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A comparative evaluation of autogenous and non-autogenous graft application in terms of VAS and patient satisfaction scores

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Abstract
Objective: The aim of this clinical study was to compare postoperative outcomes, postoperative pain and satisfaction, in patients receiving autogenous versus non-autogenous bone grafts during multiple oral reconstructive surgery procedures.
Materials and Methods: 100 patients (53 female, 47 male; mean age 53.3±12.0 years) were included at Pamukkale University, with 50 treated with autogenous grafts intraorally harvested and 50 with non-autogenous materials (allografts, xenografts, or alloplasts). Procedures performed on the patients included implant placement, ridge augmentation, sinus floor elevation, socket preservation, and periodontal bone surgery. Postoperative pain was assessed daily for 14 days using a Visual Analog Scale (VAS), and satisfaction was assessed at 2 weeks on a 0 to 10 scale. Analgesic use, complication, and time of surgery were also recorded.
Results: Demographic information were comparable between groups except for income level and jaw region distribution (p<0.001). VAS scores and analgesic consumption decreased progressively in both groups, without significant intergroup differences at any time (p>0.05). Mean scores for satisfaction were equally high (autogenous: 6.94; non-autogenous: 7.3; P=0.201). Surgical time was virtually identical (53.6±15.1 vs. 54.3±15.9 min; P=0.871). Rates of complications did not differ significantly between groups.
Conclusion: Autogenous and non-autogenous grafts yielded comparable short-term outcomes for pain, satisfaction, operating time, and complications. Socioeconomic status influenced graft choice but not demographic status. Clinically, graft selection has to be individualized, with non-autogenous materials providing safe alternatives that reduce donor site morbidity without compromising patient-centered outcomes.

Keywords: Autogenous graft, allograft, patient satisfaction, post-operative pain, visual analog Scala, Xenograft

Introduction
Tooth loss, sinus enlargement, gum disease, facial trauma, and various cysts or tumors of the mouth can create issues in the tooth-supporting bone [1]. A significant portion of oral surgery involves the correction of these bone issues. The aim of correcting them is to bring back the normal form of the bone while maintaining proper appearance and function, and ensuring adequate bone for the placement of dental implants. Among various materials utilized for grafting, autogenous bone has been regarded as the best option since it assists in growing new bone, stimulates bone growth, and provides a place for new bone to attach [2, 3]. Nevertheless, harvesting autogenous grafts requires an additional surgery, which is associated with additional risks such as pain, bleeding, swelling, blood clots, nerve injury, or infection [4]. Furthermore, donor site complications and the risk of the graft's failure to take hold restrict its use in numerous situations [3-6].
Alternatives such as xenografts (animal-derived), allografts (human donor bone from tissue banks), and alloplastic grafts (synthetic substitutes) have been introduced. These materials eliminate donor site morbidity and save surgical time, while offering biologically compatible scaffolds that favor bone regeneration [7] Implant survival rates have been reported to be comparable between autogenous and allogeneic grafts.

For example, long-term survival rates of implants placed with autogenous or allogeneic block grafts have been reported to be 96% and 98%, respectively, without a statistically significant difference [8, 9]. Likewise, systematic reviews on augmentation of the atrophic maxilla report that allogeneic bone blocks represent a reliable alternative with low complication rates and high implant survival [10]. Allografts have been used increasingly in oral surgery since the 1990s, presenting significant benefits such as unlimited material availability, decreased surgical time, and avoidance of donor site morbidity [11].

The objective of this study was to compare patient satisfaction and postoperative pain for patients receiving autogenous bone grafts versus non-autogenous materials (xenografts, allografts, and alloplastic grafts) for implant placement, ridge augmentation, socket preservation, and periodontal defect surgery. Patient-centered outcomes are still underreported in the literature, and the first prospective clinical study on patients' views on autogenous and allogeneic grafts was only recently published in 2024 [12]. In accordance, we sought to comparatively evaluate the effect of various grafting modalities on patient satisfaction (0-10 scale) and postoperative pain (VAS scores) and discuss our results against the background of existing evidence. We hypothesized that there would be no significant differences in patient-reported outcomes between autogenous and non-autogenous grafting procedures.

