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Knowledge, Attitude And Practices Of Non Guided And Guided Implant Placement Among Dental Professionals

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Abstract-
Background: when a person loses a tooth, dental implants are placed to replace the missing teeth. Achieving successful osseointegration necessitates a technique that minimizes surgical difficulties, which is one of the main attributes that establish implants as a dependable alternative. There are two primary methods for implant placement: manual implantation and implantation using a surgical guide. Implant placement with a surgical guide is more precise than with other techniques. Some have countered that although dental implants have a high accuracy rate when employing a surgical guide, the precision of free-hand implant surgery has shown adequate and acceptable in the majority of clinical settings. The purpose of this study was to assess knowledge , attitude and practices of non guided and guided implant placement among dental professionals in india.
Method and material: the present cross sectional web based questionnaire study was conducted among 300 practicing dental professionals in india the pre tested questionnaire included items on demographic details, placement of implants on regular basis, the system used, knowledge of cbct imaging , surgical guides and complications of guided and non guided implant placement. The data collected was analysed by applying descriptive statistics.
Result: the present study reported reduced postoperative morbidity in terms of swelling, pain, and bleeding with guided implant placement compared to the freehand approach. One limitation that could be noted from the included studies was the differences in the operators' clinical experience and skill set. Another limitation was a low number of quality studies comparing guided to freehand implants.
Conclusion: once an implant is placed, the outcome of its placement is dependent on distinct clinical and radiographic parameters that determine the implant's success or survival. A good implant survival rate was achieved using both guided and free-hand implant placement procedures based on different variables that included demographic data, working environment, single versus multiple implant placement and the practitioners experience.

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I. Introduction-

Implant placement requires meticulous planning of surgical and restorative treatments because it is a prosthetic-driven surgery. Numerous elements, such as the surgical method, the skill of the practitioner, the patient's health, and their anatomy, influence the outcome.[1,] Implant implantation requires the utilization of multiple surgical techniques. A surgeon has three options for implant insertion: freehand, pilot drill guide, or fully guided system.[2,3]

For successful implant placement, the treatment planning requires extensive grasp of the underlying bone morphology, anatomy, and locations of important structures which is possible with the use of CBCT.[3,4]

An implant is considered "effective" if it remains free of biological and technological problems for the duration of the observation period. Implant success criteria, according to Smith and Zarb[5], include pain, loss of movement, peri-implant radiolucency, and sickness. After ten years, they recommended an 80% success rate, and after five years, an 85% success rate.[6,]

This study aimed to investigate whether the surgical technique will affect clinicians or implantologists for accuracy in implant placement when compared to preoperative implant planning. The impact of the surgical guide model on implant placement accuracy is still being debated, with that of manual placement[8] being more common in clinics.

II. Material And Methods-

Study population and study design: The present cross-sectional questionnaire-based study was conducted among the practising dental professionals of India.

Data collection tool:

A structured web-based questionnaire in the English language was used as a data collection tool. The questionnaire had two sections. In the first section, demographic details of the study subjects such as place of practice, highest qualification, specialization, and years of experience, were included. In the second section, there were nine close-ended and semi-open questions related to knowledge, attitude and practices of non-guided and guided implant placement. This section included questions on the placement of implants on a regular basis, the number of implants placed in a year, the type of implant system used, CBCT imaging, surgical guides, manual implant placement and surgical complications.

Pilot study:

The English version of the questionnaires was first pre-tested among twenty dental professionals. The objective of the pilot study was to calculate the sample size and assess the validity of questions. In pilot testing after the completion of the questionnaire, participants were interviewed regarding the overall acceptability, length, language, clarity and feasibility of the tool. Over 90% of dental professionals found the questionnaire easy to understand and fill. Based on their suggestions necessary changes were made to prepare a revised and final version of the questionnaire. The dentists among whom pilot testing was performed were excluded from the final data collection.

