty were selected consecutively and included in the study. Patients were evaluated twice, at baseline and after septoplasty at 3 months. The patients' widespread pain and symptom severity scores were calculated according to the American College of Rheumatology 2016 Revised Fibromyalgia Diagnostic Criteria. A Revised Fibromyalgia Impact Questionnaire was filled out to evaluate the patients' fibromyalgia symptoms. The Pittsburgh Sleep Quality Index was used to assess the sleep quality of patients. Thirty-five patients, 21 (60.0%) male and 14 (40.0%) female, were accepted to the study. Nine (25.9%) patients had fibromyalgia at the beginning, and none of the patients met the fibromyalgia criteria after the surgery. After septoplasty, a statistically significant decrease was detected in the patients' widespread pain index, symptom severity scale, total score, and Pittsburgh Sleep Quality Index and Revised Fibromyalgia Impact Questionnaire scores ($P = .006$, $P = .004$, $P = .028$, $P = .014$, and $P < .001$, respectively). As a result of the study, it was observed that fibromyalgia symptoms of patients with septum deviation improved after surgical correction of the deviation.

Abbreviations: ACR = American College of Rheumatology, CT = computed tomography, FIQR = Revised Fibromyalgia Impact Questionnaire, FM = fibromyalgia, NSD = nasal septum deviation, PSQI = Pittsburgh Sleep Quality Index

Keywords: fibromyalgia, quality of life, septoplasty, septum deviation

1. Introduction

Fibromyalgia (FM) is a chronic disease that progresses with widespread body pain, fatigue, sleep disturbance, depression, anxiety, and an impairment of cognitive functions. Chronic widespread musculoskeletal pain is the primary symptom of the disease.[1] The prevalence of FM is estimated to be between 2% and 4% worldwide and is 3 times more common in women than in men.[2] Difficult living conditions create a suitable environment for FM triggered by stress. Thus, FM has become the disease of our age. Studies conducted to investigate the causes of widespread pain and pain sensitivity in FM suggest that peripheral and central mechanisms play a role in etiopathogenesis.[3] Peripheral pain generators are also considered a possible cause of FM and may present with symptoms such as chronic fatigue, sleep disturbances, irritable bowel, and mood disorders.[4] Low-grade inflammation is thought to occur in FM, and in support of this, it is assumed that high levels of inflammatory cytokines such as tumor necrosis factor alpha and interleukin-1 contribute to the clinical course of the disease.[5] Neuroinflammation in FM patients is also a topic that has been emphasized recently. An upregulation of translocator protein has been found in the brain. This protein is considered a biomarker for glial activation. Higher thalamic glutamate concentrations have been observed in translocator protein high-affinity ligands, and a positive correlation pattern has been observed between glutamate and γ-aminobutyric acid in the rostral anterior cingulate cortex.[6] Sleep has an important place in the normal functioning of the hypothalamic-pituitary-adrenal axis and the immune system. Factors that affect circadian rhythm may also affect inflammatory activity.[7] Physiological functions under circadian control include the sleep-wake cycle, heart rate, blood pressure, and body temperature, as well as endocrine gland regulation and immune response. These circadian rhythms are controlled by a central pacemaker known as the suprachiasmatic nucleus, located above the optic chiasm in the hypothalamic region. Disturbances in the 2-way interaction between inflammation

Informed consent was obtained from all patients whose clinical information was used.

The authors have no conflicts of interests to disclose.

The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

This study was conducted in accordance with the Declaration of Helsinki, and approved by the Clinical Research Ethics Committee of Giresun Training and Research Hospital (approval number 18.12.2023/10).

