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ORIGINAL ARTICLE

FREQUENCY FOR THE USE OF CBCT ANALYSIS IN DENTISTRY

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Abstract: Cone beam computed tomography (CBCT) is a method that allows a three-dimensional evaluation of hard craniofacial structures with a lower radiation dose than classic CT. This method began to be used more and more frequently in dentistry. Background: The aim of the study was to evaluate the frequency for use of CBCT in dentistry. Methods: The study was addressed to dentists of various specialties from Oltenia region that completed an online questionnaire with 10 questions. Data were collected regarding the physician's specialty, the type of interventions for which the dentist recommends CBCT, how necessary this investigation is considered, and how invasive it is considered to be. The questionnaire was launched online for a period of 4 weeks, and dentists from the Oltenia region were invited to participate. The statistical analysis was carried out with the help of the Google Docs program, the section dedicated to forms, "Google Forms". Results: Young doctors chose this technology more frequently than doctors with more than 5 years of experience. Although implant planning is the primary reason for CBCT imaging in dentistry, CBCT is increasingly being used for other diagnostic purposes, such as periodontics and endodontics. In nearly 20% of cases, the primary diagnosis and/or treatment plan was changed following CBCT evaluation. Conclusions: There is an increasing trend in the use of CBCT in dentistry, especially by young graduates.

Keywords: CBCT, dentistry, 3D imaging, implantology, endodontics, periodontology, radiological analysis, radiation.

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1. Introduction

Over time, the evolution of dentistry has been gradual and steady, leading to new treatment protocols that have challenged conventional procedures [1-9]. The recent explosion of digital technology, software, scanning and diversified materials has led to a major paradigm shift in all aspects of dentistry and slowly, artificial intelligence will enhance the usefulness of CBCT in dentistry [1-10]. Today, digital radiographs are a routine practice in dental clinics, and computer-aided virtual design is also very common: digital impressions, digitally manufactured dental prostheses and guided surgery are a reality of dental practice [9-15].

Panoramic radiography and computed tomography were the main elements of maxillofacial imaging diagnosis [11,16-20]. Dental cone beam computed tomography (CBCT) is the most important advance in oral radiology since panoramic radiology in the 1950s and 1960s, and perhaps since Roentgen's discovery of X-rays in 1895. With the advent of cone beam computed tomography, the practice of dentistry has experienced a paradigm shift [21]. The concept of using a cone-shaped X-ray beam to generate three-dimensional (3D) images has been used successfully in vascular imaging since the 1980s and is also used in dentistry today [22]. The first CBCT unit: NewTom QR-DVT 9000, was initially introduced in Europe in 1999 [21]. CBCT has an X-ray source that rotates around the patient, and at the end of the image acquisition phase, the computer, through software, generates a three-

plane reconstruction, and the images are processed using many algorithms, including the reduction of metal artifacts. The final result of the processing is the 3D volume, but also the multiplanar reconstructions (MPR) images that can be evaluated in the three planes (axial, coronal and sagittal) and in any desired angle (360 degrees) [10,11].

Cone beam computed tomography (CBCT) is a new diagnostic tool that has revolutionized diagnosis and treatment planning in the dental field. Multiplanar imaging, is a novelty for the dentist, offers the possibility of a diagnosis in different planes and allows the decryption of the real 3D spatial relationship of various anatomical elements with structures in the maxillofacial region [10,11]. The main applicability of CBCT and the most widely feature used is the measurement function in various sectional plans depending on the location of the area of interest studied. The main advantage of CBCT is the rapid volumetric acquisition, superior spatial resolution to CT, advanced multiplanar reconstruction, two- and three-dimensional analysis of anatomical structures, highlighting fine submillimeter ratios between different anatomical structures [10,11]. CBCT is a more compact, faster version and emits less radiation than conventional computed tomography. Depending on the complexity of the processing and visualization software used by the CBCT manufacturer, there is a diversity of functions for exploring the acquired volume [10,11].

CBCT was adopted in dentistry very quickly due to its compact size, low cost, low

exposure to ionizing radiation compared to computed tomography and minimal distortion. Most CBCT equipment is easy to use with visualization software that contains 3D images, provides extensive analysis tools, and allows for treatment planning. The software allows the virtual study and the diagnostic process, the treatment plan and the design of surgical guides for surgical interventions (insertion of implants) [10,11].

Current use is in the field of dental implantology, oral surgery, orthodontics, endodontics, sleep apnea, temporomandibular joint (TMJ) disorders, and periodontics [9,10,23,24]. Dentists who choose to use cone beam computed tomography for their patients assume responsibility for interpreting the entire volume included in the scan, not just the area that may be the reason for the scan [25].

The dentist's role in the identification, diagnosis and management of pathology seen on CBCT scans is to coordinate according to two main objectives: first, the scan is done specifically to evaluate a pathological condition of the patient, identified by history or examination clinically where a facial asymmetry can be observed and secondly, the scan is done to establish the treatment by fixed or mobilizable prosthesis with implant support, or by orthodontic treatments [7-9,10].

Even though the basic objective is to determine the nature of the condition and the type of management required, the steps the doctor will take will be different, with the goal being to preserve and improve the patient's health.

The purpose of the study was to evaluate and determine the categories in which CBCT type radiological scans are used and also to evaluate the opportunity of its use in the complex and complete diagnosis of patients.

2. Materials and method

The study highlighted the areas of dentistry in which dentists frequently use the three-dimensional information of the CBCT scan and the degree of confidence that doctors have in using this technology. The data obtained in this study were corroborated and used to understand if the CBCT evaluation is a standard diagnostic and prognostic method in dentistry.

The data were obtained from dentists with various specializations, from the region of Oltenia, Romania, using as an investigation method an online questionnaire, consisting of 10 questions, which contained both single-choice and multiple-choice questions. The questionnaire was launched for a period of 4 weeks, and a number of 55 dentists, who were assured of anonymity and confidentiality of the research data, responded to it voluntarily.

Information was collected such as: the specialty of the doctor, the type of interventions in which the doctor recommends the CBCT scan, if the CBCT evaluation confirmed the presence of the pathology for which the recommendation was made, if the doctor considers the CBCT scan absolutely necessary for his cases, if the doctor considers the scan CBCT is a radiologically invasive procedure for its patients.

The questionnaire was made up of the following questions:

1. Are you a medical specialist? If the answer is yes, what specialization do you have?

2. How long have you been working in a dental office?

3. Is the office where you work in an urban or rural environment?

4. Do you consider CBCT evaluation absolutely necessary for your patients' cases?

5. What do you think you need to be able to evaluate a CBCT scan?

6. When do you recommend a CBCT scan?

7. What CBCT analysis software do you use?

8. Did the CBCT evaluation confirm the presence of the pathology for which the recommendation was made?

9. Do you consider the CBCT scan to be a radiologically invasive procedure for your patients?

10. Do you use CBCT scanning to make surgical guides for implant therapy or other aesthetic procedures?

Following the results obtained in this study, different graphs were made, which were processed statistically, and which were later exemplified individually, in the chapter dedicated to the results and discussions. The statistical analysis was carried out with the help of the Google Docs program, the section dedicated to the "Google Forms" forms.

The study was approved by the Ethics Committee of the University of Medicine and Pharmacy in Craiova (Approval Number

55/29.01.2024) and was carried out in accordance with the ethical principles of the Declaration of Helsinki (version 2013).

3. Results

The study involved the analysis of data obtained from a group of 55 dentists with various specializations, from Oltenia, Romania. Among them, 16 (29.09%) are not specialist, 10 (18.18%) are dentists in a residency program, 9 (16.36%) work as specialists in general dentistry, 6 (10.91%) specialists in orthodontics, 6 (10.91%) specialists in endodontics, 5 (9.09%) specialists in periodontology and 3 (5.46%) specialists in dento-alveolar surgery (Figure 1, Table 1).

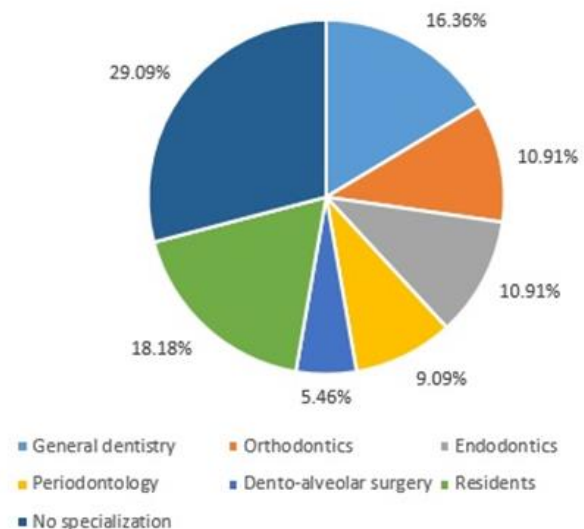


Figure 1. The specializations of the responding dentists.

Regarding experience in the field of dental medicine, 28 (50.90%) responding doctors stated that they have less than 5 years of experience in this field, 19 (34.55%) doctors

have more than 5 years of experience and 8 (14.55%) doctors have more than 10 years of experience. Most of the surveyed candidates have an activity period of less than 5 years, which confirms the increased prevalence of

the adoption of CBCT technology by the new generations of dentists. At the opposite pole, the lowest percentage belongs to doctors with more than 10 years of experience.

Table 1. The experience of the responding dentists.

Specialization	Number	Percentage (%)
General dentistry	9	16.36%
Orthodontics	6	10.91%
Endodontics	6	10.91%
Periodontology	5	9.09%
Dento-alveolar surgery	3	5.46%
Dentists in a residency program	10	18.18%
No specialization	16	29.09%
General dentistry	9	16.36%

Taking into account the environment in which the responding dentists work, the predominant number is occupied by the urban environment 47 (85.45%), the remaining 8 (14.55%) working in the rural environment (Figure 2). Most dentists, respectively 36 (65.46%), chose to use CBCT technology in some cases, 16 (29.09%) doctors stated that CBCT is always necessary for their patients' cases and only 3 (5.45%) doctors answered that it is not necessary (Table 2). No participant considered that CBCT radiography technology is too expensive or that it requires a lot of time and is not justified.

expensive or that it requires a lot of time and is not justified.

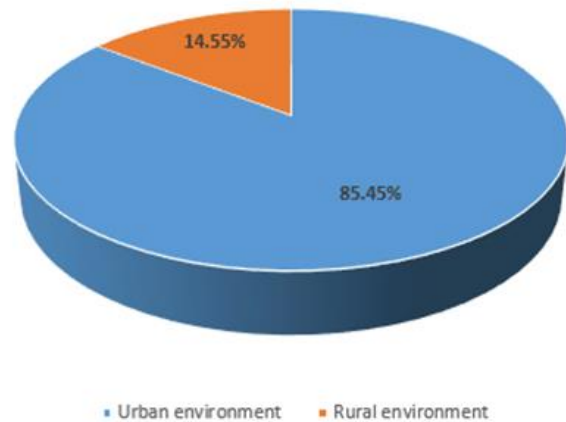


Figure 2. Distribution of subjects according to residence area.