Sample size and sampling technique:

Based on the response rate in pilot study (75.00%), confidence interval of 95% and 5% absolute precision, sample size calculated was 289 dental professionals. Hence, it was decided to include 300 dental professionals in the study via simple random sampling technique.

Data collection and study duration: The Google form was used to collect informed consent and responses. The study was conducted between December 1, 2022, and November 30, 2023.

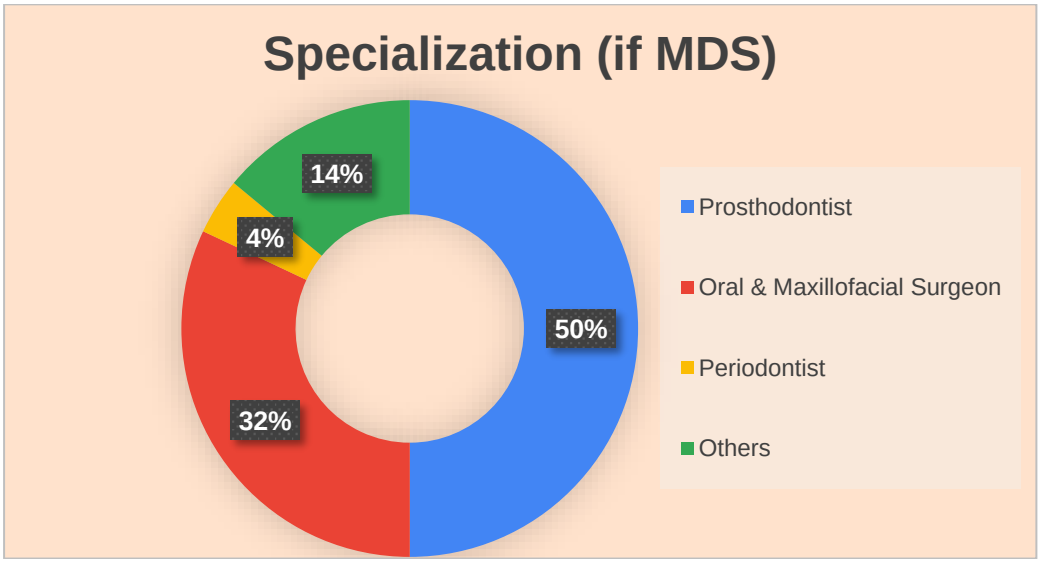
Statistical analysis:

Data collected was entered in Microsoft excel 365 for Windows. The frequency and percentages of responses were calculated using version 21.0 of the Statistical Package for Social Sciences (IBM Corporation, Armonk, New York, USA).

