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CBCT

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Special Issue



Interview of the
CAI President
Dr. Widmann
MD, PD, MSc, EBIR



Utilizing
Prosthetically
Driven Implant Planning
Robert Pauley Jr. DMD



Interview with the
Basal Implant Mentor
Prof. Stefan Ihde



Guided Implant placement-
Requirements for a successful planning
Dr. M. Shiva Shankar
Director Confident Dental Laboratory, Bengaluru,



A Modified surgical protocol using
TTPHIL- ALL TILT® technique
for Pterygoid implants: Clinical
and Radiographic study of 556 implants
Dr. P. Venkat Ratna Nag MDS

First Tryst With Guided Surgery



Dr. Maneesh Rai
BDS, Bhopal, India



Prof. Dr. Siddharth Gupta
BDS, MDS (Prosthodontics),
Bhopal, India

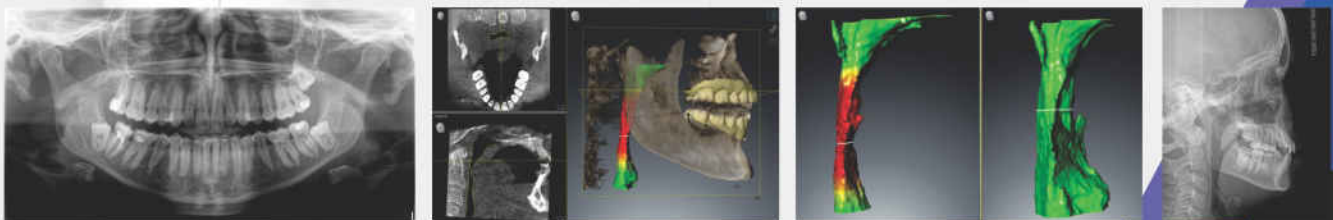


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Editor-in-Chief
Dr. Prashant Jaju

Editor's Desk

It gives me immense pleasure as editor of CBCT magazine to write this editorial for the special issue for the annual Computer Aided Implantology Congress in Florence, Italy. As the Editor in Chief, we are proud to be associated with an International society like CAI which associates and strives for better patient treatment and is at the forefront of the new advancement and techniques with dental implants. It has been great year for our magazine as we started with the AEEDC 2019, Dubai where we released the first issue followed by issue on TMJ and Sleep Apnea, CAD -CAM issue and now with special issue at CAI, Florence.

Dental implantology is racing ahead at tremendous speed both in terms of scientific gathering and technological advancements. Guided implantology is one such advancement having a great scientific backing and the centre of this technique is the amalgamation of dental radiology and digital dentistry tools like CAD CAM and 3D printing. With the recent introduction of new three-dimensional (3D) diagnostic and treatment planning technologies in implant dentistry, a team approach to the planning and placement of dental implants, according to a restoratively driven treatment plan, has become the norm in quality patient care. The team can now start with the end result, the planned tooth, and then place an implant into the correct position according to the restorative plan. The accurate and predictable placement of implants according to a computer-generated virtual treatment plan is now a reality, taking the virtual plan from the computer to the patient clinically. Precision and accuracy are the cornerstone of effective dental implant practice and guided surgery protocol can suffice these parameters with ease and excellent precision. Conventional surgical stents to aid in implant positioning have been used in implant dentistry for many years. Guides of these types were simple and easy to use. The problem with these techniques was the lack of correlation between the planned restoration and the underlying bony anatomy. With the use of computer-guided implant surgical guides, this anatomic relationship can be predictably established and considered before surgery. Communication between clinicians and understanding of these technologies are key components to improved case results and clinical outcomes.

Do read the articles and give your valuable feedback about the articles and interviews.

Our magazine strives to be one of the best in the clinical dentistry field and we welcome all suggestions and criticism with equal measure.

Merry Christmas & Prosperous Happy New Year 2020.

Dr. Prashant Jaju

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CONE BEAM COMPUTED TOMOGRAPHY

Special Issue

Abstracts

in inside pages



International Meeting of Computer Aided Implantology Academy



Imaging in Computer Aided Implantology

Asma'a Al'Ekrish BDS, MDS

Dental implant therapy is considered the standard of care in treatment of missing teeth and completely edentulous cases. Computer aided implantology has shown numerous benefits over the conventional approach during the treatment planning phase, surgical phase, and follow-up stage of implant therapy. During each of these phases, imaging plays an integral role in computer aided implantology. This presentation will present the latest research on imaging hardware and software affecting computer aided implantology. The influence of radiation dose and image quality on the various diagnostic and therapeutic tasks involved in computer aided implantology will be emphasized along with their clinical implications.



Computational evaluation of anatomical considerations in dental implant surgery

Trikeriotis Dimitris DMD, OMS

Panagiotis Diamantopoulos DPhil, Dr Eng

Aim

The aim of this study is the computational evaluation of maxillary sinus anatomy as well as of the interforaminal anatomy related to dental implantology.

Objectives

The evaluation of the angle between the buccal and palatal sinus walls and its relation to the width/height of the sinus and the height of the sinus floor. The frequency and location of sinus septa. The investigation of communications between the inner and outer bone plates in the interforaminal area.

Result

Higher angle values appeared at the 40% of the sinus length. Edentulous areas showed significantly sharper angle values at the 20%, 40% and 80% of the sinus length. Sinus floor height was found significantly lower in the edentulous group. 50,9% of the patients appeared with septa. Communications between the labial and lingual mandibular plates either as a crossing of the lateral lingual with the incisive canal or as an extension of the median lingual canal to the labial plate were found in 28% of the patients.

Conclusion

The study of the sinus anatomy contributes to evidence, regarding the sinus dimensions. The study of the interforaminal anatomy provides evidence for the canalicular network connecting the inner with the outer plates of the mandible.



Limitations of Guided Implant Surgery

Prof .Dr Prashant P Jaju BDS,MDS (Oral Medicine & Radiology)
Prof & Head of Dept. Rishiraj College of Dental Sciences
and Research Centre, Bhopal, India

Co Authors :**Dr Sushma Jaju** BDS ,MDS | **Dr Shiva Shankar** BDS,MDS

Dental implant therapy is considered the standard of care in treatment of missing teeth and completely edentulous cases. Computer aided implantology has shown numerous benefits over the conventional approach. Digital dentistry is the future of dentistry and dental implantology is at the forefront of this technology. Dental implants has always been a prosthetically driven treatment and with the advent of digital tools like Cone beam computed tomography (CBCT) and intra oral scanners ,

3D assessment of the implant sites as become more precise and realistic. Guided implant surgery is the current norm for a predictable, precise and prosthetically accurate restoration. Guided implant surgery has its indications and is better than conventional or free hand implant surgery. With rising acceptance and popularity of guided implantology, questions arises is this the best treatment option available for accurately replacing the missing teeth. Guided implant surgery has its share of limitations .This presentation will highlight the problem related to guided implant surgery with respect to CBCT imaging, integration with CAD CAM and printing of the guides. ring the treatment planning phase, surgical phase, and follow-up stage of implant therapy. During each of these phases, imaging plays an integral role in computer aided implantology. This presentation will present the latest research on imaging hardware and software affecting computer aided implantology. The influence of radiation dose and image quality on the various diagnostic and therapeutic tasks involved in computer aided implantology will be emphasized along with their clinical implications.



Three-dimensional (3D) imaging techniques and implant planning software

Marco Tallarico (Italy)

Nowadays, the development of three-dimensional (3D) imaging techniques and implant planning software has contributed to a large diffusion of prosthetically guided implant placement, nevertheless, the replacement of lost natural teeth is still a challenge for the clinician, mostly due to bone deficiency. Alveolar bone atrophy is a chronic and progressive clinical situation characterized by moderate to severe loss of bone volume due to teeth loss, extraction, periodontal disease, and trauma. As a consequence, dental implants placement could be difficult or unfavorable from both a functional and aesthetic perspective. To overcome these possible drawbacks, graft (bone augmentation techniques) as well as graftless (narrow and short implants) solutions have been introduced. The aim of this lecture is to present clinical cases and scientific evidence combining graft and graftless solution with computer guided implant placement.



Full digital rehabilitations : myth or reality

Mario Beretta DDS, PhD

Marco Aguzzi Dental Technician

Digital technologies have been demonstrated to be more and more relevant simplifying oral rehabilitation procedures in dentistry. According to literature, digital benefits include less discomfort for the patient and better planning for a proper prosthetic guided implant placement. Nowadays the main challenge consists in establishing a full digital workflow protocol suitable for all the cases. The aim is to present a novel workflow for a full digital model free restoration in case of full arch rehabilitation.

Material and Methods

Thanks to specific softwares it's possible to analyze the initial situation by means of intraoral scans which can be matched with the datas obtained from the CBCT examination. The goal of this approach is to plan computer- guided implant placement and then two obtain a fully digital model free restoration.

A specific clinical protocol using a scanning stent for intraoral scan can be applied for a full digital model free restoration.

Results and Conclusions

The novel approach seems to be reliable and predictable in the restoration of fully edentulous patients.



Pterygoid implants and navigated antral bone expansion (NABE) as alternative to bone graft in the atrophic posterior maxilla

Luigi Vito Stefanelli (Italy)

The use of dynamic navigation presents several advantages respect to the use of static guides. Perhaps the most significant advantage lies in combining the real time view of the actual drilling and implant placement with the tactical sense of the procedure. DCAI also eliminates the need to purchase costly ad hoc implant drilling systems (surgical kits), since drilling occurs free hand (but under real time verification and validation of positional accuracy). Moreover, DCAI expands its use to include clinical situations do not permit the construction of a stereolithographically generated SCAI. These situations include: reduced interocclusal and mesiodistal spacing. Lastly, DCAI allows the implementation of one-day approach as a result of its simplified workflow

Posterior atrophic maxilla is one of the most common scenarios where implant placement can be challenging: Resorption of the alveolar bone crest; Pneumatization of the maxillary sinus; Sinus pneumatization was identified after extraction of maxillary posterior teeth. Low density bone of the posterior maxilla.

Several techniques have been described for the placement of implants in the posterior atrophic maxilla: Sinus lift; Zygomatic Implants; Short implants.

Alternative procedures with the use of dynamic navigation:

Place implant in the pterygoid area; Navigation Antral Bone Expansion (NABE). The use of this techniques are quite difficult free hand and with the use of static surgical guides. The use of dynamic navigation allows with a short learning curve the insertion of implants in the pterygoid area and the use of a technique consisting in moving native bone into an ideal

prosthetic direction to insert the implants.

This could led to these advantages:

Minimally invasive (no bone grafting); Predictable; Shorter period of treatment; Stable during the time; Immediate loading is possible; Decreasing of the costs (patient and dentist).



Practical Dynamic Navigation: From Single Units to Full Arch Reconstruction

Robert Pauley, Jr. (USA)

It's becoming more common to utilize dental implants to restore lost or missing teeth and non-restorable teeth. The patient pool today is becoming more educated with regards to the benefits of dental implants over traditional bridges (where adjacent teeth are prepped) and removable partials and dentures (which are very uncomfortable to wear, chew food properly and aren't always aesthetic). With the growing number of patients electing to have restorations with dental implants and becoming more educated on their options; esthetic and hygienic restorations are becoming the expected norm. The ability to develop a "Prosthetic Driven Implant Placement" treatment plan and ideally work from the optimal final prosthetic platform and plan in a reverse manner is paramount to optimize surgical and prosthetic results.

Prosthetic Driven Implant Placement workflows will allow clinicians to work towards ideal implant placement after first determining the appropriate site development. The process will let the clinician evaluate the need for hard and or soft tissue augmentation prior to or during the surgical implant placement. My office's typical digital dental implant workflow the past four years has utilized cone beam computed tomography, full arch intraoral scans and dynamic guided implant placement technology to plan and place patient's implants.

The result is confidence that the final implant placement will be ideal; with sound bone and soft tissue concerns addressed to allow for excellent long term prognosis for This could led to these advantages: implants and prosthetics.

By incorporating cone beam computed technology and intraoral scanning with X Nav technologies we are able to follow a dynamic navigational workflow which gives the following advantages:

1. The patient can be scanned, planned and undergo surgery on the same day
2. The plans can be altered during surgery when clinical situations dictate a change from the original plan.
3. The entire field can be visualized at all times
4. Accuracy can be verified at all times.

You will find literature with statistics noting that dynamically placed implants are more precise and accurate in every plane. Clinicians will also find that the utilization of a dynamically guided navigational system for treatment planning and placement will optimize surgical and prosthetic results while following a more efficient workflow, and avoid the costs associated with static guidance.

In conclusion, I feel the utilization of dynamic guided navigation allows me to confidently treatment plan and place implants to minimize surgical complications, avoid excessive tissue manipulation (avoid flap reflection to visualize site) and to have the implant(s) ultimately placed in the position in which it was originally planned. With this technology there is no reason not to utilize its workflow for Every Patient - Every Implant - Every Time.



