

SUBJECTIVE ASSESSMENT OF AESTHETICS RELATED TO COMPLICATIONS OF IMPLANT THERAPY IN THE MAXILLARY AESTHETIC REGION

СУБЈЕКТИВНА ПРОЦЕНКА НА ЕСТЕТИКАТА ПОВРЗАНА СО КОМПЛИКАЦИИ ОД ИМПЛАНТНАТА ТЕРАПИЈА ВО МАКСИЛАРНИОТ ЕСТЕТСКИ РЕГИОН

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Abstract

Introduction: In contemporary dentistry, aesthetics has become a primary concern, with increasing demand from patients, seeking optimal visual outcomes. Alongside this demand, complications that affect aesthetic results have become a growing challenge. This study aims to evaluate the impact of complications on the aesthetics of suprastructures in the maxillary aesthetic region. **Material and method:** The research was conducted at a private dental practice "Dr. Bajraktarov" in Strumica. The study involved an assessment of the aesthetic impact of prosthetic superstructures in the maxillary aesthetic region. Evaluations were performed both by patients and by clinicians. **Results:** Among the subjects who experienced complications, 86.36% had a deterioration in aesthetics. Most of the subjects estimated that they have significant deterioration of aesthetics (47.36%). Clinicians, however, reported an even higher percentage of significant aesthetic deterioration identifying major issues in 57.89% of cases. **Conclusions:** A Variety of complications can negatively affect the aesthetic outcomes of prosthetic restorations in the maxillary anterior region. These complications should be carefully considered during diagnosis, treatment planning, and execution, as they play a crucial role in patient satisfaction and overall treatment success. **Keywords:** dental implants, esthetic, complications, aesthetic assessment.

Апстракт

Вовед: Бидејќи во современата стоматологија, естетиката навлегува на широка врата и станува исклучително барана од пациентите, како и од бројните компликации поврзани со естетиката, главната цел на овој труд беше поставена - да се направи проценка на ефектот на компликациите врз естетиката на супраструктурите во максиларната естетска зона. **Материјал и метод:** Истражувањето е направено во една приватна стоматолошка ординација „Д-р. Бајрактаров“ во Струмица. Извршена е проценка на влијанието на протетските супраструктури во максиларниот естетски регион на естетиката од испитуваната популација и од лекарите. **Резултати:** Од испитаниците кои имале компликации, 86,36% укажале на влошување на естетиката. Поголемиот дел од испитаниците процениле дека имаат значително влошување на естетиката (47,36%), за разлика од клиничарите, каде значително влошување на естетиката поради компликациите е забележано кај 57,89%. **Заклучоци:** Постојат бројни компликации кои можат да го нарушат постигнатиот естетски ефект во максиларната фронтална регија. **Клучни зборови:** Дентални импланти, естетски, компликации, естетска проценка.

Introduction

Dental implants, along with their associated suprastructures, constitute an essential component of contemporary dental practice. Beyond their primary role in replacing missing teeth and restoring critical functions within the oral cavity, dental implants contribute significantly to the aesthetics rehabilitation of the anterior region.

The focus of modern dentistry has consistently been, and shall continue to be, the dentist's responsibility to fulfil the requirements for a fully functional and visually appealing dentition, tailored to the unique characteristics of each patient. The field of dental implantology has advanced remarkably in recent years with continual improvements in surgical techniques, biomaterials and prosthetic technologies. These advances have enabled general dental practi-

tioners to integrate implant procedures more readily into their practices, expanding patient access to implant-supported restorations.

It is crucial for dentists to recognize that complications may arise either during or after the surgical process, as well as during the placement of prosthetic components, potentially jeopardizing the overall treatment outcome. Early complications during implantation which may directly affect the immediate aesthetic outcome of the suprastructures are considered to be: infection, edema, ecchymoses, hematomas, emphysema, bleeding, dehiscences and sensitive alterations. Late complications, occurring after initial healing can affect the aesthetics of prosthetic restorations placed over dental implants, are considered to be: perforations of the mucoperiosteal flap, maxillary sinusitis, mandibular fractures, loss of osseointegration, bone defects, and of course the occurrence of peri-implantitis and other infectious conditions of the tissues occluding dental implants¹.