III. Result-

Demographic Characteristics of Respondents

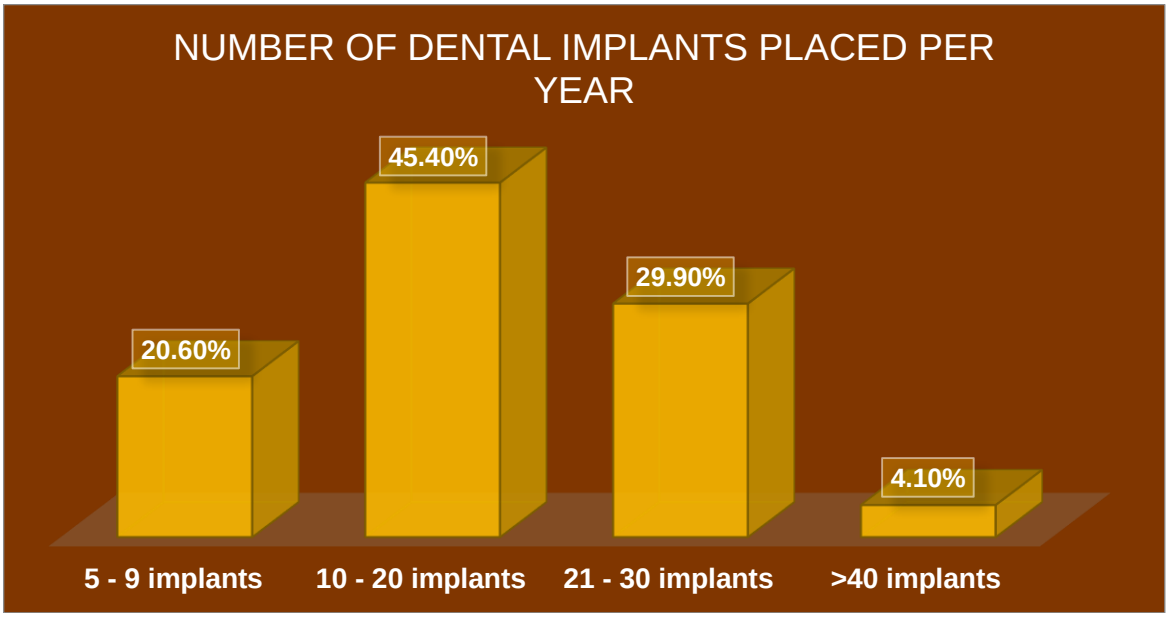
The study surveyed dental practitioners from both within and outside Madhya Pradesh, revealing that the majority (76.30%) practiced inside the state. Regarding qualifications, a significant proportion of respondents held Master of Dental Surgery (MDS) degrees (68.80%) compared to those with Bachelor of Dental Surgery (BDS) degrees (32.20%). Among MDS holders, the most prevalent specializations were Prosthodontics (50.00%) and Oral & Maxillofacial Surgery (32.00%). Respondents reported varied ranges of working experience, with the majority falling within the 5-9 years category (45.20%), followed by 10-12 years (30.80%)(pie chart 1).



Implant Placement Practices

Regarding implant placement practices, the majority of respondents (57.60%) reported placing implants on a regular basis. Bar graph 1 illustrates the distribution of respondents based on the number of dental implants placed per year.

