NEU PRESS

Diş Hekimliği Dergisi

Vol: 1 No: 1 Year: 2024 | Research Article | e-ISSN: 2687-5535

https://doi.org/10.51122/neudentj.2024.88

Perceptions and Surgical Approaches of Periodontists and Residency Students for Bone Augmentation Procedures

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Article Info

Article History

Received: 30.08.2023
Accepted: 05.02.2024
Published: 30.04.2024

Keywords:
Biomaterial,
Bone Regeneration,
Defect,
Implant.

ABSTRACT

Aim: Bone deficiency due to various systemic and periodontal diseases, trauma, and tumors remains a major challenge for osseointegration in implant therapies. To provide implant survival, sufficient bone volume is mandatory. The purpose of the present study is to assess the techniques used by periodontists in implant applications, treatment plans, and solutions to the complications they experience.

Material and Methods: 126 periodontists and/or residency students participated in this study. A questionnaire consisting of 20 questions was used. The knowledge and treatment methods about the technique, materials, and planning they use in bone regeneration and the management of complications were questioned. Descriptive statistics and the Pearson Chi-square test were used to analyze the data.

Results: All participants needed bone regeneration in implant cases. The most used material for regeneration by the participants was xenograft, with 43.5%. The most preferred application in bone regeneration is guided bone regeneration (GBR) using the collagen membrane, with a rate of 78.3%. The most common complication was membrane exposure. In order to prevent complications, 77.3% of the participants performed adequate soft tissue release, while 63.6% controlled periodontitis. The most commonly used treatment option for complications was the use of postoperative antibiotics/antiseptics. 82.6% of the participants received support in the management of complications.

Conclusion: In our study, it was observed that periodontists frequently chose different planning methods and treatment options when performing bone reconstruction/regeneration. It will be beneficial for periodontists to include the latest treatment models applied in the current literature in periodontology residency education.

Periodontoloji Uzmanlarının ve Uzmanlık Öğrencilerinin Kemik Ogmentasyonu Açısından Algıları ve Cerrahi Yaklaşımları

Makale Bilgisi

Makale Geçmişi

Geliş Tarihi: 30.08.2023
Kabul Tarihi: 05.02.2024
Yayın Tarihi: 30.04.2024

Anahtar Kelimeler:
Biyomateryal,
Defekt,
Implant,
Kemik
Rejenerasyonu.

ÖZET

Amaç: Sistemik ve periodontal hastalıklar, travma ve tümörlerden dolayı oluşan kemik kaybı veya yetersizliği, dental implantların osseointegrasyonu için büyük bir zorluk yaratmaktadır. İmplant sağkalımını sağlamak için yapılan bölgelerde yeterli kemik hacmi bulunmalıdır. Çalışmamızın amacı; periodontoloji uzmanlarının, implant uygulamalarında kullandıkları teknikleri, tedavi planlarını ve yaşadıkları komplikasyonlar karşısındaki çözüm yollarını değerlendirmektir.

Gereç ve Yöntemler: Çalışmaya, 126 periodontoloji uzmanı ve/veya uzmanlık öğrencisi katılmıştır. İmplant uygulamaları ve kemik rejenerasyonu ile ilgili 20 sorudan oluşan anket uygulanmıştır. Kemik rejenerasyonunda ve oluşan komplikasyonların yönetilmesi için kullanılan teknikler, malzemeler ve planlama hakkındaki bilgi ve yöntemler sorgulanmıştır. Veriler tanımlayıcı istatistik ve Pearson Ki kare testi ile analiz edilmiştir.

Bulgular: Tüm katılımcıların dental implant uygulamalarında kemik rejenerasyonuna ihtiyacı olmaktadır. Rejenerasyon için en çok kullandığı materyal ksenogrefttir (%43,5). Kemik rejenerasyonunda en çok tercih edilen uygulama, kollajen membran ile yönlendirilmiş kemik rejenerasyonudur (YKR) (%78,3). En sık karşılaşılan komplikasyon, membran ekspozürüdür. Komplikasyonları önlemek adına, katılımcıların %77,3'ü yeterli yumuşak doku serbestleştirmesini yaparken, %63,6'sı periodontitis kontrolü yapmaktadır. Komplikasyon yaşandığında en çok kullanılan tedavi seçeneği postoperatif antibiyotik/antiseptik kullanımıdır. Oluşan komplikasyon yönetiminde, katılımcıların %82,6'sı destek almaktadır.

