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Evaluation of the Impacts of Surgical Removal of Impacted Teeth on Alterations of the Mood with Beck Depression Inventory

Mustafa Sami Demirsoy[1-a], Aras Erdil[2-b]*, Sefa Çolak[3-d], Mehmet Kemal Tümer[4-e]

[1]*Department of Oral and Maxillofacial Surgery, Faculty of Dentistry, Sakarya University, Sakarya, Turkey*
[2]*Department of Oral and Maxillofacial Surgery, Faculty of Dentistry, Uşak University, Uşak, Turkey*
[3]*Department of Oral and Maxillofacial Surgery, Faculty of Dentistry, Tokat Gaziosmanpaşa University, Tokat, Turkey*
[4]*Department of Oral and Maxillofacial Surgery, Faculty of Dentistry, Alanya Alaaddin Keykubat University, Antalya, Turkey*
**Corresponding author*

Research Article

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ABSTRACT

Objectives: To determine whether the inflammatory complications following impacted third molar surgeries and varying surgical difficulties impact individuals' mood alterations.
Materials and Methods: A prospective, double-blind, observational study was designed with three study groups (slightly, moderate, and very difficult) constituted with surgical difficulty scores. The participants were evaluated preoperatively and postoperatively on the sixth hour, second and seventh days. The visual analog scale (VAS) and Beck depression scale (BDS) scores, maximal mouth opening, and swelling amounts were recorded.
Results: A total of 75 patients were enrolled and divided into three study groups with an equal number of participants.
The preoperative mean BDS scores of the study groups (slightly, moderate, very difficult) were 9.16, 7.16, and 8.12, and mean VAS scores were 2.86, 1.4, and 1.56, respectively. A significant correlation was observed between the surgical difficulty and the increased BDS scores on the second and seventh postoperative days. Significant correlations were observed between surgical difficulty and VAS scores and maximum mouth opening amounts on the second postoperative day. Also, postoperative swelling amounts were significantly affected by surgical difficulty on the postoperative second day. The impact of surgical difficulty and inflammatory complication-related factors on the postoperative BDS scores' increase was also evaluated, and the postoperative pain, trismus, swelling, and operation time correlated.
Conclusion: The surgical removal of impacted molar teeth has significant effects on alterations in mood. It would be beneficial to consider different aspects of the postoperative term that the patient will experience in third molar surgeries.

Keywords: Lower Third Molar, Inflammatory Complications, Beck Depression Inventory, Surgical Removal

Beck Depresyon Ölçeği ile Etki Dişlerin Cerrahi Olarak Çekilmesinin Ruh Durum Değişiklikleri Üzerindeki Etkilerinin Değerlendirilmesi

Süreç

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ÖZ

Amaç: Cerrahi üçüncü molar çekimleri sonrası oluşan enflamatuvar komplikasyonların ve farklı çekim zorluklarının bireylerin duygu durum değişikliklerine olan etkilerini belirlemek.
Gereç ve Yöntemler: Cerrahi zorluk skorlarına göre oluşturulan üç çalışma grubu (kolay, orta ve zor) ile prospektif, çift-kör, gözlemsel bir çalışma tasarlanmıştır. Katılımcılar preoperatif, postoperatif altıncı saat, ikinci ve yedinci günlerde değerlendirilmiştir. Vizüel analog skala (VAS) ve Beck depresyon ölçeği (BDS) skorları, maksimum ağız açıklığı ve şişlik miktarları kaydedilmiştir.
Bulgular: Çalışmaya dahil edilen 75 hasta her bir grupta eşit sayıda katılımcı yer alacak şekilde üç çalışma grubuna ayrılmıştır.
Çalışma gruplarının (kolay, orta, zor) sırasıyla preoperatif ortalama BDS skorları 9,16, 7,16 ve 8,12 iken ortalama VAS skarları 2,86, 1,4 ve 1,56'dır. Postoperatif ikinci ve yedinci günlerde BDS skorlarındaki artış ile cerrahi zorluk arasında anlamlı ilişki görülmüştür. Cerrahi zorluk ile VAS skorları ve maksimum ağız açıklığı miktarları arasında postoperatif ikinci günde anlamlı korelasyon gözlenmiştir. Ayrıca postoperatif ikinci günde cerrahi zorluk ile kaydedilen şişlik arasında anlamlı ilişki görülmüştür. Cerrahi zorluk ve enflamatuvar komplikasyonlarla ilişkili faktörlerin postoperatif BDS skorlarının artışı üzerine etkileri de incelenmiş ve artış ile postoperatif ağrı, trismus, şişlik ve operasyon süresinin korele olduğu gözlenmiştir.
Sonuçlar: Gömülü üçüncü molarların cerrahi çekimlerinin duygu durum değişikliklerine anlamlı etkileri vardır. Üçüncü molar cerrahilerinde hastaların deneyimleyeceği postoperatif sürecin farklı yönlerinin de değerlendirilmesi faydalı olacaktır.