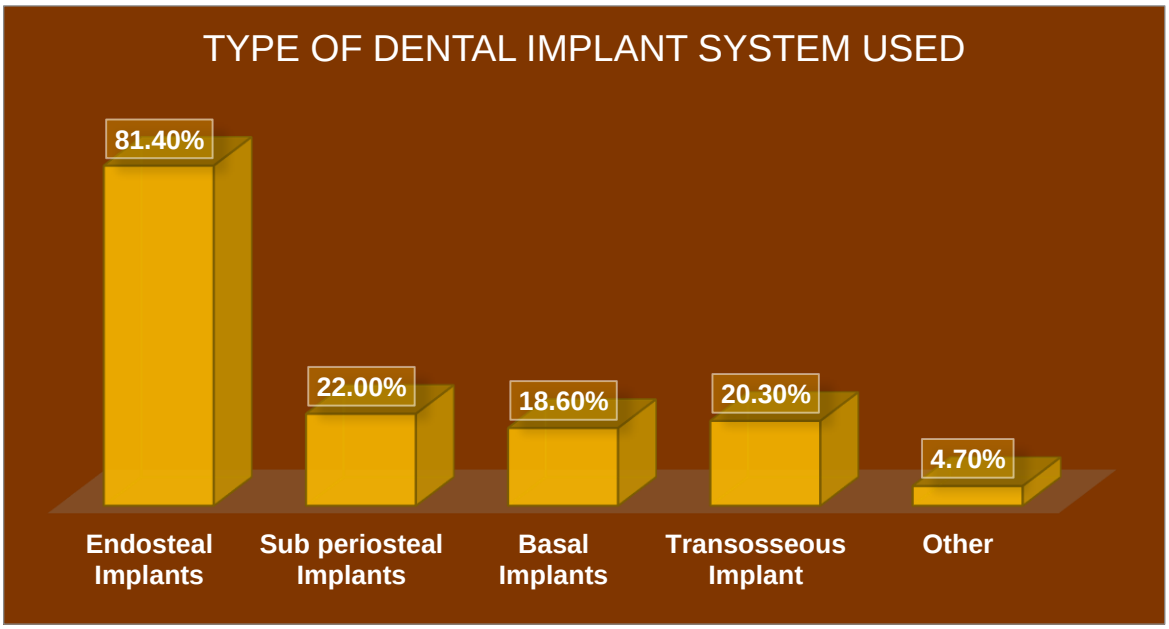
GRAPH 1-



Implant System and CBCT Imaging

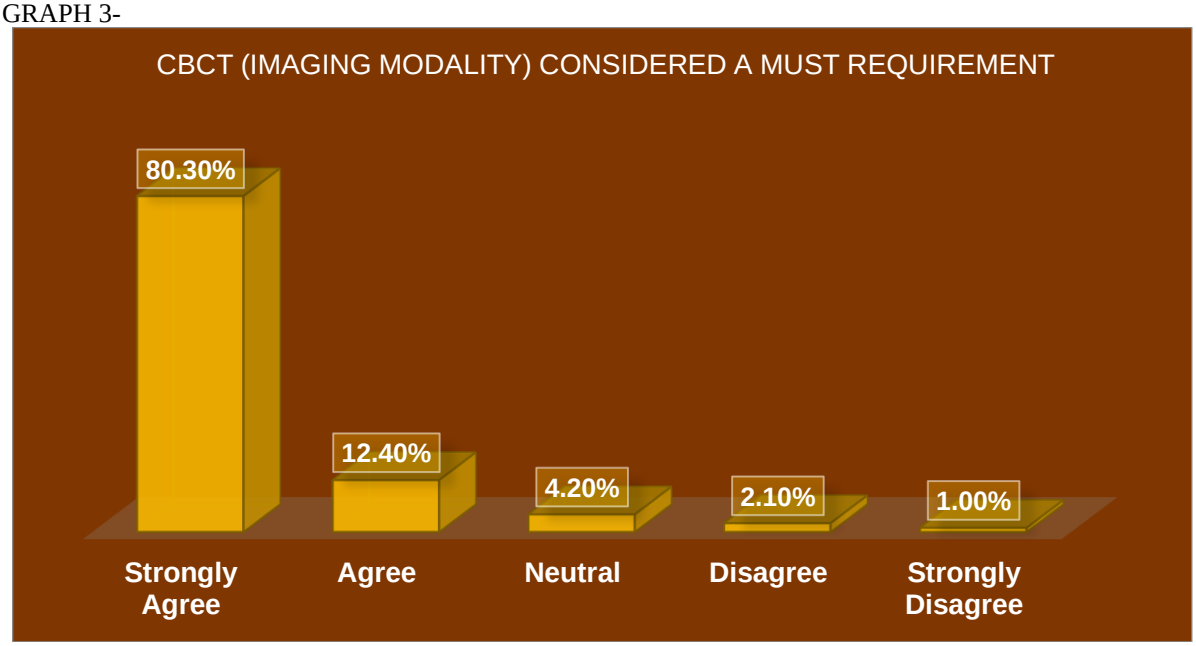
The preferred type of dental implant system and awareness about Cone Beam Computed Tomography (CBCT) as an imaging modality for virtual planning are presented in Bar graph 2.