The successful establishment of aesthetic qualities in the superstructures supporting dental implants is largely contingent upon a comprehensive understanding of biological, periodontal, and surgical principles².

Various elements have been identified that significantly affect the aesthetic quality of definitive prosthetic superstructures and the long-term efficacy of oral implantology. The first group of elements pertains to periodontal factors, which include the morphological characteristics and positioning of the gingiva, the periodontal biotype, the positioning of the lower lip in both relaxed and smiling conditions, and the interocclusal space. The second group is associated with surgical interventions, which involve the ability to regenerate soft tissues and alveolar bone, correct implant positioning, and the absence of the need for flap elevation. The final group of relates to prosthetic rehabilitation, encompassing the morphology and interrelationships of suprastructures, the interaction of prosthetic devices with adjacent soft tissues, and the careful planning of prosthetic devices^{3,4}.

According to the findings of Ramanauskaite and Sader⁵, key factors that influence the aesthetic success of prosthetic superstructures over implants placed in the anterior region of the oral cavity include the presence of interdental spaces gingival tissue near a dental primarily depends on the clinical attachment level of the adjacent tooth.

The extent of tissue loss at the beginning of treatment plays a crucial role in determining the predictability of aesthetic success for dental implants. As the loss of alveolar bone and soft tissue increases, achieving an ideal aesthetic outcome becomes significantly more difficult. Furthermore, aesthetic challenges vary considerably when comparing the replacement of a single tooth to the replacement of multiple teeth in the aesthetic zone.

It is important to note that recent scientific literature increasing focuses on the issue of insufficient mucosal volume around implants, particularly because non-invasive evaluations of soft tissue volume remains complex⁶.

Expectations from implant therapy in today's dental practice have evolved substantially compared to previous decades. The growing number of implants placed in aesthetic zones is directly associated with a rise in complications related to such treatments. Therefore, it is essential to thoroughly document aesthetic complications and to define the associated risk factors⁷.

Evidence gathered from the literature indicates that the aesthetic outcomes experienced by patients after the application of suprastructures on dental implants depend on a variety of factors. Accordingly, this research focuses on the complications that may arise following the placement of suprastructures on dental implants located in the aesthetically critical maxillary anterior region. Identifying these complications, and exploring methods for their prevention and management represents a significant responsibility for dental clinicians involved in implant placement and prosthetic restoration⁸.

Given the increase importance of aesthetics in contemporary dentistry-driven largely by growing patients expectations-this study aims to evaluate the impact of complications associated with implant therapy on the aesthetic outcomes following the placement of superstructures in the maxillary aesthetic region.

Material and method

This study involved a total of 163 respondents, consisting of 79 males (48.47%) and 84 females (51.53%) with and average age of 54 years. The research was conducted at a private dental office „Dr. Bajraktarov“ in Strumica, Republic of North Macedonia, between May and October 2022.

Participants were required to meet specific inclusion criteria: they must have undergone implant treatment within the past two years, have a permanently fixed superstructure, and have used for a minimum duration of six months.

All patients who met the defined inclusion criteria were invited to participate in a follow-up examination. This group also included patients who presented at the clinic with complaints related to their dental implants or prosthetic superstructures. A comprehensive medical and dental history was taken from each patient, with particular emphasis of their main complaints-especially those related to aesthetics.

An additional component of the study involved a survey designated to evaluate how existing complications affected the patients' personal perception of aesthetic eval-

uations. Simultaneously, a small portion of the questionnaire was completed by the dentist-clinician who assessed the aesthetic impact of the complications from a clinical perspective.

The questionnaire was fully completed by all participants, including the three dentists who form part of the implant therapy team at the clinic.