Sonuç: Çalışmamızda periodontoloji uzmanlarının sıkça kemik rekonstrüksiyonu/ rejenerasyonu uygularken farklı planlama şekli ve tedavi seçeneklerini seçtikleri görülmüştür. Tedavi yaklaşımları vakaya göre değişebileceğinden, periodontoloji uzmanlık eğitiminde güncel literatürde uygulanan en son tedavi modellerinin yer alması periodontoloji uzmanları için faydalı olacaktır

To cite this article:
Lektemur-Alpan A. & Torumtay-Cin G. Perceptions and Surgical Approaches of Periodontists and Residency Students for Bone Augmentation Procedures. NEU Dent J. 2024;6:48-59. https://doi.org/10.51122/neudentj.2024.88

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INTRODUCTION

Osseointegrated dental implants are an important tool in dentistry and are used to support many different configurations, from single missing teeth to complete dentures. Periodontal destruction, traumatic tooth extractions, and bone loss due to the long-term use of removable dentures are the most important reasons that prevent implants from being placed in the ideal position.[1] One problem frequently experienced in implant dentistry is the lack of bone required for implant installation according to standard procedures. To solve bone insufficiency, various clinical techniques have been established.[2] The treatment protocol applied to restore the lost bone tissue volume is called bone augmentation. Bone grafts and/or membranes are used in most of these methods. Selecting an appropriate graft material for augmentation requires knowledge of the material used in terms of biocompatibility, biodegradability, structural stability, availability, ease of use, and cost.[3]

Various complications can occur during or after bone augmentation procedures.[4] To minimize poor outcomes and failure, it is important to both understand and manage bone graft-related complications. The complications can either originate at the site where the bone graft was harvested or develop as secondary complications at the site of the graft. They can include injury to local anatomical structures such as the teeth, the nerves, the muscles, the vasculature, and possible sinus complications.[5, 6] In addition, graft exposure, resorption, and infection at the recipient site are also complications.[5, 6] In order to prevent such complications, the experience of the physician performing the technique, the systemic condition of the patient, and clinical and radiographic examination of the augmentation site are important. In Turkiye, there are two departments where implant application is given as a specialty course obligation. The first one is oral and maxillofacial surgery and the other is periodontology. Since the periodontology department includes operative procedures related to the gingiva, some specialists do not prefer advanced bone surgery applications and residents may be deficient in advanced bone surgery and complication management. With all this information, the aim of our study is to evaluate the methods used by periodontists and periodontology residents in planning bone augmentation, graft selection, causes of complications, and methods used to prevent them.

MATERIALS AND METHODS

The protocol of our study was approved by the Pamukkale University Faculty of Medicine Non-Interventional Clinical Research Ethics Committee. The number of participants was determined with 95% confidence and 99.9% test power.[7] The duration of professional experience of the physicians was taken into account for power analysis. In our study, a total of 20 questions were asked to 126 periodontist/periodontology residency students about the number of years they have been practicing implants, the biomaterials they prefer in regenerative treatment, the bone augmentation methods they apply, and the diagnosis and treatment of complications they encounter. The questionnaire form is given in Table 1.

Table 1: Survey questions administered to physicians

Age?
23-29
30-39
40-49
50-59
Over 60 years old
Gender?
Female
Male
How many years have you been practicing in dentistry?
0-5 years
5-10 years

More than 10 years
In which institution do you work?
Dental Polyclinic
Private Dental Clinic
Oral and Dental Health Center/Government Hospital
University Hospital
Do you use dental implants?
Yes
No.
Do you need bone reconstruction and/or regeneration?
Yes
No.
How often do you perform bone reconstruction?
Every day
Every week
Every month
Several times a year
Never
What is the material you use most for regeneration?
Autogenous graft
Allograft
Xenograft
Alloplastic graft
Composite graft
What is your reason for choosing this material?
For clinical success
Because of its cost
Due to hand habit and ease of implementation
Because of the opinions of other physicians
Due to ease of transportation
Do you perform socket preservation procedures after tooth extraction?
Frequently
Rarely
Always
Do you perform procedures other than standard implant surgery?
Yes
No.
If no, why?
I did not need
I do not have enough practice
Avoiding complications
Due to the cost
I choose more minimally invasive methods (short implant, closed lift)
Which augmentation procedures do you prefer? (You can choose more than one)
Ramus/symphysis block
GBR collagen membrane
t/e/d-PTFE reconstruction
Tent screw
Bone ring
Sandwich technique
Khoury technique
Sausage technique
Lateral window sinus elevation
Titanium mesh
Split crest
Distraction osteogenesis
What is the most common complication you experience in the early period after bone augmentation? (You can choose more than one)
Soft tissue dehiscence
Implant failure
Infection
Bone fractures
Membrane exposure
Nerve damage
Sinus membrane perforation
Graft resorption
No complications

