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Computer Aided Implantology Academy
CAI

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CBCT

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Contents

From the Editor's Desk

Editor-in-Chief
Dr. Prashant Jaju MDS
Oral Medicine & Radiology (India)

Wishing all my readers of CBCT magazine a very Happy New Year .

2023 had been a enriching experience for CBCT magazine readers and reviewers as it showcases articles of varying range from clinical studies to research on artificial intelligence and digitisation in dentistry. We got a fantastic feedback from all readers and this has given philip to our team of CBCT for providing you all with more scientific information for the year 2024.

Our first issue of CBCT- Official publication of Computer Aided Implantology Academy to be released at AEEDC 2O24 .We are the media partners of AEEDC Dubai every year and we get great opportunities to showcase our work to the dental fraternity at this gigantic event held in Dubai.

Our current issue focusses of the digital world of dentistry which includes digital implant planning, artificial intelligence, interview of the pioneer radiologist from Egypt Dr Ahmed EL Sarafi who is sharing his views about the global radiological trend and the role middle east countries are playing in the digital health space .

Do give your valuable feedback and have a Happy Reading of CBCT magazine.

Editor-in-Chief
Dr. Prashant P. Jaju MDS
Scientific Coordinator-CAI

CAI Academy
President Message

Dear friends, colleagues and CAI Academy members,

I'm deeply honoured to welcome you all on this new issue of our media partner **CBCT Magazine**, announcing the beginning of my two years of Presidency of our prestigious CAI Academy.

I'm proud to say that being elected President of this pioneering institution has been a sign of recognition that I'm truly thankful for.

This year it is the **CAI Academy anniversary: 20 years** of challenges, innovation, spirit of the future with knowledge of the past. Now, in our present, we must dare to invent, to be provocative and never stop researching for new solutions and new adventures in our profession.

Dentistry has radically changed in the past two decades, so much so that we hardly can think of the times in which we used to work in oral surgery without computers or other technological help.

The CAI Academy was founded when some brilliant minds read in advance what was coming, seeing what future was about to bring: a never ending source of tools for a constant development of implantology with updated computers, softwares and evolving devices that allow us to plan, predict, implement and finalise projects once not even imaginable.

After twenty years of evolution and growth, we can certainly state that our path is still long: we are entering the A.I. era, and it will be our ultimate goal to find the strength to embrace the novelty without being overwhelmed by it. Artificial Intelligence must be a plus for those who previously worked without it, not a new boss with no soul and humanity. We should always remember that everything the A.I. knows, it comes from our very real and human Intelligence.

I've seen many of you, my dear colleagues, try new solutions and find new ways to make our profession more and more functional, effective and - last, but not least - aesthetically satisfying and long lasting.

Our founders understood that there was work to be done and new perspectives in the days to come. Now it is our duty, and for sure our purpose, to carry on their vision and build tomorrow step by step, looking for innovation and using everything technology can provide us to improve our performances. But always keeping in mind that the best digital planning, therefore the best computer aided implantology, needs our curious, inquisitive doctors, hard workers as well as visionary thinkers.

CAI Academy was founded when **Computer Aided Implantlogy was static, then it became dynamic.** We are already dealing with robotics and A.I. is entering our world with increasing power, so we have to keep the pace and explore **new frontiers** with an open mind and the strength of our **culture**. Two are the aspects that are revolutionary in our field: the Cad Cam planning of 3D printed prosthesis and the A.I. getting inside the new softwares. Our primary challenge is to stay put and show that our work is still necessary, even more. That **the "human touch" is not replaceable by a machine**, no matter how sophisticated.

Surgery has to walk side by side with technology, not simply follow it on roads we never walked before, but building new, innovative routes, methods, protocols to optimise the results and give our patients the smiles they deserve and dream of.

In the next two years as President, with the help of all the members of the CAI Academy, I will try to find new incentives to encourage our medical excellences to improve their dedication and commitment to our cause, starting from a brand new program of courses, in person and online, post-graduate masters supported by the important universities many of us work in, webinars and clinical symposiums with the protagonists of our field of interests.

The aim of these two-year period will be also to give **new energy to the Academy**, involving the most vivid young minds we can find among our students and residents and bringing them to discover our exclusive, but not omitting Academy. The new generations will bring in ideas, digital attitude, disruptive yet intriguing points of view. In other words, fuel to make our classic car not vintage, but iconic. And gaining speed!

Waiting to meet you all at the upcoming **annual event that will take place in Milan next** Autumn, I warmly invite you to subscribe yourself and select physicians, researchers, dentist, professors, scientists and prominent surgeons who on your opinion shall join our community. Please remember to keep in touch with us, read our newsletters and follow our events.

And don't forget to write or call me if you have material that can be worth discussing inside the CAI Academy.

Thank you very much and the best to you all.

Michele Manacorda
President of CAI Academy

Dr Akash Chakravarthy

Oral & Maxillofacial Surgeon

"On completion of his graduation from Ramachandra University, Chennai, Dr Akash Chakravarthy went on to complete his Post Graduation in Oral & Maxillofacial Surgery in 2017 from Saveetha Dental College and Hospital, Chennai. Dr Akash currently runs a private practice at Hyderabad named, Saritha Implant and Aesthetic Dentistry Pvt Ltd. His key areas of interest include, Full mouth rehabilitation. He has completed trainings with key pioneers in Industry including Dr Paulo Malo, Dr. Gunasheelan, Dr. Komal Mazumdar, Dr. Girish Rao and Dr. Venkat Nag. An active member of the International Congress of Oral Implantologists, Dr. Akash has wide clinical expertise in advanced implant procedures like zygomatic implants, pterygoid implants, sinus grafting and guided bone regeneration. Wanting to create a one stop solution for his patients and meet their prosthetic demands, after being trained in Italy he started The Crown Company in 2019. With 3 national patents under his wing, he is the recipient of the prestigious International Award of Excellence in Dentistry in London for the invention of Reflect, a self-cleansing, anti- fogging mouth mirror. Also a Dental Business Management graduate from London, his holistic business protocols focus on patient welfare and awareness. Being a Key Opinion Leader (KOL) for Sirona, Graphenano Dental Spain and a member of the Board of Advisors for CIPLA (dental division), he is a firm believer in continued dental education. His intent is to set a new benchmark for expert, ethical and affordable dental care that is focused on preventative care. Employment of cutting edge technology puts us at par with the best international practices."