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and the circadian clock have a significant impact on the performance of the immune system. Eighty percent of FM patients suffer from poor sleep.[8] Studies show that sleep quality is associated with pain and emotional states, and poor quality sleep can be a risk factor for FM.[9] There are studies supporting that improving the quality of sleep rather than the quantity of sleep can reduce pain and have positive effects on depressive symptoms in the FM population.[10] Additionally, FM may accompany many chronic diseases, such as rheumatoid arthritis, and these patients also suffer from poor quality sleep.[11]

For many years, the American College of Rheumatology (ACR) 1990 diagnostic criteria were used for the diagnosis of FM.[12] According to this criteria, an examination of tender points was taken as basis. However, some patients do not have tender point sensitivity, and due to the lack of a marker indicating the severity of the disease and the fact that symptoms such as fatigue, sleep disturbance, and cognitive impairment were not included, new diagnostic criteria were published by the ACR in 2010. A widespread pain index and symptom severity scale were used in the ACR 2010 criteria, and clinician evaluation was required for the symptom severity scale. These criteria were revised in 2011, and in the new revised criteria, patients' own evaluations were sufficient without the clinician's opinion.[13] However, the 2010/2011 criteria could also diagnose regional pain syndromes such as chronic limb pain syndromes and chronic temporomandibular joint disorders, which may be accompanied by somatic symptoms, such as FM. Based on these criteria, the guidelines were updated in 2016, and this criteria can be used as classification criteria for research as well as diagnostic criteria.[14] The 2016 criteria improved the symptom-based diagnostics of FM by eliminating patients with regional pain syndromes.[15] A diagnosis of FM according to the 2016 criteria does not exclude the presence of other diseases. Regardless of which criteria are used, it has been observed that FM symptoms are more intense in female patients, and this may cause the disease to be ignored in male patients.[16]

FM symptoms negatively affect quality of life, with many accompanying symptoms as well as widespread pain. Quality of life has been shown to be worse in FM patients.[17] When compared with other diseases, such as rheumatoid arthritis, osteoarthritis, chronic obstructive pulmonary disease, and insulin-dependent diabetes, the quality of life in FM patients was found to be low.[18] The abundance of symptoms seen in FM patients and their severity cause a constant state of dissatisfaction in patients and their close circle, and patients constantly seek treatment. There are no specific laboratory findings in the follow-up of this disease, so it is more important to evaluate the quality of life in the follow-up of these patients. Considering that the treatment and follow-up of this disease, which affects the quality of life so negatively, is very difficult, it is therefore very important to determine the factors in etiology. FM may occur with infections, diabetes, rheumatic diseases, and psychiatric or neurological disorders.[19] In addition to these diseases, it is also crucial to bring to light other disorders that have not been discussed before.

Nasal septum deviation (NSD) is the most common structural anomaly that causes nasal obstruction.[20] The most important factor in its etiology is nasal trauma, especially those that occur in infancy and childhood. The frequency of NSD varies among age, gender, and race and across societies. In a study conducted using computed tomography (CT), the incidence was found to be 40%.[21] The nose is the most protruding and weakest part of the face, so it is most affected by facial trauma. The fact that the nose protrudes, unprotected, in the middle of the face is another factor that facilitates trauma. Irregularities in maxilla development, asymmetries of maxillary sinuses and turbinates, and genetic and environmental factors can be listed among other reasons.[22,23] NSD can affect facial development during childhood, causing undesirable results in later periods and leading to complications that affect people's quality of life. Septum deviation may cause psychological symptoms and other organ system symptoms aside from ear, nose, and throat complaints, and sometimes these secondary effects may be patients' major complaints. Nasal obstruction caused by deviation negatively affects sleep quality and may lead to psychiatric findings such as obsession and somatization.[24] In patients with septum deviation, headaches may occur as a result of the contact of the septum with the lateral nasal wall.

Septoplasty, a common surgical intervention, offers a solution by improving both subjective experiences and objective measures of nasal function, leading to a significant improvement in quality of life.[25] Beyond correcting structural deformities that impede nasal breathing, septoplasty offers surgical solutions for recurrent epistaxis, sinusitis, obstructive sleep apnea, and facial pain stemming from septal spurs touching the lateral nasal wall (Sluder syndrome).[26] Considering that septum deviation, which is frequently accompanied by sleep disorders and psychiatric findings, may predispose to FM, we asked the question whether FM findings could improve after septoplasty, and this study was designed to seek the answer to this question.