What is your preferred option to prevent such complications? (You can choose more than one option)
Systemic disease control
Periodontitis control
Smoking cessation
Choice of surgical method
3d radiography
Adequate soft tissue release
Preop soft tissue augmentation
Platelet-derived biological products
Preop antibiotic use
What are the procedures you have performed to overcome complications? (You can choose more than one)
Postop antibiotic/antiseptic use
Removal of the exposed portion of the graft
Autologous soft tissue graft
Complete removal of the graft/membrane
Re-suture the area
Irrigation with Chx
Do you get support when you face complications?
Yes
No.
Where/whom do you get support?
YouTube
Instagram
Experts/faculty members
Courses
Colleagues
Implant representative
Do you think periodontology specialty training is sufficient to perform advanced bone surgery?
Yes
No.
Do you follow developments in bone augmentation? Which resources do you benefit? (You can choose more than one)
No, I do not
Current literature
Training seminars
Hands-on courses
YouTube videos
Social media

Statistical Analysis

All data were analyzed using SPSS 21 (Statistical Package for the Social Sciences Inc., Chicago, IL, USA). Although descriptive statistical methods were used for the data analysis (frequency distributions, percentage distributions), the comparison of qualitative data was performed with the Pearson chi-square test. The significance value was taken as $p < 0.05$.

RESULTS

A total of 126 periodontists/ periodontology residents participated in our study. 52.2% of the participants were between the ages of 30-39, 21.7% between the ages of 40-49, and 13% between the ages of 23-29. 56.5% of the participants were male and 43.5% were female. 69.9% of the participants have been practicing dentistry for more than 10 years. More than half of the periodontists work in university hospitals (56.5%) and 26.1% work in private polyclinics. All participants stated to practice dental implant treatment and all of them need bone regeneration. 34.8% of periodontists reported performing bone regenerative procedures every week, 26.1% every month and 39.1% several times a year. The most commonly used materials for regeneration were xenograft (43.5%), autogenous graft (26.1%), allograft (13%), and alloplastic graft (8.7%) (Figure 1). The two most important reasons for periodontists to choose the graft material they used were the clinical success of the material with a rate of 30.4% and the ease of application with hand skill. The cost of the graft material was the reason for preference with a rate of 21.7%. The accessibility of the material was the reason for

preferring this material with a rate of 13%. When the regeneration materials used by participants and the reasons for choosing them were compared., the clinical success of the material was found to be significantly higher than the other reasons for preference in terms of autogenous graft use, while ease of application was significantly more preferred in allograft and xenograft use ($p < 0.05$) (Table 2).

Figure 1. Answers to the question of materials used for regeneration

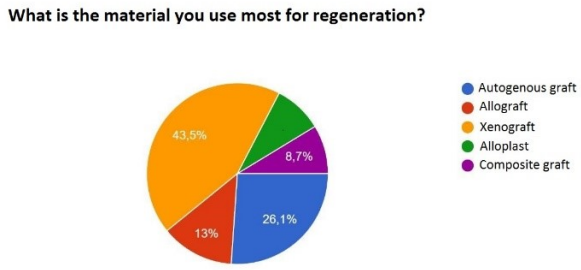


Table 2: Reasons for physicians' preference according to the regeneration material used

	Clinical success	Cost	Ease of application	Advice from other colleagues	Accessibility	Total
Autogenous graft	27(81.8%)[a]	0(0)[b]	3(9.1%)[b]	3(9.1%) [b]	0(0)[b]	33(100%)
Allograft	1(6.3%)[a]	3(18.8%) [a]	12(75.0%)[b]	0(0)[a,b]	0(0)[a]	16(100%)
Xenograft	6(10.9%)[a]	10(18.2%)[a]	30(54.5%)[b]	6(10.9%)[b]	3(5.5%)[a]	55(100%)
Alloplastic graft	1(9.1%)[a]	2(18,2%) [a]	1(9.1%)[a]	0(0)[a.b]	7(63.6%)[b]	11(100%)
Composite graft	2(18.2%)	2(18.2%)	1(9.1%)	0(0)	6(54.5%)	11(100%)