Case Presentation

Introduction:

Dental implants have revolutionized restorative dentistry offering the permanent replacement for missing teeth and can also be a substitute of dentures and restoring confidence of patients with a functional and aesthetic smile. The advances in dental techniques clearly state that we have experienced sensational technological growth. The advancement of CBCT, Oral scans and dental software helped the clinician to rehabilitate implant-prosthetic workflow digitally, rendering the final result. Thus, enabling the patients to receive upswing solutions to traditional problems.1

Full mouth rehabilitations like All-on-four, all-on-five, all-on-six concepts allows maximum use of the available bone, avoiding the other regenerating procedures which increases treatment costs and patient morbidity. Immediate implant loading is well documented for the edentulous patients undergoing full mouth rehabilitations.2 But we have put forward the Rapid temporization with digital workflow allowing the outcome in a highly predictable manner and improving the efficiency in both time and cost. The purpose of this article is to rehabilitate edentulous mandible with guided all-on-five implant concept providing rapid temporization of prosthesis at the time of surgery.

Material & Methods:

A patient aged 72 years presented with a chronic generalised periodontitis. Medical history reveals patient is known hypertensive and under medications. After clinical and radiological examination, patient advised with full mouth extractions and rehabilitation with All-on-five implants for which written consent obtained.

Workflow:

Clinical workflow - Full mouth extractions done followed by fabrication of complete denture done. Radiological data (CBCT) obtained. Double denture scan done.

Digital workflow - Implant planning and guide designing was done on Real guide software. The data is then exported to Exocad software, where designing of the prosthesis was done. Then the prosthesis designed in Exocad was imported in RealGUIDE for the further assembly of connectors and attachments to the base guide. The base guide (stack unit 1) was used for stacking the implant guide (stack unit 2). The base guide and implant guide was then tridimentionally (3D) printed for surgical purpose.

Surgical and Prosthetic workflow - Under Local anaesthesia and IV conscious sedation base guide was placed followed by stackable implant guide. Flapless guided implant placement done, followed by multi-unit level abutments placed rendering to the plan. Temporary cylinders were placed and pick up of 3D printed temporary prothesis was done using acrytemp material. Then the pick-up denture was sent to the lab for finishing and polishing followed by rapid temporization of denture.