Use of dynamic navigation to simplify the surgical procedure in advanced implantology

Gerardo Pellegrino, DDS, PhD

Researcher (Department of Biomedical and Neuromotor Science,
Oral and Maxillo-facial Surgery Unit, University of Bologna, Italy)

The new trend in medicine is to use the last technologies to increase the accuracy of the procedure and to reduce the morbidity for the patients. Dynamic navigation is one of the most promising methods in computer-assisted surgery for dental implantology. The aim of the presentation is to show how the use of a navigation system can aid the surgeon to approach advanced implantology. The advantages of using this computer-assisted technology are represented in the reducing of morbidity via a flapless approach and the reduction of bone grafting, promoting the use of short, tilted or zygomatic implants. The result of research projects about the topics above-mentioned and clinical cases will be shown.



The use of electro-magnetic instruments in the digital era

Domenico Baldi (Italy)

Recently there have been numerous innovations in the field of oral surgery, and among these there has been great interest in electro-magnetic instruments . This is especially convenient when it is necessary to perform osteotomies near delicate anatomical structures e.g. sinus membrane. These features are particularly useful in oral bone surgery because we have improved control of the insert during procedure in total assurance . Clinical applications will be shown in cases of extraction therapy, implant surgery, and maxillary sinus surgery i.e. sinus lifting with crestal access, split crest.

The most significant clinical advantages are represented by : Avoid that applied forces influence the whole craniofacial mass.?Get a better visibility and control in osteotome entry direction and directionality.? Simplify the bone augmentation procedures such as sinus lift and split crest.? Guarantee the initial implant stability and limit or avoid bone milling.?Avoid the split crest practice with cadwell luc.?Get a better access to the inner part of maxilla and to the lower jaw. ? Get an easier and riskless abutment, impacted teeth and roots extraction. ? Get a osseodensification The outcomes for the patient are remarkably reduced morbidity and recovery period.



Applications of intraoral scanner in guided surgery

Arturo D'Arienzo (Italy)

An increasing number of clinician in their practice use IOS as alternative to conventional physical impression taking. Several studies have shown high levels of accuracy in Prosthodontics and in Orthodontics. Little is known about applications of intraoral scanners in guided surgery. The aim of the presentation is to understand how the intraoral scanners can be integrated in the process of the computer guided surgery. Starting from literature up to clinical cases, the Author will analyze the applications of intraoral scanner in case of partial edentulism and complete edentulism.



Bone customized reconstruction adopting xeno-hybrid scaffold

Gianni Pertici

Chemical Engineer, PhD in Biomaterials
Executive Vice-President of IBI (Switzerland)

Aim

Bone regeneration is the physiological process of hard tissue formation and it is essential for effective skeletal reconstruction in large bone defects after traumas, infections, tumour and abnormalities. Conventional prosthesis, although providing adequate support, do not get fully resorbed upon implantation. Conversely, SmartBone® (IBI SA, Switzerland) a novel composite xenohybrid biomaterial ensures volumetric maintenance, full resorption and complete bone remodelling [1], combining bovine bone mineral matrix with biopolymers and collagen, which improve mechanical resistance and cell attachment.

Objectives

Custom-made bone grafts (SmartBone® On Demand™, SBoD), addressing cases of bone reconstruction have been developed. Specifically, starting from Computerized Tomography (CT) scans, personalized grafts were developed for every kind of defect. Patients were followed several months after treatment, and histological and CT data were collected.

Results

Several cases (mostly oral/maxillo-facial surgeries) were investigated during these last 7 years [2]. Histological analysis indicated that SB is osteoconductive, promotes fast bone regeneration and mature bone formation in about 8 months. Moreover, CT-scans showed impressive osteointegration and good volumetric stability.

Conclusion

SBoD grafting technique allows complete restoration of wide defects, customized on each patient's specific needs. This way, a much less invasive approach toward treatment of large bone defects is possible.



Guided surgery-innovative concepts

Dr. Georg D. Strbac

Assoc. Prof. Priv. Doz., PhD

Division of Oral Surgery, School of Dentistry, Medical University of Vienna

In current dental implant treatment accurate clinical and radiological examination can enhance treatment planning, ensuring an atraumatic and minimally invasive surgical procedure. Modern diagnostic techniques, such as 3D imaging, not only allow imaging of anatomic structures for accurate diagnosis and treatment planning but can also be used for the fabrication of surgical models and for the construction of surgical templates in guided implant surgery. Today latest implant planning software programs can simplify the previously used template production techniques by shortening the fabrication process and by avoiding additional radiographic exposures. This can be achieved directly after the initial 3D radiographic assessment

by merging the uploaded radiographic data with the STL files of scanned dental models or intraoral scans of the jawsto fabricate accurate surgical templates prior to the intervention. Next to the virtual planning of dental implants and prosthodontics reconstructions these modified computer-supported planning and guided surgical approaches can also be used for sinus grafting procedures. Additionally new surgical methods could be developed to ensure precise and safe guided osteotomies for future treatment methods. Moreover recently introduced innovative techniques such as Guided Autotransplantation of Teeth and Guided Modern Endodontic Surgery have become reality.



Atrophic jaw rehabilitation: the role of Digital Imaging

Raffaele Vinci (Italy)

Michele Manacorda (Italy)

Chemical Engineer, PhD in Biomaterials

Executive Vice-President of IBI (Switzerland)

In the edentulous maxilla advanced atrophy is often observed and implant placement could become a challenge. Also elder patients when they loose their teeth often prefer a fixed prosthesis rather than a removable denture. And the research of a sufficient bone amount for implant positioning is a fundamental issue for the oral surgeons. Different techniques has been proposed in the last decades for bone augmentation or splitting residual bone. These procedures however are generally

expansive and request a long time for reaching a fixed reconstruction. The goal for us and our patients is to achieve the oral rehabilitation in a short period and through a mininvasive implanto prosthetic procedure. A specific volumetric evaluation of hard and soft tissues allows the clinicians to evaluate atrophy and plan surgery for immediate loading of screw retained full arch prosthesis. Using a proper diagnostic software we are able to plan fixtures position also in few amount of residual bone. CBCT examination shows in three dimensional views the basal bone, in which is always possible to place implant with enough torque, allowing immediate loading. The purpose of the present speech is to reveal and measure the existence of a permanent basal bone volume, for example in the mid-maxilla area in patients presenting a severely atrophic maxilla. Furthermore, tilted iuxtameatal implants has been virtually positioned in CBCT volume reconstruction in order to show that this bone volume could be an adequate base for implant placement. Matching soft tissue 3D volumes with bone Dicom images is possible to plan prosthetic mock up and realise our temporary rehabilitation in few hours, with a full digital procedure. A considerable amount of patients show a significant degree of bone atrophy and sinus pneumatization. The implant-supported treatment plan can rely on the three dimensional imaging of the residual bone as a guiding tool to establish the most effective implant position for each specific case. We founded that in the majority of the maxillary atrophy, for example, the volumetric evaluation of the mid-maxilla region could suggest the availability of iuxtameatal implants placement.



Prof. Matteo Chiapasco Dr Grazia Tommasato

Guided Bone Regeneration of atrophic edentulous ridges: Present trends and New horizons

Prof. Matteo Chiapasco
Dr Grazia Tommasato

Edentulous areas, if associated to bone or soft tissue defects, may present several challenges for the rehabilitation with implant-supported prostheses, because "compromise solutions" such as short or narrow implants may not always guarantee satisfactory results from an aesthetic and functional point of view.

The objective of this presentation is to present rational and well documented surgical and prosthetic

protocols aimed to reconstruct the deficient areas in order to make it possible implant placement in a ideal, prosthetically driven way with optimization of functional and aesthetic results. Reconstructive techniques including GBR both "traditional" and with new customized CAD/CAM Titanium meshes, bone grafts, and soft tissue management with autogenous tissues and biomaterials/collagen matrices will be presented. An analysis of the latest scientific data will be used to support different clinical treatments proposed in our daily practice.



ZAGA minimally invasive zygomatic osteotomy

Carlos Aparicio
MD, DDS, MSc, MSc, DLT, PhD

Zygomatic implants are used for prosthetic rehabilitation of the severely atrophic maxilla. The original surgical technique (OST) prescribed an intra-sinus pathway of the implant from a palatal entrance, and the preparation of an antrostomy. However, different morphologies of the edentulous maxilla can be identified. The more concave is the maxillary anterior wall, the more marked palatal position of the implant head will be attained. If the maxilla is very atrophic, the palatal entrance will occur through a thin cortical bone facilitating a subsequent sinus communication. Those situations will frequently end into bulky prosthetic constructions, impaired hygiene and eventual sinus complications. Materials and methods. A protocol, named Zygo Anatomy-Guided Approach (ZAGA) will be introduced. ZAGA method is aiming at promoting a patient-specific therapy. In most cases, this method avoids the opening of a window or slot into the lateral wall of the maxillary sinus previous to implant placement.

Instead, a muco-periosteal flap, including the posterior maxillary wall and the superior zygomatic rim is raised to allow visual control of the complete surgical field. The surgical management of the implant site is guided by the anatomy of the patient according to specific prosthetic, bio-mechanic and anatomic criteria. Results consistently show less traumatic osteotomy; better implant stability together with better bone sealing around implant neck. Conclusions based on comparative long-term results of the OST vs ZAGA support the elective use of ZAGA protocol. The rate of late sinus complications dramatically decreases and more anatomic rehabilitation is achieved.



AMSJI: Additively Manufactured Subperiosteal Jaw Implant for severe maxillary atrophy: Technical issues and solutions

Maurice Y. Mommaerts

MD, DMD, PhD, FEBOMFS, FICS, FAACS

Objectives

To present the technical issues that we encountered when designing and manufacturing the AMSJI for the atrophic maxilla without terminal dentition, and to discuss the rationale for the proposed solutions.

Material and Methods

Thirty-four maxillary installments in a nearly 4 years timespan have been scrutinized in the design, implantation and prosthetic phases of the treatment. Problems, obstacles and complications have been painstakingly examined and addressed. These have been retrospectively compiled for analysis and presentation.

Results, Discussion & Conclusion

Technical issues were: segmented or not; exposure & peri-implantitis; determination of the proper area for osteosynthesis; one or two screws per wing; a paracrestal or crestal incision; best surface treatment in relationship to keratinized and non-keratinised tissues; number, height and conicity of the connectors; fixation of the provisional denture; freeway space and mandibular rest position; position of the connecting arms, limitations by maxillary sinus pneumatization and implantation using local anesthesia only; stress, strain, fatigue, fracture and disuse atrophy (stress shielding) Solutions were branching, Mimics Medical 21 software, nearly crestal incision, finite element analysis (generic and individual), SLA treatment and polishing, choice of prosthetic solution, no connecting struts under the incision line, reduction of wing size, EVO connection type.



AMSJI: Additively Manufactured Subperiosteal Jaw Implant for severe maxillary atrophy: Clinical issue and early clinical results.

Marco Rinaldi MD DMD

Objectives

The AMSJI could be a valid alternative for implant rehabilitations that require a bone reconstruction or zygomatic implants as in the Cawood-Howell V and VIII classes. We present the clinical and technological principles of AMSJI and the early clinical results. A new approach will also be presented for the use of AMSJI in presence of residual alveolar bone.

Material and Methods

The AMSJI implant is made of two parts fixed in the maxillary bone and joined by the prosthetic structure. Each part is made up of wings, which extend to the zygomatic process of the maxilla and to the sides of the pyriform opening in the middle-facial pillars. For clinical case in which there is still some residual bone, we have developed a protocol for using specific alveolectomy and reshaping guides.

Results, Discussion & Conclusion

We will show some clinical cases, including those where we used alveolectomy and reshaping guides. It is not easy to take conclusions about such a recent procedure, which still lacks of long-term follow-up, but the clinical impressions related to the precision of the components and the perfect bone adaptation of the implant structures have been very positive. All the AMSJI installed are stable and of clinical success.



Continued advances in guided applications: sinus, harvest and zygomatic guides

Scott D Ganz, DMD

Dental implantology has forever been changed with the advent of computed tomography (CT), cone beam computed tomography (CBCT), providing clinicians with the ability to move from 2-D imaging to 3-D imaging. As computing power increased, so did interactive treatment planning software and links to CAD CAM and stereolithography applications which could be used to fabricate static guides for dental implant placement. As defined by Ganz and Rinaldi, 3-D imaging for guided surgery has three different categories; (1) diagnostic-freehand; (2) template-assisted; and (3) full template guidance. These categories applied originally to the placement of dental implants. A combination of enhanced software applications and proliferation of low-cost 3-D printing modalities has provided clinicians with a foundation to develop

improved solutions for surgical guides beyond the conventional dental implant procedure. Based on concepts illustrated by the Rinaldi, Ganz, Mottola textbook, there are now additional methods for fabricating sinus lift guides, harvest guides, and surgical guides for the placement of zygomatic implants. These concepts will be the focus of this presentation, both for static and dynamic navigation.

Aim

To educate clinicians on the use of advanced software applications for the diagnosis, treatment planning, and fabrication of surgical guides for grafting procedures and advanced implant placement.