Data are presented as numbers and percentages (%). For data with different superscripts, $P < 0.05$ is statistically significant

Table 3: Comparison of the methods used by participants for bone augmentation according to their professional experience

	Ramus/ symphysis block	GBR/ collagen membrane	t/e/d PTFE	Tent screw	Bone ring	Sandwich technique	Khoury technical	Sausage technique	Lateral window Sinus elevation	Titanium mesh	Split crest	DO	Total
	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)
0-5 years	13 (29.5%)	13 (13,1%)	0 (0)	13 (48.1%)	0 (0)	0 (0)	13 (34.2%)	0 (0)	13 (15.9%)	0 (0)	13 (%19,7)	0 (0)	13 (%10,3)
5-10 years	25 (56,8%)	25 (25,3%)	0 (0)	14 (51.9%)	0 (0)	11 (40.7%)	24 (65.8%)	0 (0)	25 (30.5%)	0 (0)	25 (%37,9)	0 (0)	25 (%19,8)
>10	6 (13,6%)	61 (61,6%)	33 (100%)	0 (0)	11 (100%)	16 (59.3%)	0 (0)	27 (100%)	44 (53.7%)	33 (100%)	28 (%42,4)	0 (0)	88 (%69,8)
Total	44 (34.9%)	99 (78.6%)	33 (26.2%)	27 (21.4%)	11 (8.7%)	27 (21.4%)	38 (30.2%)	27 (21.4%)	82 (65.1%)	33 (26.2%)	66 (%52,4)	0 (0)	126 (%100)

Data are presented as numbers and percentages (%)

Table 4: Preferred methods by the participants in terms of bone augmentation according to the institution they work.

	Ramus/ symphysis block	GBR collagen membrane	t/e/d-PTFE	Tent screw	Bone ring	Sandwich technique	Khoury technical	Sausage technique	Lateral window sinus elevation	Titanium mesh	Split crest	DO	Total
	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n(%)
Dental Polyclinic	2 (4.5%)	25 (25.3%)	8 (24.2%)	2 (7.4%)	7 (63.6%)	0 (0)	2 (5.3%)	22 (81.5%)	25 (30.5%)	7 (21.2%)	10 (15.2%)	0 (0)	33 (26.2%)
Private Dental Clinic	1 (2.3%)	5 (5.1%)	9 (27.3%)	1 (3.7%)	3 (27.3%)	0 (0)	1 (2.6%)	3 (11.1%)	4 (4.9%)	5 (15.2%)	4 (6.1%)	0 (0)	13 (10.3%)
ODHC/ State Hospital	2 (4.5%)	8 (8.1%)	4 (12.1%)	2 (7.4%)	0 (0)	3 (11.1%)	2 (5.3%)	0 (0)	5 (6.1%)	3 (9.1%)	5 (7.6%)	0 (0)	9 (7.1%)
University Hospital	39 (88.6%)	61 (61.6%)	12 (36.4%)	22 (81.5%)	1 (9.1%)	24 (88.9%)	33 (86.8%)	2 (7.4%)	48 (58.5%)	18 (54.5%)	47 (71.2%)	0 (0)	71 (56.3%)
Total	44 (34.9%)	99 (78.6%)	33 (26.2%)	27 (21.4%)	11 (8.7%)	27 (21.4%)	38 (30.2%)	27 (21,4%)	82 (65.1%)	33 (26.2%)	66 (52.4%)	0 (0)	126 (100%)

Data are presented as numbers and percentages (%). (%) values within all applied procedures are given

While 43.5% of the participants frequently performed socket preservation procedures, 43.5% stated that they rarely performed, and 13% did not perform socket preservation procedures. The proportion of periodontists who do not perform advanced surgical procedures other than standard implant surgery procedures was 8.7%. The main reason was that 66.7% did not feel competent in this field and 33.3% avoided complications. The most preferred method of advanced bone surgery was guided bone regeneration (GBR) with a collagen membrane (78.3%) followed by lateral window sinus elevation (65.2%). The bone ring method was the least preferred operation with a rate of 8.7% (Figure 2). Tables 3 and 4 show which methods are preferred by the participants in terms of bone augmentation according to their professional experience and the institution they work. As the duration of professional experience increases, the practices of participants in advanced bone surgery also increase. While periodontist/periodontology residency students working in university hospitals applied most of the different bone augmentation methods at similar rates, periodontists working in private clinics reported that they most frequently preferred GBR with a collagen membrane, sausage technique, and lateral window sinus elevation. When the preferred materials for regeneration were evaluated according to the demographic characteristics of the participants such as gender, duration of professional experience, and the institution, no significant relationship was found (Table 5).