Most dentists, respectively 36 (65.46%), chose to use CBCT technology in some cases, 16 (29.09%) doctors stated that CBCT is always necessary for their patients' cases and only 3 (5.45%) doctors answered that it is not necessary (Table 2). No participant considered that CBCT radiography technology is too

18 doctors (32.7%) answered that they require a CBCT for implantology and surgical diagnosis and only one of the doctors does not recommend CBCT. Most dentists confirmed that CBCT is a very useful tool for diagnostic

confirmation (67.3%), while a third of the responding dentists appreciated that CBCT analysis conducted to a modified treatment plan, very important for the proper management of the patient. Asked if the use

of CBCT imposes a necessary training and a special equipment, participating dentists responded that training is necessary (63%), but also equipment (29.6%) (Table 2).

Table 2. Characteristics of the responding dentists.

Characteristics	Number	Percentage (%)
Experience		
≤5 years	28	50.90%
≥5 years	19	34.55%
≥ 10 years	8	14.55%
Use of CBCT		
Always	16	29.09%
Sometimes	36	65.46%
Never	3	5.45%
Impact of CBCT on diagnostic and treatment plan		
CBCT confirmed initial diagnostic	37	67.3%
CBCT modified treatment plan	16	29.1%
No additional benefit	2	3.6%
Training necessary for CBCT use		
Training	34	63%
Training and office equipped with CBCT	16	29.6%
No additional resources necessary	4	7.4%

A total of 45 (81.8%) participants chose the CS 3D image software (Carestream Dental LLC Atlanta, GA, USA), reasoning that the interface is easier to use compared to the variants on the market.

4. Discussions

The study showed a continued increase in CBCT use in dentistry, especially by young dentists with a high acceptance of technology. CBCT is used more in implantology, for diagnostic and treatment planning, but also in orthodontics, dento-alveolar surgery, periodontology and endodontics. CS 3D

Most participants did not consider CBCT to be an invasive procedure. More than half of the doctors in the study group answered that they use CBCT in the guidelines for implants.

image software is the most used by dentists in Oltenia, probably because of the recommendation made by radiology equipment producers. Most participants did not consider CBCT to be an invasive procedure. This result showed that most dentists understood that irradiation through CBCT radiography technology is minimally invasive according to the protocol of use.

Also, more than half of the dentists in the study group answered that they use CBCT in the creation of surgical guides for implants. This trend could be explained by the fact that most participants want to decrease possible intraoperative risks at the expense of additional costs. Almost all participants in the study considered CBCT as an important analysis for diagnostic confirmation, since in many cases CBCT led to a change in the treatment plan.

Other studies confirm the increased share of users from the urban environment compared to those from the rural environment, the reason being access to the internet, as well as the initial equipment costs, these representing two objectives that are more accessible to dentists working in the urban environment [1].

There are mentions in many publications in the literature regarding CBCT imaging, which conferred a significant value in the process of diagnosis and establishment of the treatment plan [9-11,26]. Along with the clinical examination, radiological imaging is essential for a complete diagnosis in dentistry. Image analysis is often essential to confirm or deny clinical findings or diagnoses. According to most current guidelines, three-dimensional imaging by cone beam computed tomography is recommended for patients in whom the diagnosis would remain uncertain, or the treatment plan unclear [9-11,26].

There are few research papers published in the literature that describe the analysis of the utility of CBCT in diagnosis, assessment, planning and delivery of treatment. This study

was done to improve our understanding of the contribution and limitations of the CBCT imaging modality in diagnosis and treatment planning by various dentistry specialties [9-11,26].

The largest percentage is represented by dentists who have been working for less than 5 years, most of them working in the urban area. We found that a small number of dentists use the CBCT assessment in rural areas. The most indications being for the analysis of the sites necessary for the insertion of dental implants, the second position is occupied by the diagnostics for surgical conditions. None of the respondents checked the answer as an expensive and unjustified investigation.

Before performing a more complex or long-term treatment, complementary examinations are necessary to avoid the risks and complications associated with it, the surveyed doctors recommend CBCT for a limited number of diagnoses, not as an option related to the patient's initial diagnosis [10]. Scan-detected lesions must be evaluated for the following characteristics: location, periphery and shape, internal structure, and the effects of the lesion on adjacent structures with the goal of preserving and improving the patient's health. It is essential that all anomalies are identified, and their nature determined [6,23].

CBCT can also facilitate the planning of surgical treatment in several ways: it is used to examine the precise location and extent of pathologies (odontogenic and non-odontogenic tumors, cysts) of the jaws, as

well as osteomyelitis [27,28], it can allow a clinician to locate and map the structures vital (inferior alveolar, lingual, mental, or greater palatine nerves), when planning surgical therapies [18-20], it can be used to determine the number and morphology of associated roots and canals (both main and accessory), to establish working lengths, and to determine the type and degree of angulation of the root, providing a real assessment of the root present for obturation of the canals, but also to classify the source of the lesion as endodontic or non-endodontic, a fact that can significantly influence the treatment plan [27,29].

Studies performed to evaluate periodontal defects on human and porcine mandibles, using intraoral radiography, panoramic radiography, CT and CBCT concluded that 3D imaging had a high accuracy in detecting alveolar defects [30].

The use of CBCT can replace surgical reintervention because it provides 3D images and measurements of the affected site, which is almost equivalent to direct surgical measurement [10]. In addition, CBCT provides non-overlapping images that are self-corrected for magnification, with a practical 1:1 measurement ratio, for morphometric analysis of structures and anatomical relationships essential to address various orthodontic requirements [10].

Rossini et al. [31] reviewed the literature focused on cone beam computed tomography (CBCT) diagnostic accuracy and effectiveness in detecting impacted maxillary canines and evaluated possible advantages in using the

CBCT technique compared to traditional radiographs.

Mota de Almeida et al. reported that in 53% of cases (28 out of 53 cases), the therapy plan changed after the CBCT examination, especially in cases referring to the differentiation of pathology from normal anatomy [32].

Data has been collected, there has been a move to lower radiation protocols and better diagnostic value in high resolution protocol scans. Some researchers have even suggested that CBCT may become the first choice for endodontic treatment planning and outcome assessment, especially when new scanners with lower radiation doses will be used [9]. The published literature suggests that CBCT imaging is superior to 2D imaging in describing periapical lesions, accurately demonstrating the juxtaposition of the lesion to the maxillary sinus, the involvement of the sinus membrane, and the location of the lesion relative to the mandibular canal [10].

To use the software and to have the certainty of a correct diagnosis, most of dentists consider that a dedicated training is needed to use CBCT. By using CBCT, the participating doctors chose its usefulness for implantology interventions. According to the completed questionnaire, CBCT evaluations are most frequently recommended for implantology interventions. Before the surgical placement of dental implants, a thorough planning must be carried out in stages, analyzing: the dimensions, positions and axes of insertion of the implants, which must be established for the intervention [33].

Pre-surgical assessment guidelines emphasize the need for an accurate assessment of bone volume and the location of adjacent anatomic structures in relation to the positioning of the denture-derived dental implant [33]. Imaging for pre-surgical dental implant planning should provide information to support the following goals: establishing the morphological characteristics of the residual alveolar ridge, includes considerations regarding the volume and quality of the bone. The vertical bone height, horizontal width and length of the edentulous ridge determine the amount of bone volume available for placement of the implant fixation device and it is necessary to maintain the available bone volume to determine the diameter and length of the implant [33].

Most respondents use Carestream 3D software. This result can be explained by the low cost of use as only a computer with average specifications is required. Standard imaging software allows the clinician to view the data in several ways: multiplanar reconstruction, standard axial, coronal and sagittal planes that can be traversed in reconstructed panoramic view, cross-sections perpendicular to the dental arch, specific views of structures such as the temporomandibular joint and three-dimensional (3D) volumetric renderings. Some programs also allow for implant planning and orthodontic analysis, among other functions. The clinician must be trained through training to use the features available in the software package being used [34].

The study was carried out to understand the importance of CBCT evaluation in order to make a precise diagnosis and treatment plan, in different dental specialties. Referral for CBCT imaging should always be guided by the pursuit of improved diagnostic accuracy and the prospect of an improved treatment plan. Ideally, indications for a CBCT scan should be based entirely on case-related factors [10, 33].

In recent years, since the data have been collected, there has been a shift towards lower radiation protocols and better diagnostic value in high-resolution protocol scans. Some researchers have even suggested that CBCT may become the first choice for endodontic treatment planning and outcome assessment, especially when new scanners with lower radiation doses become available [28, 33].

Most participants did not consider CBCT to be an invasive procedure. At the same time, the studies carried out on the new CBCT equipment have demonstrated an emission of radiation that does not negatively affect the human body. Regarding the ALADA (as low as diagnostically acceptable) principle, CBCT has a higher radiation dose compared to other imaging methods. According to the FDI policy statement, all reasonable means should be used to reduce radiation exposures without compromising diagnosis [27, 33]. For CBCT machines, a review by Ludlow et al. estimated effective doses of 13–769 mSv for large or medium FOVs and 7–521 mSv for small FOVs, depending on the machine and acquisition protocols used [35].

5. Conclusions

Although the radiation dose is significantly higher than in the case of two-dimensional radiographs, there is a tendency to increase the use of CBCT with the progress of years among dentists. Although implant planning is the primary reason for CBCT imaging in dentistry, it is also increasingly used for various other diagnostic and

treatment planning purposes. In many cases, the primary diagnosis and/or treatment plan was modified following CBCT evaluation, highlighting the important role of CBCT in diagnosis and treatment by various dental specialties. In the future, when the radiation dose of CBCT decreases to similar values of 2-D imaging, it may be the imaging technique of choice in dentistry.

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Will be provided on request.

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ORIGINAL ARTICLE

ROLE OF DENTIST – PATIENT COMMUNICATION IN ORAL REHABILITATION

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Abstract: Communication is an important skill for dental professionals. For dentists, this means the best way to communicate diagnosis and treatment plan to the patient, altering favorable the patient's mood (minimizing fear, anxiety, increasing confidence, hope for favorable treatment results), influencing the patient's lifestyle and behavior. Objective: This study aimed to analyze how the communication between the dentist and the patient influences the treatment plan in oral rehabilitation. Results: 64 patients with ages between 17 and 62 years participated in the study. Patients were invited to participate in the study immediately after the end of the treatment session. Most of the patients included in the study received the requested treatment. This correlates positively with the level of education, most patients having higher education. Since patients in Romania have a low monthly income and dental treatment is extremely low compensated by a Dental Insurance, their addressability to the dentist is reduced, the main reasons for presentation being pain and the request for teeth extraction. Conclusion: Dentist-patient communication is positively influenced by the level of education, patients with higher education having a greater capacity to understand and accept the treatment plan.

Keywords: communication, influencing factors, patient, dentistry.

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1. Introduction

Nowadays, communication is an important skill for dental professionals, because every doctor wants to have a good relationship with his patients. For the dentists, this means an accurate diagnosis of the patient's oral disease, changing the patient's mood (minimizing fear, anxiety, increasing confidence, hope for favorable treatment results), influencing the patient's lifestyle and behavior in order to carry out the recommendations given by the dental specialist treating him [1]. Dental anxiety is a form of anxiety that occurs when the patient is presenting to the dentist or just with the anticipation of dental treatment experience [2,3].

The idea of doctor-patient relationship and the medical dialogue have been described or mentioned in the history of medicine since the times of Ancient Greece (Plato), and in the modern medical and social science literature of the last 50 years [4,5,6].