FIGURE-1&2 PRE-OPERATIVE

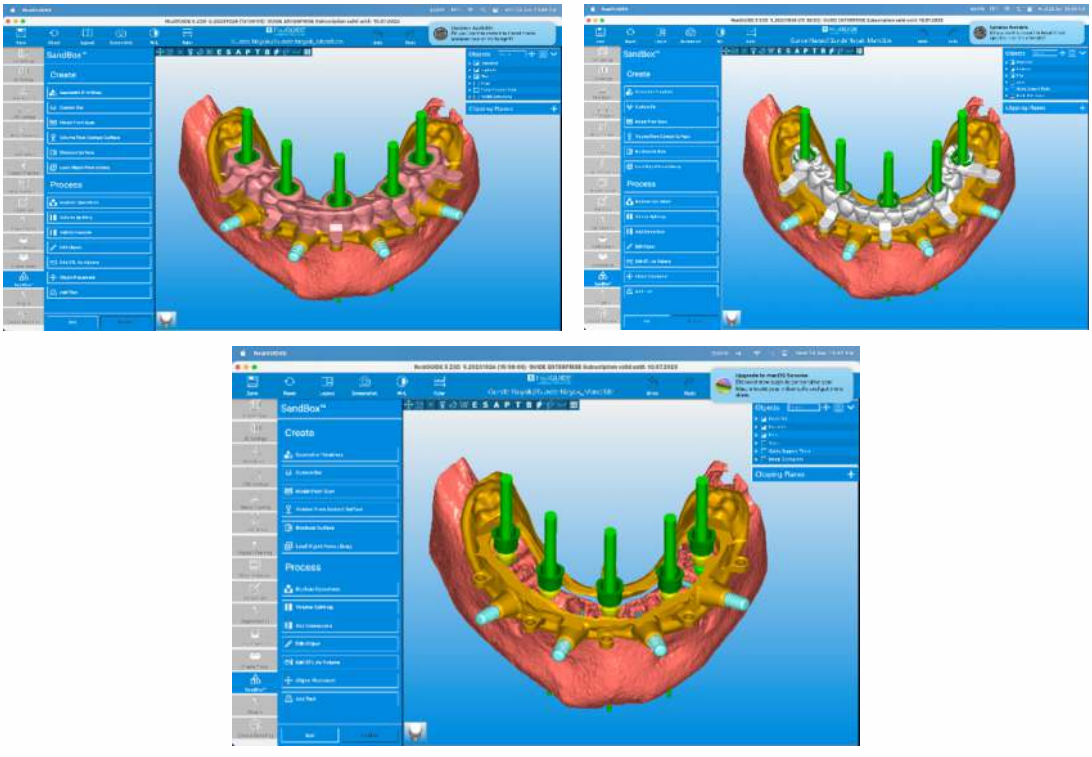


FIGURE-3,4 & 5 PRE- OPERATIVE PLANNING IN REAL-GUIDE SOFTWARE

FIGURE-6 BASE GUIDE & IMPLANT GUIDE SECURED

FIGURE-7 OSTEOTOMY SITE PREPARATION

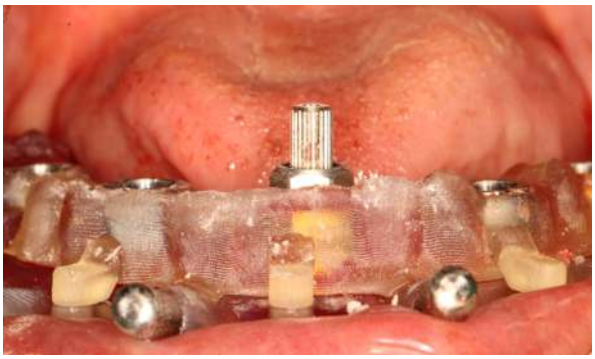


FIGURE-8 IMPLANT PLACEMENT

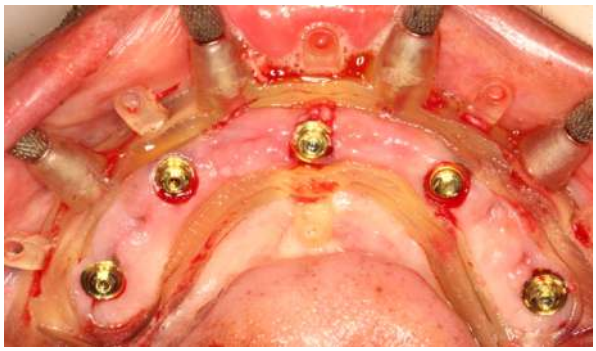


FIGURE-9 IMPLANTS &
MULTI-UNIT LEVEL ABUTMENTS PLACED

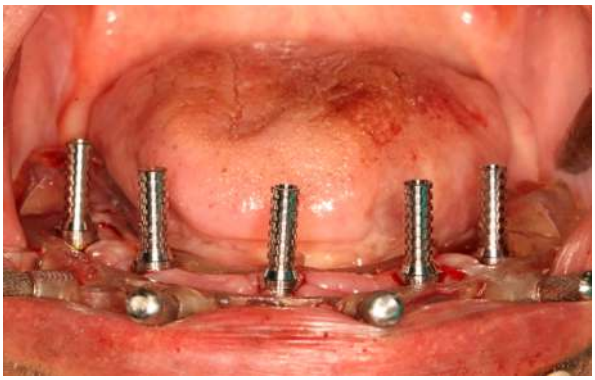


FIGURE-10 TEMPORARY CYLINDERS PLACED

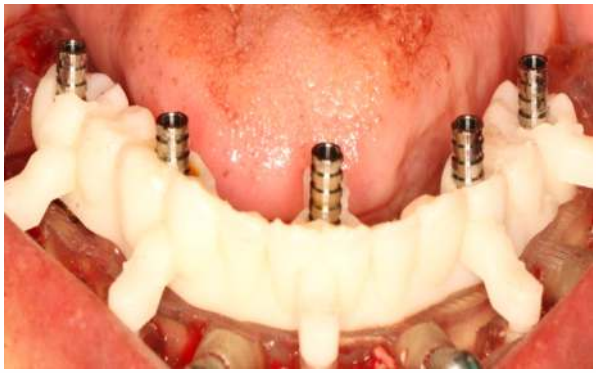
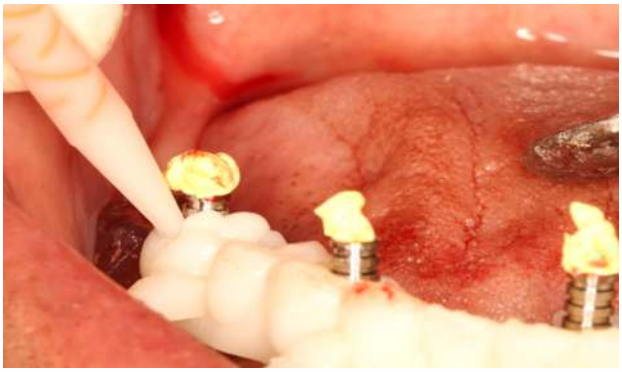


FIGURE-11 3D PRINTED DENTURE
STACKED TO THE BASE GUIDE



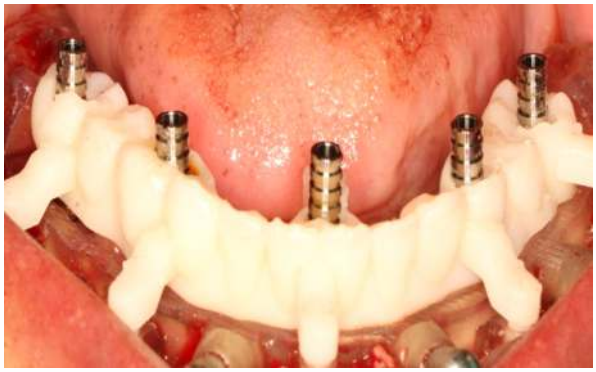


FIGURE-12 & 13 DENTURE PICK-UP

FIGURE-14 PICK-UP DONE

FIGURE-15 DENTURE INSERTION DONE

FIGURE-16 POST-OPERATIVE OPG

Conclusion:

Full mouth rehabilitation with flapless guided implants and rapid temporization of prosthesis is faster treatment modality for both clinician and patient. The digital technology concedes us not only to plan implants but also provide temporary prosthesis rapidly. This is to be followed by intermediate temporary prosthesis which should be given within 1-2 weeks' time period. The treatment planning and execution was visualized in prior which is precise and reliable in the clinical practice. Concluding that the treatment option attempted in the article fulfilled the demands of the patient.

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Prof. Ahmed ElSerafi

MSC, PhD, MD

Professor of Radiology, Suez Canal University, Ismailia, Egypt. Visiting Professor Sharjah University and Gulf Medical University. Keen interest in Cross sectional and Dental Imaging and Imaging IT. CEO International Radiology Center, UAE. CEO Meridian Healthcare, UAE. Secretary General Emirates Osteoporosis Society, UAE. Director for Computer Aided Implantology, Egypt. Author of AI Chapter in Healthcare in UAE book "Springer 2023.

Interview

Q. CBCT : Your views on the role of diagnostic radiology in diagnosis and treatment planning in healthcare.

Prof. Ahmed : Role of Diagnostic Radiology in Healthcare:

Diagnostic radiology has become indispensable in healthcare for accurate diagnosis and effective treatment planning. It allows for non-invasive visualization of internal structures, aiding in early detection and management of diseases. Advancements in this field have enhanced precision in treatment, reduced risks, and improved patient outcomes.

Q. CBCT: Can you share your experience of ever changing radiology and radiological tools in the last decade?

Prof. Ahmed : Experience with Changing Radiology and Tools:

Over the last decade, radiology has undergone significant transformations, mainly driven by technological advancements. Digital imaging, improved resolution, faster processing times, and the integration of IT systems and AI applications have revolutionized diagnostic procedures. My experience has been marked by adapting to these changes, which have enabled more precise diagnoses and efficient workflow.