Anahtar Kelimeler: Azı Dişi, Üçüncü, Enflamatuvar Komplikasyonlar, Beck Depresyon Envanteri, Cerrahi Çekim

[a] *xdemirsoy@hotmail.com* *https://orcid.org/0000-0001-8654-2799*
[b] *erdil.aras@gmail.com* *https://orcid.org/0000-0002-9582-5114*
[c] *dr.sefacolak@gmail.com* *https://orcid.org/0000-0002-0807-9089*
[d] *dr_kemaltumer@yahoo.com* *https://orcid.org/0000-0002-6250-0954*

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Introduction

Most of the third molars do not follow regular eruption patterns and remain impacted.[1] Nearly half of the third molars cannot obtain a vertical position on the dental arch and remain impacted in the mesioangular position.[2] Most individuals require at least one impacted molar surgically removed at some point in their lives due to complaints related to them. Therefore, surgical removal of impacted third molars is one of the most common interventions performed by oral surgeons in an outpatient setting.[3]

Complications are observed after surgical extraction of third molars. Some of these complications are postoperative inflammatory complications such as swelling, pain, trismus, and mild bleeding. According to the literature, these complication rates range from 3 to 30%.[4] Although severe and persistent complications such as postoperative infection, mandibular fracture, inferior alveolar nerve damage, and alveolar osteitis can be observed, their frequency is rare.[5] Although the inflammatory complications due to tissue damage are tried to be controlled with local measures and pharmacological treatments, they cause a decrease in the quality of life of the patients and postoperative discomfort.[6] Although controversial, studies indicating a correlation between surgical difficulty and the severity of postoperative complications.[7–9] In the literature, the number of studies investigating the effects of different methods and pharmacological agents on quality of life in the postoperative period is increasing.[10–12]

The Beck depression scale (BDS), developed in 1961, targets the assessment of depression in psychiatric disorders.[13] BDS is one of the most widely used and empirically validated questionnaires for screening for depression.[14] The scale was derived from clinical observations of attitudes and symptoms commonly seen in depressed and non-depressed psychiatric patients. From these observations, 21 items were determined, and these items were graded between 0-3 points according to their severity. The lowest possible score is 0, and the highest score is 63.[13] Also, BDS is used to measure the depression level of adults with different disorders and symptoms.[15,16]

Although there are studies in the literature investigating the surgical stress during surgical removal of impacted teeth[17], postoperative quality of life[6], and the frequency of complications experienced[4], only one study investigated the difficulty of surgical extraction and the level of depression.[18]

This study aims to examine the alterations in the mood due to inflammatory complications after surgical removal of impacted third molars and investigate the impact of surgical difficulty on the inflammatory complications. The study's null hypothesis is that there will be a correlation between the surgical difficulty scores and the severity of inflammatory complications and alterations in the mood.

Material and Methods

Patients who had an appointment for surgical extraction of impacted mandibular third molars at the Oral and Maxillofacial Surgery Clinic in the Faculty of Dentistry, Tokat Gaziosmanpaşa University, were included in the study. The Helsinki Declarations were considered and followed through the study. The study protocol was approved by the Tokat Gaziosmanpaşa University, Clinical Research Ethical Committee before the inclusion of the patients (Protocol number: 19-KAEK-142). All patients signed the informed consent for participation in the study. The current study was conducted in accordance with TREND guidelines.[19]

Inclusion criteria were: patients aged between 18-65 years requiring surgical removal of one mandibular third molar. Exclusion criteria were: outside the targeted age range, systemic diseases (ASA II or higher), autoimmune diseases, immunosuppressed, malignancies, clinical conditions that contraindicate the surgical removal of third molars, and preoperative BDS scores above 20.