Consumer society has significant implications for the 21st century dentist: patients want to be "involved" in treatment decisions and to have an experience that exceeds their expectations during their visit to the dental office [7]. The changing attitude of patients is the most key factor that contributes to the decline of "trust" towards the medical staff. Patients today have more options than ever before. If a dental office does not offer what the patient wants or needs - if the interaction with the dentist does not exceed his expectations - he does not perceive the doctor as "different and unique", and

therefore, he will solve his problem by going to one of his competitors [8].

Communication is considered by The Nova Scotia Dental Association (NSDA), as part of the dentists' job to enable their patients to make informed decisions about their oral health by providing them with information about professional opinions, goals of dental treatment, and scientific findings in this field of knowledge [9,10].

The dentist must consider the patient's level of competence when communicating with him [11]. Patient competence is the patient's ability to understand the information necessary to make an informed treatment decision and to assess the foreseeable consequences of a decision or failure to decide about dental treatment [12].

2. Materials and method

This study aimed to analyze the way in which the communication between the dentist and the patient influences the implementation of the treatment plan in oral rehabilitation. The study included 64 patients aged between 17 and 62 years old, who were asked to participate in the study immediately after the end of the treatment session, so that the dentist who performed the treatment was not present when completing the questionnaire. The questionnaires were analyzed, and the data obtained have been used to create the tables included in the study.

The study received the positive approval of the University Scientific Commission of Ethics and Deontology no. 62/29.01.2024.

3. Results

64 patients aged between 17 and 62 years old participated in the study, of which 64.06% were women and 35.94% were men, 18.75% from rural areas and 81.25% from urban areas

(Table no. 1.). Two age groups are highlighted: teenagers and young people aged between 17 - 35 years (57 patients - 89.06%), i.e. the overwhelming majority and the rest adults over 35 years old (7 patients - 10.94%).

Table 1. Demographic data of the participants in the study.

Patients	Urban	Rural	Total
	No / %	No / %	No / %
Women	33/ 80.48	8/ 19.51	41/ 64.06
Men	19/ 82.6	4/ 17.39	23/ 35.94
Total	52/81.25	12/ 18.75	64/ 100

* Description.

The reasons for presenting to the dentist were, in the vast majority, pain (30.9%) and a claim for tooth extraction (32.3%) and, to a lesser extent, scaling (14%), and periodic control (12.6%). Requests for more complex

treatments, such as oral rehabilitation with bridges or removable dentures or implant prostheses, were found in a small number of patients (8.06%) (Table 2).

Table 2. Patients' reason for dental visit.

The reason for coming to the dentist	Women		Men		Total No / %
	Urban	Rural	Urban	Rural	
	(No / %)	(No / %)	(No / %)	(No / %)	
Toothache	9/12.64	4/5.61	5/7.02	4/5.61	22/30.9
Tooth extraction or treatment of a dental problem	7/9.83	3/ 4.21	8/11.23	5/7.02	23/32.3
Scaling or other treatment unrelated to a specific dental problem	7/9.8	1/1.4	2/2.8	0/0	10/14
Dental bridge or removable denture or implant prosthesis	2/ 3.22	0/0	3/ 4.83	0/0	5/8.06
Periodic inspection	9/12.6	0/0	0/0	0/0	9/12.6
Other	1/ 1.07	0/0	1/ 1.07	0/0	2/2.14

The patients included in the study primarily requested the application of fillings (45.5%) or, as the patients say, "fillings". In a smaller number, the requested treatments were extraction (16.4%), scaling (11.3%), bridge

(7.5%) or root canal treatment (7.5%). No patient requested treatment with a removable denture or periodontal surgery. Very few patients were interested in teeth whitening (3.7%). A small part of the patients did not

request a certain treatment, they just came for periodic check-up (1.2%) (Table 3).

Table 3. The data obtained when asking: "What treatment did you request at the last visit to the dentist?".

The requested treatment	Women		Men		Total No / %
	Urban	Rural	Urban	Rural	
	(No / %)	(No / %)	(No / %)	(No / %)	
I don't know/no treatment.	2/2.53	1/1.26	1/1.26	1/1.26	5/6.32
Tooth filling	18/22.78	5/6.32	7/8.86	6/7.59	36/45.56
Tooth Extraction	4/5.06	2/2.53	5/6.32	2/2.53	13/16.45
Scaling	8/10.12	0/0	1/1.26	0/0	9/11.39
Teeth whitening	2/2.53	0/0	1/1.26	0/0	3/3.79
Dental bridge	2/2.53	1/1.26	2/2.53	1/1.26	6/7.59
Removable prosthesis	0/0	0/0	0/0	0/0	0/0
Endodontic Treatment	2/2.53	1/1.26	2/2.53	1/1.26	6/7.59
Periodontal surgical interventions	0/0	0/0	0/0	0/0	0/0
Others	1/1.26	0/0	0/0	0/0	1/1.26
Total	39/49.36	10/12.65	19/24.05	11/13.92	79/100

Participant responses about the treatments recommended by dentists were mostly "I don't know or no treatment" (29.7%), followed by fillings (22.9%), then, in descending order, scaling (10.8%), bridges (9.4%), whitening (4%), periodontal surgery (2.7%) (Table 4).

Table 4. Responses of patients to the question "Instead of the treatment you requested, what other treatment did the dentist suggest?".

The suggested treatment	Women		Men		Total No / %
	Urban	Rural	Urban	Rural	
	(No / %)	(No / %)	(No / %)	(No / %)	
I don't know/no treatment.	13/17.56	1/1.35	8/10.81	0/0	22/29.72
Tooth filling	9/12.16	3/4.05	3/ 4.05	2/ 2.7	17/22.97
Tooth Extraction	5/ 6.75	4/ 5.4	3/ 4.05	1/ 1.35	13/17.56
Scaling	7/ 9.45	0/0	1/ 1.35	0/0	8/10.81
Teeth whitening	3/ 4.05	0/0	0/0	0/0	3/ 4.05
Dental bridge	3/ 4.05	0/0	3/ 4.05	1/ 1.35	7/ 9.45
Removable prosthesis	0/0	0/0	0/0	0/0	0/0
Endodontic Treatment	1/ 1.35	0/0	0/0	0/0	1/ 1.35
Periodontal surgical interventions	0/0	0/0	2/ 2.7	0/0	2/ 2.7
Others	0/0	0/0	0/0	1/ 1.35	1/ 1.35
Total	41/ 55.4	8/ 10.81	20/ 27.02	5/ 6.75	74/100

Correlating the answers to questions numbered 2, 3, 4, we made the following 4 groups of patients:

- group I: 68.75% of patients received the requested treatment,
- group II: 14.06% of patients requested a treatment and the doctor recommended something else and they accepted,
- group III: 4.68% of the patients requested a treatment and the doctor recommended something else and they did not accept it,
- group IV: 12.51% of patients claim that the doctor did not recommend any treatment or they do not remember.

The majority of patients in group I (patients who received the requested treatment) have higher education (65.9%) – 19 women out of 27, 10 out of 17 men, while almost a third (22.7%) of these patients have high school. As for the average monthly income, it is below 1500 lei for most of these patients (72.7%) - 70.37% of women and 88.23% of men.

Most of the patients in group II (patients who requested a treatment and the doctor recommended something else and accepted) have higher education - 77.77% of the

4. Discussions

The reasons for the patients coming to the dental office are pain and the request for teeth extractions and less for scaling and periodic control, which shows a low level of oral health education. Most of the patients included in the study received the requested treatment. This correlates positively with the

patients. No patient in this group falls into the training level of grades 1-8. Regarding the average monthly income, it is for most of these patients below 1500 lei (25%) and between 1500 and 2500 lei per month (25%).

The patients from group III (patients who requested treatment and the doctor recommended something else and did not accept it) have higher education (66.6%), while almost a third (33.3%) of these patients graduated highschool. As for the average monthly income, it is below 1500 lei for most of these patients (66.66% of these patients).

Most of the patients in group IV (patients who claim that the doctor did not recommend any treatment or that they do not remember) have higher education - 75% of patients, while almost a quarter of these patients graduated highschool. As for the average monthly income, it is below 1500 lei for most of these patients (75%). As can it be seen from the analyzed data, in the four groups of patients the distribution according to the level of training and according to the average monthly income is almost similar, so these two variables do not seem to influence the doctor-patient communication.

level of education. The treatment requested was mostly the treatment of dental caries by teeth fillings. Patients refuse expensive treatments, then teeth extractions for financial, pain and discomfort reasons. The refusal of expensive treatments is justified by the average monthly income (most patients have a minimal monthly income).

Sondell [13] published a review of the literature, where different doctor/dentist-patient relationships and communication characteristics are described and analyzed, suggesting a new model of dentist-patient communication, which states that what is done and what is said during dentist-patient encounters will have an impact on outcome. It is concluded that a theory of communication is lacking in the dental context, and the need to develop a reliable and valid interaction analysis system for patient-dentist communication is confirmed.

A scoping review [14] on communication tools in esthetic dentistry concluded that only little is known about implementing communication tools in dentistry and their impact on patient communication and patient satisfaction. It is stated that verbal and visual communication methods like PowerPoint presentation for patient information [15], before and after photos of other patients, wax-up on the model of the patient, intraoral mock-up and digital computer-imaging simulation positively influence patient satisfaction, patient-dentist relationship, information retention, treatment acceptance, quality of care or treatment outcome.

Communication between the dentist and the patient influences the realization of the complex treatment plan. Since patients in Romania have a low monthly income, their addressability to the dentist is reduced. Dentist-patient communication is positively influenced by the level of education, patients with higher education having a greater capacity to understand and accept the

treatment plan. Patients prefer doctors to communicate with them in a patient-centered manner and female dentists usually have higher communication abilities compared with males [16]. The dentists considered important to show interest in their patients' symptoms, use language that is easy to understand, explain the (dental) problem clearly and discuss the treatment plan with their patients [17].

Older age and more experience have a profound positive effect on attitudes and awareness regarding communication skills in this study. Dentists with experience more than 4 years are always or often resourced (books, articles, videos) about communication skills with patients, are always or often very convincing when proposing the treatment plan to the patients, using open questions, attending always or often communication skills courses more than the younger and less experienced doctors [16,18].

The average monthly income is a key factor in communication. Due to the lack of information, regarding the positive effects of dental prophylaxis that reduces long term treatment costs, patients arrive at the dental office in advanced stages of degradation of their oral health, when the treatments have become complex are expensive and almost impossible to pay with an extremely low monthly income.

The ability of dental practitioners to accept the views and emotional state of patients is extremely important for effective communication between them. The information provided to the patient during the

diagnostic and treatment process must be accurate and complete. The informed consent document that the patient signs must be explained to him in a clear and comprehensible way [1]. Excellent communication between the dental professional and the patient promotes better oral health [19].

The patients' trust in their dentist's decisions regarding their dental care turned out to be a significant predictor of both satisfaction and loyalty [17,20].

The visit to the doctor must influence the patient's emotional states and worries. Doctors are not only professionals, experts, but also people to whom people turn when they feel vulnerable. Therefore, support, empathy (understanding of the other person's condition), care and trust, as well as the accurate examination of mental states and emotions are important elements in building a cooperative relationship and also represent the key to the feeling of well-being, the patient feeling cared for and understood [21-23].