Q. CBCT: What is your opinion of role of Artificial Intelligence in radiological diagnosis and its shortcomings?

Prof. Ahmed : Opinion on AI in Radiological Diagnosis:

AI in radiology holds great promise for enhancing diagnostic accuracy, reducing human error, and improving workflow efficiency. However, its shortcomings include potential biases in AI algorithms and the need for large, diverse datasets for training. There's also the challenge of integrating AI seamlessly into existing healthcare systems.

Q. Will AI replace radiologists ? What is your view?

Prof. Ahmed : Will AI Replace Radiologists?:

AI is unlikely to replace radiologists but rather augment their capabilities. Radiologists bring critical contextual understanding, clinical knowledge, and the ability to navigate complex ethical considerations, which AI currently cannot replicate. The future likely lies in a collaborative approach, with AI serving as a powerful tool to assist radiologists.

Q. CBCT : As a owner of one of the oldest and largest multi radiological centres in Middle East and Meridian Health care , what services and products do you cater to the medical and dental doctors.

Prof. Ahmed : Services and Products at Meridian Health Care:

As a leading multi-radiological center, we offer a wide range of services including MRI, CT scans, Ultrasound, X-rays, and specialized dental imaging like CBCT. Our focus is on providing accurate diagnostics with state-of-the-art equipment and applications including deployment of AI at scale, and we constantly update our technology to stay at the forefront of medical and dental radiology.

Q. CBCT : What is your advise to young radiologists ,how should they pursue their careers and is it demanding branch workwise .

Prof. Ahmed : Advice to Young Radiologists:

For young radiologists, I recommend focusing on continuous learning and adaptation. Radiology is a rapidly evolving field; staying updated with the latest technologies and research is crucial. It's also important to develop skills in patient communication and interdisciplinary collaboration. While the field is demanding, it is also immensely rewarding and pivotal in patient care.

Q. CBCT : CBCT machines are premier equipments in dental radiological centres. What is your experience of using such machines and how will you compare with CT machines .

Prof. Ahmed : Experience with CBCT Machines vs. CT Machines:

CBCT (Cone Beam Computed Tomography) machines have been a game-changer in dental radiology. They provide high-resolution 3 D images with lower radiation doses compared to conventional CT machines, making them ideal for detailed dental structures analysis. My experience with CBCT has been extremely positive, especially in implantology, surgical planning and orthodontics, where precision is key.

REAL TIME DYNAMIC NAVIGATION IMPLANT PLACEMENT FOR A CHALLENGING ANTERIOR AESTHETIC CASE

Sanjay Jain
BDS, MDS, MLD (Vienna)

Dr Priyesha Rathod
& **Dr Disha Chordia**

Sanjay Jain
BDS, MDS, MLD (Vienna)

Dr Sanjay Jain is private practioner in Pune,India . He is India's first master trainer for real time dynamic surgical navigation for implants . He is faculty of biohorizon implant programme in India and faculty for society of oral laser applications . He frequently conducts various laser and implant courses across India. He has numerous national and international publications to his credit. He was invited speaker at various International conferences at China, UAE,Sri Lanka and Malaysia.

Abstract

This case report describes the challenges faced due to the poor prognosis of a fractured and infected left maxillary central incisor tooth with a buccal plate fenestration. Allograft along with a collagen membrane was placed followed by temporization with splinting for the next 9 months. After the waiting period a dental implant was placed using real time dynamic navigation along with a temporary single tooth fiber reinforced splinting. Impressions were recorded after 6 months and final screw retained prosthesis was delivered to the patient. The patient exhibited no clinical or radiologic complications through 2 years of clinical monitoring. The dental implant provides the patient with comfort, esthetics and function.

Introduction

The use of real time dynamic navigation in such a challenging case proves beyond doubt that inclusion of technology for the betterment of our patients is the way ahead in digital age.

Case Report

A 36-year-old female patient presented with a history of trauma and crown fracture along with a periapical inflammation (Fig.1) and requested for an immediate solution. Clinical evaluation was completed along with sinus tracing (Fig. 2) which reconfirmed the source of infection (Fig. 3).

Keywords

Implant, Real time dynamic navigation, Tissue regeneration, Aesthetic, Osseointegration.

Fig.1

Fig.2

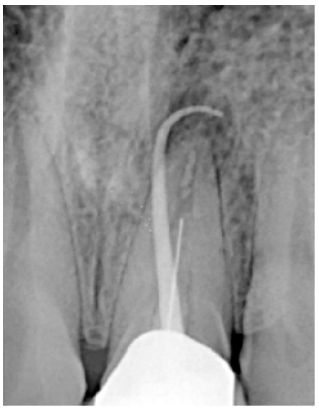


Fig.3

Radiological evaluation with CBCT (Fig. 4) confirmed loss of buccal plate (Fig. 5), periapical radiolucency (Fig. 6) and a vertical fracture (Fig. 7). Alginate impression was recorded for temporization.