2. Methods

This cross-sectional study was conducted with 35 patients at the Giresun University Giresun Training and Research Hospital Physical Medicine and Rehabilitation Outpatient Clinic and Otolaryngology Department between January 2024 and June 2024. Patients who were over 18 years of age, had been diagnosed with NSD, and indicated for septoplasty were selected consecutively and included in the study. Pregnant women, patients with cardiac, pulmonary, endocrine, renal, hepatic, and inflammatory rheumatic diseases, malignancies, and patients with a history of regular drug use and a history of previous nasal surgery or nasal fracture were not included in the study. The patients were not taking any medication which could affect breathing and reduce pain linked to FM. Since the patients had no pain after the tampon was removed in the postoperative period, analgesic medication was not administered to them in the postoperative period. The NSD diagnosis was made by the same otolaryngologist, and patients were evaluated twice: at baseline and after septoplasty at 3 months. The study protocol and design were approved by the Clinical Research Ethics Committee of Giresun Training and Research Hospital (approval number 18.12.2023/10).

To visualize the nasal septum and valves, anterior rhinoscopy with a nasal speculum was performed. However, for a more comprehensive examination, flexible or rigid nasal endoscopy was used alongside it. The location, degree, and direction of the septal deviation were identified through examination. The presence of concomitant nasal pathologies was comprehensively evaluated using paranasal sinus CT imaging (Fig. 1).

According to the ACR 2016 Revised FM Diagnostic Criteria, the patients' widespread pain and symptom severity scores were calculated, and those who met the diagnostic criteria were diagnosed with FM. In this criteria, 3 conditions must be met to diagnose FM: symptoms must have been present at a similar severity for 3 months, and there must be a widespread pain index ≥ 7 and a symptom severity scale of ≥ 5 points or a widespread pain index 4 to 6 and a symptom severity scale of ≥ 9 points; there should be pain in all 4 of the generalized pain zones. Generalized pain index areas are divided into upper right, upper left, axial, lower right, and lower left. The chin, chest, and abdominal areas are included in the common pain index areas but are excluded from the definition of generalized pain. The symptom severity scale evaluates fatigue, waking up without rest and cognitive symptoms in the last week, and headache, lower abdominal pain, and depression in the last 6 months.[14] The Revised Fibromyalgia Impact Questionnaire (FIQR) was filled out to evaluate the patients' FM symptoms and quality of life. FIQR provides information on function, overall impact, and symptoms in FM patients.[27] It has 21 questions and differs

Figure 1. Coronal paranasal computed tomography scan of a patient with nasal septal deviation.

from the fibromyalgia impact questionnaire in including questions about memory, sensitivity, balance, and environmental sensitivity. All questions in the survey are scored between 0 and 10 points. Automatic score calculation in a computer environment makes it widely available.

The Pittsburgh Sleep Quality Index (PSQI) was used to assess the sleep quality of patients. PSQI is a scale developed by Buysse et al[28] that provides a quantitative measure of sleep quality in order to identify good and bad sleep. The total index score ranges from 0 to 21. A total score of 5 or above indicates poor sleep quality.

2.1. Statistical analysis

Sample size was determined by a power analysis based on previous studies. As a result of the power analysis using the G*Power program, the effect size was found to be d: 0.683, standard deviation (SD): 8.2, power: 0.80, and $P = .05$, and the minimum number of participants was 35. Statistical analysis was performed using SPSS, version 23.0 (IBM Corporation). Continuous variables were expressed as mean ± SD and median (minimum–maximum), while categorical variables were reported in terms of number and frequency. The assessment of normality was analyzed using the Shapiro–Wilk test. To compare delta changes in FM-related scores and PSQI scores after septoplasty between the 2 groups (with and without FM), an independent samples *t* test or Mann–Whitney *U* test was employed according to the normality of data. To compare the pretreatment and posttreatment data, an in-group paired sample *t* test or Wilcoxon test was used according to the normality of the data. The correlation between PSQI and symptom severity scale, widespread pain index, total score, and FIQR scores was assessed using the Spearman correlation test since the assumption of normality was not met. A *P* value of < 0.05 was considered statistically significant.