Objectives

- (1) To demonstrate the importance of 3-D imaging and proper diagnosis
- (2) To demonstrate how to plan for dental implant placement and bone grafting procedures
- (3) To demonstrate the use of 3-D printing for the fabrication of advanced surgical guides

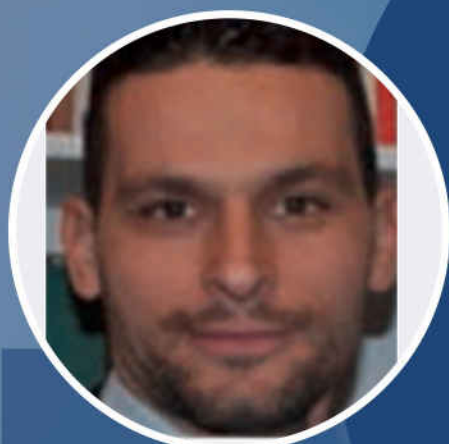


DIGITAL WORKFLOW: Simplification strategies in implant prosthodontics

Salvatore Longoni

The recent knowledge on implant complications leads us to consider further factors in defining long-term success. This report aims to highlight how the correct implant morphology and position, combined with the prosthetic design and materials, lead to a simplification of the whole therapeutic approach. In order to predictably improve aesthetic and functional outcomes of implant-prosthetic rehabilitation, digital planning protocols will be illustrated. Starting from a virtual planning of the implant position, it is possible to predetermine the prosthetic emergence profile. This leads to an improvement of both aesthetics and quality of peri-implant soft tissues. With the aid of CAD-CAM technology we are now able to maintain the morphology of the

restoration during all clinical phases. Special attention will be given to the intraoral luting technique of multilayered monolithic zirconia prosthetic structures. The whole process both benefits the patient and the clinician, leading to a significant reduction of chair times.



Technology to Support the Clinic from Intra-oral Scan to Guided Surgery

Dott. Francesco Zingari Dentist Oral Surgeon

Aim

The advent of the intra-oral scanner and the new guided surgery software have revolutionized the results achieved in dentistry. More specifically in the field of guided surgery, both the new software and the new high-definition CBCT, have made it possible to overcome the difficulties encountered so far.

Objectives

In the field of implant-prosthetic rehabilitations, both simple and complex, the correct positioning of the implant with respect to its prosthetic component is of great importance, both for its function and, of course, for its aesthetic component. To date the correct definition for this type of therapy is that "guided prosthetic surgery", just to indicate how the virtual positioning of the implant monitor, is determined only after having created the correct diagnostic wax, thus giving way to pre-visualize the final prosthetic result.

Results & Conclusion

Associated with guided surgery software, the advent of intra-oral scanners has improved precision levels in detecting pre-surgical and post-surgical impressions in both immediate loading and traditional prosthetics. Prediction in the implant-prosthetic field, a fundamental aspect, improved by these technologies, is important both for the patient, who can actually understand and accept his treatment plan, and for the doctor who can apply the best therapy for the specific clinical case.



Piezo vs Guided Surgery: the Winsix KE Implant System advantages in both

Michele Nannelli (Italy)

In recent years there has been a development of various techniques in implant surgery aimed at minimizing surgical stress and increasing precision such as guided surgery and piezoelectric surgery; but nothing new had been proposed with the real actor of implantology, the titanium implant that very little had evolved in the last 20 years except for minor factors. The KE Winsix implant of Biosafin with this new concept of conical transmucosal collar is at the cutting edge technology and lays the foundations for decreasing the effects of abutment / implant micromovements in order to minimize at the same time a pump effect on bacteria and contextual inflammation and stress oxidative linked to the release of metal ions mainly linked to rubbing during micromotion between abutments implants.



Marco Duvina

Short implants: an alternative treatment option. A 12-year retrospective clinical study

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Key Words

Short implants, Short wide-diameter-implants, alternative to regeneration, crown-root ratio.

The increased use of short dental implants is a consolidated reality in literature today. Aim: to assess literature for conclusions for every day clinical use and to present our clinical results in short implant use. Sixty patients were selected and 96 implants were placed in both maxillary and mandibular bone. Single crowns or part bridges were the planned prostheses. Survival implants and prosthesis results are reported and peri-implants bone resorption was evaluated on periapical digital X-rays. Follow-up from September 2007 to July 2019. Results: implant survival rate at 14 months was about 97% and at 12 years was about 95%. 1 implant failed at 12 months and 4 at 3 years from loading, respectively. From literature indications for short implants are: general or local oral health conditions (considered an obstacle for regenerative therapy), partial failure of regenerative techniques (as vertical ridge augmentation) and rescue therapy for failed standard implants sites. These implants have better outcome in anatomically challenging areas. Rules for successful treatment are increase implant diameter, surface area, number and splinting and avoid cantilever.

Conclusions

Short implants are a simple, easy and quick solution that shortens surgical plan with results similar to conventional therapy.



The digital workflow supporting the biology in immediate loading implant treatment.

Docteur Laurent Sers, DDS, DUI, DUIB, Expert in Oral Implantology DGOI

The contribution of computer science in implantology is a major technological breakthrough in terms of precision, time saving, data storage, guarantees and customization of work. The Immediate loading concept has to take account of several items as aesthetic and function to be done successfully, but the most important point is to be in accordance with the bone and tissue biology. The use of digital planning, guided-surgery, Cad Cam and intra oral scanner are perfectly defined and protocolized with satisfactory results. But this Digital workflow must nevertheless be at the service of implant biology. The digital planning allows an implant positioning in 3D according to the biological rules of osseointegration. That means a perfect distance with surrounding elements: teeth, implant, contact point and thickness bone. More than that it gives information on the bone density value to adapt a correct surgical protocol and implant

design. The digital planning gives the opportunity to plan a correct prosthetic axis placement according to the prosthetic rules of aesthetic and function and anticipates the tissue thickness and level. All these points can be managed for immediate loading implant treatment before the surgery. Then the surgical guide transfer all the planning data safely, accurately and easily. Likewise cadcam process for temporary prosthesis in immediate loading can be done before the surgery according to all the principles of correct emergence profile, perfect prosthetic connexion and biologic space respect. Innovative solutions that integrate into the digital flow allow us to better understand the bone and tissue response of our patients. This aim is to validate an immediate loading implant treatment using the digital flow, which is certainly easy and fast to realize but especially safe in the long term. This presentation describes how to anticipate this biological response during the execution of all the elements of the implant chain from the prosthetic project and the surgical phase to the final prosthesis for a better result in terms of predictability, durability and safety in the management of immediate loading implant treatment from simple to complex cases.



Silvio Mario (DDS, PhD, MS)

One-year results of a prospective study on functional and aesthetic guided implant placement with double template in association with one stage GBR procedure: the computer guided bone regeneration approach.

Silvio Mario (DDS, PhD, MS)

RTDB, Assistant Professor of Periodontology and Implantology,
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Meloni S.M.¹, Tallarico M.², Pisano M.³

Purpose

To evaluate the 1-year after loading results of a new computer guided surgical approach for the prosthetically- and aesthetically-driven implant insertion in horizontal atrophic ridges, using a double template concept

Materials & Methods

This study was designed as a prospective case series. Patients in need to be restored in between upper premolars, having a residual horizontal bone width of less than 6 mm and more than 4 mm, were treated with simultaneously computer guided implant placement using two templates and guided bone regeneration (GBR) with autologous bone, anorganic bovine bone arranged in layers, and protected with a resorbable collagen membrane. Outcome measures were: failures of implants or prosthesis, complications, marginal bone level (MBL) changes, periodontal parameters, and pink aesthetic score (PES).

Results: Twenty-one consecutive patients (mean age of 39.2 years) with Cawood-Howell Class III defects received at least one Computer GBR procedure each, with contemporary placement of 25 conical connection implants. No implants or prostheses failed and two minor complications were observed. Mean marginal bone level at implant placement was 0.15 ± 0.07 mm (95% CI 0.12 to 0.18 mm). At final loading, the mean MBL was 0.62 ± 0.16 mm (95% CI 0.56 to 0.69 mm). One year after loading, the mean MBL was 0.86 ± 0.33 mm (95% CI 0.73 to 0.99 mm). Thus, the mean marginal bone loss experienced after final loading was 0.23 ± 0.26 mm (95% CI 0.13 to 0.34 mm). The mean bleeding on probing (BOP) measured at the definitive prosthesis delivery was 1.32 ± 0.95 (95% CI 0.95 to 1.69). One year after, the mean BOP was 1.12 ± 0.88 (95% CI 0.77 to 1.47). The difference was not statistically significant (0.2 ± 1.04 [95% CI -0.21 to 0.61]; $P=0.346$). The mean probing pocket depth (PPD) measured at the definitive restoration delivery was 2.57 ± 0.51 mm (95% CI 2.37 to 2.77 mm). One year after, the mean PPD was 2.54 ± 0.49 mm (95% CI 2.35 to 2.73 mm). The difference was not statistically significant (0.03 ± 0.32 mm [95% CI -0.10 to 0.15 mm]; $P=0.679$). At the definitive crown delivery, the mean PES was 11.2 ± 1.2 (95% CI 10.3 to 12.1). One year after, the mean PES was 11.4 ± 1.1 (95% CI 11.0 to 11.9). The difference was not statistically significant 0.2 ± 0.7 (95% CI 0.0 to 0.4 mm; $P=0.078$).

Conclusions

With the limitation of the present study, high survival rate and PES seem to validate the use of a double template approach in association with one stage GBR and implant placement in atrophic aesthetic areas. Randomized controlled trials are needed to evaluate this technique.

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Dr. Giuseppe Spinelli

New technologies in Maxillo Facial surgery: update

Spinelli G.¹Conti M.^{1,2}

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Surgery had an important evolution in the last 100 years, surgery has become a safe and reliable tool, not to mention a necessary component of public health. In this digital age, maxillo facial surgeons embraced the revolutionary changes that modern computer technologies have brought to this field. Piezoelectric device allows surgeons to achieve better results compared to a traditional surgical saw, especially in terms of intraoperative blood loss, postoperative swelling and nerve impairment. Management of atrophic mandibular fractures by bone marrow aspirate cells is a safe and useful procedure which has a lower complication rate when compared to standard technique. Endoscopic assistance allows a good positioning control during maxillo facial surgeries.

From computer-aided design/computer-aided manufacturing to surgical navigation to robotic surgery, computer-aided surgery has gradually become an indispensable part of our modern practice - one with greater accuracy, safety and simplicity.

CAD/CAM technology in orthognathic surgery has advantages including digital impressions and models, and use of virtual articulators. Virtual surgical planning and CAD/CAM fabricated surgical splint are proven to facilitate treatment planning and offer an accurate surgical result in orthognathic surgery. CAD-CAM technology in oncologic surgery is a very useful way to obtain the native morphology of the mandible or of the maxilla, especially when both bi-dimensional and tri-dimensional defects occur. The reconstruction protocol presented offers several benefits and few disadvantages. Finally preoperative planning using CAD/CAM allows for safe and precise craniofacial reconstruction in complex pediatric cases with a reduction of operative time.



Split Crest Surgical Technique: a New Paradigm

Tomaso Vercellotti MD, DDS

The presentation begins with the description of the clinical advantages of the Split Crest technique for traditional cylindrical-conical implants. A brief analysis of the State of the Art in literature follows in order to highlight its limitations. A new surgical technique, conceived by the author, is introduced to better take advantage of the different anatomical features which characterize the horizontal dental ridge defect. The goal is to obtain the highest possible peri-implant bone thickness both in the case of multiple edentulism and mono-edentulism. These results are possible thanks to the use of a new modular surgical protocol in which, for each implant site, it is possible to establish the

extent of perforation or expansion to take advantage of the reduced bone volume. The protocol is based on the use of a precise sequence of special piezoelectric inserts in combination with special wedge-shaped bone expanders thoroughly controlled by a magnetic force which allows easy vestibular distraction of the bone flap. The crestal expansion thus obtained is then completed and stabilized by the insertion of new press-fit wedge-shaped implants whose rectangular section is in line with the atrophic edentulous ridge.

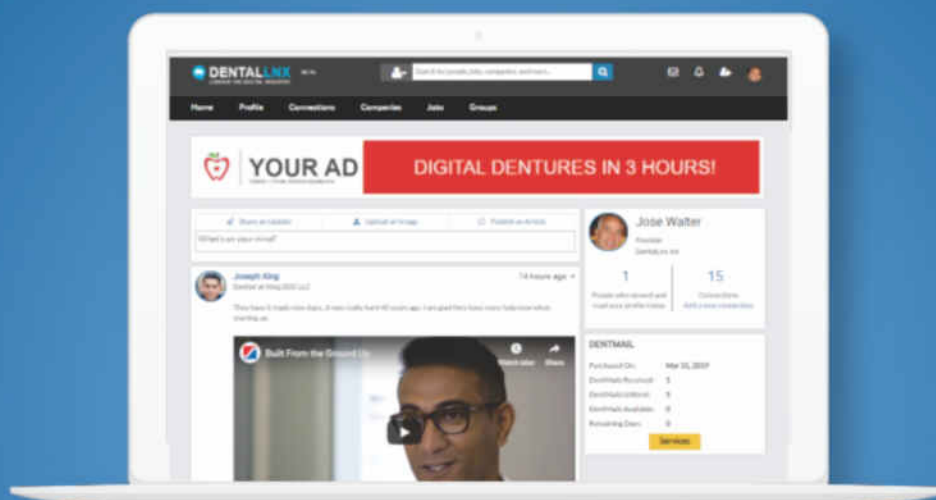
The author wishes this new surgical technique will represent a significant and promising improvement of today's split-crest technique. La presentazione inizia con la descrizione dei vantaggi clinici della Tecnica di Split Crest finalizzata per impianti tradizionali di forma cilindro-conica. Segue una breve analisi dello Stato dell'Arte in letteratura in modo da evidenziarne i limiti. Viene quindi introdotta una nuova tecnica chirurgica, ideata dall'autore, per sfruttare al meglio le diverse caratteristiche anatomiche che caratterizzano il difetto orizzontale di cresta.