Figure 2. Answers to the question on preferred methods of regeneration

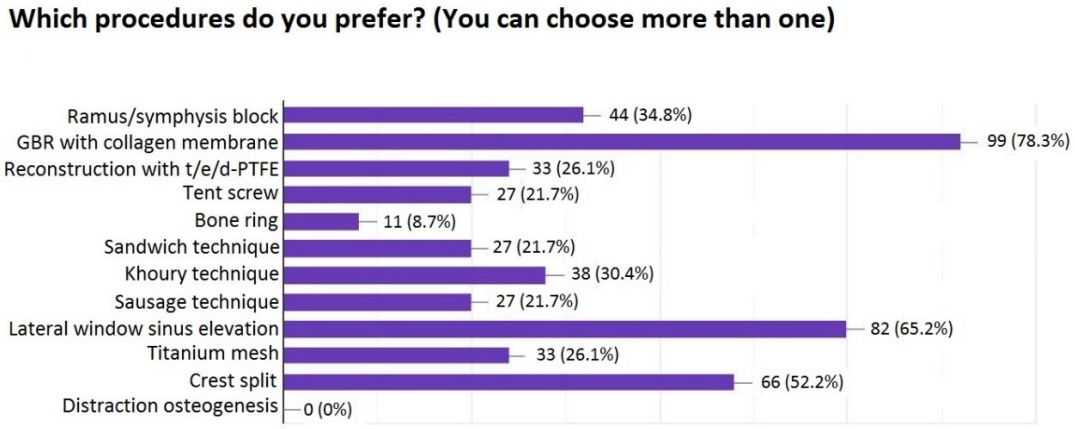


Table 5. The relationship between demographic characteristics of physicians and material selection

	Autogenous graft	Allograft	Xenograft	Alloplastic graft	Composite graft	Total	P value
	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	
Gender							
Woman	15 (27.3)	6 (10.9)	24 (43.6)	5 (9.1)	5 (9.1)	55 (100)	0.989
Male	18 (25.4)	10 (14.1)	31 (43.7)	6 (8.5)	8 (8.5)	71 (100)	
Duration of professional experience							
0-5 years	5 (38.5)	1 (7,7)	5 (38.5)	1 (7.7)	1 (7.7)	13 (100)	0.993
5-10 years	7 (28)	3 (12)	11 (44)	2 (8)	2 (8)	25 (100)	
> 10 years	21 (23.9)	12 (13,6)	39 (44.3)	8 (9.1)	8 (9.1)	88 (100)	
Institution							
Dental Polyclinic	7 (21.1)	6 (18.2)	16 (48.5)	2 (6.1)	2 (6.1)	33 (100)	
Private dental clinic	6 (46.2)	4 (30.8)	0	0	3 (23.1)	13 (100)	0.108
ODHC/Government hospital	1 (11.1)	0	4 (44.4)	3 (33.3)	1 (11.1)	9 (100)	
University Hospital	19 (26.2)	6 (8.5)	35 (49.3)	6 (8.5)	5 (7)	71 (100)	

Data are presented as numbers and percentages (%).

The most common complications encountered by periodontists after bone augmentation procedures were membrane exposure (52.2%) and graft resorption (43.5%). Soft tissue dehiscence (34.8%), sinus membrane perforation (30.4%), and infection (17.4%) were also among the complications (Figure 3). The most important interventions to prevent complications were adequate soft tissue release (77.3%), periodontitis control (63.6%), and preoperative soft tissue augmentation (59.1%). Systemic disease control, motivation for smoking cessation, and choice of the most appropriate surgical method were among the options preferred by participants at the same rate. 3D imaging options and preoperative antibiotic use were preferred by almost half of all periodontists (Figure 4). Postoperative antibiotic/antiseptic use was the most common procedure to overcome the complications (91.3%). The preference rate for re-suturing the operation site was 65.2%. Removal of the exposed part of the graft is preferred by 34.8%, and autologous soft tissue graft or complete removal of the graft/membrane is preferred by 21.7%. Irrigation of the wound site with chlorhexidine was the least preferred procedure with 4.3% (Figure 5). 82.6% of the participants received support when faced with complications. The most frequently requested support were faculty members, followed by colleagues. 47.8% of periodontists thought that periodontology residency training was insufficient to perform advanced bone surgery. Participants regularly follow current developments in bone regeneration. The most followed sources were current literature (78.3%), educational seminars (65.2%), and social media (52.2%).