The clinical evaluations involved two key assessments":

1. Assessment of the impact of prosthetic superstructures in the maxillary aesthetic region in terms of aesthetics

This form of assessment is based on patient responses to questions regarding the aesthetic implications of prosthetic rehabilitation for those with dental implants in the upper frontal region. Patients were asked to choose from the options: Improved aesthetic effect, Worsened aesthetic effect, or No impact on aesthetics. Respondents who noted a decline in aesthetic quality were subsequently asked to evaluate the severity of this decline, with options including significantly, moderately, or satisfactorily deteriorated aesthetics.

2. Ultimately, the clinicians involved in the interventions conducted an evaluation of the effects of prosthetic superstructures positioned over dental implants in the maxillary aesthetic area on overall aesthetics. The results were categorized according to the degree of aesthetic impact as follows: significantly deteriorated aesthetics, moderately deteriorated aesthetics, or satisfactorily deteriorated aesthetics.

Results and discussion

The analysis showed a total of 277 dental implants were placed across the entire study population. It was also noted that the average number of dental implants per patient was 1.680982 ± 1.086991 , with a range from 1 to 8 implants. The relationship between the number of patients and the dental implants placed is presented in Table 1. The average duration of implant therapy, defined as the time from the

Table 1. Number of dental implants per subject

Number of implants per subject	Subjects	Percentage
1	94	57,67
2	44	26,99
3	18	11,04

Table 2. Type of suprastructures

Type of suprastructure	Subjects	Percentage
Solo crowns	79	48.47
Bridge with maximum 4 artificial teeth	21	12.88
Bridge with 5-6 artificial teeth	59	36.19
Bridge construction with more than 7 artificial teeth	4	2.46

placement of dental implants in the studied group, was found to be 20.07362 ± 17.12027 months, with a range of 10 to 59 months.

The analysis of the studied population reveals that solo crowns in the anterior maxillary region are the most frequently utilized type of prosthetic superstructure, comprising just under 48.47% of the cases. The next most common type of prosthodontic appliance was bridge construction, which connects both canine teeth and is present in 36.19% of the respondents. Furthermore, 12.88% of the participants, equating to 21 individuals, reported having bridge constructions with a maximum of four teeth. Of these, 20 individuals had bridges that included the two central and two lateral incisors, while one individual had a bridge that spanned teeth 11-23. Additionally, a small subset of four subjects (2.46%) had bridge constructions with more than six teeth, including one subject with a bridge from 15-24, another from 15-25, and two subjects with bridges covering teeth from 16-26 (Table 2.).

The findings indicate that complications were present in 22 participants from the studied population, which corresponds to 13.49% of the entire sample analyzed (Table 3.).

Table 3. Assessment of the aesthetic complications

Complications	Subjects	Percentage
Present	22	13.49
Absent	141	86.51

Of the total number of respondents who experienced complications from dental implants, it was noted that in 86.36% of the subjects there was a deterioration in aesthetics due to the present complication, while 13.63% of the respondents indicated neither a deterioration nor an improvement in aesthetics from the complications themselves (status quo condition) (Table 4.).

Tabele 4. Influence of complications on aesthetics

influence	Subjects	Percentage
Better aesthetics	0	0 %
Worsen aesthetics	19	86,36 %
No influence	3	13,63 %

Furthermore, each of the subjects made a subjective assessment of the degree of deterioration in aesthetics due to the complications present in the maxillary region. Thus, the majority of the subjects estimated that they had a significant deterioration in aesthetics (47.36%). A smaller proportion of respondents indicated that they had a moderate deterioration in aesthetics (31.58%), while only 21.06% of respondents indicated that they had a minimal deterioration in aesthetics (Table 5.).

Tabele 5. Grading of the aesthetic effect by the patients

grading	Subjects	Percentage
significantly impaired aesthetics	9	47,36 %
moderately impaired aesthetics	6	31,58 %
minimal impaired aesthetics	4	21,06 %

Gradation of the deterioration of the aesthetic effect in patients during the study was also performed by the doctors, based on their subjective assessment. Most clinicians indicated that there was a significant deterioration in aesthetics due to the complications present (57.89%). Moderate deterioration of achieved aesthetics was assessed by 31.58% of the superstructures with complications, while 10.53% of clinicians indicated that the complications present after implantation of the maxillary frontal region lead to a minimal disruption of the achieved aesthetics (Table 6.).