Surgical difficulty scores of the impacted third molars were determined according to the Pederson difficulty index[20], and the postoperative measurements regarding inflammatory complications were obtained by the same investigator (AE). According to the surgical difficulty index scoring, the mandibular third molars with 1, 2, 3, and 4 scores were determined as the slightly difficult group, those with 5, 6, and 7 scores as the moderately difficult group, and those with 8, 9, and 10 scores as the very difficult group. The determined scores were rechecked by another investigator independent of the study design. Third molar teeth were excluded from the study, which could not agree on the determining difficulty scores.

BDS was administered to the participants by an investigator (SC) who did not know surgical difficulty scores pre-and postoperatively. Also, the operating surgeon (MSD) was unaware of the scored surgical difficulty and BDS scores. All interventions were performed by the same investigator (MSD). In addition, the time from incision to completion of the operation in minutes was recorded by the operating investigator in all interventions. The study was designed as a double-blind, prospective clinical study, as the participants did not know their groups.

Inferior alveolar nerve, lingual nerve, and long buccal nerve blocks were administered with 40 mg/ml articaine ve 0.01 mg/ml epinephrine containing 2 ml local anesthetic solutions. In the slightly difficult group, mucosal flaps were elevated following a sulcular incision. In moderately and very difficult groups, the full-thickness flaps were raised as described by Alcântara *et al.*[21] In cases required, bone removal and tooth sectioning were performed using round carbide and flat fissure carbide burs. Third molars were removed with Bein elevators, and if a flap was elevated, the wound was sutured with 3-0 silk sutures.

All participants were prescribed the same postoperative medications (25 mg dexketoprofen trometamol BID and chlorhexidine digluconate+ benzydamine hydrochloride mouthwash for seven days). In cases where bone removal was performed, antibiotics (500 mg amoxicillin and 125 mg clavulanic acid BID during seven days) were prescribed to the patients.

In order to monitor the pain, which is one of the postoperative inflammatory complications, the patients were asked to mark the severity of pain on a 1 cm equally spaced, 10 cm long visual analog scale (VAS) preoperatively, at the 6th hour, 2nd, and 7th days postoperatively. VAS scores were classified as mild pain in the range of 0-3 cm, moderate in the range of 3.1-6.9 cm, and severe pain in the range of 7-10 cm.

The amount of swelling was calculated by taking the average of the distance between the lateral canthus-angulus mandibulae and the distance between the lateral commissure-tragus of the operated side in millimeters on the preoperative, postoperative 2nd, and 7th days. The increase in swelling compared to preoperative measurements was calculated and classified as a percentage. According to this classification, an increase of less than 5% was considered mild, 5-10% was considered moderate, and more than 10% was considered severe swelling.

Maximum mouth openings of the participants were measured to determine the amount of trismus that occurred in the postoperative period compared to the preoperative period. The distance between the right upper and lower incisors was measured and recorded in millimeters on preoperative, postoperative 2nd, and 7th days. The decrease in maximum mouth opening compared to preoperative measurement was calculated and classified as a percentage. According to this classification, a decrease of less than 20% was considered mild, a decrease of 20-40% was considered moderate, and an increase of more than 40% was considered severe trismus.

The alterations that may occur in the mood of the patients who were evaluated with preoperative BDS due to inflammatory complications was tried to be determined by repeating the scale on the 2nd and 7th postoperative days. The total BDS scores, 0-10, were interpreted as no depression, 11-16 mild depression, 17-20 borderline clinical depression, 21-30 moderate depression, 31-40 severe depression, 41 and above severe depression.[16]

However, since the diagnosis of depression was outside the scope of the study and required expertise in the field of psychiatry, the BDS total scores above 10 were used to evaluate alterations in the mood.