3. Results

Thirty-five patients, 21 (60.0%) male and 14 (40.0%) female, were accepted to the study. The average age of the patients was 27.69 ± 7.96 years. Nine (25.9%) patients had FM at the beginning, of whom 5 were women (55.6%) and 4 were men (44.3%), and none of the patients met the FM criteria after the surgery. A slight correlation was found between PSQI and symptom severity scale, and a moderate correlation was found between PSQI and FIQR scores of the patients before surgery ($R = 0.335$, $P = .049$; $R = 0.699$, $P < .001$, respectively).

Widespread pain, symptom severity, total scores, and PSQI and FIQR scores of the patients before and after septoplasty are shown in Table 1 and Figure 2. After septoplasty, a statistically significant decrease was detected in the patients' widespread pain index, symptom severity scale, total score, and PSQI and FIQR scores ($P = .006$, $P = .004$, $P = .028$, $P = .014$, and $P < .001$, respectively). When FM conditions and the sleep quality of patients with and without FM were evaluated before and after surgery, there were significant differences in widespread pain index, symptom severity scale, and total score. However, differences in FIQR and PSQI scores were not significant (Table 2).

4. Discussion

This study investigated the potential impact of septoplasty on FM symptoms in patients with septum deviation. Our findings suggest a promising association, with a statistically significant improvement in all pain scores (widespread pain index, symptom severity scale, and total score) following septoplasty. Additionally, FIQR scores, reflecting functional limitations due to FM, also demonstrated a significant decrease after surgery.

FM is a syndrome whose cause is not fully elucidated. It is accompanied by many symptoms, such as chronic widespread pain, morning stiffness, headache, irritable bowel syndrome, hypermobility syndrome, fatigue, sleep disturbance, cognitive dysfunction, and depressive episodes.[29,30] FM patients constitute the second- or third-largest group followed and treated in rheumatology clinics.[31,32] Many factors negatively affect the quality of life in FM, among which sleep disorders have an important place. Most patients with FM complain of restless sleep, nocturnal awakening attacks, and increased pain after sleep. In electroencephalography studies, it was observed that alpha waves were mixed in with the delta waves seen in the fourth phase of non-rapid eye movement) sleep, and the delta wave frequency decreased; it has been suggested that this causes fatigue and psychological disorders.[33,34] In addition, sleep affects the circadian rhythm, and the immune response under the control of the circadian rhythm favors the inflammatory aspect in FM accompanied by sleep disturbance. In line with this information, a hypothesis can be created that the physiological correction of situations that may cause sleep disturbance can improve FM symptoms. In our study, it was found that FM scores were higher before surgery in patients with NSD, an important cause of sleep disturbance. A previous study has shown that sleep disorders such as obstructive night apnea syndrome and upper airway obstruction are common in FM patients, but the treatment of these disorders has no effect on FM symptoms.[35] Unlike this previous study, in our study, it was observed that the FM symptoms of patients with a deviated septum decreased after surgery. A more detailed examination of FM symptoms according to the new criteria may have led to this result, because the new criteria include an evaluation of the patient's painful areas as well as fatigue, sleep disturbance, and cognitive factors, and also question somatic symptoms.

Septoplasty is most commonly performed to correct a deviated septum when it significantly obstructs nasal breathing.[36] Septum deviation causes conditions such as sleep disorders and snoring due to inadequate breathing as a result of nasal obstruction. Patients with nasal obstruction have higher rates of depression and anxiety.[37] Additionally, conditions such as headache and facial pain that may accompany nasal obstruction could also be factors that impair quality of life. In a study conducted to evaluate the quality of life in patients with nasal obstruction, the anxiety and depression levels of the patients were examined, and lower scores were obtained after surgery.[38] Waking up without rest, jaw pain (which is included in facial pain), headache, and depression are also among the conditions included in the ACR 2016 FM

Table 1

Widespread pain index, symptom severity scale, total score, and FIQR and PSQI scores before and after surgery.