The most important communicative strategy in dentistry is a brief, but convincing description of the procedures the doctor will perform to the patient. This has an anxiety-reducing effect, which is significantly important in dentistry [17,24]. Delivering professional explanations in simple language is also the first step to engage patients and make them partners in their own care, which has been shown to increase satisfaction [25].

Patients with different awareness levels and health culture come to the dental office. The dentist must consider the patients' ability

to understand the information necessary to make a treatment decision and to assess the foreseeable consequences of a decision or non-decision [26].

The specialized literature clearly mentions the fact that the future in service marketing is the professional approach to customer relations [27]. In the "hyper-competitive" era we live in, maintaining long-term growth requires those who offer services to find new ways to win „customers”. Therefore, instead of keeping their customers at a distance, service providers must develop strategies and tactics to bring them closer. If companies - including dental offices - want to succeed in today's competitive market, where customers are becoming smarter and "loyalty" towards the service provider is decreasing, it is time for a major change. It is time to become aware of a new term in an old concept, namely "Success in the relationship with the client" [28].

Health culture and management as a part of the patient's general culture and knowledge is a system of knowledge, values, habits, skills, and behavior to satisfy the need for protection, restoration and strengthening of personal and public health. Continuously improving the health culture of patients, through screening and preventive campaigns, is the basis of analyzing and overcoming the risk factors for dental health [26].

Dentists play a significant role in oral health and prevention, so, they should have a positive attitude and self-efficacy in doctor-patient communication with practical applications. Communication skills should be

included as an important educational goal for dentists and given enough weight in objective, systematic clinical assessments [16].

5. Conclusions

Doctors should have care and compassion towards the patients because their caring attitude and the patient's trust determine the satisfaction and agreement regarding the treatment. When patients perceive their interaction with the doctor as personalized –

they are listened to, respected and confident that they are talking to someone who wants to help them – they feel special and cared for. The dentist's attitude is especially important when communicating with patients, therefore, clinical skills must be mixed with human skills, such as building a lasting relationship based on communication and understanding the patient from a psychosocial point of view, together with his expectations, worries and emotions.

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ORIGINAL ARTICLE

**POST EXTRACTION ALVEOLAR RIDGE PRESERVATION –
TECHNIQUE USE AND WIDESPREAD**

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Abstract: Evaluation of the use of post extraction alveolar ridge preservation techniques by a group of dentists from the Oltenia region. The study was addressed to dentists with various specialties, who completed an online questionnaire, following which information such as the number of extractions usually performed, the clinical causes, paraclinical tests performed before extraction, the percentage of patients to whom alveolar ridge preservation therapies were proposed, the materials used, the experience in implantology, the specialty of the clinician, the percentage of patients who accept alveolar ridge preservation therapy, the benefits of the technique, but also possible complications was extracted. The questionnaire was launched online for a period of 4 weeks, and dentists from the Oltenia region were invited to participate. The statistical analysis was carried out with the help of the Google Docs program, the section dedicated to the "Google Forms" forms. 64 dentists participated in the study, of which 40.63% were general dentists, 28.13% dento-alveolar surgeons, and the rest from other specialties. The most common causes reported for dental extractions were: 35.94% dental caries complications, 25.00% periodontal causes, 21.88% vertical root fractures, 9.37% for orthodontic purposes, 7.81% trauma. Doctors use as materials for post extraction alveolar grafting: PRF (46.88%), xenogeneic materials (31.25%), synthetic bone grafts (9.38%), extracted tooth material (6.25%), hemostatic sponges (1.56%), and 4.68% of doctors does not perform alveolar ridge maintenance techniques. Alveolar ridge preservation is a technique that must be known and used by all dentists who perform tooth extractions.

Keywords: tooth extraction, alveolar ridge preservation, PRF, bone graft, collagen membrane.

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1. Introduction

Dental extraction is indicated when a tooth can no longer be saved or maintained in optimal conditions on the dental arch from the perspective of health, functionality and aesthetics [1]. Edentulism has a direct impact on the patient's quality of life, by affecting masticatory function, speech and in certain cases, affecting social life [1,2].

The alveolar process is a structure dependent on the teeth present on the arch, thus, the absence of teeth results in a marked reduction in bone size [3-6]. Dental extraction results in the loss of "bundle bone", which causes resorption of the alveolar ridge. Following alveolar bone resorption, soft tissue contraction occurs [1,7,8]. Even the most conservative tooth extraction can cause bone resorption and a bone augmentation procedure may be necessary, especially in the aesthetic area [9]. Following the resulting atrophy, it is obvious that resorption of the alveolar ridge is a complex process involving structural, functional and physiological components [10]. Post-extraction surgical traumas induce micro-traumas in the adjacent bone, which can accelerate bone remodeling [9].

Bone remodeling takes place throughout life, new bone permanently replacing old, degraded bone, so that every 10-year cycle there is a complete regeneration of bone tissue from the level of the entire human skeleton [10]. Bone remodeling takes place in two functional stages: bone resorption coordinated by osteoclasts and new bone formation produced under the effect of osteoblasts, both processes being functionally coordinated by

osteocytes [11]. Both osteoblasts and osteoclasts involved in a bone remodeling cycle are included in a structure called the bone multicellular unit (BMU) [11]. During a bone remodeling cycle, the process of bone resorption occurs first and proceeds more rapidly than the process of bone formation, so that increasing the rate of bone remodeling translates into an initial imbalance in favor of bone resorption [9, 10].

Age and gender are thought to influence the bone resorption process [11]. Changing the volume and shape of the post extraction alveolar bone is an important element from the medical point of view due to the possibility to prevent marked loss of bone volume and to rehabilitate the bone structure by insertion of implants and prosthetic restoration of the edentulous area with the help of guided bone regeneration techniques. In the presence of marginal bone pathology or traumatic extraction when a bony wall is absent, fibrous tissue will invade the post extraction alveolus and interfere with normal healing and bone regeneration [6]. Studies state that alveolar ridge preservation therapy decreases the process of vertical and horizontal bone resorption and favors better preservation of keratinized tissue [7].

Based on the experimental studies, in the case of dimensional changes, it can be suggested that the resorption of the bone walls of the post extraction alveoli occurred in two overlapping phases. In the first phase, the resorbed bone is replaced by cancellous bone, resulting in a vertical reduction of the alveolar ridge. In the second phase, resorption occurs

at the level of the outer surfaces of both bone walls [3,12]. This pattern of bone remodeling causes a horizontal resorption that can also induce a further vertical reduction of the buccal bone. These ridges often do not allow conventional fixed prosthodontics, nor placement of dental implants in a favorable prosthetic position [3,11,13].

The bone loss in the horizontal direction of the post extraction alveolar ridge is more extensive compared to the bone loss in the vertical direction and it tends to be greater in the buccal area [12]. Resorption of the alveolus is intense during the first six months after tooth extraction, but it will continue throughout the patient's life. Studies have also reported 35% to 50% loss of ridge dimensions following tooth extraction [12]. After extraction any alveolar site involves important anatomical changes, this aspect being proven by numerous studies in the specialized literature, it is necessary to apply "Socket Preservation" or "Ridge Preservation" techniques (preservation of the alveolar ridge), to block the post-extraction alveolar site change [13]. The clinical need is to maintain sufficient alveolar dimensions and to encourage bone augmentation following tooth extraction to support implants in ideal positions. To limit the effects of the resorptive healing process, alveolar ridge preservation techniques were used at the time of surgery [1]. Thus, to carry out this procedure, a grafting material is placed in the alveolus, with the aim of limiting dimensional change and providing enough bone to achieve optimal aesthetics and function [3,13].

Advances in the field of bone substitute materials have brought to the area of alveolar regeneration an increasing number of products that can cause confusion and uncertainty regarding their biological valence [8]. Current methods used to prevent ridge resorption include the placement of autografts, allografts, xenografts, and alloplasts. These biomaterials present both advantages and disadvantages, depending on their structure and biochemical composition, being resorbable or non-resorbable [1,8,10]. Over the past two decades, multiple studies have evaluated the effectiveness of different alveolar ridge preservation techniques [8]. In these studies, a variety of biocompatible materials have been used, including autologous bone, human bone substitute materials (autologous transplant, heterologous transplant, and allograft), autologous blood derivatives, and bioactive agents [3,8,14].

In the past, the absence of standardized protocols and long-term data on alveolar ridge preservation materials prevented some specialists from routinely performing this procedure [2,15]. According to published studies, the post-extraction alveolar ridge preservation operation is not widely used, most tooth extractions being performed using the traditional method [16,17]. Alveolar ridge preservation therapy should be considered in conjunction with minimally traumatic tooth extraction to minimize post extraction bone loss [17].

Post extraction alveolar ridge preservation therapies are now widely indicated in contemporary dental practice and there is

solid evidence supporting their effectiveness [1,13,17- 20].

The purpose of this study is to present the experience and knowledge about alveolar ridge preservation techniques in a group of dentists from Oltenia region.

2. Materials and method

This retrospective study aimed to evaluate and to determine the use of postextraction alveolar ridge preservation techniques by a group of dentists. The study highlighted the way in which dentists apply post extraction bone ridge preservation therapy, the clinical advantages, patient compliance, the type of recommended therapeutic method, the clinician's experience in implantology, the materials used, but also the reasons why post extraction alveolar ridge maintenance was not achieved in certain clinical cases. Possible complications arising from bone preservation surgeries were also presented. The data obtained from the study were corroborated and used to understand if the alveolar ridge preservation is a standard of care at this time in dental clinics in Romania.

This study included data on patients who underwent dental extractions and on whom were proposed alveolar ridge preservation by various techniques and using different biomaterials. The data were obtained from dentists with various specializations, from the region of Oltenia, Romania, using as an investigation method an online questionnaire, consisting of 15 questions, which contained both single-choice and multiple-choice questions. The questionnaire was launched for

a period of 4 weeks, and a number of 64 dentists, who were assured of anonymity and confidentiality of the research data, answered it voluntarily.

Information was collected such as: the number of dental extractions usually performed in the clinic, the causes that led to the extraction (periodontal causes, severe caries, orthodontic causes, fractures, trauma), the paraclinical tests and complementary examinations performed before the extraction, the percentage of patients on whom were proposed alveolar ridge preservation therapies, the materials used for alveolar ridge preservation, experience in implantology, the specialty of the clinician, the percentage of patients who usually accept alveolar ridge preservation therapy, the benefits of the technique and possible complications.

The questionnaire was made up of the following questions:

1. What is the number of dental extractions performed per week in your clinic?
2. What are the most common reasons for which you perform dental extractions?
3. What are the paraclinical assessments you use before performing the tooth extraction?
4. Have you often proposed therapeutic methods to patients in order to preserve the post-extraction alveolar ridge?
5. What biomaterial do you use in your clinic for grafting the post-extraction alveolus?
6. What type of xenograft do you use?
7. What synthetic material do you use?

8. In which area of the dental arches do you consider it is useful to preserve the alveolar ridge?

9. What is the percentage of patients who accept alveolar ridge preservation therapy after extraction?

10. If, after extraction you did not propose the alveolar ridge preservation technique to the patient, what are the reasons?

