v. 3, n. 22, 2023

International Journal of Health Science

OVERVIEW OF GUIDED SURGERY IN IMPLANT DENTISTRY

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Abstract: This study aims to search the literature for published scientific evidence on the context of guided surgery in implant dentistry. Scope review carried out from January to February 2023 in the MEDLINE, LILACS and BBO databases, using the descriptors "guided surgery", "dental implants" and "dentistry". 4,510 publications were found, after applying the eligibility criteria, 244 articles were filtered, of which their titles and abstracts were read, this way 237 were excluded and 7 articles were selected for inclusion in this analysis. The articles demonstrated that the guided approach results in a safer implant installation, contributing to greater precision when compared to the hands-free protocol. It is considered that carrying out this review provided the expansion of knowledge about guided surgery, in which both the static and dynamic techniques are an alternative to make implant dentistry more acceptable and comfortable with promising results in aesthetic and functional terms.
Keywords: Dental Implants, Dental Prosthesis, Oral Rehabilitation.

INTRODUCTION

The loss of teeth is a major public health problem at the national and global level, and is caused by several factors, such as growth in life expectancy, level of education, socio-environmental conditions and ineffectiveness of policies aimed at promoting oral health (ASSIS, 2022). It is a phenomenon that occurs partially or totally representing a traumatic experience, as it impacts on various aspects of the life of the affected person, reflecting negatively on physical self-perception, in the social context, in interpersonal relationships and consequently in the emotional sphere (SILVA; TEXEIRA; VERAS, 2023).

In view of this, dentistry has evolved with increasing advances throughout history, with emphasis on the area of implant dentistry that

seeks to restore the primordial and aesthetic functions of the teeth through less invasive techniques and faster solutions, this way with the aim of increasing productivity. professional and customer satisfaction (SILVA; TEXEIRA; VERAS, 2023).

In the beginning, the implantation technique was performed by the surgeon with many limitations, as they were conducted by radiographic images with only two-dimensional perception and plaster molds, lacking incisions, detachment of fibromucous tissue and sutures, a method that required more skill and experience from the professional. and quick decision-making in the face of unpredictability (PEREIRA; SIQUEIRA; ROMEIRO, 2019).

In this follow-up, due to the need for rigorous installation of implants, new possibilities have emerged with the expansion of technological inclusion, in which guided surgeries stand out, started in the mid-2000s, are categorized into dynamic and static types, currently both techniques have been used and both provide safety in performing the procedure, improving clinical results and mitigating failures (PIMKHAOKHAM et al., 2022).

The static-type surgery method employs a surgical guide to conduct the osteotomy and implant insertion, and is based on three-dimensional data acquired by cone-beam computed tomography and surface scanning. The dynamic type guides the professional surgeon through optical tracking devices that provide images of the procedure in real time of the positioning of the drill, where the monitor screen identifies the deviations in the three-dimensional portion between the traced point and the objective location of the perforation, allowing the necessary adjustments (FENG et al., 2022).

Thus, the present study is based on the occurrence of high rates of edentulism, requiring reconstructive dentistry care through implant dentistry to restore the aesthetic and functional aspects of the teeth through updated techniques, considering the indication bias, limitation and benefits. The purpose of the present study was to search the literature for published scientific evidence on a general idea of guided surgery in implant dentistry.

METHODOLOGY

It refers to a study with a descriptive and exploratory approach, of a qualitative nature based on an integrative literature review, which is equivalent to a methodological and systematized investigation of previously published content, with the integration of theoretical and practical information, which favors the understanding about a given fact more extensively, thus raising the complement and advancement of new fundamentals (SOUSA et al., 2018).

SELECTION OF STUDIES

In order to achieve the proposed objective, it was decided to carry out a structured review according to the systematic scoping review, which refers to the synthesis of scientific foundations, in which the mapping of studies present in the bibliography on a given subject takes place, describes its nature, volume and the most relevant characteristics (SOUSA et al., 2018).