The obtained data were analyzed IBM SPSS version 22 (IBM Corp; Armonk, NY, USA). The normal distributions of the obtained data were analyzed with the Shapiro-Wilk test. Also, validation was done with Skewness and Kurtosis values. The homogeneous distribution of variances was checked.

Preoperative mouth opening, preoperative swelling, maximum mouth opening on postoperative 2nd and 7th days, swelling on postoperative 2nd and 7th days, and postoperative 2nd day pain values were analyzed by Analysis of variance (ANOVA) test because they demonstrated normal distribution.

Preoperative BDS and pain scores, postoperative 2nd day BDS scores, postoperative 7th day BDS scores, mouth opening, and pain values were analyzed with the Kruskal Wallis test as they did not show normal distribution.

In addition, the chi-square test was used to compare grouped data of the study variables.

Finally, multiple linear regression analysis was utilized to determine the variables that significantly affected BDS scores. Independent variables were determined as patients' gender, pain, swelling, trismus, and surgical difficulties (slight, moderate, and very difficult). *p* values of less than .05 were considered significant.

Results

A total of 75 patients, 37 male and 38 female were included in the study. The mean age was 26 years with a standard deviation (SD) of 4.6 years. Participants were divided into three groups based on surgical difficulties, with an equal number of participants in each group (slightly difficult= 13 m, 12 f, moderately difficult= 12 m, 13 f, and very difficult group= 12 m, 13 f.). Descriptive statistics of the study population are presented in Table 1.

BDS Scores

Compared to the preoperative BDS scores, the mean scores of the patients in the slightly difficult group increased from 9.16±5.62 to 11.96±5.09, in the moderate difficulty group increased from 7.16±4.60 to 12.64±5.03, and in the very difficult group increased from 8.12±4.22 to15.68±3.91 on the second postoperative day.

Compared to the BDS scores on the second postoperative day, the patients' mean scores in the slightly difficult group decreased to 6.20±4.75, in the moderate difficulty group decreased to 9.64±5.33, and in the very difficult group decreased to 12.24±5.08 on the seventh postoperative day.

Median and range values of the BDS scores for the slightly difficult group on the preoperative, postoperative second, and seventh days were 11, 12, 4, and 19, 19, 17, respectively. For the moderate difficulty group, the same values were 6, 14, 11, and 16, 19, 18. For the very difficult group, the median and range values were 6, 14, 11, and 16, 19, 18.

On the second postoperative day, 16 patients in the slightly difficult group, 19 patients in the moderate difficulty group, and 24 patients in the very difficult group had BDS scores above 10. On the 7th postoperative day, the BDS scores of 7 patients in the slightly difficult group, 13 patients in the moderate difficulty group, and 18 patients in the very difficult group continued to be above 10

A statistically significant correlation was observed between the surgical difficulty and the alterations in the mood on the second and seventh postoperative days (p=0.02 / p=0.008) and increases in the means of the BDS scores (p=0.015/p=0.001) (Table 2).

VAS Scores

Compared to the postoperative sixth hour mean VAS scores, on the second postoperative day, the scores of the patients in the slightly difficult group ranged from 2.86±2.16 to 2.90 ± 2.15, in the moderate difficulty group ranged from 1.40 ± 1.94 to 3.78±2.60, and in the very difficult group increased from 1.56±2.35 to 4.74±1.89.

Compared to the VAS scores on the second postoperative day, patients' mean sores in the slightly difficult group decreased to 0.28±0.50, in the moderate difficulty group decreased to 1.43±2.07, and in the very difficult group decreased to 1.22±1.99 on the seventh postoperative day. Median and range values of the VAS scores for the slightly difficult group on the preoperative, postoperative second, and seventh days were 3, 3, 0, and 6, 7, 2, respectively. For the moderate difficulty group, the same values were 0, 3, 0, and 7, 10, 6. For the very difficult group, the median and range values were 0, 5, 0, and 8, 9, 7.