L'obiettivo è quello di ottenere il maggior spessore osseo possibile peri-implantare sia in caso di pluri edentulia che di mono-edentulia. Questi risultati sono possibili grazie all'impiego di un nuovo protocollo chirurgico di tipo modulare, in cui, per ciascun sito implantare, è possibile stabilire l'entità della perforazione o dell'espansione per sfruttare al meglio il ridotto volume osseo. Il protocollo si basa sull'utilizzo di una precisa sequenza di appositi inserti piezoelettrici in combinazione con appositi espansori cuneiformi azionati da forza magnetica che permettono una facile distrazione vestibolare del lembo osseo. L'espansione crestale così ottenuta viene quindi completata e stabilizzata dall'inserimento di nuovi impianti press-fit a cuneo la cui sezione rettangolare risulta conforme a quella della cresta edentula atrofica.

L'autore si augura che la nuova tecnica chirurgica possa rappresentare un significativo e promettente miglioramento della tecnica di split Crest sino ad oggi utilizzata.

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Interview of the CAI President **Dr. Widmann** MD, PD, MSc, EBIR



GERLIG WIDMANN
MD, PD, MSc, EBIR

Gerlig Widmann, MD, PD, MSc, EBIR. Studies of Human Medicine (MD, Medical University of Innsbruck), Habilitation in Radiology (PD-Privatdozent, Medical University of Innsbruck), studies of health sciences (MSc, University of Applied Health Sciences Hall in Tirol), board certification in radiology, European Board of Interventional Radiology (EBIR). Head of the section of computed tomography and clinical risk manager of the Department of Radiology, Medical University of Innsbruck, Austria. Chief radiologist Head & Neck Radiology, Thoracic Radiology and Oncology. Board member of the Austrian Roentgen Society, member of the radiology examination council of the Austrian medical chamber, chair of the working group head and neck radiology of the Austrian Roentgen Society and current president of Computer Aided Implantology Academy.

Dr Prashant : How do you perceive digital dentistry growing in the next five years?

Dr. Gerlig Widmann : Digital technology is rapidly growing and currently changing the world of dentistry. Computers and digital devices will not replace but become essential partners of lab technologists and dental clinical experts. They will add to the manual skills and clinical expertise and may help dental care to become faster, cheaper and more predictable.

Dr Prashant : What was the idea behind starting an event like annual CAI event?

Dr. Gerlig Widmann : CAI Academy is proud of being the oldest and most respected scientific institution in computer-aided implantology and related sciences. The first congress started in Rome 2005 and has been continuously repeated as the society's annual highlight, which gathers the top experts in the field presenting and discussing the latest innovations, academic research, and daily clinical experience.

Dr Prashant : As a president of CAI, how was your tenure and can you elaborate on the work done during this period?

Dr. Gerlig Widmann : It has been a great honour and pleasure to take over the presidency of CAI Academy. We continued promoting our commissions per territories around Europe, the USA, Chile, middle East, India and Pakistan with their mission to support members with national trainings, workshops and collaboration. Currently we are planning to establish an international CAI Academy master course on computer-guided implantology and clinical orientated CAI Academy fellowships.

Dr Prashant : How would you like the CAI to contribute towards digital dentistry?

Dr. Gerlig Widmann : CAI Academy with its experts and broad network will further contribute as academic teachers in workshops and congresses, and serve as a clinical partner for introduction of new developments in all fields of digital dentistry.

Dr Prashant : Can you share something about your academic growth in dentistry?

Dr. Gerlig Widmann : My academic career in the field of computer-aided implantology began during my doctoral thesis on a technique to produce CT-guided surgical templates using a navigation system. I was fascinated about the possibilities of image-guided therapy and continued scientific exploration of CT-guided stereotaxy in oral implantology and interventional radiology.

Dr Prashant : What are your future plans?

Dr. Gerlig Widmann : My future plans as president of CAI academy are to continuously stimulate academic research and technological development by bringing together academic institutions with industrial partners, and encouraging multidisciplinary teams of clinicians, lab technologists, computer scientists and engineers working together to improve dental care.

Dr Prashant : What would be your advice to fellow students and colleagues who wish to make big in digital dentistry?

Dr. Gerlig Widmann : It is a great time for the computer and internet generation of fellow students and young colleagues! I would advise them to take their active role in the process of development, scientific evaluation and clinical application of digital dental technologies.

The logo for CBCT Magazine features the acronym 'CBCT' in a large, white, serif font. Below 'CBCT' is the text 'CONE BEAM COMPUTED TOMOGRAPHY' in a smaller, white, sans-serif font. Below that is the word 'Magazine' in a large, white, serif font.

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Utilizing Prosthetically Driven Implant Planning

Robert Pauley Jr. DMD

ROBERT PAULEY JR.
DMD

It's becoming more common to utilize dental implants to restore lost, missing or non-restorable teeth. The patient pool today is becoming more educated in regards to the benefits of dental implants over traditional bridge (where adjacent teeth are prepped) and removable partials and dentures (which can be uncomfortable to wear, make chewing properly difficult and may lack the desired level of aesthetics)¹.

With the growing number of patients becoming more educated on their options, and electing to have dental implants placed, esthetic and hygienic restorations are becoming the expected norm. The ability to develop a "Prosthetic Driven Implant Placement" treatment plan-that is, working from the ideal final prosthetic platform and planning in reverse-allows practitioners to optimize surgical and prosthetic results.

Prosthetic Driven Implant Placement workflows allow the clinician to evaluate the need for hard and or soft tissue augmentation prior to or during the surgical implant placement.² My office's typical digital dental implant workflow the past four years has utilized cone beam computed tomography, full arch intraoral scans and dynamic guided implant placement technology to plan and place patient's implants. The result is confidence that the final implant placement will be ideal, with sound bone and soft tissue concerns addressed to allow for excellent long-term prognosis for implants and prosthetics.

This crown-down approach produced favorable results for a patient who sustained a fractured tooth. In 2013, the female patient presented to my practice with tooth #6 all-ceramic crown in hand. The tooth structure and partial root had fractured in the crown, leaving only the tooth root remaining. We discussed the different options available to the patient:

1. Do nothing
2. Extract tooth #6 and

- a. Restore with a single tooth implant
 - i. Immediately, if the extraction socket for tooth #6 has a 4 walled defect post extraction
 - ii. Bone graft only; develop site and return in 4-6 months for implant placement if socket is deemed not suitable for immediate implant placement
- b. Restore with a 3-unit bridge, which would entail removing the crown on previously endodontically treated tooth # 7 and preparing tooth # 5 to be retainers.
- c. Restore with a removable partial denture.

The patient stated that she did not want a removable appliance, and preferred a single tooth implant retained crown restoration if at all possible. In addition, she also wanted to have tooth #5 prepared for a crown on the extraction date; it has been previously treatment planned.

By incorporating cone beam computed technology and intraoral scanning with X-Nav technologies, we were able to follow a dynamic navigational workflow which gives the following advantages:¹

1. The patient can be scanned, planned and undergo surgery on the same day
2. The plans can be altered during surgery when clinical situations dictate a change from the original plan.
3. The entire field can be visualized at all times
4. Accuracy can be verified at all times.

In this case, we prepared tooth #5 for the crown and extracted tooth #6. By using an intraoral scanner and CBCT system, we were able to plan the case virtually to ensure the ideal final restoration and to enable the use of a guided osteotomy and implant placement workflow. The Carestream Dental 8100 CBCT Scan and CS 3600 Intraoral Scan were exported to the X-Nav Technologies unit and the implant treatment planned. With these pre-extraction scans, the surgeon was able to treatment plan the implant with both bone contours and previous crown contours in mind.

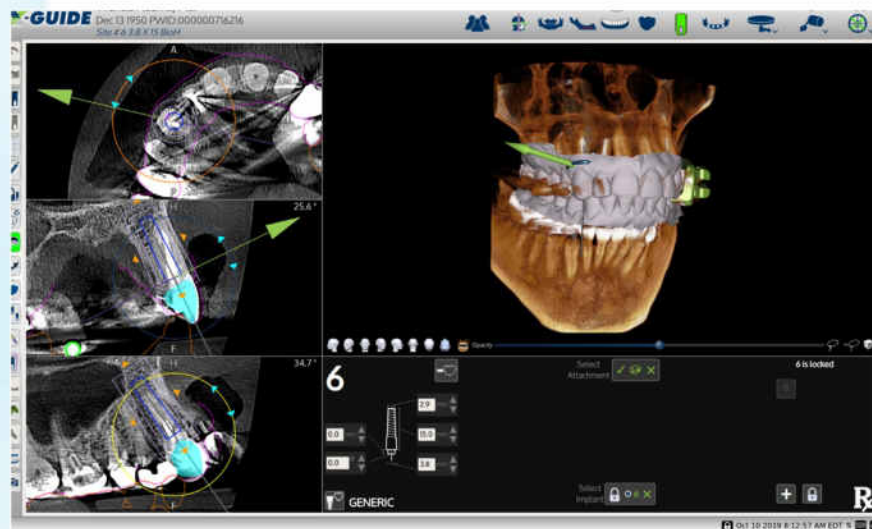


Image 1: Implant Treatment Plan with CBCT and Intraoral Scan Imported



Image 2: A Meisinger Benex Extractor Kit was then utilized to atraumatically remove tooth #6's root.



Image 3: 4 - Walled Socket Post Extraction



Image 4: Dynamic Guided Osteotomy with X Clip in Place



Image 5: Dynamic Guided Implant Placement with X Clip in Place

Upon finding an intact 4 walled socket, the surgeon elected to proceed with the immediate placement of an implant in site # 6.

You will find literature statistics noting that dynamically placed implants are more precise and accurate in every plane.^{3-5, 6,7} Clinicians will also find that the utilization of a dynamically guided navigational system for treatment planning and placement will optimize surgical and prosthetic results while following a more efficient workflow, and avoid the costs associated with static guidance.^{8.}

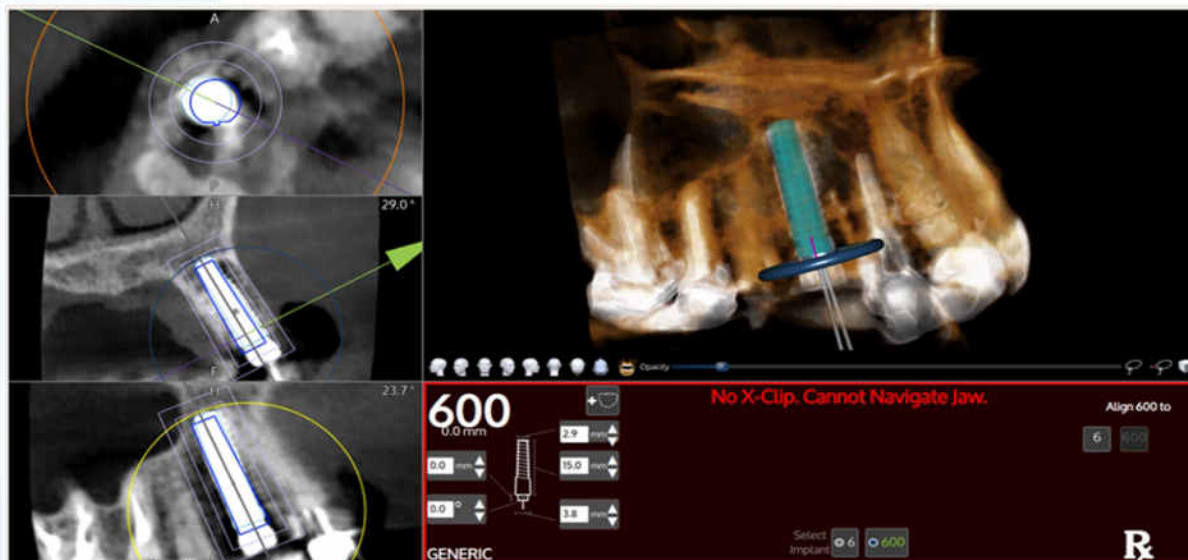


Image 6: Post Op Limited Field With Treatment Plan Overlaying Actual Implant Placement

The utilization of dynamic guided navigation allows me Clinicians to confidently treatment plan and place implants to minimize surgical complications, avoid excessive tissue manipulation) and to have the implant(s) ultimately placed in the position in which it was originally planned. With this technology there is no reason not to utilize its workflow for Every Patient, -Every Implant, - Every Time.