Materials and Methods

This clinical study was carried out at the Department of Periodontology, Faculty of Dentistry, Pamukkale University. Patients between 18-75 years old, of any gender, in need of bone grafting procedures were deemed eligible. Systemic diseases that may interfere with bone healing (e.g., uncontrolled diabetes, osteoporosis), smoking, pregnancy, and refusal to participate were considered exclusion criteria. This study was authorized by the Non-Interventional Clinical Research Ethics Committee of Pamukkale University (04.2023/06). Written informed consent was signed by all subjects before they were enrolled in the study.

Sample size and Study Groups

According to a priori power analysis, 27 subjects per group were the minimum needed to obtain 80% power using a 95% confidence interval. To make the study more robust, 100 patients were enrolled: 50 who received autogenous bone grafts and 50 who received non-autogenous grafts. Patients were assigned to groups based on clinical indication.

- **Group autogenous graft group:** Individuals who received autogenous bone grafts taken intraorally (mandibular ramus, mandibular symphysis, or maxillary tuberosity) as block or particulate grafts.
- **Group non-autogenous graft group:** Those patients who were treated with xenografts, allografts, and alloplastic. Socket coverage or guided bone regeneration was done in a few instances.

Surgery Procedures

Patients received dental implant insertion, alveolar ridge augmentation (horizontal or vertical), sinus floor elevation, socket preservation after tooth extraction, or periodontal bone surgery. All procedures were carried out under local anesthesia (2% lidocaine with 1:100,000 epinephrine) under aseptic conditions. All patients received standardized postoperative care procedures. Suture removal was done on postoperative day 14.

Patient-Reported Outcomes

Postoperative pain was assessed with a 10-cm Visual Analog Scale (VAS), with 0 representing no pain and 10 representing unbearable pain. The patients registered the maximum pain daily on postoperative days 1, 2, 3, 4, 5, 6, 7, and 14. Patient satisfaction was registered at the 2-week follow-up visit on a 0-10 scale, ranging from "not satisfied at all" (0) to "extremely satisfied" [10]. The following question was also asked: Would you prefer to use the same grafting technique again in future treatment? Postoperative complications were recorded as none, minor (transient paresthesia, mild infection, minor graft exposure), or major (major graft exposure, permanent paresthesia, graft loss due to infection). All pain, analgesic use, and satisfaction evaluations were self-recorded by the patients.

Post-op Medication Protocol

All patients received the same post-operative treatment. This was paracetamol (500 mg, as required) for pain and amoxicillin (1000 mg daily in two doses) to avoid infection.

Statistical Analysis

Statistical analysis was conducted with SPSS version 27.0 (IBM Corp., Armonk, NY, USA). The normality of data distribution was evaluated by the Shapiro-Wilk test. Age and duration of surgery were presented as mean±standard deviation and compared between the two groups by the independent samples t-test or Mann-Whitney U test. Categorical data were presented as number and percentage and compared with the Chi-square test. VAS scores, analgesic consumption, and patient satisfaction were presented as median (minimum-maximum) and compared by the Mann-Whitney U test. p-value <0.05 was regarded as statistically significant.

Results

The study included a total of 100 patients, with 50 patients in the autogenous and 50 in the non-autogenous group. The mean age of the patients was 53.3±12.0 years (range: 22-74). The population was made up of 53 women (53%) and 47 men (47%). In the autogenous group, 27 women (54%) and 23 men (46%) were included, and in the non-autogenous group 26 women (52%) and 24 men (48%) were included. The mean age was 53.8±11.5 years in the autogenous group and 52.7±12.6 years in the non-autogenous group, which was not significantly different between the groups (P=0.733). The gender distribution also did not differ significantly between the groups (P=0.841). No significant difference was found in educational level, residence place, or complication occurrence ($p>0.05$). However, significant differences were identified in monthly family income ($p<0.001$) and jaw region distribution ($p<0.001$). Patients in the non-autogenous group were likely to have a high level of monthly family income (28% vs. 2%), while those in the autogenous group were likely to have a low level of monthly family income (30% vs. 12%). As for the jaw region, maxillary cases occurred significantly more often in the non-autogenous group (42% vs. 5%), whereas cases affecting both jaws were more frequent in the autogenous group (50% vs. 20%). The surgery time was similar between the autogenous (53.6±15.1 min) and non-autogenous groups (54.3±15.9 min) (P=0.871). The demographic and clinical data of the patients are summarized in Table 1.