When the VAS scores were classified as mild, moderate, and severe, on the second postoperative day in the slightly difficult group, 16 patients had mild, 8 patients had moderate, and 1 patient had severe pain. In the moderate difficulty group, 13 patients had mild, 6 had moderate, and 6 had severe pain. In the very difficult group, 6 patients had mild, 14 had moderate, and 5 had severe pain.

Table 2. Comparison between the surgical difficulty and alterations in mood (BDS scores)

Variables		Surgical Difficulty			*p* values
		Slight (n=25)	Moderate (n=25)	Very (n=25)	
Postoperative 2nd day	(0< BDS<10)	9 (36%)	6 (24%)	1 (4%)	0.020*
	(BDS>10)	16 (64%)	19 (36%)	24 (96%)	
	Mean	11.96	12.64	15.68	
	SD	5.08	5.03	3.91	0.015‡
	SE	1.01	1.00	0.78	
Postoperative 7th day	(0<BDS<10)	18 (72%)	12 (48%)	7 (28%)	0.008*
	(BDS>10)	7 (28%)	13 (52%)	18 (72%)	
	Mean	6.20	9.64	12.24	
	SD	4.75	5.33	5.07	0.001+
	SE	0.95	1.06	1.01	
	Q1	3	4	11	
	Q2 (Median)	7	11	14	
	Q3	7.5	14	16	

*denotes p values obtained by chi-square (χ2), ‡ ANOVA, and + Kruskal-Wallis tests. SD:Standard deviation, SE:Standard error

Table 3. Comparison between the surgical difficulty and postoperative pain

VAS Score classes and Mean values		Slightly difficult	Moderate Difficulty	Very Difficult	Total (n)	*p* values
Postoperative 2nd day	Mild (0<VAS<3)	16 (64%)	13 (52%)	6 (24%)	25	
	Moderate (3.1<VAS<6.9)	8 (32%)	6 (24%)	14 (56%)	25	0.019 *
	Severe (7<VAS<10)	1 (4%)	6 (24%)	5 (20%)	25	
	Mean	2.9	3.78	4.74		
	SD	2.14	2.59	1.88		0.018
	SE	0.42	0.51	0.37		‡
	n	25	25	25	75	
Postoperative 7th day	Mild (0<VAS<3)	25 (100%)	18 (72%)	19 (76%)	25	
	Moderate (3.1<VAS<6.9)	0	7 (28%)	5 (20%)	25	0.042 *
	Severe (7<VAS<10)	0	0	1 (4%)	25	
	Mean	0.27	1.43	1.22		
	SD	0.49	2.06	1.99		
	SE	0.09	0.41	0.39		
	Q1	0	0	0		0.360 +
	Q2 (Median)	0	0	0		
	Q3	0.5	4	2.5		
	n	25	25	25	75	

* denotes p values obtained by chi-square (χ2), ‡ ANOVA, and + Kruskal-Wallis tests. SD:Standard deviation, SE:Standard error

On the seventh postoperative day, in the slightly difficult group, all patients reported mild pain; in the moderate difficulty group, 18 patients had mild, 7 patients had moderate pain, and in the very difficult group, 19 patients had mild, 5 patients had moderate, and 1 patient had severe pain.

A significant correlation was found between the surgical difficulty and the classification of postoperative VAS scores on the second and seventh days (p=0.019/p=0.042). While there was a significant relationship between the surgical difficulty groups and the mean VAS scores on the postoperative second day (p=0.018), no significant relationship was found on the postoperative seventh day (p=0.360) (Table 3).

Swelling

Compared to the preoperative measurements, the mean swelling amount of the patients in the slightly difficult group on the second postoperative day increased from 106.45±4.76 mm to 110.82±4.99 mm, in the moderate difficulty group increased from 106.86±7.56 mm to 115.42±6.36 mm, and in the very difficult group increased from 106.24±7.64 mm to 116.60±8.13 mm.

Compared to the second postoperative day, the mean swelling amounts of the patients in the slightly difficult group decreased to 107.28±4.77 mm, in the moderate difficulty group decreased to 109.96±6.27 mm, and in the very difficult group decreased to 109.88±7.25 mm on the seventh postoperative day.