It was structured with adjustments based on the observations of the international script of the Main Items for Reporting Systematic Reviews and Meta-analyses - PRISMA-ScR (PAGE et al., 2022) and on the guidelines of the Joanna Briggs Institute (2021) that establishes a regulation composed of five periods: 1- Definition of the research problem; 2- Specification of relevant studies; 3- Screening of studies; 4- verification of information; 5- Grouping, synopsis and presentation of

information.

IDENTIFICATION

The search for publications took place from January to February 2023, in the following databases: Online System for Search and Analysis of Medical Literature (MEDLINE), Latin American and Caribbean Literature in Health Sciences (LILACS) and the Library National Board of Dentistry (BBO). The Health Science Descriptors (DeCS) were applied as keywords in the search strategy: "guided surgery", dental implants" and "dentistry", with the Boolean operators "AND" and "OR" to refine the search.

tw:(guided surgery OR guided surgery AND dental implant OR dental implant OR dentistry OR dentistry) AND (collection:("06-national/BR" OR "05-specialized") OR db:("LILACS" OR "MEDLINE")) AND (fulltext:("1" OR "1") AND db:("MEDLINE" OR "LILACS" OR "BBO") AND la:("en" OR "pt")) AND (year_cluster:[2018 TO 2023])

Quantitative and qualitative primary studies were defined as eligibility criteria, with temporal configuration of the last five years and written in Portuguese and English. Exceptions were made for those that did not address the proposed topic, as well as studies of systematized reviews, editorials, duplicates, abstracts in annals of events, research in the design phase and articles not fully provided in the databases and with access fee to the content.

DATA ANALYSIS

Obtaining data described particularities about authorship, year of publication, methodology, objectives, database, levels of evidence, evaluation approaches (type of evaluation, indicators and degree of inference), relevant approaches for the construction of this review and the recommendations.

GROUPING, SYNTHESIS AND PRESENTATION OF DATA

The grouping of the extracted studies was done through a spreadsheet, later the analysis of the synthesis of the evidence was carried out and the presentation of the results through descriptive statistics, in which it was discussed according to the bibliography with compatible theme.

ETHICAL AND LEGAL ASPECTS

Regarding the ethical and legal aspects, research carried out with texts for reviewing the scientific literature does not require the opinion of the Ethics and Research Committee (CEP) since they do not present damage, however, it is essential to comply with the principles of integrity and reference of the researchers cited throughout the article (BRASIL, 2016).