11. What do you consider to be the benefits of preserving the postextraction alveolar ridge?

12. In how many cases have you applied alveolar ridge preservation therapy, followed by implant insertion?

13. What is your specialty?

14. What is your clinical experience in the field of implantology?

15. What complications of alveolar ridge preservation procedures have you encountered in your clinical experience?

Following the results obtained from this study, different graphs were made, which were processed statistically, and which were later exemplified individually, in the chapter dedicated to the results and discussions. The statistical analysis was carried out with the help of the Google Docs program, the section dedicated to the "Google Forms" forms.

The study was approved by the Scientific Ethics and Deontology Commission of the University of Medicine and Pharmacy in Craiova (Approval Number 52/29.01.2024) and was carried out in accordance with the ethical principles of the Declaration of Helsinki (version 2013).

3. Results

The study included the analysis of data obtained from a group of 64 dentists with various specializations, from Oltenia, Romania. 26 (40.63%) are general dentists, 18 (28.13%) are specialists in dento-alveolar surgery, 6 (9.37%) work as specialists in orthodontics and dento-facial orthopedics, 4 (6.25%) in dental prosthetics, 3 (4.68%) are specialists in periodontology and pedodontics, 2 (3.12%) in endodontics and 5 (7.81%) without specialty. The results obtained from the answers received were recorded and centralized and will be presented in the following.

Regarding the clinical experience in implantology, 20 (31.25%) doctors answered that they have one year of experience, 20 (31.25%) doctors stated that they have no experience in implantology or have little expertise, 12 (18.75%) are medical specialists with more than 5 years of clinical implantology experience, 8 (12.5%) have been active in the field of implantology for 5 years, and 4 (6.25%) have 2 years of experience in this field.

It is a great diversity caused by clinical experience and the specialty in which dentists work. 10 (15.63%) of the surveyed doctors reported 5 extractions per week, another 9 (14.06%) doctors reported 10 weekly extractions, 9 (14.06%) answered that they perform 2 tooth extractions every week, 6 (9.38%) perform only one extraction weekly, 5 (7.81%) do not perform any extractions, 3 (4.69%) physicians said they perform 6 extractions per week, and 2 (3.12%) reported

30 extractions each week. Other single responses, representing a percentage of 31.25%, reported a varied number of tooth

extractions. The maximum was 30 tooth extractions per week, and the minimum was 2 extractions.

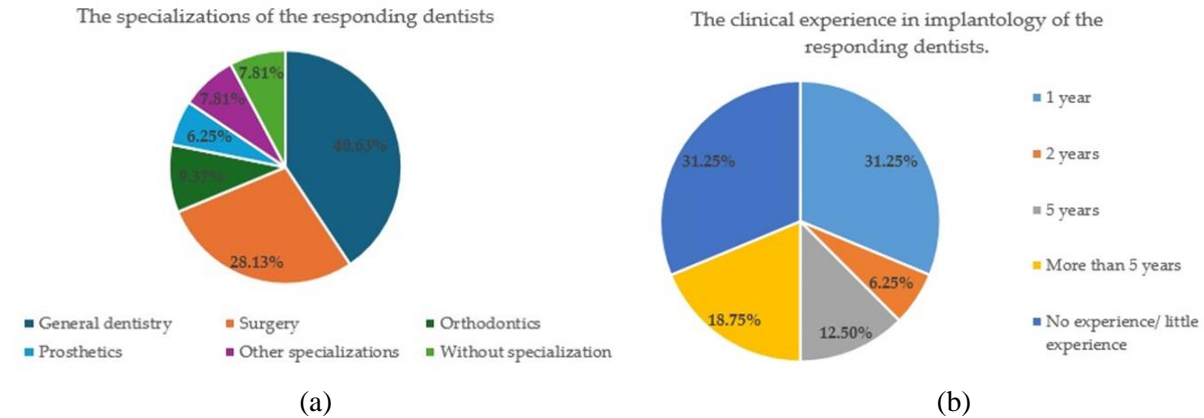


Figure 1. Responding dentists’ characteristics. (a) specialization; (b) clinical experience in implantology.

Table 1. Characteristics of the responding dentists.

Characteristics	Number	Percentage (%)
Specialization		
General dentistry	26	40.63%
Surgery	18	28.13%
Orthodontics	6	9.37%
Prosthetic	4	6.25%
Other specializations	5	7.81%
No specialization	5	7.81%
Experience in implantology		
No experience/ little experience	20	31.25%
1 year	20	31.25%
2 years	4	6.25%
5 years	8	12.50%
More than 5 years of experience	12	18.75%

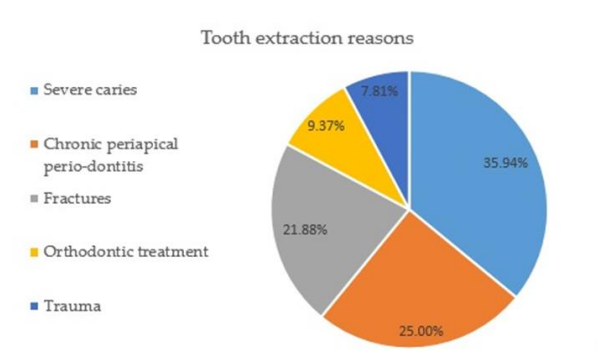
The most common reasons for dental extractions, which the dentists included in the study presented, are: 23 (35.94%) mentioned severe caries, 16 (25.00%) indicated periodontal causes, 14 (21.88%) answered the

fact that coronal-radicular fractures are frequent causes for tooth extractions, 6 (9.37%) performed extractions for orthodontic purposes, and 5 (7.81%) reported extractions caused by trauma.

Table 2. Causes of tooth extraction.

Tooth extraction causes	Number	Percentage (%)
Severe caries	23	35.94%
Periodontal causes	16	25.00%
Vertical Root Fractures	14	21.88%
Orthodontic purposes	6	9.37%
Trauma	5	7.81%

Before performing extraction procedures, complementary examinations are necessary to avoid the risks and complications associated with tooth extraction.

**Figure 2.** Causes of tooth extraction.

According to the study, the most used paraclinical evaluations are orthopantomography (OPG), indicated by 35 (54.69%) of the responding dentists, cone beam computed tomography (CBCT) indicated by 20 (31.25%) of the dentists and intraoral radiography (RIO) indicated by 9 (14.06%) of the respondents.

The doctors included in the study indicated these materials for post-extraction alveolar grafting as being the most used by them: 30 (46.88%) mentioned PRF and variants, 20 (31.25%) use xenogeneic materials, 6 (9.38%) synthetic preparations, 4 (6.25%) use the extracted tooth, 1 (1.56%) use hemostatic sponges, and 3 (4.68%) doctors do

not perform alveolar ridge maintenance techniques. Among the doctors who use xenografts for dental alveolus grafting, they indicated that they prefer: bovine-derived xenografts in proportion 56.67%, porcine-derived xenografts in proportion 30% and equine xenografts in proportion 13.33%. Among the doctors who use synthetic materials for dental socket grafting, they indicated: synthetic hydroxyapatite, tricalcium phosphate, bioactive glass and calcium sulfate.

Alveolar ridge preservation therapy is considered useful by the study participants both in the lateral and anterior area of the dental arches by 49 (76.56%) of the dentists, 9 (14.06%) believe that the preservation technique ridge is more useful for the posterior area of the dental arches, and 6 (9.38%) participants indicated the anterior area of the dental arch as priority.

In postextraction alveolar ridge preservation therapy, patient compliance is one of the most important factors that determine the success of the intervention. Among the study participants, 23 (35.94%) indicated that only 2 out of 10 patients accept post extraction alveolar ridge preservation therapy, 17 (26.56%) indicated a ratio of 1 out of 10 patients, 10 (15.62%) of the doctors

answered that 4 out of 10 patients accept the bone preservation therapy, 9 (14.06%) indicated a percentage of 5 out of 10 compliant patients, only one respondent (1.56%) indicated a ratio of 9 out of 10 patients accepting the preservation technique of the alveolar ridge, and 4 (6.26%) of the doctors reported that no patient accepted post extraction alveolar ridge preservation therapy.

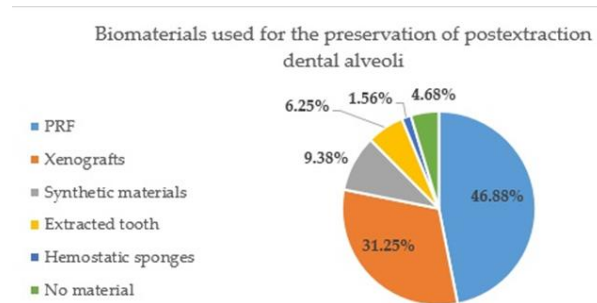


Figure 3. Biomaterials used for postextraction alveolar grafting.

Respondents indicated three major benefits of alveolar ridge preservation in their clinical experience. 31 (48.44%) answered that bone preservation therapy increases the efficiency of implant insertion following extraction, 17 (26.56%) believe that quantitative and qualitative bone preservation is the main clinical benefit, and 16 (25%) of the dentists included in the study have answer the fact that bone loss is greatly reduced post-extraction in patients who accept post-extraction alveolar ridge preservation therapy. One of the advantages of the bone preservation technique is precisely that of increasing the efficiency of post-extraction implant placement. 20 (31.25%) of the dentists inserted implants following ridge preservation therapy in 2 out of 10 patients, 16 (25%) indicated a ratio of 1

out of 10 patients, 10 (15.63%) reported a number of 5 out of 10 patients, 7 (10.94%) indicated a ratio of 4 out of 10 patients in whom the insertion of implants was performed following postextraction alveolar ridge preservation therapy, 3 (4.69%) dentists indicated the percentage of 10 out of 10 patients, however, 8 (12.4%) of the study participants did not insert implants following the ridge preservation technique.

Alveolar ridge preservation procedures can also cause complications. Dentists have exposed a number of these complications encountered in the dental office. 26 (40.63%) indicated pain and edema, 10 (15.63%) post extraction alveolitis, 6 (9.38%) wound dehiscence, 7 (10.94%) ecchymosis and hematoma, 6 (9.37%) post extraction bleeding, 4 (6.25%) have reported healing disorders. Less common complications include bone necrosis indicated by 3 (4.68%) dentists, maxillary sinus pneumatization and fascial infections by 2 (3.12%) study participants.

Post extraction alveolar ridge preservation therapy is not yet widely used in dental clinics, although numerous specialized studies reveal important benefits for patients who have undergone bone preservation interventions. The reasons why some of the doctors included in the study did not propose such techniques to the patients in the office were: financial problems, the complexity of the technique and the lack of experience of the practitioner, difficult patients or with health problems, the advanced age of the patients and the time limited for treatment.

Table 3. Biomaterials used for postextraction alveolar grafting.