	Before surgery		After surgery		
	Mean ± SD	Median (min–max)	Mean ± SD	Median (min–max)	*P* value
Widespread pain index	1.91 ± 2.64	0 (0–7)	0.46 ± 0.95	0 (0–3)	.006*
Symptom severity scale	4.49 ± 3.19	5 (0–10)	4.11 ± 3.05	4 (0–12)	.004†
Total score	6.40 ± 5.20	6 (0–15)	4.57 ± 3.53	4 (0–15)	.028†
FIQR	19.31 ± 12.69	19.00 (0–47.33)	15.19 ± 9.08	15 (0–36.17)	<.001†
PSQI	6.29 ± 3.33	6 (4–8)	4.83 ± 2.74	4 (3–7)	.014*

FIQR = Revised Fibromyalgia Impact Questionnaire, PSQI = Pittsburgh Sleep Quality Index.
*Wilcoxon test.
†Paired sample *t* test.

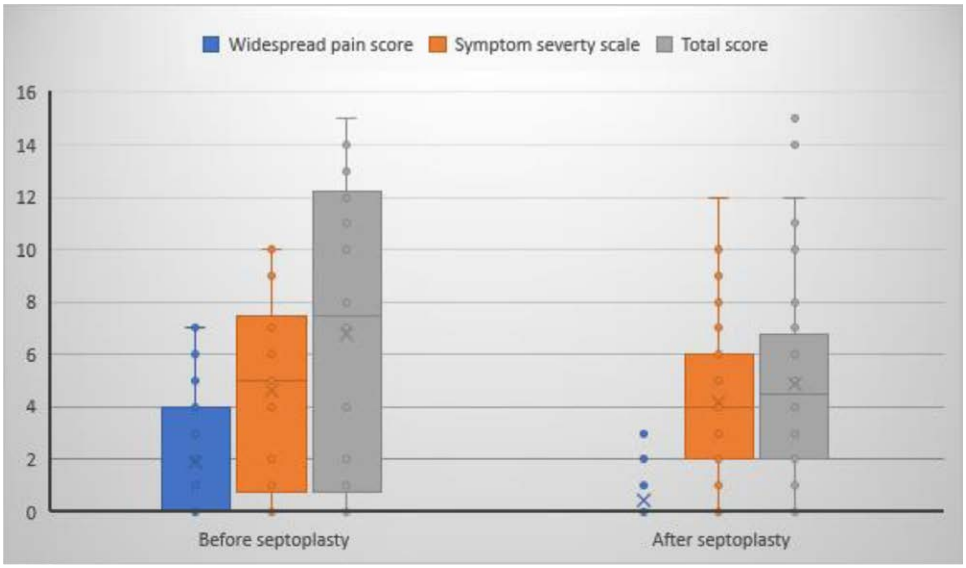

Figure 2. Widespread pain score, symptom severity scale, and total score before and after septoplasty.

Table 2

Comparison of preoperative and postoperative differences in widespread pain index, symptom severity scale, total score, and FIQR and PSQI scores of patients with septal deviation with and without FM.

	With FM		Without FM		
	Mean ± SD	Median (min–max)	Mean ± SD	Median (min–max)	*P* value*
Widespread pain index	5.56 ± 1.59	6 (3.0 to 7.0)	0.04 ± 1.25	0 (–3.0 to 3.0)	<.001
Symptom severity scale	2.44 ± 2.60	5 (–1.0 to 6.0)	–0.35 ± 3.10	0 (–8.0 to 5.0)	.020
Total score	8.00 ± 1.94	8 (6 to 12)	–0.31 ± 3.94	0 (–11.0 to 7.0)	<.001
FIQR	6.48 ± 9.27	11.00 (–7.67 to 17.00)	3.31 ± 10.18	4.08 (–13.34 to 25.50)	.317
PSQI	1.11 ± 2.71	1.00 (–3.0 to 7.0)	1.58 ± 3.13	1.0 (–4.0 to 8.0)	.818

FIQR = Revised Fibromyalgia Impact Questionnaire, FM = Fibromyalgia, PSQI = Pittsburgh Sleep Quality Index.
*Mann–Whitney *U* test.