GRAPH 2



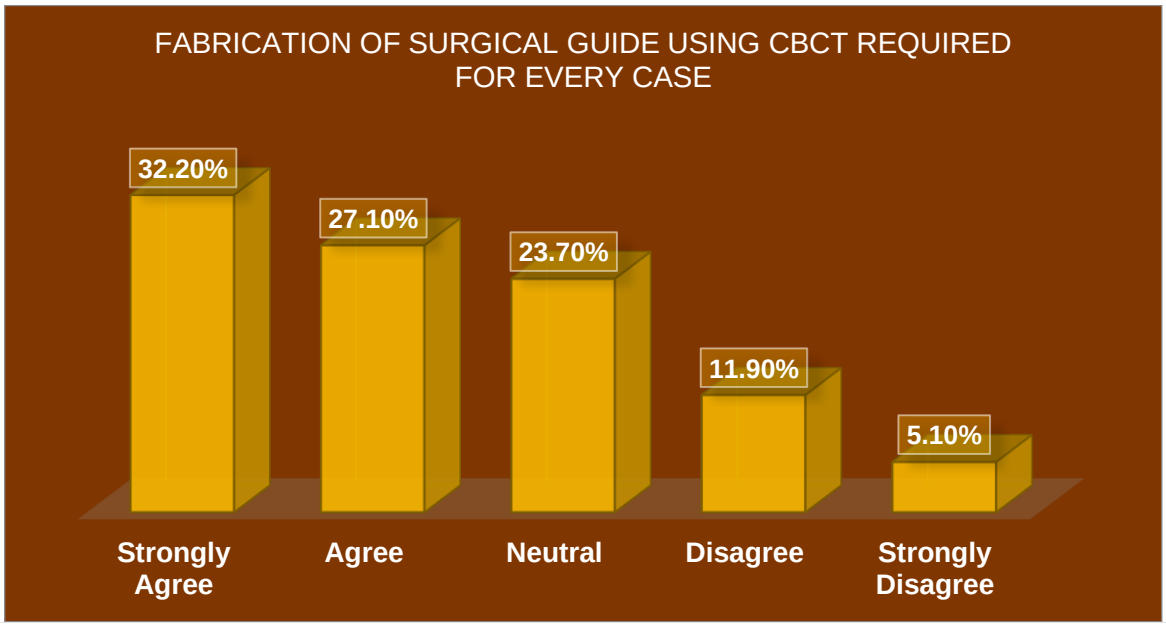
Awareness and Attitude towards CBCT Imaging and Surgical Guides has been reported in Bar graph 3

GRAPH 3-



Graph 4 illsutrates- the requirement of surgical stents by the practitioners as per each case.