Biomaterials	Number	Percentage (%)
PRF	30	46.88%
Xenografts	20	31.25%
Synthetic materials	6	9.38%
Extracted tooth	4	6.25%
Hemostatic sponges	1	1.56%
No preservation	3	4.68%

4. Discussions

The present study was conducted to understand whether alveolar ridge preservation therapy after tooth extraction represents a standard of care used and accepted as beneficial by dentists of different specialties with varied clinical experience. The obtained results reveal that dentists understand the importance and benefits of the bone preservation technique. The advantages indicated by the dentists were: increasing the efficiency of implant insertion after tooth extraction, limiting post extraction alveolar bone resorption and maintaining an optimal quantitative and qualitative bone level. In the literature, numerous studies have confirmed that bone resorption is greatly reduced in dental alveoli grafted with a collagen membrane compared to non-grafted alveolar sites [9-11]. In the study conducted by Ucer and the use of PRF platelet concentrates during ARP include reduced healing time, improved angiogenesis and bone regeneration, sealing of the alveolus by the fibrin matrix, antibacterial properties and decreased post-extraction pain and risk of infection. [21].

The dentists included in the study perform extractions in the usual way in the dental office. They reported a varied number of weekly extractions, the maximum being 30 extractions per week, and the minimum 2 weekly extractions. According to the study by Passarelli et al., dental caries complications and periodontal diseases are the most common reasons for tooth extractions [22]. The study conducted by Aljafar et al, supports the same scientifically proven fact [23]. Tooth extraction is largely caused by complicated carious lesions and progression of periodontal pathology [23]. In this study, it was found from the answers received that the main causes of dental extractions were dental caries complications and periodontal causes. In the study conducted by Fayaz et al, the main cause of extraction was complicated caries, and other causes were periodontal reasons, failed root canal therapy (RCT), tooth mobility, and root fractures [24].

The study by Shabaninejad et al. exposed the fact that CBCT (Cone Beam Computer Tomography) is the most effective diagnostic method for obtaining information about oral health status and guides the dentist in choosing an effective diagnosis compared to

intraoral radiography or OPG [25]. However, the study by Hassan et al concluded that although multislice computed tomography is the gold standard from the authors' perspective, not every implant situation can justify such a test [26]. The present study indicated that among the responding doctors, the majority prefer OPG, followed by those who prefer CBCT and in a small number prefer RIO as an elective diagnostic method.

The use of grafts is determined by the clinical case and the prosthetic treatment plan. Following the answers received, the most used biomaterials for grafting post-extraction alveoli are: PRF and xenografts. Among the xenografts, the most used are bovine xenografts. The synthetic materials most used by the dentists included in the study are synthetic hydroxyapatite and tricalcium phosphate.

The literature reveals numerous scientific evidence that encourage the implementation of post extraction alveolar ridge preservation therapy [1, 11, 13-18, 25-28]. In contrast, the study conducted showed that patients are refractory to bone-preserving surgery. The reasons why patients are still reserved towards bone preservation surgery are: advanced age, general status, lack of surgical expertise of the dentist, financial problems, clinical complexity of the treatment and lack of effective information about the benefits of alveolar ridge preservation therapy post extraction.

The study carried out by Darby et al. [14] claims that prosthetics on implants has an increased efficiency in the case of post

extraction alveolar site grafting. Maintaining a quantitatively and qualitatively optimal bone level is a key factor in implant therapy. Due to the scientifically proven benefits, the authors of the study believe that the dentist should consider performing bone preservation interventions in the case of every tooth extraction [14]. According to the cited study, the most common complications of alveolar preservation techniques are postoperative pain and edema, as well as fascial infections [14].

The responses received indicated a series of complications of alveolar ridge preservation therapy, including postoperative pain and edema, post extraction alveolitis, wound dehiscence, ecchymosis and hematoma, and post extraction bleeding. Postoperative discomfort, severity and duration of pain and swelling, spontaneous bleeding and persistent swelling, implant stability, and treatment modalities were evaluated in the study by Lee et al, and the conclusions were that there were no serious or adverse complications in any of the cases and none of the measured parameters differed significantly between groups [29]. To avoid complications and to ensure the long-term success of the treatment plan, post extraction alveolar ridge preservation therapy must be performed in association with minimally invasive extraction procedures [29-33].

Various trends were identified for alveolar ridge preservation techniques performed and biomaterials used [34]. Autologous materials like A-PRF are preferred, with a good performance for maintaining of the ridge dimensions but also with good healing

properties [35, 36]. Whenever possible, the alveolus will receive immediately the dental implant [37], and only in compromised cases the alveolar ridge preservation will be chosen, delaying implantation [34]. Sealing materials for socket have received particular attention lately, become important for ridge preservation [38-40]. Alveolar ridge preservation is a technique that conserves the ridge but also the clinical attachment of the adjacent teeth [41].

5. Conclusions

The benefits obtained by patients who accept bone preservation interventions considerably improve the therapeutic act performed by the dentist. Reducing the alveolar resorption process, maintaining a qualitatively and quantitatively optimal bone

level, making post extraction implant insertion more efficient and maintaining an alveolar anatomy as close as possible to the physiological state are proven benefits of post extraction alveolar ridge preservation techniques. Alveolar ridge preservation therapy is not a secondary intervention, and studies now provide us with concrete data on the effectiveness of modern diagnostic methods (CBCT), the materials we can use for grafting alveolar sites, minimally invasive extraction techniques and flapless surgery (flapless). In Romanian dental clinics, post-extraction alveolar ridge preservation techniques are currently not routinely performed. Conventional tooth extraction is preferred by some patients and in some cases by medical staff.

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Authors read and approved the final manuscript. All authors have equally contributed to this work.

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Will be provided on request.

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ORIGINAL ARTICLE

SURGICAL GUIDES VS FREE-HAND TECHNIQUE IN THE WORKING PROTOCOL OF IMPLANTO-PROSTHETIC THERAPY

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Abstract: The objective of the study was to compare the advantages and disadvantages of using surgical guides with the free-hand technique in the working protocol of implanto-prosthetic therapy and to evaluate the usefulness of the surgical guide technique in patient implanto-prosthetic oral rehabilitation. Materials and method: 130 patients who presented in the dental clinic requesting complex oral rehabilitation with implant supported restorations participated in the study. Following the anamnesis, intraoral clinical examination, lab and radiological evaluation, the type of edentulism (lateral, terminal, frontal, complete) was diagnosed, for which classical and alternative treatment plans were proposed, with surgical guided implanto-prosthetic therapy or by the free-hand placement method. Results: Out of the total number of edentulous patients, 55 patients agreed to be rehabilitated by the implanto-prosthetic method. Of these, in 38 cases the guided surgical method of implant insertion was used and in 17 the surgical approach was classic (free-hand). Guided placement implant restorations had implant survival rates similar as conventional protocols, and a significant decrease in pain and discomfort in the immediate postoperative period, probably due to the use of flapless procedures. Conclusions: Guided placement implant restorations are a viable solution for a painless and successful protocol in implant oral rehabilitation.

Keywords: surgical guides, free-hand technique, dental implant restorations.

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1. Introduction

Dental implants restorations have become the golden standard in replacing missing teeth [1]. One of the key factors that make implants known as a reliable option is successful osseointegration, which requires a method that achieves minimized surgical complications such as nerve damage, perforation, and cortical plate perforation to achieve this goal and ultimately achieve the desired result [2].

Prosthetically driven implant surgery has become a standard of care to improve short and long-term treatment success. Precise implant positioning has obvious advantages, such as favorable esthetic and prosthetic outcomes, long-term stability of peri-implant hard and soft tissues because of easier oral hygiene, and the potential to ensure optimal occlusal contacts and implant loading [3].

In the past, 2-dimensional (2D) images such as panoramic and periapical radiographs were used when placing dental implants. However, these modalities could only provide basic information about the anatomy of the mouth and were also liable to significant limitations in accuracy due to inherent disadvantages, such as magnification and distortion [4].

The introduction of cone-beam computed tomography (CBCT), which provides imaging at a low radiation dose and at a relatively low cost, has increased the applicability and justification of 3-dimensional (3D) pre-surgical planning. The oral and maxillofacial regions have anatomical structures that can be visualized in three dimensions using CBCT. CBCT scanners have clear advantages over

computed tomography (CT) scanning equipment: they are smaller, require lower radiation doses, and are less expensive [5].

Individual patient 3D-imaging data is essential for virtual dental implant planning, computer aided design (CAD) and computer aided manufacturing (CAM) of a drill guide or implant-supported prosthesis. Anatomical data is derived from (cone beam) computed tomography (CT or CBCT) and optical scans of teeth and mucosa [6].

In recent years, static guided implant surgery, which uses surgical guides for the preparation of the implant site and the positioning of the implant, has gained tradition in the field of implantology [7]. The benefits of this approach are evident and include prosthetically guided implant placement that prevents functional and esthetic compromises, safe surgery avoiding dangerous anatomical structures, and a minimally invasive or flapless procedure with less intra-operative discomfort and post-operative swelling and/or pain for the patient, avoidance of vital anatomy (nerves, sinus cavity, nasal cavity, adjacent dental roots, adjacent implants) [8].

Considering the clinical, biological, functional, and esthetic advantages guaranteed using guided implant surgery, all of which are fundamentally related to the accuracy of 3D implant placement, it is not surprising that this procedure is frequently used today to position implants.

However, although the body of literature on guided implant surgery is now vast, few studies have compared the accuracy of post-

extraction implant placement using surgical templates and the classical freehand technique [9].

The objective of the study was to compare the advantages and disadvantages of using surgical guides with the free-hand technique in the working protocol of implanto-prosthetic therapy and to evaluate the degree of use of the surgical guide technique in patient implant-prosthetic rehabilitation.

2. Materials and method

130 patients who presented in the dental clinic requesting the implant supported oral rehabilitation participated in the study. Following the anamnesis, intraoral clinical examination and lab and CBCT evaluation, the type of edentulism (lateral, terminal, frontal, complete) was diagnosed, for which classical and alternative treatment plans were proposed, with guided implant-prosthetic therapy or by the free-hand placement method.

For each patient who participated in the study, the clinical chart was completed, which included a questionnaire regarding the general state of health, in which personal data, hereditary-collateral and personal antecedents, eating habits, oral hygiene status, diagnosis and treatment plan were mentioned. A complete blood analysis and a radiological 3D evaluation through CBCT were performed to appreciate the systemic state of health of the patient and the bone status of the jaws.

Also, all patients signed the GDPR agreement (personal data management) and completed the standard form for inclusion in

the medical research study according to law no. 46/2003. As complementary examinations, intra-oral scans with a digital scanner (Medit I500) were performed.

The two investigations mentioned above were processed in the dental software Blue Sky Plan 3D, with the help of which the project of the surgical guide was made. The data were interpreted and processed with the help of SPSS and Microsoft Excel programs. The clinical study was approved by Ethics Committee of the University of Medicine and Pharmacy of Craiova, with no 52/29.01.2024.

3. Results

Out of the total number of edentulous patients, 55 patients agreed to the rehabilitation by the implanto-prosthetic method. Of these, in 38 cases the guided surgical method of implant insertion was used and in 17 the approach was classic (free-hand).

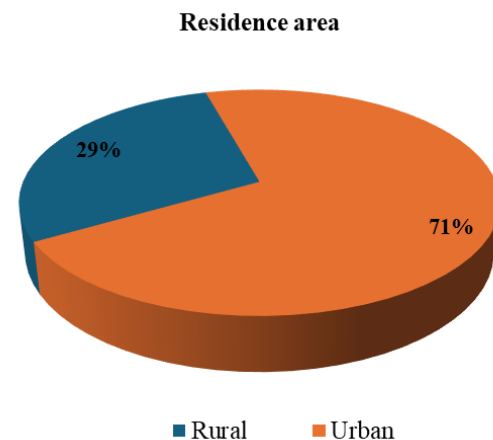


Figure 1. Distribution of study participants in relation to their residence area.