Table 1: Demographic and clinical characteristics of the autogenous and non-autogenous groups

		Autogenous Graft Group, (N=50)	Non-Autogenous Graft Group, (N=50)	P-Value
Age	Mean±Std	53.84±11.50[s]	52.68±12.64[a]	0.733
Gender	Women	27[a](54%)	26[a](52%)	0.841
	Men	23[a](46%)	24[a](48%)	
Educational Level	Illiterate	3[a](6%)	0[a](0%)	0.257
	Primary school	16[a](32%)	15[a](30%)	
	Secondary school	5[a](10%)	2[a](4%)	
	High school	10[a](20%)	11[a](22%)	
	University	16[a](32%)	22[a](44%)	
Monthly Household Income	Low	15[a](30%)	6[b](12%)	<0.001
	Middle	34[a](68%)	30[a](60%)	
	High	1[a](2%)	14[b](28%)	
Place of Residence	Urban	35[a](70%)	33[a](66%)	0.668
	Rural	15[a](30%)	17[a](34%)	
Jaw Region	Maxilla	2[a](5%)	21[b](42%)	<0.001
	Mandible	23[a](46%)	19[a](38%)	
	Both	25[a](50%)	10[a](20%)	
Complication	None	31[a](62%)	24[a](48%)	0.371
	Minor	16[a](32%)	22[a](44%)	
	Major	3[a](6%)	4[a](8%)	
Surgery Duration (min)	Mean±Std	53.62±15.05[a]	54.34±15.90[a]	0.871

* Age and surgery duration are presented as mean ± standard deviation. Categorical variables are presented as n (%). Comparisons between groups were performed using the Chi-square test. Different superscripts indicate statistical significance. P-Value < 0.05 was considered statistically significant.

VAS scores decreased from day 1 to day 14 in both groups. There were no significant differences between the autogenous and non-autogenous groups on any day after operation (p>0.05). The consumption of pain medicine also decreased steadily with time in both groups, with no significant differences between the groups (p>0.05). The patient satisfaction scores averaged 6.94 (5-9) in the autogenous group and 7.3 (5-9) in the non-autogenous group, and the difference was not statistically significant (P=0.201). Postoperative outcomes are presented in Table 2.

Table 2: Postoperative outcomes of the study groups

		Autogenous (N=50)	Non-Autogenous (N=50)	P-Value
VAS	Day 1	6.20 (3-9)	6.24 (3-9)	0.925
	Day 2	5.34 (2-9)	5.44 (2-9)	0.828
	Day 3	4.7 (1-9)	4.8 (1-9)	0.802
	Day 4	3.52 (0-7)	3.62 (0-7)	0.776
	Day 5	2.8 (0-6)	2.74 (0-6)	0.857
	Day 6	1.52 (0-3)	1.36 (0-3)	0.505
	Day 7	0	0	0
	Day 14	0	0	0
Amount of Analgesics (Tab Count)	Day 1	2.4 (2-4)	2.46 (2-4)	0.664
	Day 2	2.02 (1-3)	2.02 (1-3)	1.000
	Day 3	1.88 (1-3)	1.84 (1-3)	0.827
	Day 4	1.38 (0-3)	1.48 (0-3)	0.644
	Day 5	1.02 (0-2)	0.98 (0-2)	0.811
	Day 6	0.66 (0-2)	0.68 (0-2)	0.902
	Day 7	0.04 (0-1)	0.02 (0-1)	0.562
	Day 14	0	0	0
Patient Satisfaction Score		6.94 (5-9)	7.3 (5-9)	0.201

* Values are presented as median (min-max). VAS: Visual Analogue Scale. Comparisons between autogenous and non-autogenous groups were performed using the Mann-Whitney U test. P-Value <0.05 was considered statistically significant.