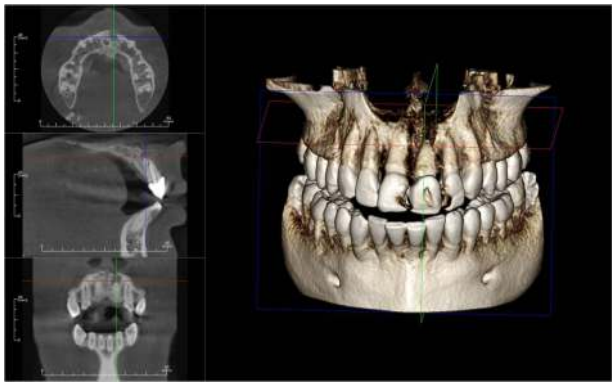


Fig.4

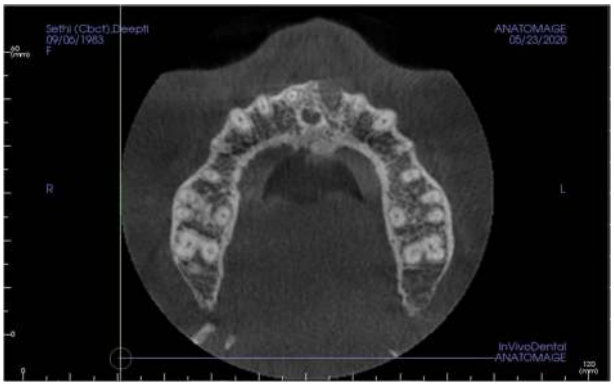


Fig.5

Fig.6

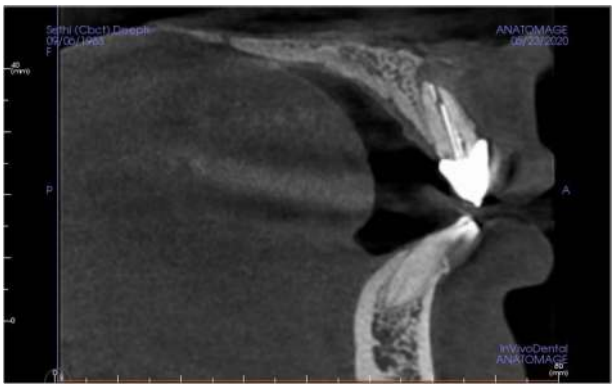


Fig.7

Alginate impression was recorded for temporization. According to the treatment plan; the tooth was extracted (Fig. 8) under local anesthesia using lignocaine with adrenaline and flap was raised to acknowledge the buccal plate defect (Fig. 9).

Fig.8

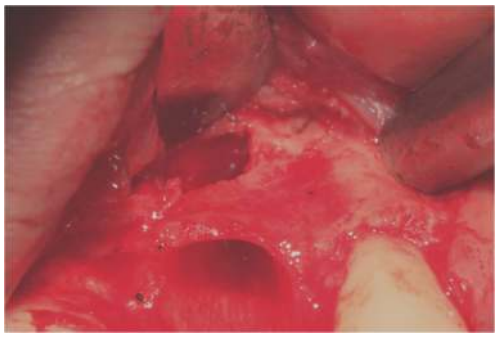


Fig.9

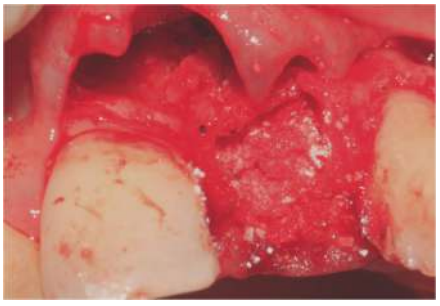


Fig.10

Fig.11

The sockets were debrided with curettes and irrigated with betadine solution. Socket grafting was done using Rocky Mountain bone graft Fig. 10) and OSSIX resorbable collagen membrane was tacked (Fig. 11) for guided bone and tissue regeneration (GBR and GTR).

Resorbable silk sutures (Fig. 12) were placed after which dexamethasone was locally injected and five days course of antibiotics and analgesics were prescribed. Healing was satisfactory on 8th day of follow-up. Temporary crown (Fig. 13) as per previous recorded impression was splinted at the site. Regular follow up was done.

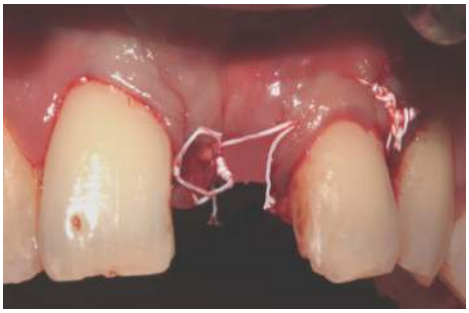
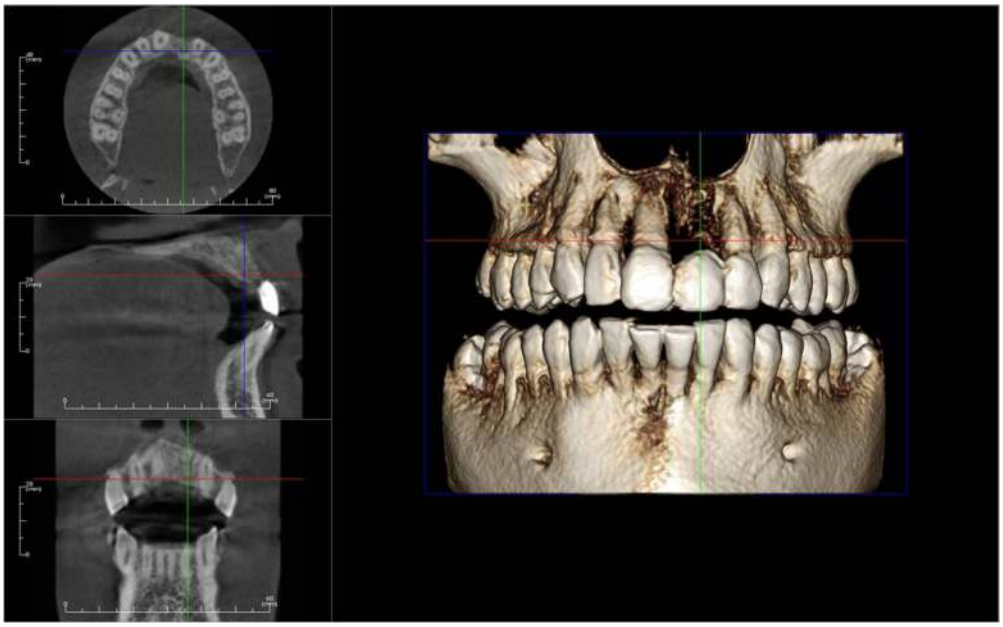


Fig.12

Fig.13



After 9 months, the CBCT scan (Fig. 14) depicted successful socket grafting (Fig. 15) and buccal plate regeneration (Fig. 16, 17).

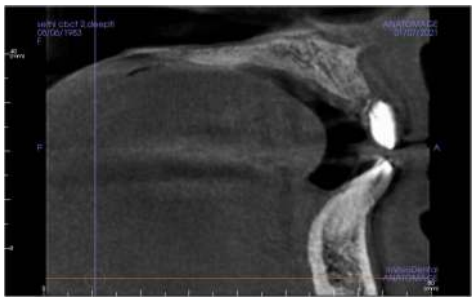


Fig.15

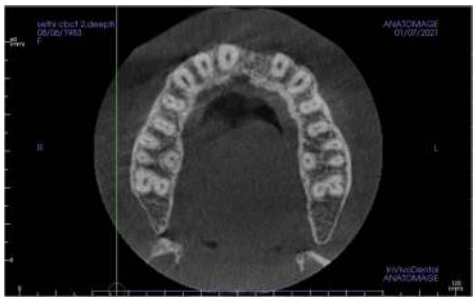


Fig.16

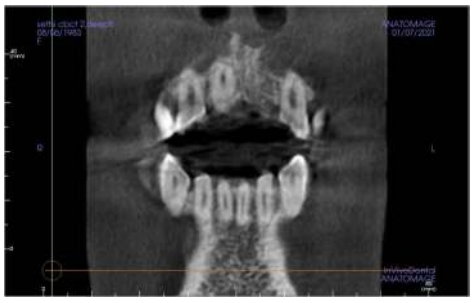


Fig.17

Fig.18

Fig.19

Straumann implant of 3.3 x 10mm dimension was planned in the Navident software. On the day of implant surgery, temporary was removed (Fig.18) and flap was raised (Fig.19) for regenerative purpose.