Tabele 6. Grading of the aesthetic effect by the clinicians

influence	Subjects	Percentage
significantly impaired aesthetics	11	57,89 %
moderately impaired aesthetics	6	31,58 %
minimal impaired aesthetics	2	10,53 %

The importance of aesthetics in contemporary life and human functionality is increasingly recognized. With patients placing greater emphasis on achieving an appealing appearance and smile, there has been a notable rise in the demand for dental implants, resulting in a continuous increase in their application. The advancements in the characteristics of these implants provide a valid rationale for this growing demand. As the number of individuals undergoing implant therapy continues to expand, dental professionals must navigate the associated challenges and potential complications inherent in these complex restorative interventions. To minimize complications, it is imperative to prioritize thorough preoperative preparation. The processes of diagnosis and treatment planning should be informed by a careful evaluation of current risk factors, and the assessment of the advantages of implant therapy should follow a detailed anamnestic procedure, alongside comprehensive medical, dental, psychological, and radiographic evaluations.

Throughout the research, endosseous dental implants were consistently employed across all cases studied. To achieve the research aims, only one specific type of implant from Implant Swiss was utilized. Some participants underwent a two-phase surgical technique with delayed loading, while others experienced immediate implantation. The study did not differentiate between the types of dental implants or the loading methods of the dental implants. Moreover, the investigation did not focus on the types of prosthetic superstructures; instead, it considered patient satisfaction with the aesthetic results following the placement of these superstructures as the primary measure.

In our study, we found that 86.36% of patients reported a decline in aesthetic quality attributed to the complications they experienced, while 13.63% noted no change in aesthetics. Among the respondents, 47.36% experienced a significant decline in aesthetics, 31.58% reported a moderate decline, and 21.06% indicated only a minimal decline. Clinicians also assessed the aesthetic impact of these complications based on their subjective observations. A majority, 57.89%, of the clinicians reported a significant deterioration in aesthetics, while 31.58% noted a moderate decline, and 10.53% observed only a minimal disruption in aesthetics following complications from the implantation in the maxillary frontal region. It is important to highlight that the higher percentage of significant aesthetic deterioration reported by clinicians may be attributed to their heightened sensitivity in identifying even minor imperfections in the outcomes.

The influence of superstructures on dental implants significantly affects the perception and outcomes of smile aesthetics, with complications further complicating these effects. This leads to a diverse interpretation of aesthetics among different groups, including the general public, den-

tal students, and specialists across various dental fields. Such differences likely explain the varying degrees of aesthetic satisfaction reported by patients. However, the study's limitations are exacerbated by the lack of subjective measures to evaluate the impact of complications on the aesthetics of superstructures. Aesthetics is fundamentally a personal experience, heavily influenced by the subjective desires of patients who engage with dental services. Therefore, we contend that their evaluations can be interpreted as having positive implications, thereby enhancing the relevance of this study.

Moreover, another constraint of this investigation is the application of diverse implant types, loading strategies, and superstructure variations. Given the broad spectrum of research possibilities in this field, we hope that this study will motivate additional research that will clarify the aesthetic consequences of the various complications that may occur during the postoperative period of dental implant therapy. In summary, we believe that the results presented will be beneficial for clinicians in grasping the aesthetic implications of complications associated with implant therapy in the anterior region of the maxilla.

Conclusion

The analysis of the collected data and the study results leads to several key conclusions regarding the influence of complications arising from implant therapy in the maxillary frontal region on aesthetic outcomes. A

significant majority of respondents reported that complications resulted in a decline in aesthetic quality. Subjective evaluations of aesthetic deterioration due to complications in the maxillary region revealed that most respondents perceived a significant decline, with clinicians reporting an even greater extent of disruption to aesthetic outcomes.

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