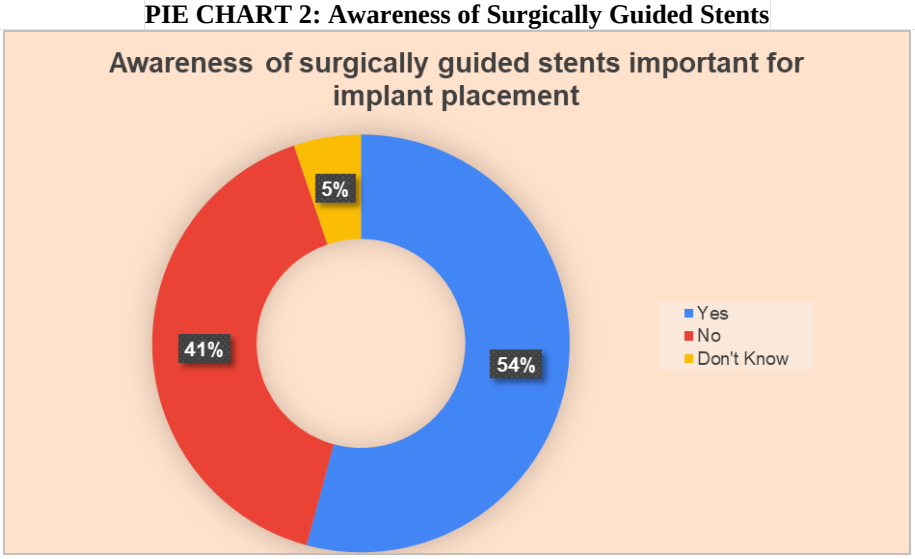
GRAPH 4-



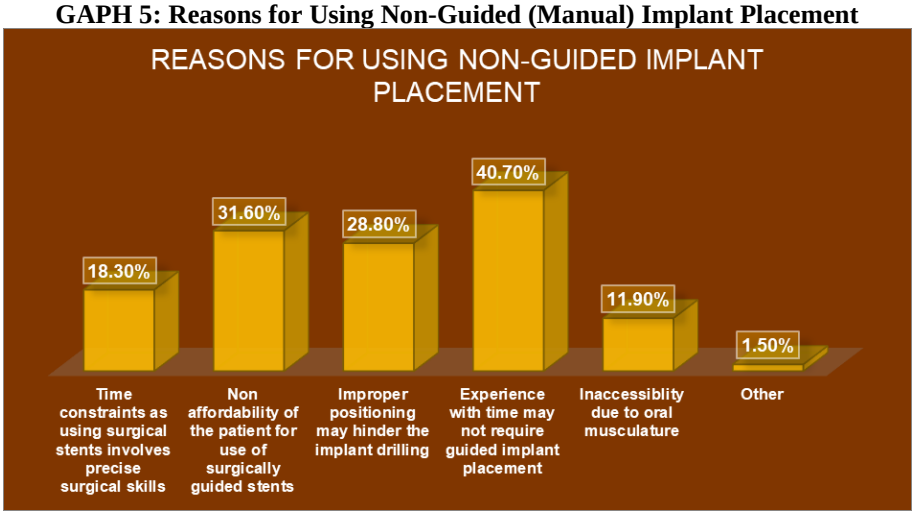
Awareness of Surgically Guided Stents and Non-Guided Implant Placement

The importance of awareness regarding surgically guided stents for implant placement was assessed. While a majority of respondents affirmed its importance (54.20%), a significant portion also expressed uncertainty (40.60%). Reasons for opting for non-guided (manual) implant placement and common errors encountered during manual placement are presented in PIE CHART 1 and GRAPH 5, respectively. Time constraints, affordability issues, and concerns regarding proper positioning were cited as primary reasons for not using guided stents.

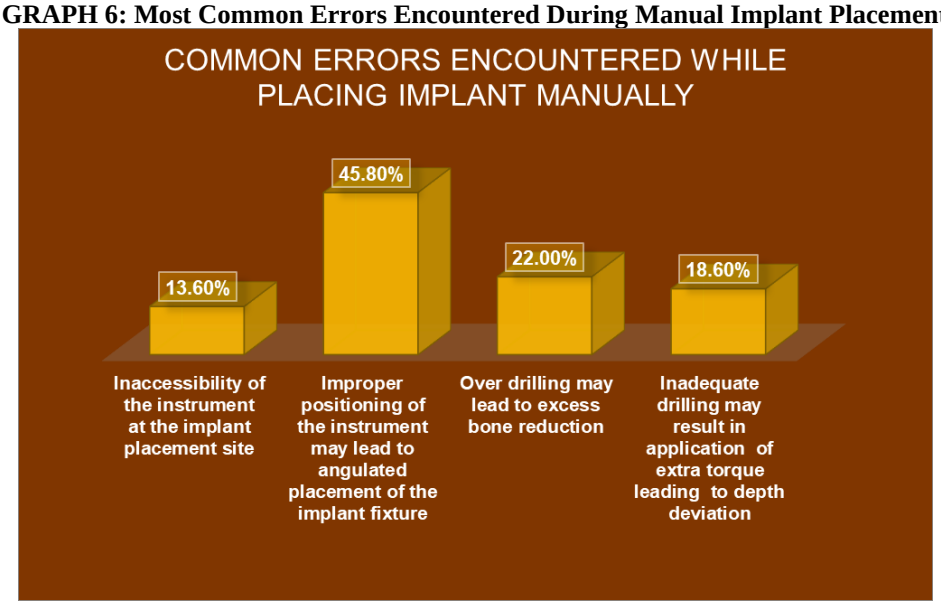
PIE CHART 2: Awareness of Surgically Guided Stents