Osseodensification was performed with densah burs (Fig. 20, 21) and implant was placed under Real time dynamic navigation system (Fig. 22, 23, 24).

Fig.20

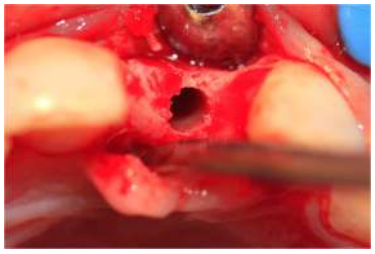


Fig.21

Fig.22

Fig.23

Fig.24

Image guided insertion of dental implant allowed more precision than manual insertion (Fig. 25, 26).

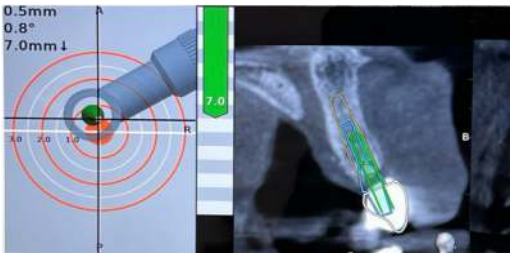


Fig.25

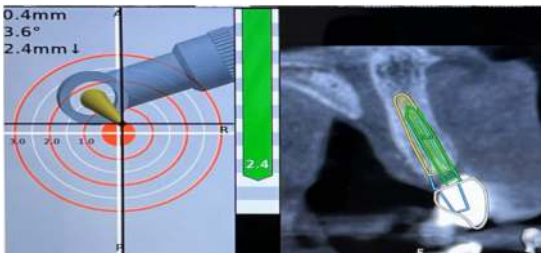


Fig.26

Fig.27

Fig.28

Fig.29

Collagen membrane was buccally adapted and sutures were given (Fig.27). Temporary crown was again splinted. The patient was recalled after 6 months for the prosthetic procedures (PICTURE 28, 29).

A screw retained PFM crown (Fig. 30) was planned and STL file was shared with the lab for the same. The patient was recalled for prophylaxis and follow up.

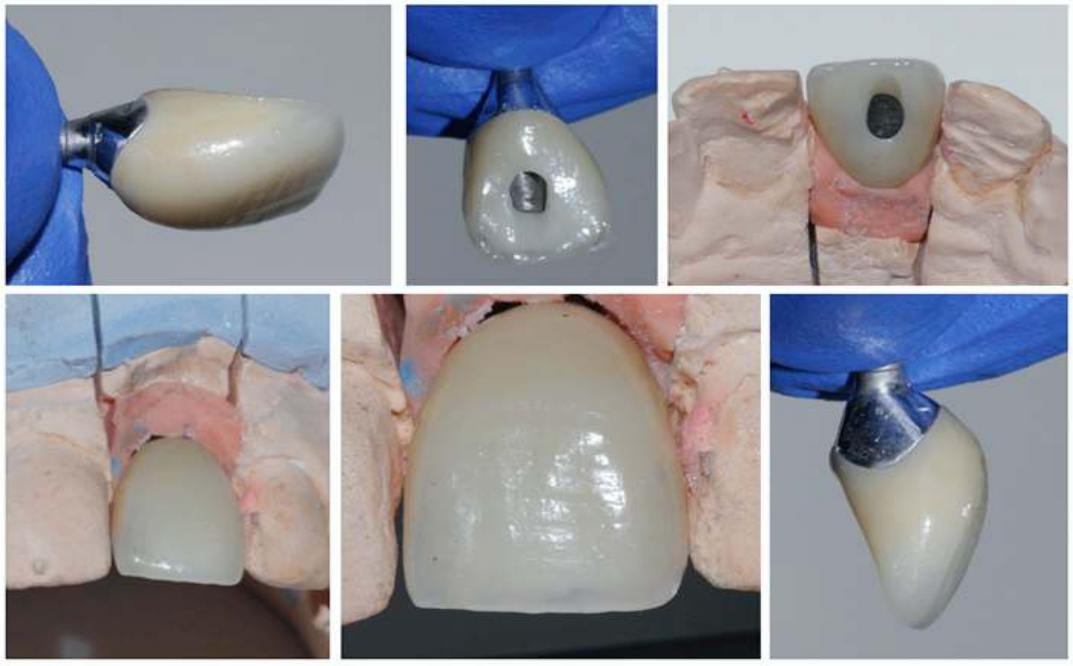


Fig.30

The clinical and radiographic appearances at 2 years show good esthetics, osseointegration and maintenance of bone around the implant. (Fig. 31- 37)