Diagnostic Criteria. Therefore, these conditions may pose a risk for FM in patients with NSD. The treatment of FM, which has a complex etiopathogenesis, is also very difficult. Most supported treatment protocols are methods that treat FM as a systemic disease. However, identifying and eliminating conditions that respond to FM should also be considered part of the treatment. These situations may be caused by psychological and also nonpsychological factors. Ciaffi et al[39] reported worse foot function index scores in the presence of FM in patients with conditions that cause pain in the foot and ankle. Another study found a relationship between overactive bladder and FM.[40] Consistent with these results, in the current study, patients diagnosed with FM before septoplasty did not meet the diagnostic criteria after surgery. In addition, symptom severity scales, which evaluate conditions such as fatigue, waking up from rest, cognitive symptoms, headache, and depression, also decreased significantly after surgery. Orofacial pain is an important comorbid condition that may accompany nasal obstruction.[41] Mouth breathing, adaptive head posture, muscle fatigue, and temporomandibular joint pathologies may be sources of this pain. These conditions may cause pain in the jaw area or may spread to areas such as the shoulder girdle and upper extremities. Based on this result, in our study, widespread pain indexes of patients

with NSD were found to be higher before surgery than after surgery.

Soler et al[42] investigated whether patients with chronic rhinosinusitis and concomitant FM experienced an improvement in their quality of life following endoscopic sinus surgery. The study's findings showed that patients who had chronic rhinosinusitis and concomitant FM experienced depression to a higher degree and had lower baseline quality of life scores compared to other chronic rhinosinusitis patients. They also reported that even though patients with FM started with lower quality of life scores, they experienced significant improvements in most sinus-related quality of life measures after surgery. These improvements were comparable to those seen in patients without FM, suggesting similar benefits from the surgery. A study by Erdivanli et al[43] demonstrated improvements in acoustic rhinometry and rhinomanometry measurements, as well as symptom scores and quality of life, following septoplasty. The investigation by Muthubabu et al[44] revealed that the Nasal Obstruction Symptom Evaluation scale is a highly effective tool in evaluating the preoperative symptoms of patients undergoing septoplasty. Gratifyingly, all participants in the study exhibited a substantial improvement in their overall quality of life 8 weeks after surgery. Furthermore, the study highlighted facial pain as another significant preoperative symptom that demonstrably improved following surgery. The findings of the study by Muthubabu et al strongly support the continued relevance of septoplasty as a surgical intervention for achieving significant symptomatic improvement and promoting a healthier lifestyle. An improvement in PSQI scores was observed after septoplasty, supporting a previous study. Deveci et al[45] also showed a significant improvement in PSQI after nasal surgery. Septoplasty is also a treatment method that improves quality of life, including sleep.[46] Based on these results, an improvement in sleep quality may also explain the improvement in the symptoms of FM, as sleep has an important place in the etiology. These results suggest that addressing nasal obstruction via septoplasty may contribute to an overall alleviation of pain and functional limitations in patients experiencing NSD alongside FM-like symptoms. In our study, it was observed that patients with NSD saw an improvement in their quality of life and sleep quality after septoplasty.

Although this is an important study providing information about the effects of septoplasty on FM symptoms, it does have some limitations. While FM is more prevalent among females, the majority of participants in our study were male. Additionally, the sample size was limited, and follow-up time was insufficient. FIQR, a scale that evaluates FM patients, was also applied to patients who did not meet FM criteria in our study. Based on these observations, future studies with a large sample size and long period can examine the incidence of FM by following patients after septoplasty in the long term.

In summary, the effect of surgical correction for septum deviation on FM symptoms was studied for the first time, and it was observed that there was an improvement in FM symptoms after surgery. Although septoplasty alone cannot eradicate FM, it can be incorporated into a comprehensive treatment plan to potentially alleviate FM symptoms, improve nasal breathing, and thereby elevate patients' quality of life. However, further research with larger, well-designed trials is warranted to confirm these findings, elucidate the underlying mechanisms, and establish septoplasty as a potential treatment option for this patient population. The precise mechanisms by which septoplasty might improve FM-related symptoms remain unclear. Future research should explore potential pathways such as improved sleep quality due to better breathing, reduced inflammatory responses, or modulations to the central nervous system.

Author contributions

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