Image 7: Final All Ceramic Crown # 5 & Abutment Retained Implant Crown # 6

1. Emery RW, Gibbs J, Lank K, Merritt S: Accuracy of Dynamic Navigation For Dental Implant Placement - Model-Based Evaluation: Journal of Oral Implantology Vol. XLII/No.Five 2016
2. Brugnamì F, Caleffi C: Prosthodontically Driven Implant Placement. How To Achieve The Appropriate implant Site Development. Keio J Med. Dec 2005;54(4):172-178.
3. Block MS, Emery RW. Static or dynamic Navigation for Implant Placement - choosing the Method of Guidance. J Oral Maxillofacial Surgery 2016; 74 (2):269-277
4. Block MS. Emery RS, Cullum Dr, Sheikh A. Implant Placement Is More Accurate Using Dynamic Navigation. J Oral Maxillofacial Surgery. 2017. Article in Press. [http://www.joms.org/article/S0278-239\(17\)30252-5/fulltext?rss=yes](http://www.joms.org/article/S0278-239(17)30252-5/fulltext?rss=yes). Accessed March 2, 2017
5. Block MS, Emery RW, Lank K, Ryan J. Implant Placement Accuracy Using Dynamic Navigation. Int J Oral Maxillofacial Implants. 2017;32 (1):92-99
6. Vercruyssen M, Cox C, Coucke W. Naert I, Jacobs, R, Quirynen M: A Randomized Clinical Trial Comparing Guided Implant Surgery (bone - or mucosa- supported) With Mental Navigation or The Use Of A Pilot - Drill Template. J Clinical Periodontology. 2014;41 (7):717-723
7. Kramer FJ, Baethge C, Swennen G, Rosahi S: Navigated VS. Conventional Implant Insertion For Maxillary Single Tooth Replacement. Clinical Oral Implants Res. 2005;16(1): 60-68
8. Emery, RW, Progebin, K: The Use Of Dynamic Navigation To Prevent Implant Complications -Every Patient, Every Time. Implant Practice US. April 22, 2017. Volume 10: Number 2.

Guided Implant placement- Requirements for a successful Planning Dr. M. Shiva Shankar

DR. M. SHIVA SHANKAR
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The role of Implant dentistry is to restore the form, function and esthetics of the lost teeth. In the pursuit of this goal, Guided Implant placement has been developed hand-in-hand with computed tomography to improve the accuracy of implant surgery and future prosthodontic treatment thus becoming a boon to the implantologists in a variety of clinical situations which has now been well documented in the literature.

Guided templates greatly assist in the implant surgery, providing prosthodontic considerations before surgery, guiding the drilling procedure and preventing unexpected surgical complications. Guided implant placement is not the standard of care but is rapidly becoming the standard for excellence in terms of safe and precise implant placement

The Use of digital implant planning requires a series of steps, all of which are necessary in order to make a precise plan that will result in a guided template. The resultant template is as accurate as the quality and accuracy of the collected data.

The steps /data required for the Fabrication of a Precise and predictable guided template are

1. CBCT of the patient
2. Impression / Intraoral scan
3. Implant planning software

CBCT

This radiographic technology called cone-beam computed tomography (CBCT) scan, which emits low levels of radiation and captures multiple small "slice" views of the patient's anatomy. The aggregate of those slices, called a dicom file, provides the dentist, surgeon, and dental laboratory with all the necessary information to accurately and appropriately plan the execution of implant placement in the bone in combination with an implant planning software.

Guidelines for a CBCT image for Implant planning are

1. The Field of volume (FOV) should be a minimum of 8cm X 8cm which will cover the single arch (Fig 1). Ideally it should cover both the arches 12cm x 12 cm (Fig 2). Smaller FOV are good for visualization but are not good for fabrication of the guide.



Fig 1. Single arch FOV (8 X 8 cm)



Fig.2 – Both the arches
FOV (12 cm X 12 cm)

2. Stitched Volumes of smaller FOV are best avoided as during stitching errors can occur in the stitching process in the midline region
3. Always it is best to do the scan with the open jaw position with the teeth apart (Fig 3). It is easier for the visualization of the occlusal surface and also for merging of the surface scan (stl) with the dicom data.



Fig.3 Open position

4. It is always advisable to get the scan done without any removable prosthesis in the patient's mouth
5. It is advisable to separate the cheek from the teeth by placing cotton rolls in the sulcus to get better separation of the cheek and the teeth for better visualization
6. The patient should be instructed to touch the tip of the tongue the posterior part of the palate during the mandibular scan and tongue contact the floor of the mouth during the maxillary scan as this will significantly reduce the tongue shadow on the scan.
7. For edentulous cases a dual scan protocol should be followed. Dual scan protocol refers to a protocol wherein 2 scans are made. The first scan is made with the denture with radiographic markers in the patients mouth with a silicon bit to stabilize the denture during the scan process. The next scan is taken of only the denture. The denture is positioned on the bite tab of the machine Fig 4, Fig 5.

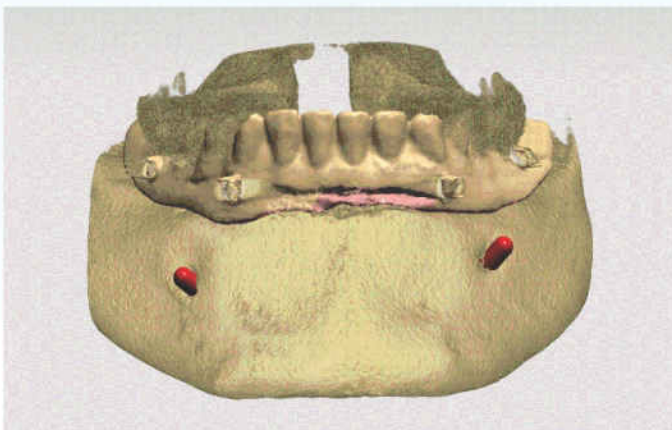


Fig. 4 Scan with denture



Fig. 5 Denture scan

8. The slice thickness of the dicom images should be 0.3 - 0.4 mm in the maxilla and 0.2 mm in the mandible.
9. The dicom images should be saved in a separate folder either multi-slice files or a single slice file. Multi-slice files are preferred.

Intraoral scan /Model Scan

Intra oral scan or the model scan (STL) of the patient's mouth (Fig 6 & 7) is also required as the principle of guided implant placement template the virtual prosthetic position of the implant is determined by the stl and also the template is fabricated on the STL and the implant position is determined by the dicom.

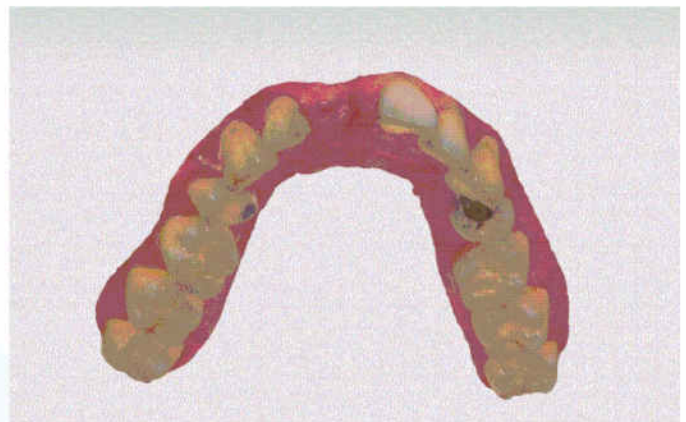


Fig 6 – IOS



Fig 7 –Model scan

There is a growing trend towards intra oral scanners in the dental clinics, still impression taking is still common practice. Accurate impression taking & proper preparation of plaster models is essential to guarantee accurate seating of the surgical guide.

Guidelines for accurate STL data

1. Intra oral scans if available are a best available option to recorded the digital scan of the patient's mouth.
2. When physical impressions are being made it is best to be made with silicone impression material
3. The silicone impressions should faithfully record the teeth and soft tissue without any distortion
4. The impressions should be poured with type iv plaster to reproduce the surface qualities and also be abrasion resistant. The casts should have a proper base as this will help it to be positioned in the scanner properly during the scanning process
5. The casts need to be scanned in a lab scanner and save the stl format. The maxillary and the mandibular casts need to be scanned separately and in occlusion so as to develop the virtual prosthetic position in the software.



Fig 8 –Casts

Guided planning software

There are many Planning software's available. The basic premise of all the software's are allowing the visualization of the 2 sets of data (Dicom & STL), Fig 9 & Fig10 merging them precisely Fig 11, and plan the virtual teeth and the implant placement in relation to the virtual tooth and the surrounding vital anatomic structures. Fig 12, Fig 13

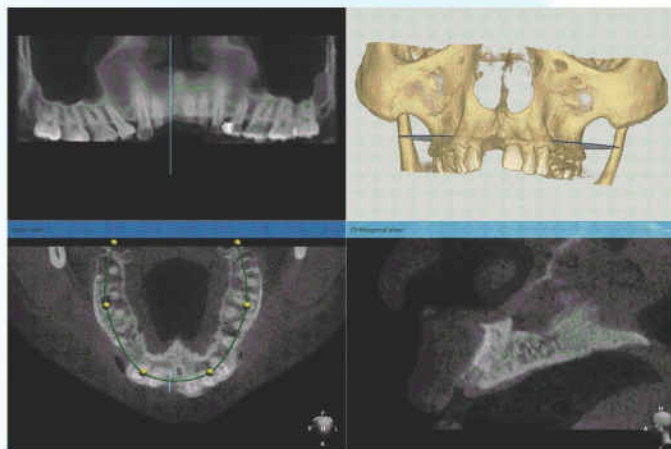


Fig 9 Dicom data set



Fig 10 STL data

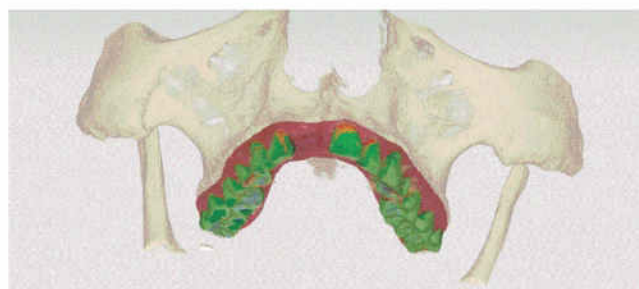


Fig 11 – STL merged with dicom data



Fig 12 Virtual tooth plan



Fig 13 – Prosthetically driven implant planning

For the edentulous arch planning two sets of dicom data will be there and they have to be merged together for the planning to be finalized. One set of dicom data will contain the patients jaw with the denture with the radiographic markers. Another set of data will contain the denture with markers data alone.

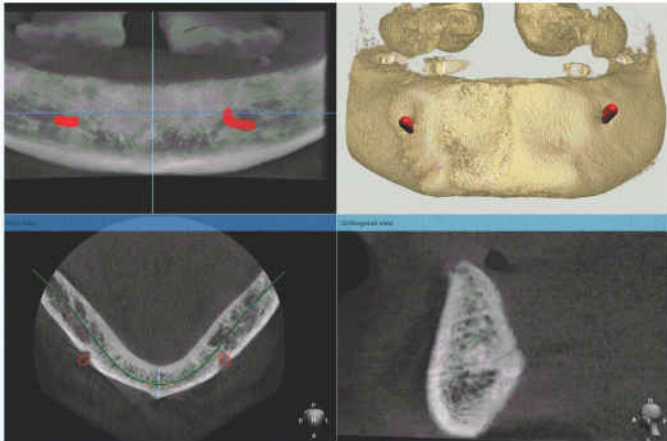


Fig 14 – Edentulous dicom data with markers & Denture



Fig 15 – Denture with the markers

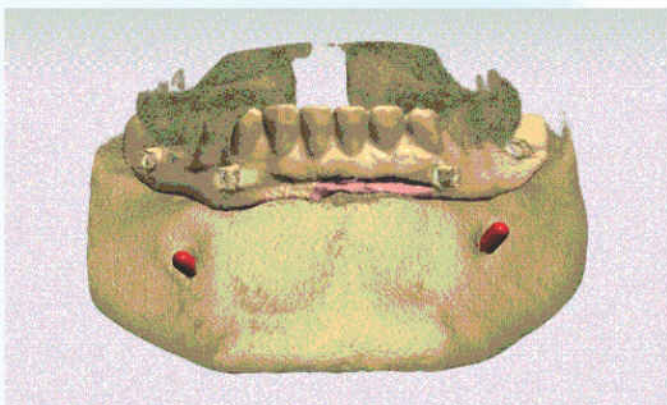


Fig 16 : Merged dicom sets

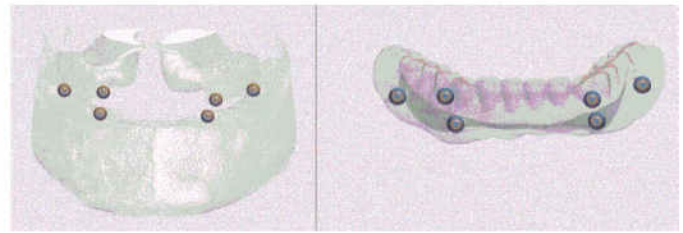


Fig 17 – Matching of Radiographic markers

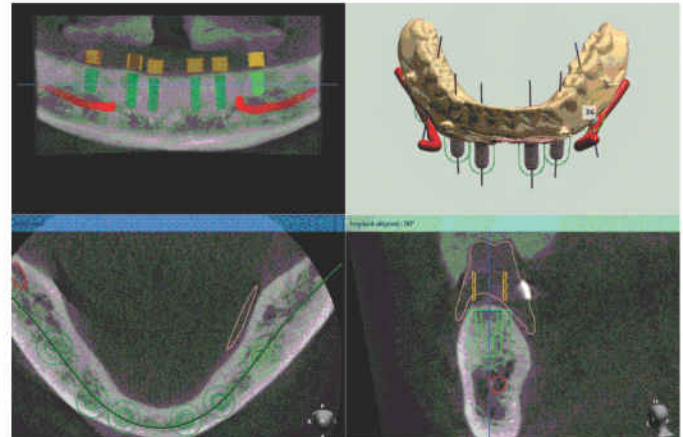


Fig. 18 – Edentulous planning

Conclusion:

Guided implant placement is not the standard of care but is rapidly becoming the standard for excellence in terms of safe and precise implant placement. Digital implant planning and placement is here to stay because it delivers more efficient care with consistently better outcomes. Placing an implant that is "restorable" is no longer a clinician's aspiration. With today's technology, one can hope to do better. Properly executed guided surgery combined with proper treatment planning elevates the level of excellence while increasing efficiency and safety.