Median and range values of the swelling amounts for the slightly difficult group on the preoperative, postoperative second, and seventh days were 106.5 mm, 111 mm, 108mm, and 16.5 mm, 18 mm, 20 mm, respectively. For the moderate difficulty group, the same values were 107.5 mm, 116 mm, 111 mm, and 29.5 mm, 22.5 mm, 25 mm. For the very difficult group, the median and range values were 105 mm, 115 mm, 108 mm, and 27.5 mm, 31 mm, 26 mm.

When the increase in swelling amounts was classified as mild, moderate, and severe, on the second postoperative day, in the slightly difficult group, 18 patients had mild, 6 patients had moderate, and 1 patient had severe swelling. In the moderate difficulty group, 6 patients had mild, 12 moderate, and 7 patients had severe swelling. In the very difficult group, 12 patients had moderate, and 13 patients had severe swelling.

On the seventh postoperative day, in the slightly difficult group, all patients reported mild swelling; in the moderate difficulty group, 20 patients had mild, 4 patients had moderate, 1 patient had severe swelling, and in the very difficult group, 19 patients had moderate, and 6 patients had severe swelling.

A significant correlation was found between the surgical difficulty, the classification, and mean amounts of postoperative swelling on the second postoperative day. (p=0.000/p=0.007). However, there was no significance between the surgical difficulty and the mean and grouped swelling on the postoperative seventh day (p=0.073/p=0.225) (Table 4).

Trismus

Compared to the preoperative measurements, the mean amount of MMO in the slightly difficult group on the second postoperative day decreased from 44.24±3.19 mm to 31.68±5.62 mm, in the moderate difficulty group decreased from 43.76±3.60 mm to 28.88±5.53 mm, and in the very difficult group decreased from 42.88±4.17 mm to 25.16±6.32 mm.

Table 4. Comparison between the surgical difficulty and postoperative swelling (mm)

Swelling amount classes and Mean values		Slightly difficult	Moderate Difficulty	Very Difficult	Total (n)	p values
Postoperative 2nd day	Mild (<4.99%)	18 (72%)	6 (24%)	1 (4%)	25	0.000 *
	Moderate (5<-<9.99%)	6 (24%)	12 (48%)	7 (28%)	25	
	Severe (10%<)	0	12 (48%)	13 (52%)	25	
	Mean	110.82	115.42	116.66		0.007 ǂ
	SD	4.98	6.35	8.12		
	SE	0.99	1.27	1.62		
	n	25	25	25	75	
Postoperative 7th day	Mild (<4.99%)	25 (100%)	0	0	25	0.073 *
	Moderate (5<-<9.99%)	20 (80%)	4 (16%)	1 (4%)	25	
	Severe (>10%)	19 (76%)	6 (24%)	0	25	
	Mean	107.28	109.96	109.88	109.04	0.225 +
	SD	4.76	6.26	7.25	6.22	
	SE	0.95	1.25	1.45	0.71	
	Q1	104	104.5	104		
	Q2 (Median)	108	111	108		
	Q3	110	114	116.5		
	n	25	25	25	75	

* denotes p values obtained by chi-square (χ2), ǂ ANOVA, and + Kruskal-Wallis tests. SD:Standard deviation, SE:Standard error

Compared to the second postoperative day, the mean amounts of MMO in the slightly difficult group increased to 43.36±2.64 mm, in the moderate difficulty group increased to 37.88±3.97 mm, and in the very difficult group increased to 35.28±5.40 mm on the seventh postoperative day.

Median and range values of the maximum mouth opening amounts for the slightly difficult group on the preoperative, postoperative second, and seventh days were 45 mm, 32 mm, 44 mm, and 15 mm, 20 mm, 11 mm, respectively. For the moderate difficulty group, the same values were 44 mm, 28 mm, 38mm, and 14 mm, 19 mm, 18 mm. For the very difficult group, the median and range values were 43 mm, 25 mm, 37 mm, and 13 mm, 23 mm, 19 mm.

When the trismus rates were classified as mild, moderate, and severe, on the second postoperative day, in the slightly difficult group, 6 patients had mild, 14 patients had moderate, and 5 patients had severe trismus. In the moderate difficulty group, 2 patients had mild, 13 patients had moderate, and 10 patients had severe trismus. In the very difficult group, 2 patients had mild, 7 patients had moderate, and 16 patients had severe trismus.