The present study showed that 71% of the patients lived in urban areas, and 29% in rural

areas (Figure 1). As can be seen from the figure above, the urban environment is significantly more present, compared to the rural one, when we discuss new techniques for

solving dental problems. Of the patients who participated in the study, 20 (36%) were female and 35 (64%) were male (Table 1).

Table 1. Distribution of study participants in relation to their age and gender.

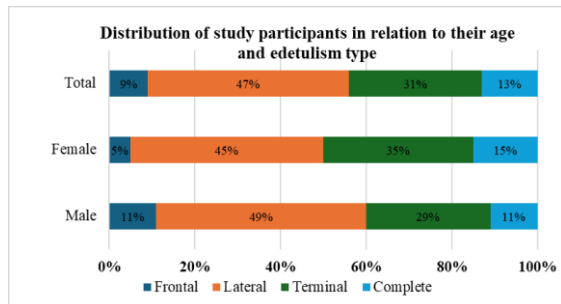
Gender	Age (years old)					Total
	18-30	31-40	41-50	51-6	61-70	
Female	2	5	5	6	2	20
Male	7	9	7	8	4	35
Total	9	14	12	14	6	55

The systemic conditions present in the study patients were classified as follows:

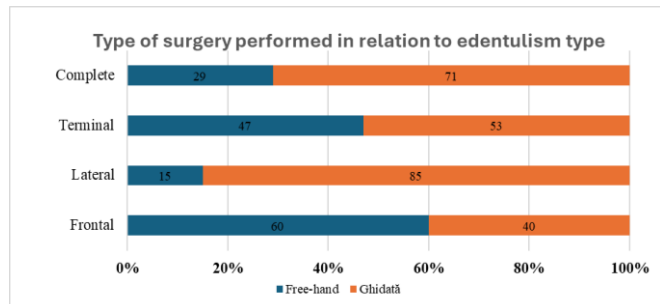
- 85% had no known systemic conditions,
- 11% were patients diagnosed with hypertension,
- 4% were patients diagnosed with diabetes (Table 2).

Regarding the type of edentulism, we identified among female patients, 1 patient

with esthetic anterior area edentulism, 9 patients with posterior lateral edentulism, 7 patients with terminal edentulism and 3 patients with total arch edentulism. Regarding the type of edentulism, among male patients, we identified 4 patients with frontal edentulism, 17 with lateral edentulism, 10 with terminal edentulism and 4 with total edentulism (Figure 2a).



(a)



(b)

Figure 2. Distribution of study participants in relation to: (a) age and edentulism type; (b) edentulism type and surgery type.

Depending on the type of surgical intervention and patient gender, after analyzing the data, we found that more than

half of the patients, both among women and men, underwent surgical intervention using the guided method.

Table 2. Distribution of study participants in relation to the presence of a systemic disease.

Age (years old)	Systemic diseases			Total
	Type II diabetes	High blood pressure	Clinically healthy	
1 (18-30)	0.00%	0.00%	100.00%	100.00%
2 (31-40)	0.00%	0.00%	100.00%	100.00%
3 (41-50)	0.00%	0.00%	100.00%	100.00%
4 (51-60)	7.14%	14.29%	78.57%	100.00%
5 (61-70)	16.67%	66.67%	16.67%	100.00%
Total	3.64%	10.91%	85.45%	100.00%

As can be seen from the statistical data, guided intervention was used for 69% of patients in the study sample. Also 58% of the guided interventions were for lateral edentulism.

Guided intervention was used for 71% of the total arch edentulous patients and only for 29% free-hand intervention. In case of terminal edentulous patients, 53% had guided

intervention, and for 47% free-hand, for lateral edentulous patients it was guided intervention for 85% and only 15% opted for free-hand intervention. In esthetic anterior area, for 60% of patients with frontal edentulousness free-hand intervention was performed and only for 40% guided intervention. (Figure 2b).

Table 3. Distribution of study participants in relation to gender and surgery type.

Gender	Surgery type		Total
	Free-hand	Guided	
Female	7	13	20
Male	10	25	35
Total	17	38	55

The patients with frontal edentulism had no associated systemic diseases, among the patients with lateral edentulism, one suffered from diabetes, the other 25 had no other systemic diseases, among the patients with terminal edentulism, one suffered from

diabetes, 3 declared that they were diagnosed with arterial hypertension, and 13 had no systemic diseases, patients with total edentulism, 3 were hypertensive, and 4 did not suffer from systemic diseases (Table 4).

Table 4. Distribution of study participants in relation to edentulism type and systemic disorders.

Edentulism type	Systemic disorders			Total
	Type II diabetes	High blood pressure	Clinically healthy	
Frontal	-	-	5	5
Lateral	1	-	25	26
Terminal	1	3	13	17
Complete	-	3	4	7
Total	2	6	47	55

4. Discussions

The present study indicated that guided placement had at least as good implant survival rates as conventional protocols, also showing a significant decrease in pain and discomfort in the immediate postoperative period, but probably due to the use of flapless procedures. However, it should be emphasized that this technique requires good training of the operators to reduce as much as possible unexpected adverse events related to the procedure during guided implant placement [5].

Clinicians worldwide are increasingly turning to guided surgery for the insertion of dental implants, becoming aware of the benefits of appropriate planning, supported by imaging and interactive treatment planning applications [10]. All aspects of the planning phase are based on surgical and restorative fundamentals solid, and as an integral part of the team, dental labs have moved from the analog world to the digital world, providing the necessary support for the new digital workflow [5].

Regarding the free hand protocol, surgical experience plays a significant role in the osseointegration of dental implants [11].

Insufficient surgical experience may increase the occurrence of complications such as high heat during drilling, implant non stabilization, or lack of flap adaption [12].

The impact of the operator's expertise on the precision of implants performed following surgical guides has not been assessed in many reports. There is no consensus in the literature regarding whether surgical experience affects the accuracy of computer-assisted implant surgery. Several in vitro studies have shown that experienced surgeons can place implants more accurately when they use guided surgery (partially, fully, or both). However, other studies have reported inconsistent findings [13].

One challenge in research aiming to address this question is the difficulty of quantifying the level of the operator's experience [14]. To describe the operator's experience, most studies have used the number of implant placement procedures rather than years of practice [15]. One study showed that experienced operators were considered as those who had placed more than 100 implants [16].

Literature data highlights the fact that guided surgery can offer a good level of

precision, under the conditions of choosing the most suitable surgical protocol and the ability of the surgeon to implement it [17]. This translates into practice, on the one hand, by avoiding serious complications, such as damaging nerves or blood vessels, and, on the other hand, by the possibility of applying these protocols even in complex cases, such as those with severe bone atrophy [18].

Guided surgery is often associated with flapless implant placement techniques. Although there are no long-term studies in the literature that directly compare the success rate of conventional and flapless implant placement, many studies seem to agree that survival rates of the implant are comparable regardless of the type of protocol or implant chosen. No statistically significant differences in survival rate have been described between implants inserted with flapless guided systems versus conventional flap implant insertion surgery open [19].

A study performed by Huang L et al. found an overall degree of deviation was significantly lower in guided surgery with implant positional guide approach than the freehand approach [20]. From all aspects of compatibility of restoration such as functional, esthetical and biological, implants must be placed correctly in an ideal position. Correct implant position not only has favored prosthetic and esthetic outcomes it has also shown long-term stability of peri-implant hard and soft tissues [21].

In a previous randomized clinical study, using a tooth-supported template, surgeons with varying levels of competence placed

half-guided implants on partially edentulous jaws. Skilled surgeons placed implants more accurately than their less experienced counterparts [22].

Another in vitro study showed no statistically significant differences between experienced and novice operators in terms of positional or angular deviations. The expert operators showed larger mean values of all positional and angular deviations than the novice operators, with the exception of depth deviation, where the 2 groups had nearly identical mean values (0.40 and 0.42 mm, respectively) [23].

To fully assess the benefits that guided surgery may provide, the costs involved in these procedures must be assessed [24]. An initial investment in technology, but also in the training of the clinical team, must be considered. Finally, there will be a digital workflow cost for each clinical case. We believe it is important for the clinician to be well trained in both new and conventional digital procedures as they may be required to be applied in case of any unforeseen event during guided surgical procedures [25].

Even though the duration of surgery may be shorter with guided surgery compared to conventional techniques, it appears that much more time must be invested in preoperative planning. If guided surgery can avoid bone augmentation procedures, it can reduce the overall cost of treatment [18].

We believe that many factors are responsible for determining the effectiveness of guided implant surgery, from the diagnostic and planning phases to surgery. Each aspect

needs to be analyzed more carefully to scientifically evaluate which surgical protocol could provide the best results in the specific clinical situation.

The data presented regarding the accuracy of implant surgery using a surgical guide would be valuable for future studies since in vitro studies should be conducted extensively in advance of retrospective or prospective studies to prevent burdening patients unnecessarily.

5. Conclusions

Patient and technology-related parameters influence the successful implementation of virtual implant planning and implant-guided surgery.

In addition to data processing and computer-aided design of surgical guides, the possibilities and limitations for prosthetic configuration and planning of virtual implants are essential. Flapless guided implant surgery is more precise than guided but with a flap. Poor bone support may limit the applications of guided implant surgery.

There is a need for improvement in the planning of implant-prosthetic rehabilitations using guided surgery in cases with limited bone quality and quantity. The software system used in the planning of the surgical

guide must allow the creation of a virtual prosthetic configuration, the selection of different tooth models or the use of a standard tooth shape and must accept as many implant systems as possible from those available.

The type of edentulousness and guided surgical protocol can influence the accuracy of guided surgery. A higher accuracy was found in interdentations when the implants were inserted guided.

Guided implantology is used more and more in the planning of surgical and prosthetic stages in the case of edentulous patients. Implant-prosthetic rehabilitation through guided surgery and immediate loading of implants in edentulous patients seems to be a successful therapeutic protocol.

The data presented regarding the accuracy of implant surgery using a surgical guide would be valuable for future studies since in vitro studies should be conducted extensively in advance of retrospective or prospective studies to prevent burdening patients unnecessarily. Second, clinicians who wish to perform implant placement following surgical guides should conduct a comparison to determine the accuracy of inexperienced versus experienced operators using this in vitro model.

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ORIGINAL ARTICLE

PREVALENCE OF MALOCCLUSIONS AMONG CHILDREN WITH SPECIAL NEEDS

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Abstract: The etiology of malocclusions is multifactorial, with general somatic conditions, hereditary factors and the presence of behavioral disorders acting on their development and formation. Children with special needs develop vicious oral habits, which adversely affect the period of growth and development of both the jaws and the facial skeleton, as well as the soft tissues. Objective. The purpose of this study is to determine the prevalence of malocclusions in a group of children with special needs from Craiova, Romania. Materials and method. The study group comprised 286 special needs children, who were enrolled in a school from Craiova, Romania. Results. Following data collection and centralization, 56.29% of the subjects included in the study presented malocclusions, with female students being more affected than male students. Conclusions. Malocclusions among children with special needs have a higher prevalence. Thus, such patients require special oral care measures due to poor motor coordination, limited learning abilities and sensory problems.