Discussion

The main objective of this research was to compare patient-centered outcomes, namely postoperative pain and satisfaction, between autogenous and non-autogenous grafting interventions. Our findings showed that pain scores and analgesic intake consistently declined in both groups without intergroup differences at any point in time. Patient satisfaction levels were also high in both groups, with no difference by statistic. In addition, demographic factors such as age and sex revealed no effect on postoperative outcomes, while socioeconomic factors, including household income, were found to influence graft choice. Notably, operation duration and complication rates were equal in both groups, suggesting that both autogenous and non-autogenous grafts yield safe and predictable clinical results when properly indicated.

Prior research has examined whether demographic factors impact clinical outcomes following oral reconstructive surgery. Although some reports have indicated women experience greater postoperative pain related to a decreased pain threshold [13], others have identified no measurable sex-related differences in clinical pain perception or recovery profiles [14]. Our results support the latter, as no measurable differences were noted between male and female patients with respect to postoperative pain, satisfaction, or complication rates. Patient age also did not correlate with outcome measures, suggesting that demographic variables did not

greatly influence the postoperative experience in this group.

The influence of socioeconomic factors on treatment selection has been alluded to in the literature, and various studies have inferred that financial means may play a role in whether autogenous or other graft materials are used [12]. Our research corroborates this sentiment, demonstrating that patients with high income were treated more often with non-autogenous grafts (28% vs. 2%), while patients with low income were more highly represented in the autogenous cohort (30% vs. 12%; $p<0.001$). This trend undoubtedly demonstrates the increased cost of allografts and xenografts over autogenous harvest. Notably, however, socioeconomic status did not influence postoperative pain, satisfaction, or complication rate, indicating that although financial background may influence grafting preference, it does not dictate clinical outcome.

Donor site morbidity continues to be one of the main disadvantages of autogenous bone grafting. Heimes *et al*. noted no differences in pain scores between autogenous and allogeneic block grafts but reported more swelling and a higher rate of temporary nerve irritation in the autogenous group (P=0.001) [12]. Likewise, Pistilli *et al*. noted that 50% of patients receiving autogenous onlay grafts continued to experience moderate pain on postoperative day 10, whereas only 5% did so in the xenograft group ($p<0.05$) [15]. These results point out that autogenous harvesting, especially from extraoral donor sites, could extend discomfort due to greater invasiveness and added surgical trauma [7]. In our series, however, VAS scores dropped quickly and no differences between groups appeared at any time point (p>0.05). This can perhaps be attributed to the fact that the majority of autogenous grafts in our series were taken from intraoral donor sites, which are less morbid when compared to extraoral sources.

Patient Satisfaction High patient satisfaction with bone augmentation procedures has been reported in the literature irrespective of graft type. Heimes *et al*. described mean satisfaction scores greater than 8/10 for both autogenous and allograft groups [12], while Gjerde *et al*. reported that 90.5% of patients undergoing iliac crest grafting were still satisfied with implant-supported rehabilitation despite hospitalization and work absence [4]. Likewise, Pistilli *et al*. identified no statistically significant differences in patient satisfaction with prosthesis function and esthetics between autogenous and xenograft groups (p>0.05) [15]. Consistent with these observations, the present study reported similar satisfaction scores between autogenous (6.94) and non-autogenous (7.3) groups (P=0.201). These findings highlight the fact that patient satisfaction is more closely related to functional and esthetic outcomes rather than the type of graft material utilized.

Surgical time has been a commonly cited differentiating factor between autogenous and alternative grafting modalities. Tunkel *et al*. demonstrated that allograft block grafting using the "shell" technique was notably quicker compared to autogenous harvesting, with an average time savings of 19 minutes ($p<0.001$) [16]. Conversely, our investigation found no difference in operation time between groups (autogenous: 53.6±15.1 min; non-autogenous: 54.3±15.9 min; P=0.871), likely owing to intraoral harvesting, which minimizes the added operative burden. In terms of complications, prior studies have shown similar rates between grafting modalities. Tunkel *et al*. revealed no differences in intraoperative or postoperative complications between autogenous and allograft cohorts [16], while Heimes *et al*. similarly indicated that major complications like infection or graft failure occurred at equal frequencies in each cohort [12]. Our findings corroborate these reports, as complication rates did not differ significantly between groups ($p>0.05$).