On the seventh postoperative day, in the slightly difficult group, all patients reported mild trismus; in the moderate difficulty group, 18 patients had mild, 6 patients had moderate, 1 patient had severe trismus, and in the very difficult group, 18 patients had mild, and 6 patients had moderate, and 1 patient had severe trismus. When the classified postoperative trismus rates were compared by surgical difficulty, a significant correlation was found on the second postoperative day (p=0.021) but not on the seventh postoperative day (p=0.072). A significant relationship was also found between the surgical difficulty and the mean amounts of MMO on the second (p=0.001) and seventh (p=0.000) postoperative days (Table 5).

The possible effects of gender, operation time, mouth opening and swelling amounts, VAS scores, and surgical difficulty (independent variables) on the change between preoperative BDS scores and postoperative second and seventh day BDS scores (dependent variable) were examined by multiple linear regression analysis. The analysis results revealed that operation time, MMO amounts, VAS scores, and surgical difficulty effectively increased BDS scores on the second postoperative day. On the seventh postoperative day, the analysis indicated that VAS scores had no effect, but MMO amounts, operation time, and surgical difficulty were effective. (R^2 = 0.311; Adjusted R^2 = 0.250; F= 5.118 (P = 0.000). R^2 = 0.299; Adjusted R^2 = 0.247; F= 4.831 (P = 0.000)) (Table 6).

Discussion

According to the present study results, postoperative inflammatory complications and surgical difficulties of impacted teeth affected mood alterations in patients who underwent surgical removal of impacted teeth. While the pain and operation time variables were effective on the BDS scores on the second postoperative day, swelling and trismus continued to affect the BDS scores on the seventh day. As such, the null hypothesis can be accepted despite the current limitations of the study.

Table 5. Comparison between the surgical difficulty and postoperative trismus (mm)

Trismus rate classes and Mean values		Slightly difficult	Moderate Difficulty	Very Difficult	Total (n)	*p* values
Postoperative 2nd day	Mild (<20%)	6 (24%)	14 (56%)	5 (20%)	25	0.021 *
	Moderate (20< - <40%)	2 (8%)	13 (52%)	10 (40%)	25	
	Severe (40%<)	2 (8%)	7 (28%)	16 (64%)	25	
	Mean	31.68	28.88	25.16		0.001 ǂ
	SD	5.62	5.53	6.31		
	SE	1.12	1.10	1.26		
	n	25	25	25	75	
Postoperative 7th day	Mild (<20%)	25 (100%)	0	0	25	0.072 *
	Moderate (20< - <40%)	18 (72%)	6 (24%)	1 (4%)	25	
	Severe (40%<)	18 (72%)	6 (24%)	1 (4%)	25	
	Mean	43.36	37.88	35.28		0.000 +
	SD	2.64	3.96	5.39		
	SE	0.52	0.79	1.07		
	Q1	41	44	45		
	Q2 (Median)	44	38	40		
	Q3	45	37	39.9		
	n	25	25	25	75	

* denotes p values obtained by chi-square (χ2), ǂ ANOVA, and + Kruskal-Wallis tests. SD:Standard deviation, SE:Standard error

Table 6. Evaluation of Changes in Postoperative BDS Scores by Multiple Regression Analysis