Interview with the Basal Implant Mentor **Prof. Stefan Ihde**

PROF STEFAN IHDE

Dr. Stefan Ihde, who received dental education in Germany (1982-1987) and further training as periodontist and oral surgeon. He developed modern strategic implantology. The Simpladent association of dental clinics, an educational system for implantologists and the concept of immediate loading were all formed under his guidance.

Dr Prashant : How was your journey from delayed loading to immediate functional loading implantology

Prof Ihde : I had started to work in delayed loading approximately 1996, and I did this for 1 year. I placed 106 implants, but I was not satisfied. All implants were successful, but: - many patients remained without proper chewing function because I did not find enough bone for teeth from 6 - 6 in both jaws. This was and is my treatment aim. So I didn't actually search for "immediate loading", I searched for a way to help patients with not enough bone. Bone augmentation was not yet invented at that time. From 1997 - 2005 I worked only with lateral basal implants, means with Diskimplants (French) or with BOI-type (Swiss made) of implants. In 2006 we started all using more and more corticobasal implants, actually the Strategic Implant®. This concept allowed me to unfree the number

of cases treated and finally really all patients were able to get implants, independently of the presence of alveolar bone. For me this was the invention of real implantology, everything before was a very crippled type of "screwology". Universities started teaching this screwology (to get third party funding), only very few universities employ capable drs and teachers who can teach real implantology. But the number is increasing.

Dr Prashant : For our readers can you simplify the concept of corticobasal implants

Prof Ihde: The concept includes:

- Usage of the 2nd and/or 3rd cortical
- Immediate splinting
- Implants in strategic positions plus supporting implants
- A well thought out prosthetic concept
- Regular maintenance of the masticatory function

Dr Prashant : What were the challenges you faced in establishing strategic implantology- Academically and socially

Prof Ihde: As we didn't have the money to bribe into Universities, we didn't even try to talk to them.

Today all good publications come from practitioners, they work very well organized. The knowledge in the so called "academic field" is still zero today. That's a pity, because these people consume a lot of the taxpayers money.

Dr Prashant : What is your message to young dentists who wish to pursue career in implantology

Prof Ihde: Those who start late are lucky: they can right away skip 2-stage implantology, and come to the real implantology.

The former German chancellor Helmut Kohl created the Phrase "die Gnade der Späten Geburt". This can be translated as follows: "the grace of late birth". Those who enter the profession today don't have to suffer under old rules and from old/outdated concepts. The concept of the Strategic Implant[®] is the best concept today.

Dr Prashant: Who is your mentor in implantology and can you share any incident which impressed or motivated you. *

Prof Ihde: My mentor was clearly Prof. Dr. Leonard Linkow, who was pushing our profession from 1952 until the day when he deceased in 2017.

Dr Prashant: What do you think will be the future of corticobasal implantology?

Prof Ihde: This technology will dominate the markets, where patients are informed well and independently, e.g. through the internet. In states where democracy and free press is missing, a delay is possible.



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**A Modified surgical protocol using
TTPHIL- ALL TILT® technique for Pterygoid
implants: Clinical and Radiographic
study of 556 implants**

Dr. P. Venkat Ratna Nag

DR. P. VENKAT RATNA NAG
(MDS)

Dr. P. Venkat Ratna Nag is a Professor of Oral and Maxillofacial Prosthodontics and a Fellow and Diplomate for International Congress of Oral Implantologists, USA. He was the Joint Secretary for the third ICOI South Asia symposium in 2014. He received advanced training in maxillary sinus lift procedures and the extra maxillary approach in zygomatic and pterygoid implants, and has held countless workshops including international symposiums in Israel, Russia, Romania, Malaysia, France, Italy, Germany and Spain. His innovative TTPHIL-ALL TILT® technique, developed and researched extensively, has been of great benefit and success, especially to patients who have bone deficiency and those who cannot travel frequently. Dr. P. Venkat Ratna Nag only desire is to make dentistry affordable for everyone and create the smile everyone desires and deserves.

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Purpose:

In this study, 556 pterygoid implants were placed using TTPHIL- ALL TILT® technique in the severe atrophic maxilla. To evaluate the angulation (30 to 45°) and length (18 mm, 20 mm, 22 mm, 25 mm) of pterygoid implants when placed more horizontally over a functional loading period and a follow-up period of 3 years.

Materials and Methods: The retrospective data was composed of patients rehabilitated with pterygoid implants between February 2009 and July 2015. All patients have undergone TTPHIL-ALL TILT® in which Tall Tilted implants were placed, utilizing the bi-cortical engagement placed subcrestally, at the pterygoid region in a flapless manner with immediate loading. In this study, implant length, implant diameter, implant and prosthesis success, and the angulation of the pterygoid implants were measured.

Results: Four hundred and Thirty-four patients (301 men and 133 women) ranging in age from 35 to 80 years were fitted with 556 pterygoid implants and followed up. The 22 mm or 25 mm implant length was the most favored implant to fit in the pterygoid area as implant placement begins from first or second molar and bypasses the vital structures like maxillary sinus and maxillary artery. The mean mesiodistal angulation of the pterygoid implants was 35-degree ± 4.75 degrees. After a mean follow-up period of 3 years, 98.8% of the patients showed implant and prosthesis survival.

Conclusions: The placement of pterygoid implant acts as a better alternative as it bypasses many anatomical structures, avoid unsolicited surgeries and overcome disadvantages of zygomatic implants when placed using TTPHIL- ALL TILT® technique. The outcome of this study is the mesiodistal inclination of the pterygoid implant at 35 degrees relative to the Frankfort plane with implant length of 22 mm or 25 mm exhibits good long-term implant and prosthesis survival.

Keywords

Atrophic maxilla, Tilted implant, Pterygoid implant, bicortical engagement, TTPHIL-ALL TILT®

Introduction

The severe atrophic posterior maxilla is the most common clinical scenario where implant placement can be a challenging task for the dentists.¹ The difficulties that come across during treatment planning of such cases are inadequate residual bone height due to pneumatization of the maxillary sinus and continuous resorption of the alveolar bone crest. Some anatomical factors include low bone quality and poor bone density (type III or IV, according to Lekholm and Zarb classification) of the posterior maxilla can worsen this atrophy and affects the physical accessibility to operate.²⁻⁵

To increase bone quality for the placement of standard implants, maxillary sinus augmentation is considered as a gold standard procedure. Other several techniques have been proposed such as bone grafting, short implants, zygomatic implants for rehabilitation of severe atrophic posterior maxilla.^{6,7} This extensive surgical intervention could be avoided by an alternative method of placing the implant in the pterygoid region. Tulasne and Tessier described the technique for placement of the implant in the pterygoid plate avoiding other extensive surgical and time-consuming procedures.⁸

The TTPHIL - (Tall Tilted Pin Hole Immediate Loading)-ALL TILT® concept has been evolved from various principles in implantology like basal, pterygoid and angulated implants under immediate loading. TTPHIL-ALL TILT® technique utilizes the use of long tilted bicortical implants to maximize the success of maxillary rehabilitation. Tilting of implants is done to avoid the limiting anatomical structures like the maxillary sinus and maxillary artery. The long implants have more bone to implant contact and this helps in osseointegration. The point of entry for the pterygoid implant is first or second molar region using TTPHIL-ALL TILT® 9-11. Considering the point of entry at first molar 22 mm

or 25 mm implant is placed subcrestally, while for second molar 20 mm to 22 mm implant is placed crestally. (Fig 1 & 2)

In the posterior maxilla, pterygoid implants were placed which were intended to pass through⁽¹⁾ the maxillary tuberosity, (2) the pyramidal process of the palatine bone, and (3) the pterygoid process of the sphenoid bone.^{3,12,13}

Bicortical engagement shows a high level of initial primary stability and fewer stresses on the crestal bone and implants. The use of a flapless approach offers the chance of placing implants in less time without tissue trauma and also reduces the postoperative discomfort.^{14,15} TTPHIL implant-prosthetic protocol follows immediate loading with predictable screw-retained solutions, adequate cross arch stabilization via digital CAD-CAM technology.

In the literature, success rates of pterygoid implants for maxillary rehabilitation have been more than 94 to 99%. Many authors describe placement of the pterygoid implant(s) with an inclination of 45 degrees relative to the Frankfort plane.^{12,16,17} (Fig 3)

However, very few studies have discussed implant angulation along with the length of the implant. It has been shown that the angle of the maxillary-ptyergoideal column in the edentulous maxilla is 67.3 degrees $\pm$ 5.0 in an anteroposterior direction relative to the Frankfort plane and also has been shown that the buccopalatal angle is 14.1 degrees $\pm$ 2.1.¹⁸ This bony corridor differs slightly from the 45 degrees described by several authors.^{12, 13, 16} Most studies about pterygoid implants present a mean follow-up period of fewer than 3 years.¹⁹⁻²¹

The purpose of this study was to assess the angulation and length of pterygoid implants more horizontally than the standard (45 degrees) with a follow-up period of 3 years.

Materials and Method

Patient selection : This retrospective study included all patients who had undergone a pterygoid implant between February 2009 and July 2015 (range, 2 months to 6 years). Patient selection criteria included edentulous posterior atrophic maxilla (Fig 4), with less than 8 mm remaining from the sinus floor to the alveolar crest, as measured by orthopantomography, and the presence of an anterior implant or tooth to ensure the mesial support for a partial denture. (Fig 5)

Exclusion criteria for this study were uncontrolled diabetic or patients who underwent bone grafting, restricted mouth opening and patients unable to come for follow up.

Pre operative Orthopantomography and CBCT imaging were carried out on all patients, while for few patients stereo lithography models were made. In CBCT, the point of entry, angulation (Frankfort plane) and length of the implant in relation to the location of the maxillary sinus was planned. Routine blood investigations were done prior to surgery.



Fig 1: Orthopantomography of full mouth rehabilitation patient using TTPHIL-ALL TILT®

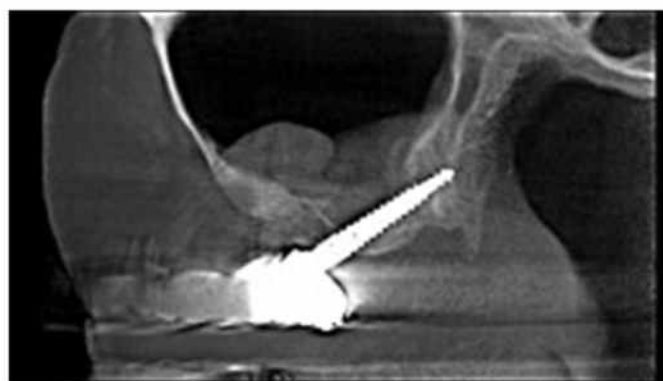
Fig 2: CT scan image of pterygoid implant after 3 years of loading



a. Axial view: the pterygoid implant is located between the posterior wall of the maxillary sinus, the palatine bone, and the pterygoid process of sphenoid



b. Coronal view: the implant body runs parallel to the palatine bone.



c. Sagittal view: the implant body and apex is located between the posterior wall of the maxillary sinus and the pterygoid process of sphenoid



d. Panoramic view: the implant body and apex is located

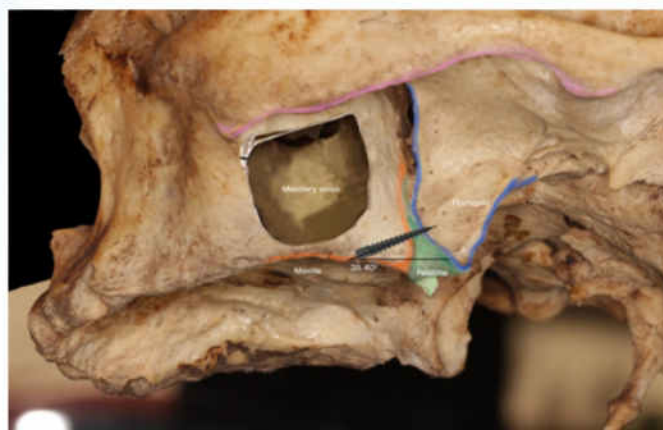


Fig3: Anthropometric representation of pterygoid implant angulation

Surgical protocol : Patient consent was obtained before surgical procedure. Under aseptic precautions local anesthesia (2% lignocaine hydrochloride with adrenaline (1:200000) was given at the planned surgical sites. The implant bed was prepared by drilling with a contraangled handpiece (20:1) to place the implant in a more horizontal position from the crest of the alveolar ridge (between 1st and 2nd molar region).