Our results demonstrate that both non-autogenous and autogenous grafts offer safe and effective treatments without significant differences in pain, satisfaction, or complications. Socioeconomic rather than demographic factors determined the type of graft used. Interestingly, treatment success and functional rehabilitation were more influenced by patient satisfaction than graft type. These findings establish the clinical validity of both approaches and further support the rationale for patient-specific, individualized treatment planning in oral reconstructive surgery.

Limitations

The present study has certain limitations. First, the design was non-randomized, as patients were assigned to treatment groups based on clinical indications, which may have introduced selection bias. Second, the evaluation period was limited to the early postoperative phase; thus, long-term outcomes such as implant survival, bone stability, and graft resorption were not assessed. Finally, patient-reported outcomes, although valuable for reflecting subjective experience, can be influenced by psychological, cultural, and individual pain perception differences, which were not controlled in this study. Future randomized controlled trials with longer follow-up periods are required to confirm and expand upon these findings.

Conclusion

Within the borders of this study, autogenous and non-autogenous grafting procedures provided comparable short-term outcomes regarding postoperative pain, analgesic use, patient satisfaction, surgical time, and rates of complications. Socioeconomic factors influenced graft material selection, yet demographic variables of age and gender were not observed to affect postoperative experiences.

Clinically, these results emphasize that the choice of graft material should be individualized to the patient, taking into account the variables of cost, morbidity, anatomical requirement, and patient preference. Autogenous grafts remain the standard due to biologic properties, but non-autogenous substitutes such as allografts and xenografts are capable and less morbid options that can reduce donor site morbidity. In general, patient-oriented outcomes are more dependent on the functional and esthetic success of rehabilitation than the graft material itself, and thus emphasize the importance of individualized, patient-specific treatment planning in oral reconstructive surgery.

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Conflict of Interest

Not available

Financial Support

Not available

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A comparative evaluation of autogenous and non-autogenous graft applications in terms of vas and patient satisfaction scores

Name Surname:

Date:

Phone:

A. Demographic Characteristics

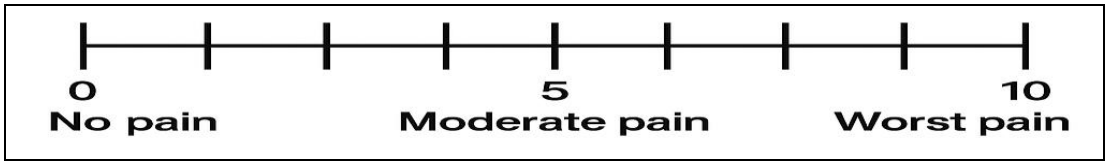
1. **Age:**
2. **Gender:** (1) Female (2) Male
3. **Monthly Household Income:** (1) Low (2)Middle (3) High
4. **Place of Residence:** (1) Urban (2) Rural
5. Education Level.

- Illiterate
- Primary School
- Secondary School
- High School
- University

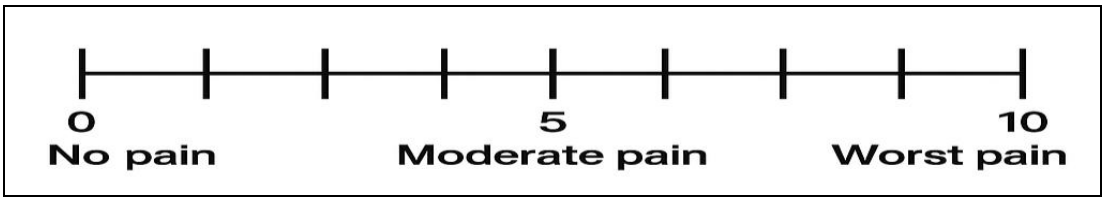
B. Surgical Process

1. Jaw Region: (1) Maxilla (2) Mandibula (3) Both
2. Duration of surgery:
3. Complication: (1) None (2) Minor (3) Major
4. Post-op local cold application: (1) No (2) Yes