Fig.31

Fig.32

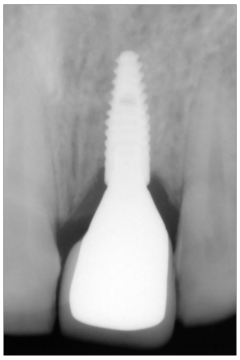


Fig.33

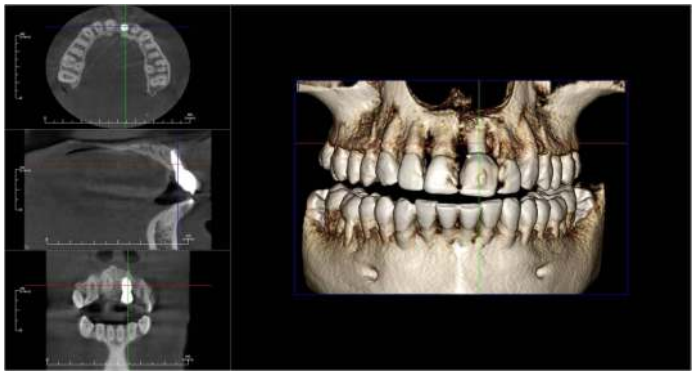


Fig.34

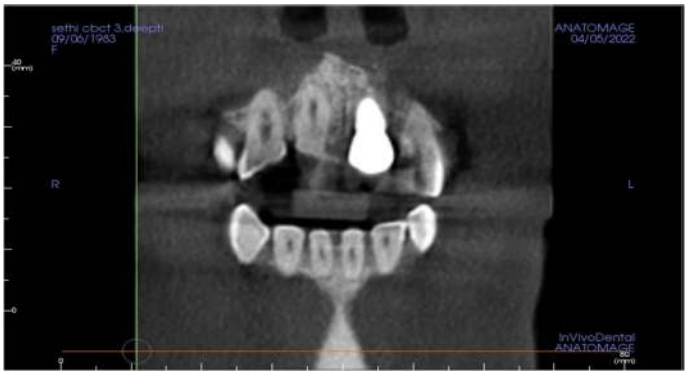


Fig.35

Fig.36

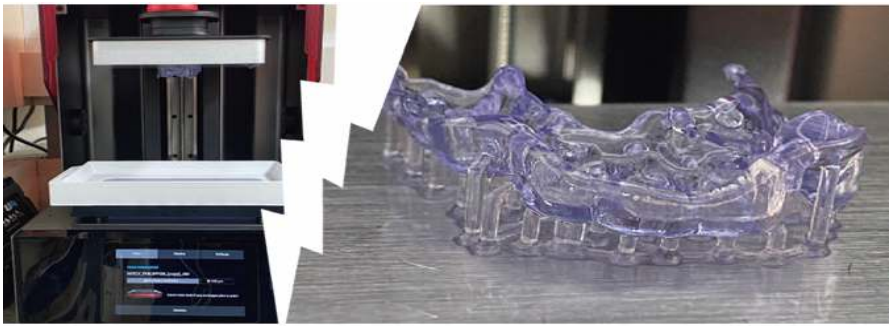
Fig.37

STATIC SURGICALGUIDES VERSUS DYNAMIC NAVIGATION: COMPLEMENTARY OR EXCLUSIVE TECHNIQUES?

Jacques Vermeulen DDS

Jacques Vermeulen DDS

Born in Nice south France, he did his study in the school of Dental Medicine of Nice-Sophia Antipolis.,Was graduate in 1979.,He open his own office in 1980 in the village of Flumet near Megeve and Chamonix.,He take in charge as Director of Post-graduate European Institute of the well-known Tufts University Boston Massachuset USA, this Institute is situated in Talloires on the shores of the lake d'Annecy. Post- Graduate of Tufts University in prosthodontic.,Post-Graduate in implantology Nice University France.,Post graduate in Emergency dental and pharmacology Lyon University France.,Post-graduate in Basal Implantology Nice University France.,Post-graduate in facial anatomy Marseille University France. Competence in Implantology from French Association of Implantology Mentor for Materialise Dental and Anthogyr Institutes.,He wrote many paper on: occlusion, guided implantology, aesthetic, clinical organization, clinical case.,He published 2 books on Dental office daily organization. CDP Edition. 2012 & 2017.



Technical Characteristics

Static Surgical Guides

Introduced over 25 years ago, static guides were the first type to be used with dedicated protocols. They are classified as tooth-supported, mucosa-supported, or bone-supported. Materialise, Nobel Biocare, and Sicat were the major firms behind the development and democratization of these guides. Materialise and Sicat have since merged to become Dentsply-Simplant.

Static surgical sleeve guides were initially proposed solely by these companies that had the necessary manufacturing know-how. Hundreds of studies and publications have confirmed their unquestionable quality in terms of accuracy compared to freehand implant placement. The author himself published an article in 2017 in the JOMI entitled "The accuracy of implant placement by experienced surgeons: guides versus freehand approach in a simulated plastic model".

Despite the accuracy of these guides, novices should invest in specialized training courses and/or university programs in order to progress along a successful learning curve to first become proficient with freehand implant placement.

Widespread utilization of static guides was unquestionably correlated with the democratization of in-office 3D technology. Implant planning software first became available either as so-called "free" versions or as part of the control software supplied for 3D devices.

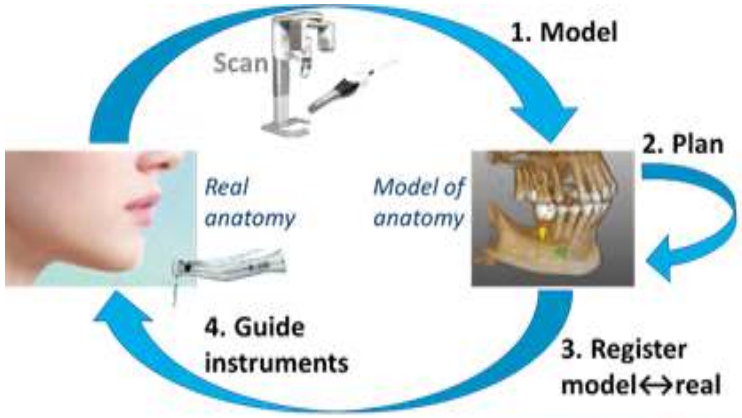


Figure 5

The guide is conceptualized and designed using a specific software program. Finally, a CEREC guide or laser-printed guide can be made in-house or outsourced to specialized firms such as Simplant-Sicat-Dentsply or dental laboratories (**Fig. 6**). After in-mouth try-in of the guide is validated, surgery can be performed.

Figure 6

Dynamic Navigation

After the DICOM (and STL) data sets are uploaded to the dedicated software, the implant or implants are planned as a function of the prosthetic project (Fig. 7-8).