Figure 3. Answers to the question about complications encountered in bone augmentation

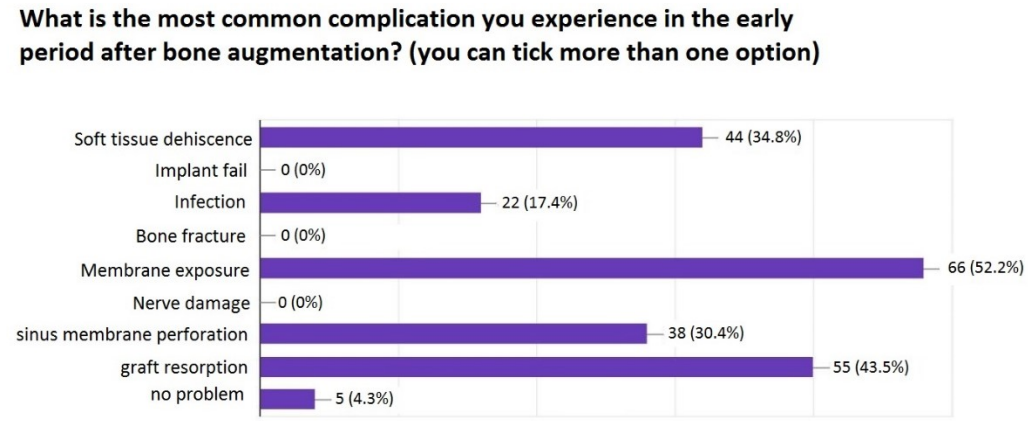


Figure 4. Responses for actions taken to prevent complications

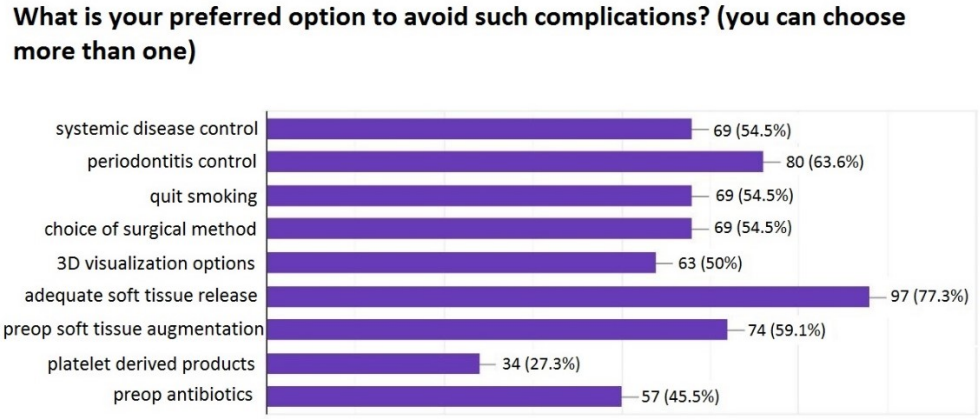
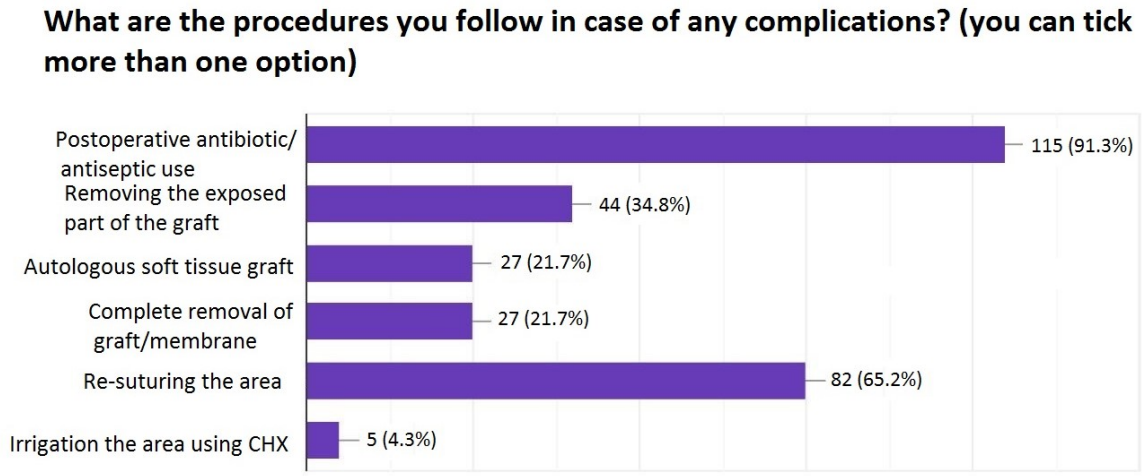