RESULTS

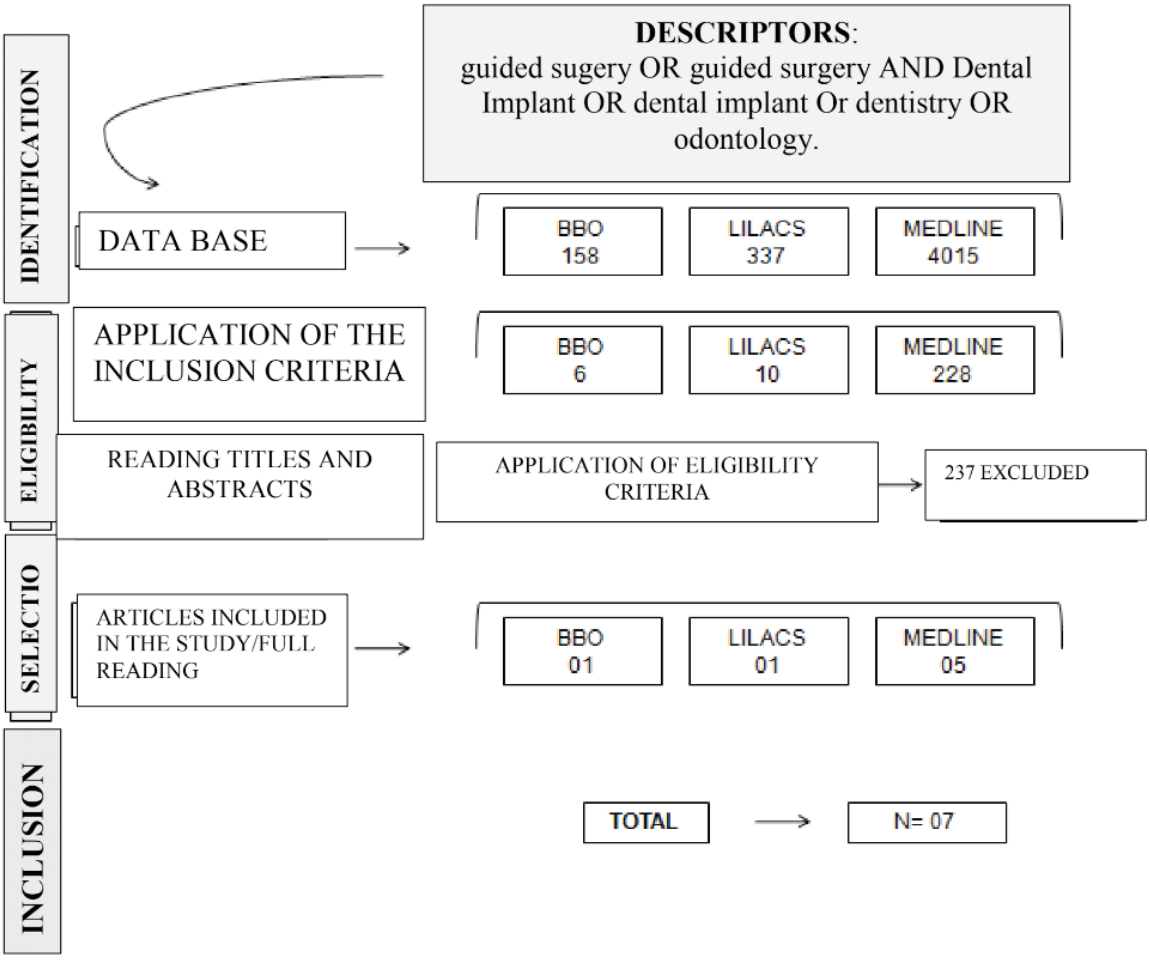

Figure 1. Flowchart of the selection process of articles included in the sample. Juazeiro do Norte-CE.

Source: Adapted from PRISMA, (PAGE et al., 2022).

As shown in the selection process in figure number 1, the search in the databases resulted in 4,510 publications, after applying the inclusion and exclusion criteria, 244 articles were filtered, from which their titles and abstracts were read, this mode excluded 237 in duplication ratio in other bases, methodological approach that was not included in the inclusion criteria, access rate and non-suitability to the theme, thus being selected 7 articles for inclusion in this sample and full analysis.

AUTHORSHIP STUDY YEAR	TITLE IDIOM	OBJECTIVE
1 FENG *et al.*, 2022	Comparison of the accuracy of immediate implant placement using static and dynamic computer-assisted implant systems in the esthetic zone of the maxilla: a prospective study. English	Compare the discrepancy between planned and actual implant positions in immediate implant placement after static or dynamic CAIS.
2 HAN *et al.*, 2021	Immediate scan-assisted implant placement throughout the process and immediate restoration in the esthetic zone: a prospective study. English	Provide experimental evidence for the clinical application of WD-assisted implantation and clarify surgical procedures.
3 SCHNEIDER *et al.*, 2021	Accuracy of computer-assisted and mold-guided implant placement compared to conventional manual implant placement - an in vitro study. English	To compare freehand versus computer-assisted implant planning and placement (CAIPP) in relation to planned and achieved implant position.
4 PIMKHAOKHAM *et al.*, 2022	Can computer-assisted implant surgery improve clinical outcomes and reduce the frequency and intensity of complications in implant dentistry? A critical review. English	To investigate whether the use of computer-guided surgery can lead to a reduction in complications as well as improve clinical outcomes.
5 ENGKAWONG *et al.*, 2021	Comparing patient-reported outcomes and experiences between static, dynamic computer-assisted, and conventional freehand dental implant placement: a randomized controlled trial. English	To compare patient-reported outcomes and experiences (PROs and PREs) between three dental implant placement techniques, including (a) conventional freehand, (b) dynamic, and (c) computer-assisted static implant surgery.
6 DINATO *et al.*, 2019	Digital flow facilitating guided surgery with implant, personalized abutment and immediate provisional. Portuguese	Demonstrate how digital dentistry can help dentists with implant rehabilitation, from guided surgery to custom abutment and milled restorations.
7 FRANTZ *et al.*, 2020	Evaluation of the reliability of cone beam computed tomography for use in guided surgery in implant dentistry. Portuguese	Assess the reliability of cone beam computed tomography for use in guided surgery.