C. Post-Operative
1. Pain Diagnosis



Day 1



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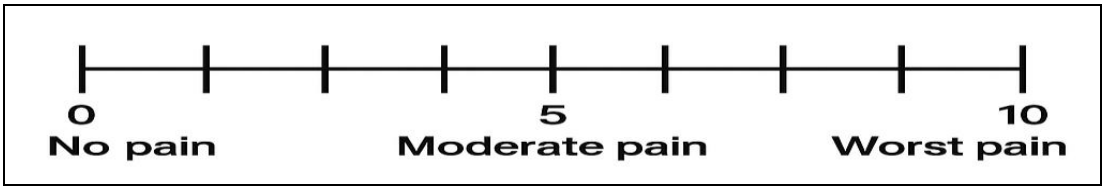

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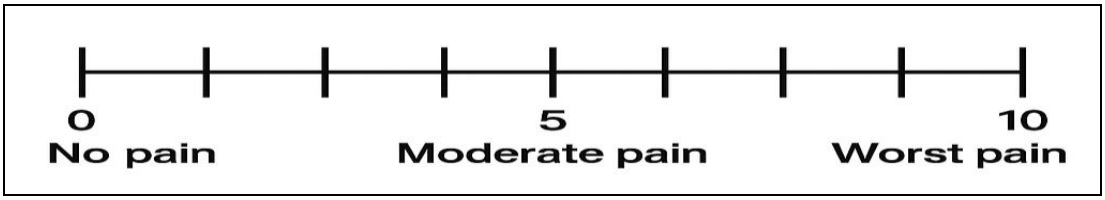

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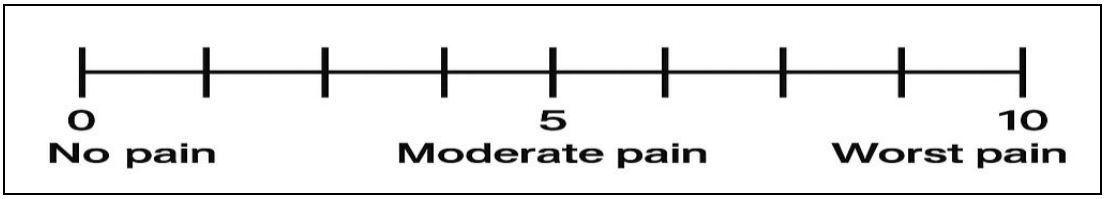

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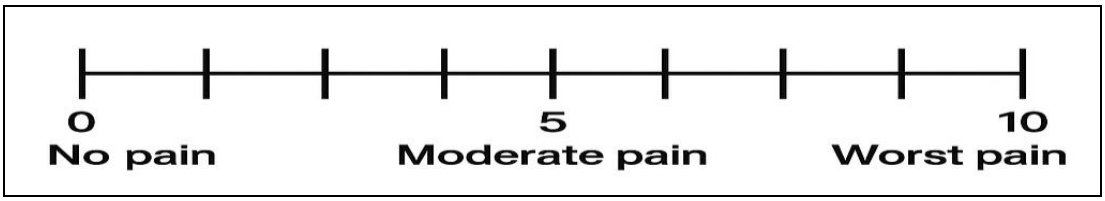
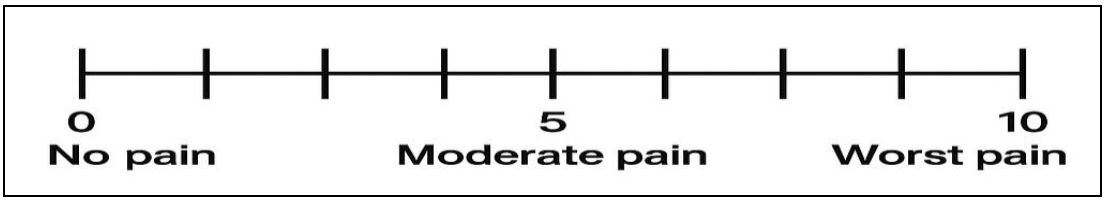
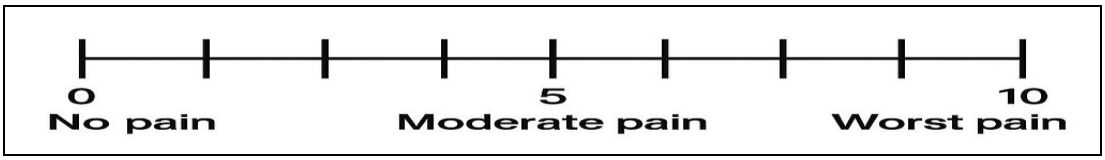