In this flapless technique, pilot drill of 1.2 mm thick was used over the crest of the ridge between 1st and 2nd molar region and penetrated through the cancellous bone. The drill was directed toward the tuberosity of the pterygoid column until resistance was felt from the high-density bone of the pterygoid region covering the maximum bone with a safe distance of 14.7mm. The mesiodistal angle of the drill was adjusted continuously to fit each patient's anatomy. In this technique, it is extremely important to feel the perforating and gradually going of the drill from crest of the alveolar ridge, soft cancellous bone to hard cortical bone (pterygoid), without a break that might indicate the drill was penetrating the maxillary sinus or nasal cavity.

The preparation continued, using a pterygoid drill of 2.2 mm thickness in the same manner, to increase implant site diameter. Under drilling was used to improve the stability of the implant. Tall tilted Bioline-i-spiral implant (Fig 6) of length (18 mm, 20 mm, 22 mm, 25 mm) and diameter of 3.75 mm and 4.2 mm was placed diagonally and inserted in a superior, posterior and distal direction, towards the pterygoid pillar of sphenoid bone with varying angulations depending on location of tuberosity, maxillary sinus floor and maxillary artery following bicortical engagement. In relation to the sagittal plane, the mesiodistal angulation of the pterygoid implants varied between 25 degrees to 45 degrees. Using a torque wrench primary stability of pterygoid implant was verified and 8° to 40° multiunit abutments of collar length varying between 2 to 3 mm were placed to compensate the implant angulation. Parallelism was obtained on the same day of surgery. Postoperative panoramic radiographs were exposed to confirm the position of the implants.



Fig 4: Intra-oral view showing edentulous maxillary arch



Fig 5: Pre-operative OPG showing severe bone loss and inadequate bone in maxillary sinus region



Fig 6: Clinical photograph showing implant placement

Prosthetic protocol : For the maxillary arch, alginate impression was made and the bite was recorded in centric relation. Immediate provisionalization was done using self-cure acrylic and cemented with provisional cement (IRM). After healing definitive prosthesis was fabricated in metal-ceramic or metal acrylic resin.

In immediate loading patients, final prosthetic rehabilitation started immediately after implant placement. Two-step open tray impressions were made with transfer copings at a multiunit level. Jaw relations recorded. Cobalt chromium framework fabricated using DMLS printing. Framework trial was done on the patient. The secondary bite was taken with bite registration material. Ceramic layering was done. The bisque trial was carried out. Final occlusion adjustment was done and was sent to the lab for glazing. The patient was then rehabilitated with permanent screw-retained metal-ceramic fixed prosthesis (Fig. 7). After prosthesis placement orthopantomogram was exposed (Fig. 8). The patients were advised to adhere to regular oral hygiene maintenance and regular follow up for 3 years.



Fig 7: Final Metal-ceramic prosthesis was given

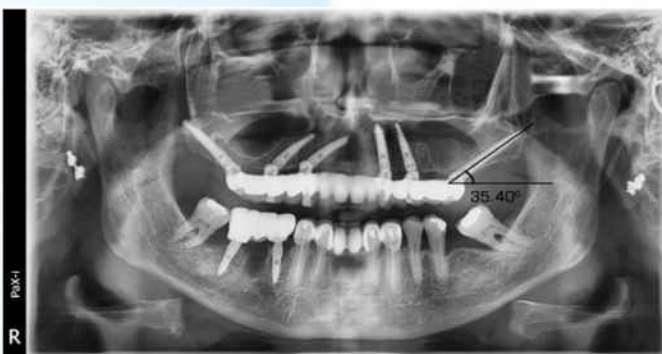


Fig 8: Postoperative OPG of the fixed implant prostheses showing angulation of the pterygoid implant on the left side

The implant length, diameter, implant and prosthesis success, and the angulation of the pterygoid implants were measured. Descriptive statistics were done using SPSS version 12.0 (IBM). Patients were scheduled for annual follow-up for 3 years.

Results

Four hundred and Thirty-four patients (301 men and 133 women) ranging in age from 35 to 80 years. For all implants, the functional loading period between 2 months to 6 years with a mean follow up of 3 years was planned. The 22 mm or 25 mm implant length was the most favoured implant length to fit in the pterygoid region with the point of entry ranging between 1st and 2nd molar region.

In 37 patients (8.5%) the length of the pterygoid implant was 18 mm, 85 patients (19.6%) implant length was 20 mm, 166 patients (38.2%) implant length was 22 mm, while in 146 patients (33.6%) implant length was 25 mm. Implant diameter was 3.75 mm in 231 patients (53.2%) and 4.2 mm diameter in 203 patients (46.8%). No operative and prosthetic complications were encountered in the present study. (Table 1)

In 3 year follow up, implant and prosthesis survival from 434

patients was 98.8%, 5 patients (1.2%) failed. Out of 5 failed pterygoid implants, 4 implants failed due to lack of osseointegration in diabetic patients, 1 implant failed in smoker patient.

The mesiodistal implant angulation relative to Frankfort plane ranged from 30 degree-45 degree. The mean mesiodistal angulation of the pterygoid implants was 35.40 degree $\pm$ 4.75 degrees. (Fig 9)

The opposing prosthesis was 326 metal-ceramic partial fixed prosthesis, 100 metal-ceramic full fixed prosthesis and 8 natural teeth. No significant difference was found in implant length, implant diameter and implant angulation with respect to gender.

Variable	Category	Mean $\pm$ SD / n (%)
Age		57.47 $\pm$ 12.26 Min – 29 Max – 80
Gender	Male	301 (69.4)
	Female	133 (30.6)
Implant Length	18	37 (8.5)
	20	85 (19.6)
	22	166 (38.2)
	25	146 (33.6)
Implant Diameter	3.75	231 (53.2)
	4.2	203 (46.8)
Implant Angulation		35.40 $\pm$ 4.75 Min – 30 Max – 45

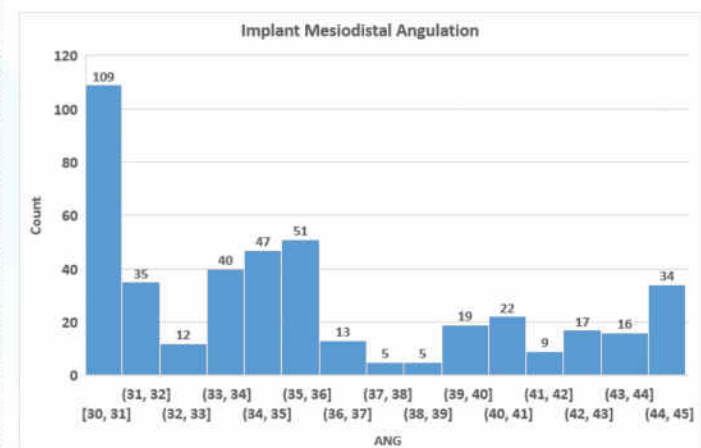


Fig 9: Graphic representation of the implant mesiodistal angulation (ANG) relative to Frankfort plane

Discussion

Pterygoid implants show strong bicortical engagement due to the maxillary tuberosity and pterygoid bone. The mesiodistal angulation of the implant depends on the posterior wall of the maxillary sinus and maxillary tuberosity. The Bucco-palatal angulation of the implant depends on the bone segments involved. Many studies show that pterygoid implants have a high survival rate for the implant, similar marginal bone loss and prosthesis, fewer complications and good acceptance by patients when compared to conventional implants.^{3,22}

Implant angulations and lengths always vary between maxillary tuberosity and the pterygoid bone. For the success of pterygoid implant, case selection is very important considering the pitfalls of the procedure. The pterygoid implants bypass maxillary sinus, avoid sinus lift, grafting procedures, help shorten the treatment time, allow immediate loading and eliminate distal cantilevers.¹²

Pterygoid implant placement is technique sensitive so expertization is required due to the proximity of vital anatomic structures and poor access for clinicians and patients are its shortcomings.⁸

In the literature, Tulasne obtained 97% success, Graves 89%, Raspall and Rodríguez 98%, Balshi et al 88%, Venturelli 97%, Fernández, and Fernández 93%, and Pi 97.2%.^{8,13,19,3,16,20,21} The success rate of the present study with respect to pterygoid survival was (98.8%).

Several authors described this bony corridor inclination which differs from the pterygoid implant inclination (45 degrees).^{12,13,16}

Yamakura et al performed a study on pterygoid implants and found mesiodistal angulation in relation to the Frankfort plane of the edentulous maxilla are 67.3 degrees $\pm$ 5 degrees. Bahat performed a study and noted that the mesial angle of 10 to 20 degrees (i.e 70 to 80 degrees relative to the Frankfort plane) for posterior implants starting from second molars.²³ Rodriguez et al performed a study on 392 patients, with the placement of 454 pterygoid implants showed the mean mesiodistal angulation of the pterygoid implants relative to the Frankfort plane was 70.4-degrees $\pm$ 7.2 degrees.²⁴

In the present study, mean mesiodistal angulation of the pterygoid implants in relation to Frankfort plane was 35.40 degree $\pm$ 4.75 degrees when the point of entry between first and second molar region.

It was observed that 45 degree mesiodistal angulation of an implant reduced its axial load capacity by half when comparing the same implant at 90 degrees. So the axial load on a 20-mm implant angled at 45 degrees would thus be equivalent to that of a 10-mm implant. It was noted by Tulasne, 80% of severe atrophic maxilla retain a bone corridor that is adequate

for implant length 13 to 20 mm.²³ Tulasne recommended the use of pterygoid implants of 13 mm length.⁸

Many authors performed a study considering tall implant of length 18 mm, 20 mm, but there are very few evidence-based studies regarding the length of pterygoid implants and angulation with respect to point of entry between first and second molar region. Balshi et al analyzed 356 pterygoid implants in 186 patients and found very less implant failure when 18 mm long implants were used. The study considered engaging the cortical bone on the pterygoid plate with tall implants enhance primary stability and long term success.³

In the present study, the 22 mm or 25 mm implant length was considered as most convenient and efficient in the pterygoid region with the good implant and prosthesis survival. The use of tall implants of length 18mm-25mm and tilting of implant meant to bypass posterior wall of the maxillary sinus, helps the clinician to achieve good primary stability, reduces stress on crestal bone due to more bone implant contact, avoid vital structures such as maxillary artery and reduces cantileverage. The success rate for pterygoid implants is one of the highest in the maxilla using TTPHIL- ALL TILT® technique.²⁵⁻³³

Apacrio et al performed a study on the combination of tilted and axial implant placement for severely atrophic maxilla and found tilted implant was the effective and good alternative to other intervention procedures.⁹

The present study showed a success rate of 98.8% using TTPHIL-ALL TILT® technique, according to those long-term studies. It was suggested that the rehabilitation in the severely atrophic maxilla using pterygoid implants of length 22, 25mm and angulation 35.4 degree to FH plane present good long term survival.

Conclusion

The TTPHIL- ALL TILT® technique is considered as a reliable, successful and predictable alternative when pterygoid implant of length 22 mm or 25mm is placed at 35 degrees relative to the Frankfort plane in severe atrophic maxilla supported by a fixed prosthesis. This technique has a good success rate for both implant and prosthesis which ensures short treatment period with long term survival.

References

1. Widmark G, Andersson B, Carlsson GE, Lindvall AM, Ivanoff CJ. Rehabilitation of patients with severely resorbed maxillae by means of implants with or without bone grafts: a 3- to 5-year follow-up clinical report. *Int J Oral Maxillofac Implants* 2001;16: 73-9.
2. Balshi, TJ, Lee HY, Hernandez RE. The use of pterygomaxillary implants in the partially edentulous patient: A preliminary report. *Int J Maxillofac Implants* 1995; 10:89-98.