Table 1. Identification of selected studies, Juazeiro do Norte-CE.

Source: Survey data, 2023.

BASE PERIODIC	SAMPLE	INSTRUMENT	KIND OF STUDY	FACTOR OF IMPACT / QUALIS
1 MEDLINE International Journal of Implant Dentistry	40	Flowchart CONSORT	Prospective clinical trial	2.984 B3
2 MEDLINE Medical science monitor (online)	60	$\chi 2$ test, t test and Mann-Whitney U test.	Diagnostic and observational study	3.386 A2
3 MEDLINE Clin Oral Implants Research	48	Analysis of Variance	Study *In vitro*	5.021 A1
4 MEDLINE Periodintology 2000	77	Description	Critical review	7.589 A1

5 MEDLINE Clin Implant Dent Relat Res	90	Questionnaire	Controlled clinical trial	3.932 A1
6 BBO Full dentistry in science	Não se aplica	Description	Clinical practice guide / Prognostic study	Sem FI B4
7 LILACS Revista de Ciências Médicas e Biológicas	3	IBM® SPSS® Statistics - version 2.0	Prognostic study	Sem FI A4

Table 2. Description of the methodological and bibliometric data of the selected studies. Juazeiro do Norte-CE.

Source: Survey data, 2023.

In this analysis, the publications occurred more frequently in the years 2021 and 2022, with a predominance of the MEDLINE base, in various journals, in the English language, with a total sample of 318 individuals analyzed, in which the main axis of the objectives focused on comparisons between the techniques performed through guided surgery and the conventional technique, on the research instruments it was seen the repetition of questionnaires and descriptive analysis, as for the type of study, the methodological path of clinical trials and prognostic studies prevailed. Related to the bibliometric analysis, the Impact Factor provided by *Web of Science and Qualis Capes*, the impact factor is obtained by the number of citations considered in the year the factor is calculated and divided by the number of articles published in the two years preceding the calculation, which is called a biennium, in this case from 2020 to 2022.

Qualis Capes for journals is a Brazilian evaluation system, classified into 10 categories: A1, A2, A3, A4, B1, B2, B3. B4, C and NP, A1 and A2 include journals of international excellence, B1 and B2 national excellence, C is of low relevance and NP has no relevance. The calculation referred to the four-year period of the year 2017-2020, in which the predominance of Qualis A1 was observed, thus evidencing publications in high-impact journals, with reliability and great relevance for the scientific community.

DISCUSSION

Fostering the discussion on the use of technologies used in the field of health promotion is of great importance for the production of knowledge, enabling the identification of potentialities and limitations that involve the whole process, as well as the decision-making of professionals that can be based on scientific evidence.

Since the dawn of societies, man's effort to compensate for edentulism with components found in the biosystem has been perceived, and over the years the attempt of scholars to find materials compatible with the human body in order to avoid corrosion and guarantee implants each time has been remarkable. increasingly durable and comfortable, in order to meet the needs caused by tooth loss, resulting in the development of various implant techniques and formats (BARROS, 2019).