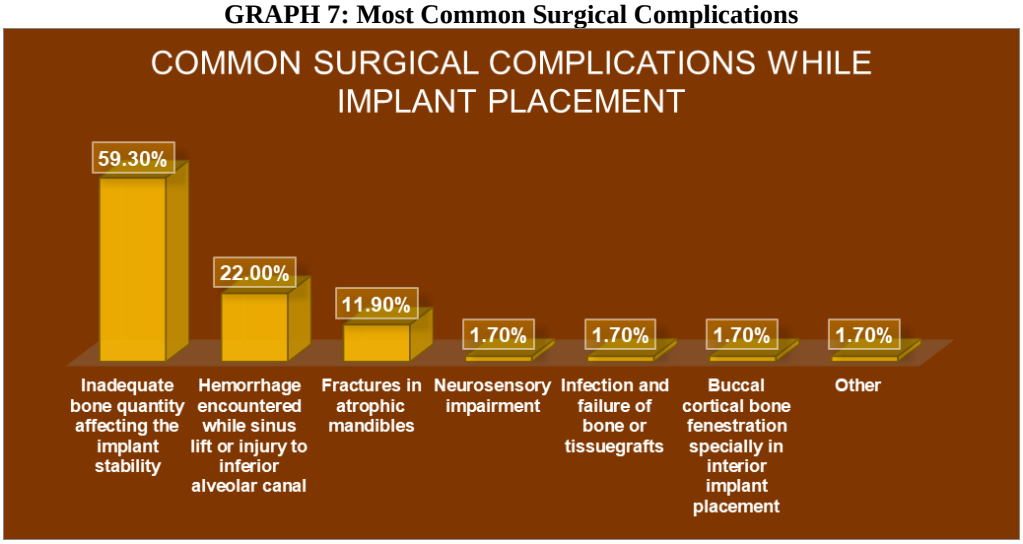
GAPH 5: Reasons for Using Non-Guided (Manual) Implant Placement



GRAPH 6: Most Common Errors Encountered During Manual Implant Placement



GRAPH 7: Most Common Surgical Complications



IV. Discussion-

The aim of a surgical implant is to obtain a high success rate. Conversely, an implant that survives but does not meet all success criteria sometimes yields a decent (but not ideal) outcome. The lifespan and success of the implant depend on the osseointegration of the implant surface[8] with the surrounding bone.

The demographic data revealed by this study indicates that practitioners with specialized training have more expertise placing implants in relation to virtual planning utilizing CT scans.[9] .As can be seen in chart 1, the prosthodontists made up the majority of them. Several studies have shown this to be the case, demonstrating that careful consideration of all factors and accurate implant placement result in prosthetics that live up to expectations. An inadequate placement and angulation of implants is linked to an increased risk of complications, including inferior alveolar canal or lingual plate perforation [10]. A failing prosthesis may transmit adverse occlusal stresses to the implants or result in an unappealing prosthesis.[11]

The four main criteria influencing the number of implants inserted are the experience of the practitioner, the tooth-born status, the time of the extraction, and the number of nearby implants, as shown by graph 1. The three primary influencing criteria on implant design for manual or guided placement [12], in the subset of tooth-borne, single-implant patients, are also the tooth-borne status, the number of nearby implants, and the width of the edentulous gap.

Numerous studies have shown that, even with non-guided methods yielding predictable results, computer-guided implant placement performs better in terms of failure rates than free-hand implant placement.[13] This might be the result of incomplete data regarding the quantity, location, and angulation of the implants, which has an impact on prosthetic design (see graph 2). The fully guided technique has the advantage of precise implant placement over the freehand technique. The procedure entails integrating the guide design program with the patient's jaw CBCT and teeth scan data.[14]. Surgical guidelines can ensure implant safety and reduce the likelihood of issues, which makes implant surgery simpler. For this reason, the findings presented in graph 3 corroborate the current body of literature.