Keywords: children with special needs, malocclusion, prevalence.

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1. Introduction

Any deviation from the range of what is considered normal in terms of tooth alignment and relationship during dental occlusion is referred to as malocclusion [1,2]. The World Health Organization (WHO) ranks malocclusions as the third most serious oral health condition, behind dental caries and periodontal disease [3-5]. Mastication, phonation and deglutition are among the dento-maxillary apparatus' functions that are disrupted [6-9].

Children with special needs present difficulties in communication and social interaction, accompanied by repetitive and restrictive behavior. These impediments lead to the impossibility of achieving adequate oral hygiene. Disabilities represent an obstacle for the dentist and not only by limiting the possibilities of cooperation [10]. These children also require special dental treatments due to their systemic conditions. Poor oral health, associated with an increased affinity for sweets, increase the risk of developing dental caries and periodontal diseases [11].

Malocclusions have a complex etiopathogenesis that involves local, loco-regional and general causes [12]. Children with special problems develop vicious oral habits, such as bruxism and Pica, which adversely affect the period of growth and development the craniofacial structures. Vicious habits are considered pathological and are determined by certain unconditional actions, which are closely related to the child's psychological development. Thus, malocclusions, even minor ones, are

significant elements in many syndromes. These manifestations produce changes in conformation and relationships at the level of the various components of the dento-maxillary apparatus, having negative consequences on its functions and oral hygiene. Alteration of mastication leads to the installation of gastrointestinal disturbances, such as gastro-esophageal reflux, constipation and abdominal pain. The presence of such a condition can be an indicator of the syndromic diagnosis, having clinical variations from one case to another [10-13].

In the case of malocclusions, the periodontal damage occurs later, but is much more severe. Therefore, the histopathological studies revealed the presence of gingival hypertrophy, with a tendency towards acanthosis. Extensive and deep epithelial erosions were also observed, often affecting the basement membrane and thus putting the gingival chorion in contact with the external environment, via the oral cavity. In the chorion, a chronic inflammatory infiltrate is found, rich in lymphocytes, plasma cells and macrophages [14].

The study aimed to find out the prevalence of malocclusions among a group of schoolchildren with special needs from Craiova, Romania.

2. Materials and method

The Ethics Committee of the University of Medicine and Pharmacy of Craiova, Romania approved the current study (approval reference no. 56/29.01.2024), in compliance with the ethical guidelines for research

involving human subjects. All the legal guardians of the children participating in the study gave informed consent.

We studied the prevalence of malocclusions in a group of special needs children from Craiova, Romania, using cross-sectional epidemiological methods.

The research was conducted in collaboration with a school from Craiova, Romania and the Dolj County School Inspectorate.

The following requirements had to be met for the children to be included in our study: they must be enrolled in the designated school, have special needs, have their legal guardians' informed consent obtained, have to be cooperative, have verbally consent to being examined and their participation must be voluntarily. Children without special needs, children who didn't have their legal guardians' informed consent and uncooperative children were all excluded from our study.

Following the application of the aforementioned criteria, 286 students were included in the study group. For the classification of malocclusions, we chose the one stated by Edward Angle in 1899, as it is the most used globally even today. He based his classification on the relative position of the permanent upper first molars. He believed that the mesio-distal dental base relationship could be assessed reliably from first permanent molars relationship, as their position remained constant following eruption. In case where the first molars were missing, canine relationship is used. Angle class I, Angle class II (with divisions 1 and 2)

and Angle class III (with divisions 1 and 2) are the three classes of malocclusions that are part of this classification [15,16].

Microsoft Excel 365 was the software used to process and record the data that came from the clinical evaluation. Therefore, sample graphs were used to represent the study's results. Numerical values and percentages were used to express categorical variables.

3. Results

Of the 286 children participating in the study, 161 presented malocclusions, so a prevalence of 56.29%. Among the 286 children participating in our study, 98 girls and 63 boys were diagnosed with malocclusions (so a prevalence of 34.27% and 22.03% respectively).

Among the 98 girls with malocclusions we identified:

- 76 girls with Angle class I malocclusions, so a prevalence of 26.57%;
- 16 girls with Angle class II division 1 malocclusions, so a prevalence of 5.59%;
- 5 girls with Angle class II division 2 malocclusions, so a prevalence of 1.75%;
- 1 girl with Angle class III division 2 malocclusion, so a prevalence of 0.35%.

Among the 63 boys with malocclusions we identified:

- 49 boys with Angle class I malocclusions, so a prevalence of 17.13%;
- 12 boys with Angle class II division 1 malocclusions, so a prevalence of 4.20%;
- 2 boys with class II/2 Angle malocclusions, so a prevalence of 0.70%.

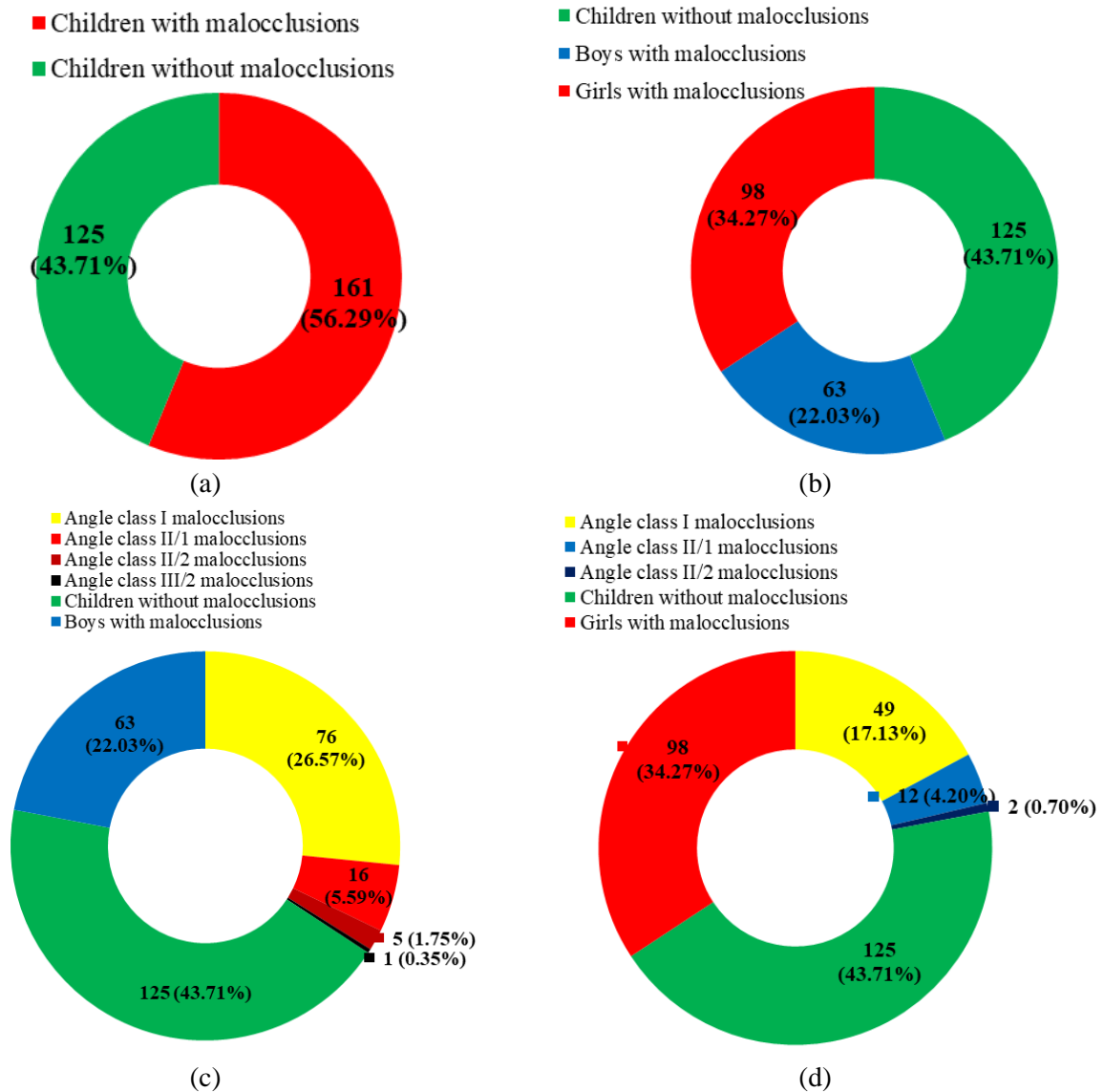


Figure 1. Figure description. (a) Statistics of children with malocclusions; (b) Statistics of children with malocclusions according to gender; (c) Statistics on types of malocclusions according to Angle's classification in female gender; (d) Statistics on types of malocclusions according to Angle's classification in male gender.

4. Discussions

Petrescu SMS et al. conducted a recent epidemiological study in the same county, but

on schoolchildren without disabilities. The results of this research showed a prevalence of malocclusions of 43.98% [17].

Following another research also carried out in southwestern Romania (Gorj county), a prevalence of malocclusions of 35.35% was obtained [4]. In Olt county, which is situated also in southwestern Romania, a comparable epidemiological study discovered a prevalence of malocclusions of 40.47% [5]. After conducting another study in southwestern Romania (Vâlcea county), a prevalence of malocclusions of 28.76% was obtained [18]. All these previously mentioned studies undertaken in the same geographical region of Romania demonstrated a much lower prevalence of malocclusions among schoolchildren without disabilities compared to the results of our current study conducted on children with special needs.

Between 2012 and 2014, Poștaru C et al. conducted an epidemiological study on children with special needs (physically/motor, visually and auditory impairments) from different temporary placement centers, auxiliary schools and special gymnasiums from Hîncești, Soroca and Orhei districts, Republic of Moldova. The results of this research showed a prevalence of malocclusions of 67.5% [19].

In another epidemiological study, the researchers used the Dental Aesthetic Index (DAI) to determine the association of malocclusions with dental caries and to assess the prevalence of malocclusion among disabled adolescents from Chennai, Tamil Nadu, India. 50.6% of the participants had DAI scores of 36 and above, which indicated

handicapping malocclusions requiring mandatory orthodontic treatment. However, there was no correlation between the severity of malocclusions and dental caries among the disabled adolescents from the study group [20].

A research was conducted by the Department of Paediatric Neurology from „Sf. Maria” Iași Emergency Hospital for Children on a group of children aged between 2 and 18 years old, diagnosed with various forms of cerebral palsy. Malocclusions were observed at 55.04% children with cerebral palsy [21].

The prevalence of malocclusions among children with special needs was found to be high in all the aforementioned studies and including in our current study (>50%).

5. Conclusions

The research showed that over half of the children included in the study group had malocclusions, which emphasizes the need for both preventative and specialist care.

The problem of dento-maxillary pathology in children with special needs is a major concern of modern dentistry. Therefore, it must be considered that, in the treatment of such patients, a series of aspects determined by both the morpho-functional development and the age-specific psychological state arise. The priority direction of modern medicine is represented by prophylactic methods, which provide for the determination and reduction, in all ways, of risks to oral health, especially of children with special needs.

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