In this context, with technological progress, guided surgeries emerge, which have been widely used with great notoriety in the dental field, through digitization and information in three-dimensional format, facilitating

accurate diagnosis, allowing simulation and better guidance to clients. (HAN et al., 2021).

Feng et al. (2022) compared the accuracy of immediate implant placement in the esthetic zone using dynamic and static guided surgery with a sample of 40 patients by running a prospective randomized clinical trial. The finding of the aforementioned research showed that the static and dynamic systems achieved similar precision for implant placement.

Dinato and co-authors (2019) address another important point in the surgical process, describing the importance of planning for successful execution in surgeries guided through a computerized system, given the possibility of building projects that replace conventional impressions through the design development and computer-assisted manufacturing, facilitating the creation of personalized abutments and temporary crowns before the procedure, a process that positively influences the transition from the pre-surgical plan to the procedure site, providing accuracy and prognosis.

It is pertinent to address the limitations seen in the literature related to the implant technique through guided surgery, which mention the higher financial cost, differentiated equipment, need to use software, lack of professional improvement in all stages, low tactile control, impossibility of changes during the operation, errors and possible fractures in the manufacture of guides (PEREIRA; SIQUEIRA; ROMEIRO. 2019).

Engkawong et al. (2021) carried out a randomized clinical trial with 90 patients, where they compared the experience reported by patients after implant placement through techniques performed by conventional free hand, static and dynamic guided surgery. The results of the research denoted that in the studied population there was no difference in the inflammatory symptoms in the postoperative phase and there were equal reports regarding the satisfaction of the procedures.

However Pimkhaokham et al. (2022) carried out a critical literature review on the research carried out in the last 10 years in the Pubed database, the authors concluded that in the analyzed literature, although guided surgeries do not seem to have a consistent impact in the postoperative period, the fact of performing the flapless surgical procedure, the possibility of assuming immediate protocols and application of repairing implants can indirectly result in considerable improvements.

Still following this line of reasoning, an in vitro study with a comparative method carried out by Schneider and collaborators (2021) showed the occurrence of a smaller deviation in the position of the implant compared to the planned location with freehand placement of the implant, and in the free hand group, the size influenced only the angulation error, not the lateral or vertical deviation.

Regarding the advantages, it is noteworthy that the findings of this review also denoted the results of an installation with less surgical time, allowing the exploration of a greater residual bone volume, without flap opening, lower rate of damage to anatomical structures, moderate bleeding, reduction of inflammatory symptoms in the postoperative period and induction of bone resorption, consequently offering less morbidity and more comfort to the patient, thus demonstrating a technique with greater precision when compared to the freehand protocol (BONFIM, 2022; DINATO et al., 2019 ; PEREIRA; SIQUEIRA; ROMEIRO, 2019).

The analyzed articles demonstrated that the guided approach resulted in a safer implant installation, thus contributing to greater precision when compared to the freehand protocol. However, the available data are still limited, so they cannot be generalized to

confirm the superiority of guided planning when compared to conventional protocols.

CONCLUSION

It is concluded that this review led to the expansion of knowledge about guided surgery, in which both static and dynamic techniques are an alternative to make implant dentistry more acceptable and comfortable with promising results in aesthetic and functional terms. This research may also serve as an aid for the construction of other studies concerning the theme. A limitation in the study was the methodology and databases chosen, that being said, it is recommended to use different information bases and with the expansion of other aspects that involve the theme, such as the cost-benefit ratio in totally edentulous patients, guided and traditional surgery after a period of proservation, with execution feasibility following other methodological approaches, such as comparative and randomized studies for dissemination on the subject and for the popularization of the technique.

INTEREST CONFLICTS

The authors declare no conflicts of interest.

FINANCING

This research was funded by the State of São Paulo Research Foundation (FAPESP – grants 2019/24903-6 and 2021/11499-2).

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