The results of the research demonstrate the significance of surgical guide manufacturing when multiple implant placement is required.[15] Poor surgical technique and treatment planning can lead to many implants put too close to the neighboring tooth's root or at an incorrect angle, which can harm the surrounding structures and periodontal ligament. The fully guided technique has the advantage of precise implant placement over the freehand technique. Graph 5 thus validates the study showing that implant placement using guidelines can be more accurate than using a free-hand approach.

The survival rates of computer-guided and freehand implantation were examined by Yogui et al. [16] They reasoned that the outcomes from both methods were comparable. Furthermore, Pozzi et al.,[17] in their review, hypothesized that guided surgery had survival rates comparable to traditional freehand techniques. Schneider et al.,[18] comprehensive analysis found that after 12–60 months of follow-up, implant survival rates ranged from 91 to 100% in cases of computer-guided implant insertion. As seen in pie chart 2, implant placement is significantly impacted by knowledge of surgically guided stents.

When analyzing graph 5's results, it is important to note that free-hand implant placement is justified by the reduction of guide preparation time and cost. For the dentist, free-hand surgery is advantageous because it may reflect soft concerns and examine bone architecture to see and relate diagnostic data to the actual clinical state.[19] Notwithstanding its advantages, the literature notes that common mistakes practitioners may make

during non-guided surgeries reveal that, first, clinical judgments regarding implant placement will rely on the visualization of the clinical condition using data from virtual planning and cast. The second drawback is that this method takes longer than the surgical guiding method since free-hand implant insertion necessitates preparation and thought.

An additional drawback of the free-hand approach is its difficulty in aligning several implants, which might result in angulation variation and less predictable results than with surgical guides. Thus, there will be a lot more room for human error with this approach. Other drawbacks of the free-hand technique[20] include longer recovery times, discomfort, edema, and bleeding, as seen in graph 6.

However, if guided implant surgery is contrasted with a typical free-hand treatment, the former is not always easier to perform. The disadvantage of a fully directed technique is that it can be more costly, and when mouth opening is restricted, it might be challenging to follow a fully guided drill sequence.

A few studies also looked at the morbidity and issues that develop during and after implant implantation.[21] Changes cannot be made during the operation because, among other reasons, the guide cannot be altered once it is created. The prosthesis's fit and, eventually, functionality will be impacted as a result. Because drilling is meant to penetrate hard bone, which puts torsional forces on the sleeves, there is a chance that the guide will become dislocated during surgery if it is not stabilized. This method also requires the treating clinician to invest time in overcoming the learning curve and pay for software, specialized equipment, and drills.[22]

Few evaluations have examined the failures, despite a number of excellent comparisons between fully guided and free-hand implant placement success and survival rates.[23] There is ongoing debate over the surgical guide model's impact on implant placement accuracy, even though it is widely used in clinics. According to some researchers, implant placement with a surgical guide is more precise than with other techniques.[24] Some have countered that although dental implants have a high accuracy rate when employing a surgical guide, the precision of free-hand implant surgery has shown adequate and acceptable in the majority of clinical settings. Thus, graph 7 provides a conclusion for the main causes.

These variances could be caused by appropriate surgical technique and patient selection. The different clinical backgrounds and skill sets of the operators were found to be another limitation in the included research. Another disadvantage was the lack of high-quality trials comparing guided versus freehand implantation. These statistics emphasize the need for additional standardized RCTs to establish the evidence when using guided and freehand implant insertion methodologies.

V. Conclusion-

Each patient's unique situation and the treating physician's preference will determine which approach is best, along with other clinical factors. The study clarifies the main conclusions drawn from a questionnaire-based investigation into the practices, credentials, knowledge of cutting-edge imaging technology, and implant placement experiences of dental practitioners. By means of an extensive examination of numerical data, enhanced by qualitative perspectives, it offers significant understanding of current patterns, obstacles, and prospects in implant dentistry. The results further our understanding of the variables affecting implant dentistry decision-making processes, practice patterns, and clinical outcomes. This will help to guide future research directions, instructional programs, and clinical guidelines in the area.

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