Figure 5: Responses to the procedures applied when faced with complications



DISCUSSION

Nowadays, implant applications are frequently performed to compensate for tooth deficiencies. Bone augmentation is a frequently required procedure in implant therapies.[8] In our study, the treatment approaches and complication management preferences of periodontist/periodontology residency students trained and specialized in periodontology were evaluated in terms of bone augmentation. The results were found to show that participants frequently underwent bone regeneration procedures, preferred xenografts as the most common regeneration material, and the most common method was GBR with collagen membrane. In terms of complications and management, it was observed that participants frequently encountered membrane exposure and graft resorption and preferred antibiotic/antiseptic use as the first treatment option in such a case. In terms of the methods and treatments applied, it was understood that periodontists used many treatment options in accordance with the literature.

While autogenous grafts remain the gold standard in bone regeneration, other graft materials can also provide satisfactory results. In our study, autogenous graft utilization was found to be 26.1%. There is a risk of morbidity and mortality in autogenous graft harvesting methods and the technical skill requirement is higher. For these reasons, the use of autogenous grafts by periodontists seems to be limited. The reason for autogenous graft preference was stated as high clinical success with a rate of 81.8%. Bovine xenograft materials have been used with great success in alveolar crest augmentation procedures.[9, 10] In our study, xenograft was the most commonly used graft type with 43.5%. More than half of the physicians preferred xenograft because of its ease of application. The choice of graft material is based on the condition of the augmentation needed, the amount of graft material required, the cost, and the patient's medical condition and wishes. Although some studies have reported that there is no difference between different graft materials in terms of regeneration capacity[11] There are also studies indicating that alloplastic materials are less successful in regeneration than others.[12] In our study, it was found that alloplasts were the least used graft type.

The membranes are routinely used as part of the GBR technique and help prevent the passage of non-osteogenic tissues. In our study, 78.3% of periodontists preferred the GBR procedure with a collagen membrane. 26.1% prefer the use of PTFE membrane or titanium mesh. PTFE membrane is a good barrier compared to resorbable membranes, but its use becomes disadvantageous due to soft tissue defects, membrane exposure, and the need for a secondary operation for removal.[13] Using

absorbable membranes provides various benefits over non-absorbable ones. These are no secondary operation to remove the membrane; simplification of procedures; no re-exposure of regenerated bone during membrane removal; a wider range of surgical techniques for abutment attachment; and reduced cost and patient morbidity. In conclusion, resorbable membranes are preferable in the treatment of horizontal bone defects whenever practically possible.[14]

The most common complication encountered by participants with horizontal and vertical bone augmentation procedures using bone grafts was membrane exposure (52.2%), followed by graft resorption (43.5%) and soft tissue dehiscence (34.8%). The most common complication seen in the literature is loss of the bone graft with impairment of regenerative results and the formation of soft tissue dehiscence which leads to exposure of the graft and subsequently contamination of the bone graft and/or membrane. [15-17] Risk factors associated with the incidence of these complications include age (> 40 years), smoking, history of periodontitis, and bone defects requiring multiple implants.[15, 16] The optimal management of complications with block bone grafts is prevention through meticulous preoperative evaluation of anatomical structures using three-dimensional imaging techniques and assurance of safety margins during surgery. Despite this, only 50% of the participants surveyed prefer 3D imaging methods. 2-dimensional visualization of the operation area will increase the complication rate. The most common complication in the lateral window sinus elevation procedure is perforation of the Schneiderian membrane. In our study, 30.4% of participants experienced sinus membrane perforation.