3. Balshi TJ, Wolfinger GJ, Balshi 2nd SF. Analysis of 356 pterygomaxillary implants in edentulous arches for fixed prosthesis anchorage. *Int J Oral Maxillofac Implants* 1999; 14:398-406.
4. Jaffin RA, Berman CL. The excessive loss of Branemark fixtures in type IV bone: a 5-year analysis. *J Periodontol* 1991; 62:2-4.
5. Lee SA, Lee CT, Fu MM, Elmislati W, Chuang SK. Systematic review and meta-analysis of randomized controlled trials for the management of limited vertical height in the posterior region: short implants (5 to 8 mm) vs longer implants (>8 mm) in vertically augmented sites. *Int J Oral Maxillofac Implants* 2014;29:1085-97
6. Procacci P, Lora V, Rossetto A, et al. Success of bone grafts in atrophic posterior edentulous mandible: Literature review. *Minerva Stomatol.* 2014; 62:59-62.
7. De Santis D, Trevisiol L, D'Agostino A, et al. Guided bone regeneration with autogenous block grafts applied to Le Fort I osteotomy for treatment of severely resorbed maxillae: A 4- to 6-year prospective study. *Clin Oral Implants Res.* 2012; 23:60-69.
8. Tulasne JF. Implant treatment of missing posterior dentition. In: Al-brekstson T, Zarb G, editors. *The Branemark osseointegrated implant.* Chicago: Quintessence; 1989. p. 103-15.
9. Aparicio C, Perales P, et al. Tilted implants as an alternative to maxillary sinus grafting: A clinical, radiologic, and periotest study. *Clin Implant Dent Related Res* 2001; 3:39-49.
10. Kim KS, Kim YL, et al. Biomechanical comparison of axial and tilted implants for mandibular full-arch fixed prostheses. *Int J Oral Maxillofac Implants* 2011; 26:976-984.
11. Yvan F, Kenji W, et al. The Fully Edentulous Resorbed Maxilla: Surgical and Restorative Techniques to Avoid Bone Grafting. *Can J Restorative Dent Prosthodontics* 2010; 2:20-25.
12. Bidra AS, Huynh BG. Implants in The Pterygoid Region: A Systematic Review of The Literature. *Int J Oral Maxillofac Surg* 2011; 40:773-781.
13. Graves SL. The Pterygoid Plate Implant: A Solution for Restoring the Posterior Maxilla. *Int J Periodont Rest Dent* 1994;14:513-523
14. Brodala N. Flapless Surgery and Its Effect on Dental Implant Outcomes. *Int J Oral Maxillofac Implants* 2009; 24:118-125.
15. Laverty DP, Buglass J, et al. Flapless Dental Implant Surgery and Use of Cone Beam Computer Tomography Guided Surgery. *Br Dent J* 2018; 224:601-611. DOI: 10.1038/sj.bdj.2018.268
16. Venturelli A. A modified surgical protocol for placing implants in the maxillary tuberosity: Clinical results at 36 months after loading with fixed partial denture. *Int J Oral Maxillofac Implants* 1996; 11:743-749.
17. Haskel Y, Morere PE, Villar WA. Implants in the pterygomaxillary region: An option for maxillary sinus floor elevation [in Spanish]. *Actas Odontológicas* 2008;5:5-13.
18. Yamakura T, Abe S, Tamatsu Y, Rhee S, Hashimoto M, Ide Y. Anatomical study of the maxillary tuberosity in Japanese men. *Bull Tokyo Dent Coll* 1998; 39:287-292.
19. Raspall-Martin G, Rodríguez X. Implantes pterigoideos [in Spanish]. *Revista Colegio Odontól Estomatól* 1998; 3:461-467.
20. Fernández Valerón J, Fernández Velázquez J. Placement of screwtype implants in the pterygomaxillary-pyramidal region: Surgical procedure and preliminary results. *Int J Oral Maxillofac Implants* 1997; 12:814-819.
21. Pi-Urgell J. Implantes en la región pterigomaxilar: Estudio retrospectivo con seguimiento de 1 a 10 años [in Spanish]. *Revista Consejo Odontól Estomatól* 1998; 3:339-348.
22. Candel E, Penarrocha D, Penarrocha M (2012) Rehabilitation of the atrophic posterior maxilla with pterygoid implants: a review. *J Oral Implantol* 38: 461-466.
23. Bahat O. Osseointegrated implants in the maxillary tuberosity: Report on 45 consecutive patients. *Int J Oral Maxillofac Implants* 1992; 7:459-467.
24. Rodríguez X, Méndez V, Vela X, Maribel SM. Modified Surgical Protocol for Placing Implants in the Pterygomaxillary Region: Clinical and Radiologic Study of 454 Implants. *The Int J of Oral & Maxillofac Implants* 2012. 1547-553
25. Nag PVR, Sarika P, Bhagwatkar T, Dhara V. Pterygoid Implant: Option for Rehabilitation of the Atrophic Posterior Maxilla. *Int J Contemp Dent Med Rev* vol.2019, Article ID: 011218, 2019
26. Nag PV, Sarika P, Khan R, Bhagwatkar T. Immediate implantation and loading in just two days with TTPHIL technique using CAD/CAM prosthesis. *Int J Appl Dent Sci* 2018; 4:209-13.
27. Nag V, Sarika P, Addanki P, Bhagwatkar T. Bite reconstruction in aesthetic zone using TTPHIL technique. *Natl J Integr Res Med* 2018; 9:51-2.
28. Nag PV, Sarika P, Khan R, Bhagwatkar T. Tall and tilted pin hole immediately loaded implants (TTPHIL) technique for maxillary arch rehabilitation. *Int J Res Rev* 2018; 5:104-10.
29. P Venkat Ratna Nag. Immediate Implant Placement and Loading with Tall and Tilted Pinhole Immediate Loading (Ttphil) Technique. *Guident Sep* 2017:26-27
30. Nag PVR, Dhara V, et al. Treatment of the Complete Edentulous Atrophic Maxilla: The Tall Tilted Pin Hole Placement Immediate Loading (TTPHIL)-ALL TILT™ Implant Option. *J Contemp Dent Pract* 2019;20(6):754-63.
31. Nag PV, Sarika P, Pavankumar A. TTPHIL-ALL TILTTM concept an innovative technique in immediate functional loading implant placement in maxilla. *Sch J Dent Sci* 2017;4:397-99
32. Venkat Ratna Nag, P. Sarika, Bhagwatkar T, Dhara V. Tilted Implant Placement for Rehabilitation of Severe Atrophic Maxilla Supported by Finite Element Analysis. *The Journal of Implant & Advanced Clinical Dentistry* 2019;11:14-6
33. Ratna Nag PV, Sarika P, Khan R, Bhagwatkar T. TTPHIL-ALL TILT™ - An effective technique for loading of dental implants: A comparative study of stress distribution in maxilla using finite element analysis. *J Dent Implant* 2019;9:4-11

First Tryst With Guided Surgery

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My Experience with Guided Surgery

Dr. Maneesh Rai, BDS, Bhopal, India

I started practicing Dental Implants in Bhopal, a small town in Central India, in 2005. As I was probably the first and only local doctor practicing Dental Implants at that time in my city, I had very little support from peers , dealers etc. After a few years if doing routine implants, I figured out that the support I was looking for more complex cases could come from practicing guided implant surgery. I used the first Implant Guide in 2009 for a case of edentulous maxilla where I placed four tilted implants . Thereafter, I regularly used guided Implant surgeries and the results were outstanding. As I got more educated through experience, I developed a trust for the guides and the lab, owned by a dynamic young dentist in Punjab province. In those days, CBCT was a technology alien to Bhopal, so we used to do normal CT scans of head with specific parameters. The data we got in such scans was huge, and internet speed pathetic, so it had to be sent to the Guide lab on a CD/DVD through courier.

Guided Implant placement changed the way I used to practice dental implants before. The main benefits of using computer-guided surgery is precise and accurate implant placement. It gave me the leverage to go for cases I would not have attempted previously. The results would be more predictable and better. Clinically, it's my belief that this technique can reduce pain and discomfort post-operatively. The ability to visualize vital anatomical structures allowed me to better preserve them during guided surgery. I had the option to use the longest and thickest Implant possible, at the same time being relatively relaxed during the surgery. Precise placement of tilted implants is not possible without the use of an accurate guide. In cases, where vital anatomical structures are present in the area of suggested implant placement, Guided surgery should be the choice. Guides also give excellent results in narrow ridges. As most implants in Guided surgery are placed without raising a flap, it was an added advantage as healing was fast. Things became easier and faster with the arrival of CBCT and improved internet speed. Detailed treatment planning beforehand helped me to reduce or eliminate unforeseen events during surgery. Often the time required for implant surgery can be substantially reduced, which is of great benefit to the patient and to the surgeon. Nevertheless, the surgeon must spend substantial time at the planning stage.

However, I do not go for Guided surgery in every case. Apart from the extra cost of Guide, the thrill and adventure of going for a conventional implant surgery without any guide is at times missing in guided surgery. Sometimes, the patient wants to go for the implants immediately, and if the case permits implant placement without the use of guide, I prefer not to use guides. However, the primary factor which guides me to go for a guided implant surgery or otherwise is the merit of the case and whatever is better for the patient.

In most cases, I realised that the computer-guided surgery can give a valuable opportunity for the patient to become more involved in their treatment plan. They often find it captivating to visualize their virtual treatment plans, making it easier for me to explain possible treatment options and potential risks, all while showing them the predicted outcome. This increased level of patient education can provide greater acceptance of a planned treatment plan.

I think Guided Implant Surgery is a boon for Implantologists, but they should also apply their knowledge, experience and skills during the process. It has a learning curve which should be respected. A relationship of trust and understanding should build between the Surgeon and the person planning and fabricating the guides, be him a technician or a dentist himself. It is a teamwork and must be done that way. Blindly following the designs and the suggestions of the lab may land the surgeon in trouble. After all, he is solely accountable to the patient and only he has examined the case.

To summarise, my take on Guided Implant planning is that it is an excellent technology, if delivered to skilful and safe hands. It depends on the practitioner how well to use it for the benefit of the patient, and for his betterment as well.

Why Guided Surgery

Dr. Siddharth Gupta, BDS , MDS (Prosthodontics), Bhopal, India

The main factors which prompted me to go for guided surgery are as follows:

1. My patient was herself a doctor, so was very concerned about the implant procedure and also wanted to know all the aspect of the surgery herself. Guided surgery helped me to involve her in the planning of the implants and reassuring her that that what ever we were planning on the Cone beam CT will be replicated inside her bones.
2. Guided surgery helped me to guarantee her best results.
3. Guided surgery helped me to do flapless osteotomy with minimum blood loss and almost no post-operative pain and discomfort.
4. Implants in the esthetic zone could be placed in the best esthetic position and could be loaded immediately.

Implant system used was : Osstem

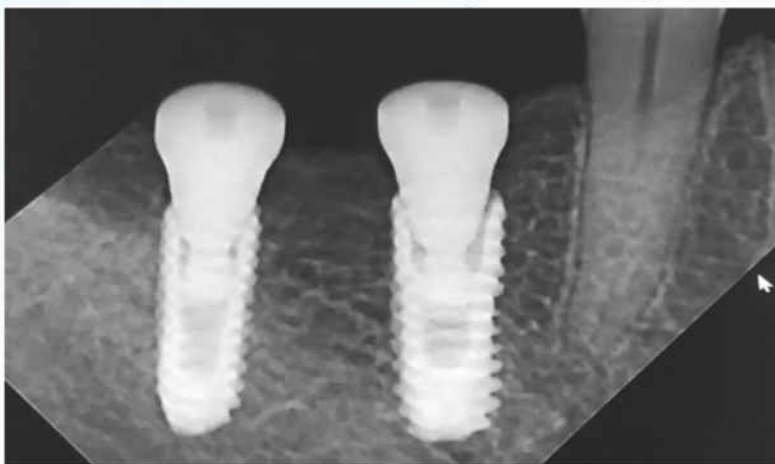
My experience with Guided surgery:

Pros:

1. Easy and accurate
2. Predictable
3. Minimum blood loss and postoperative discomfort
4. No need for stage -2 surgery

Conclusions

1. Stabilization of the guide was tedious
2. Friction was noted between the tissue punch/drills and the metal sleeves during osteotomy
3. Irrigation to the osteotomy site was very less or non-existent.
4. Added cost for the patient and the doctor
5. The extra time needed for the fabrication of the guide and its logistics.



First Hand Experience with Guided Implant Surgery

Prof. Dr. Gaurav Beohar BDS , MDS (Prosthodontics), Bhopal, India

Elderly female patient came to my Clinic Centre for Smile, Bhopal with chief complaint of pain and difficulty in chewing. Upon radiographic examinations it was seen that she had poor oral hygiene along with periodontally compromised teeth and root stumps.

A comprehensive rehabilitation plan was laid which included:

1. Extraction of root stumps, and those teeth which had poor or guarded prognosis.
2. Root canal treatment of those teeth which had deep carious lesions and periapical pathology and also those which were to be used as abutment for fixed prosthesis.
3. DMLS, FPD for was given for Maxillary arch.
4. The Mandibular Arch had to be Rehabilitated through Implant Supported Prosthesis.

For Planning of Implants the Patient was referred for CBCT Radiograph of Mandibular Arch.

CBCT revealed rich vascular bundles in the mandibular symphysis region which would require precision and accuracy in terms of placement and angulation so that the anatomical boundaries were respected. The site selection of the implants also had the mental foramen region which had to be carefully avoided during the surgical phase. Considering all the aforementioned attributed it was decided that a Guided Surgery should be planned so as to achieve a better parallelism and prognosis for Implants. As implants were placed at the planned positions using MIS M guide kit. It was great learning curve for me as a clinician using the guided surgery protocol. There was precision and accuracy in placing the implants. There were few limitations according to me like the implant system and their guided kit should be available so that there is no mismatch of drill and implant size. Secondly in patients with gag reflex, stabilization of the guides may become a problem. Overall a great learning experience for first time placement of implants.



Fig 1: Clinical intra oral photograph

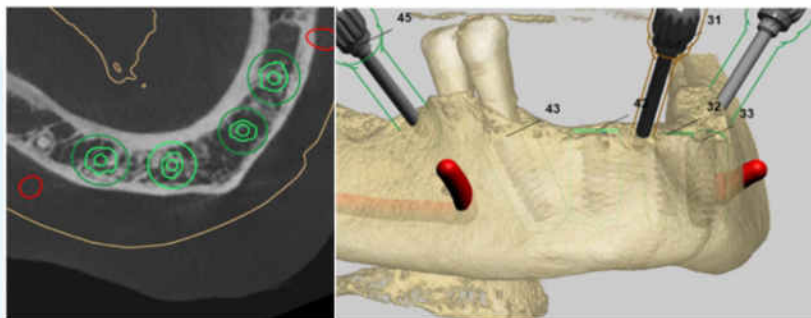


Fig 2: Virtual implant planning



Fig 3: Fabricated surgical guide



Fig 4: Surgical guide placement in the oral cavity



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