Postoperative 2nd day							
Independent variables	B	SE	β	t Value	p values	95% Confidence Interval For B	
						Lower Bound	Upper Bound
Gender	-1.7512	1.4191	-0.1970	-1.2340	0.221	-4.583	1.081
Operation Time	0.2859	0.1324	0.4528	2.1597	0.034 *	0.022	0.550
Maximum mouth opening	-0.0330	0.0876	-0.0469	-0.3772	0.707	-0.208	0.142
Swelling	-0.1996	0.1102	-0.3123	-1.8108	0.075	-0.420	0.020
VAS scores	0.5325	0.2230	0.2769	2.3878	0.020 *	0.087	0.977
Surgical difficulty	0.2788	1.1335	0.0512	0.2460	0.806	-1.983	2.541
Postoperative 7th day							
Independent variables	B	SE	β	t Value	p Value	95% Confidence Interval For B	
						Lower Bound	Upper Bound
Gender	-4.9935	1.9786	-0.3921	-2.5238	0.014 *	-8.942	-1.045
Operation Time	0.4094	0.1708	0.4525	2.3970	0.019 *	0.069	0.750
Maximum mouth opening	-0.4276	0.1552	-0.3506	-2.7551	0.007 *	-0.737	-0.118
Swelling	-0.4837	0.1642	-0.4697	-2.9459	0.004 *	-0.811	-0.156
VAS scores	0.5956	0.3619	0.1610	1.6457	0.104	-0.127	1.318
Surgical difficulty	-0.7524	1.5111	-0.0965	-0.4979	0.620	-3.768	2.263

R^2= 0.311; Adjusted R^2=0.250; F=5.118 (P= 0.000). R^2= 0.299; Adjusted R^2= 0.247; F=4.831 (P= 0.000), B=unstandardised coefficients; SE=standard error of coefficients; β=standardised coefficients. * donates significant p values < 0.05.

Postoperative pain increased on the second postoperative day, correlated with surgical difficulty. However, there was no significant difference between the groups on the seventh postoperative day. Similarly, pain scores did not affect BDS scores on the seventh postoperative day. The postoperative pain, which decreased gradually in the short term, lost its effect on the patients mood changes. The most significant handicap of postoperative pain assessment is that it is subjective. The inability to objectively evaluate postoperative pain is one of the limitations of the present study. In addition, the follow-up period of the current study was one week postoperatively, which limited the evaluation of the long-term effects of postoperative pain. However, the fact that this complication did not show a significant difference between the groups on the postoperative seventh day is consistent with other studies in the literature.[22–25] Postoperative swelling did not differ significantly on the postoperative seventh day, as did postoperative pain. Again, it did not have a significant effect on BDS scores on the seventh postoperative day.

In the current study, preoperative surgical difficulty was assessed using the Pederson scale. It has been stated that the Pederson scale is helpful in determining surgical difficulty, and variables such as surgical difficulty, the severity of inflammatory complications, operation time, chewing ability are correlated.[9,20] Santana-Santos *et al.*[26] indicated that the prolongation of the operation time and the division of the tooth contributed to the formation of postoperative trismus. In the literature, it has been reported that the change in chewing ability due to trismus after mandibular third molar surgeries is up to 80%.[27] In the current study, all operations were performed by the same investigator, using the same techniques, in the same setting, in order to standardize the effects of surgical difficulty. However, the duration of the operation in both postoperative evaluations and the persistence of trismus on the seventh postoperative day affected the BDS scores. Therefore, postoperative trismus can be considered as an unavoidable complication due to surgical difficulty. The effective management of this complication, which also has severe effects on quality of life in the postoperative period[6], should be considered.

Studies indicate that mandibular third molar surgeries have adverse effects on quality of life in the short-term postoperative period.[22,28,29] Similarly, in the current study, it was observed that depression scores were significantly affected during the one-week follow-up period. Although it has been reported that third molar surgeries have positive effects on oral health-related quality of life in the long term[30], their effects on the alterations in the mood are unknown. Although there are studies on evaluating the postoperative period with BDS in different specialties[31–33], these studies in the field of oral surgery are currently insufficient. The present study is the second study in the literature investigating the interaction between postoperative complications and alterations in the mood to the best of our knowledge.

This study did not observe any unexpected complications such as nerve damage, mandibular fracture, or infective complications. Therefore, the inability to evaluate the effects of such complications, which are more severe than inflammatory complications, on BDS scores is a limitation of the present study. In further studies, studies with more extended follow-up periods and evaluating the impacts of are needed such serious complications should be considered.

Conclusions

Inflammatory complications after surgical removal of impacted teeth can cause alterations in the mood of patients. It is essential to determine the factors that may exacerbate these complications during the preoperative evaluation process, inform the patients in this direction, and manage the postoperative process with more minor complications.

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Conflicts of Interest Statement

No potential conflict of interest was reported by the authors.

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