Systemic diseases can affect the patient's wound healing capacity, especially in patients with diabetes and osteoporosis.[18] In periodontology training, the relationship between systemic disease and periodontal disease is explained in detail. Of the participants, 54.5% tried to control systemic disease, but this rate was lower than expected compared to the training received. Smoking has also been shown to be detrimental to bone healing and osseointegration.[19] The negative impact of smoking can affect not only bone but also the healing of soft tissues. Experimental research has also shown that smoking cessation can partially reverse the previously described negative effects on bone healing.[20] More than half of physicians have attempted to get a patient to quit smoking. It is necessary for periodontists to be more aware of smoking and systemic disease control and to guide the patient in terms of the success of the procedures to be performed and to prevent complications. Karoussis et al. [21] applied implants to patients with and without a history of periodontitis. While the 10-year incidence of peri-implantitis was 6% in the group without periodontitis, this rate was 29% in those with a history of periodontitis. Roccuzzo et al. followed 101 patients who received dental implants after being categorized as 1) periodontally healthy, 2) moderate periodontal problems, and 3) severe periodontal problems. The authors reported that the frequency of implant sites showing ≥6 mm probing depth (2%, 16%, 27%, respectively), and≥3 mm bone loss (5%, 11%, 15%, respectively) differed significantly between the groups. [22, 23]. In addition, the intraoral microbial load from periodontitis may affect the success of the GBR procedure. The overall risk of membrane exposure is higher in patients with severe periodontal pockets compared to edentulous or periodontally healthy patients, so it is important to remember that all patients undergoing a surgical procedure should first be checked on a periodontal level.[24] In our study, 63.6% of the participants stated that they achieved periodontitis control. Considering that the study was conducted in the field of periodontology, this rate is expected to be higher.

Prevention of postoperative infection after bone surgery is often the basis for antibiotic use. Despite limited information

regarding the benefit of the systemic use of antibiotics in minimizing complications subsequent to bone regeneration, post-operative antibiotics are generally prescribed on an empiric basis due to the probability of contamination of the biomaterials used. Given the emergence of antibiotic resistance, antibiotic-associated hypersensitivity, ineffectiveness, and superinfections, it is left to the personal experience of practitioners to determine the need for antibiotics. Payer et al. [25] A study by the ITI Antibiotic Study Group led by the ITI Antibiotic Study Group examined the effect of giving 2 g of amoxicillin one hour before surgery and then 500 mg of amoxicillin every 8 hours for 3 days following surgery on the occurrence of postoperative complications and morbidity, compared with placebo. In both groups, the patients received paracetamol every 8 h for two postoperative days. The authors concluded that no improvement in the patient's perception of postoperative discomfort was achieved by systemic antibiotics. There were no significant differences in postoperative complications in either group. However, suppuration was higher in the control group. In a meta-analysis, there was insufficient evidence to support or reject antibiotic prophylaxis for the prevention of perioperative infection in intraoral bone grafting procedures. [26] Nevertheless, removal of the barrier membrane, curettage of the area, and systemic antibiotic treatment are recommended when abscess formation and membrane exposure are detected at the operation site. [27] In our study, 91.3% of the participants preferred the use of antibiotics. Although it is controversial whether the use of antibiotics, which is preferred at a very high rate, is sufficient to prevent postoperative complications, it should be applied in the presence of any complication.

The results of our study showed that periodontists performed advanced surgical procedures more frequently in university hospitals. Possible reasons for this include the availability of the necessary equipment and experienced assistive personnel for advanced surgical procedures or the presence of experienced faculty members who can be consulted in case of any complications.

CONCLUSION

Bone augmentation procedures have been shown to achieve highly predictable results in terms of bone recovery, regardless of the material used or the surgical method. The reduction of surgical complications is also related to the choice of surgical procedure because the incidence of complications is directly related to the condition of the bone defect. Many local and systemic factors such as systemic status, history of periodontitis, flap design, and soft tissue management affect the success of the procedure. Since regeneration-related procedures are technique-sensitive, they should only be performed by clinicians with appropriate training and experience. Expanding the residency training in periodontology to include more advanced bone surgery procedures would be beneficial for physicians in terms of complication management and procedural success.

Acknowledgment

Thank you to all our colleagues who participated in the survey.

Ethical Approval

The ethical approval for this study was obtained by Pamukkale University Faculty of Medicine Non-Interventional Clinical Research Ethics Committee (2022/07-11).

Financial Support

No financial support was received from any institution or organization for this study.

Conflict of Interest

The authors declare that they have no competing interests.

Author Contributions

Design: ALA Data collection and data analysis: ALA, GTC Analysis and interpretation: ALA, GTC Literature review: ALA, GTC Article preparation: ALA, GTC.

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