Day 6



Day 7



Day 14

2. Satisfaction Scale

Please indicate your level of satisfaction on the scale below

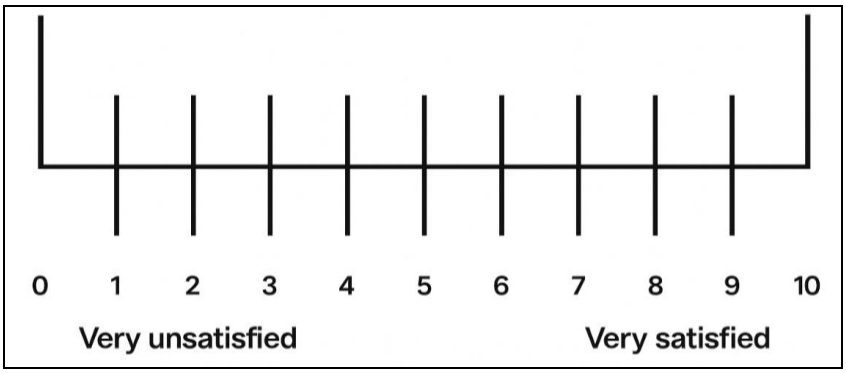


Table 1: Demographic and clinical characteristics of the autogenous and non-autogenous groups

		Autogenous Graft Group (N=50)	Non-Autogenous Graft Group (N=50)	P-Value
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	Secondary school	5[a](10%)	2[a](4%)	
	High school	10[a](20%)	11[a](22%)	
	University	16[a](32%)	22[a](44%)	
Monthly Household Income	Low	15[a](30%)	6[b](12%)	<0.001
	Middle	34[a](68%)	30[a](60%)	
	High	1[a](2%)	14[b](28%)	
Place of Residence	Urban	35[a](70%)	33[a](66%)	0.668
	Rural	15[a](30%)	17[a](34%)	
Jaw Region	Maxilla	2[a](5%)	21[b](42%)	<0.001
	Mandible	23[a](46%)	19[a](38%)	
	Both	25[a](50%)	10[a](20%)	
Complication	None	31[a](62%)	24[a](48%)	0.371
	Minor	16[a](32%)	22[a](44%)	
	Major	3[a](6%)	4[a](8%)	
Surgery Duration (min)	Mean±Std	53.62±15.05	54.34±15.90	0.871

* Age and surgery duration are presented as mean ± standard deviation. Categorical variables are presented as n(%). Comparisons between groups were performed using the Chi-square test. Different superscripts indicate statistical significance. p-value < 0.05 was considered statistically significant.

Table 2: Postoperative outcomes of the study groups

		Autogenous (N=50)	Non-Autogenous (N=50)	P-Value
VAS	Day 1	6.20 (3-9)	6.24 (3-9)	0.925
	Day 2	5.34 (2-9)	5.44 (2-9)	0.828
	Day 3	4.7 (1-9)	4.8 (1-9)	0.802
	Day 4	3.52 (0-7)	3.62 (0-7)	0.776
	Day 5	2.8 (0-6)	2.74 (0-6)	0.857
	Day 6	1.52 (0-3)	1.36 (0-3)	0.505
	Day 7	0	0	0
	Day 14	0	0	0
Amount of analgesics (Tab Count)	Day 1	2.4 (2-4)	2.46 (2-4)	0.664
	Day 2	2.02 (1-3)	2.02 (1-3)	1.000
	Day 3	1.88 (1-3)	1.84 (1-3)	0.827
	Day 4	1.38 (0-3)	1.48 (0-3)	0.644
	Day 5	1.02 (0-2)	0.98 (0-2)	0.811
	Day 6	0.66 (0-2)	0.68 (0-2)	0.902
	Day 7	0.04 (0-1)	0.02 (0-1)	0.562
	Day 14	0	0	0
Patient Satisfaction Score		6.94 (5-9)	7.3 (5-9)	0.201

* Values are presented as median (min–max). VAS: Visual Analogue Scale. Comparisons between autogenous and non-autogenous groups were performed using the Mann–Whitney U test, P-Value <0.05 was considered statistically significant