Figure 7

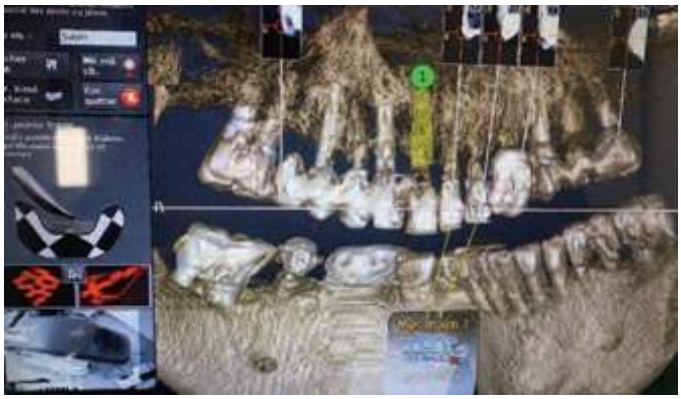


Figure 8

The surgeon first traces a number of reference points (5 or 6)on the radiographic images. A dynamic navigation tag is then placed in the patient's mouth (Fig. 9) in the form of a clip molded onto the teeth of the arch scheduled to receive the dental implants (Fig. 10). The reference marks are next_correlated with the same zones on the patient using a tracker. Once the handpiece and the drill are calibrated surgery is possible (Fig. 11).

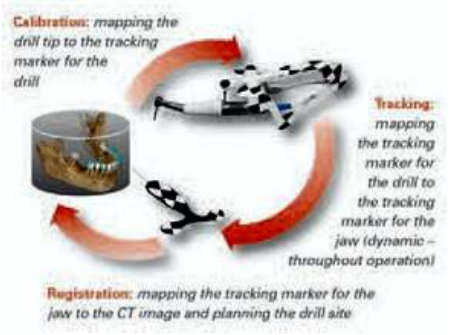


Figure 9

Figure 10

Figure 11

WORKFLOWS FOR COMPLETE EDENTULISM

Implant planning based on the prosthetic project can be considered the standard. The patient 's removable full denture or transitional removable full denture serves as the prosthetic project for both guidance techniques.

Static Guides

Both mucosa- and bone-supported guides can be used. The dual scan technique, the first to be developed, involves two indispensable steps: 3D acquisition of the patient (wearing his or her removable full denture bearing radio-opaque markers followed by a second scan of the prosthesis alone. This is followed by fusion matching of the two 3D acquisitions.

Progress in implant planning software has considerably simplified this technique, and work can be outsourced to implant guide manufacturers or to dental laboratories. Data set fusion allows the dentist to plan the implant sites and order the guide. The order can be managed either in-house, which is time-consuming, or be outsourced.

In-house conceptualization of a guide is very time-consuming. When this step is outsourced, validation of the conceptualization is submitted to the dentist within 1 to 3 days. After validation, the guide is machined or printed and delivered to the dental office several days later (as of today, there is no efficient way to do this in-house). Surgery can then be performed.

This article does not cover the details of the various surgical steps (pilot-guided, half-guided or full guided implant surgery) nor does it aim to compare the different types of static guides: with or without sleeves, machined or printed, resin or metal, etc.

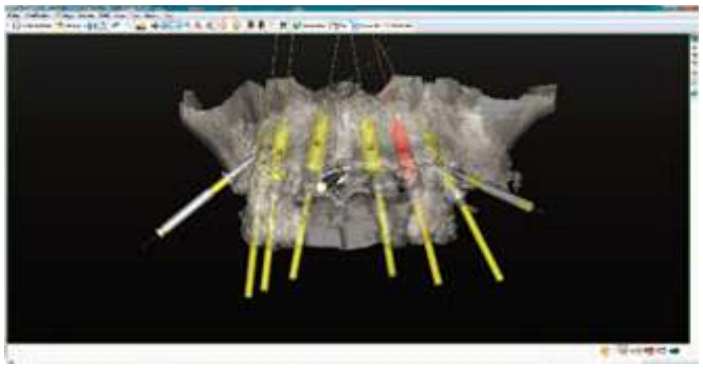


Figure 12

Dynamic Navigation

The difference in technological approaches is clear among the current systems on the market. While Navident currently has a considerable advance, this situation will unquestionably soon change as other companies develop their systems.

The initial 3D acquisition includes 3 indispensable elements: the patient with 3 bone screws in place, and the removable full denture with radio-opaque markers.

A repeat scan of the prosthesis is no longer necessary. An STL file obtained from an optical impression or supplied by the dental lab suffices. The piloting (drive) software facilitates matching of the DICOM and STL files.

The dentist plans the implants then traces the reference points on the three bone screws.

A dynamic navigation tag is placed on the patient in the form of a clip molded to the mandibular or maxillary arch scheduled to receive the implants (**Fig. 13**).The reference points are correlated with the bone screws using a tracker. The handpiece and drill are then calibrated after which surgery is possible. This workflow can be separated into two appointments if so desired by the dentist and/or the patient.

Figure 13

Figure 14-15 (not Referenced In The Text)

INDISPENSABLE EQUIPMENT

Static Guide

A specific guided surgery kit must be available for each implant system used if more than just pilot-drill guided surgery is envisaged. It is also possible to outsource all of the work: 3D, implant planning (remote control of the software), matching, dual-scan, modelling, conceptualization and manufacture of the guide. This explains why static guides have become so popular. However, a lead time of at least two weeks is generally necessary before surgery is possible.

[2]Dynamic Navigation

A completely open system such as X-Guide or Navident that is compatible with all implant systems for procedures ranging from pilot-drill guided to full-guided implant surgery is required. However, a lead time of only several minutes suffices to prepare a surgery if the DICOM files are available.

TABLE 1 – COMPARISON OF ADVANTAGES AND DISADVANTAGES

	Static guide	Dynamic navigation
Lead time before surgery	8 to 21 days	10 to 20 minutes
Influence of manufacture quality on accuracy	Significant	No influence
Visual access to the operative site	Little or none	Total
Tactile feeling of the operator	Reduced	Total
Time required to place the equipment (guide/tag)	Tooth support: 5' Mucosal support: 10' Bone support: 15'	1' to 5'
Flap dimension for bone support	Extensive	No influence
Accessibility to the molar and retro-molar zones	Very difficult	Easy
Influence of mouth opening	A problem in some cases	No influence
Alteration of irrigation	Significant	No influence
Dedicated surgical kit required	Yes	No
Specific surgical ancillaries (handpiece)	Yes	No with Navident Yes with X-guide
Video traceability of surgeries	No	Yes with Navident No with X-guide
Post-op comparison of treatment plan/actual implant position	No	Yes with Navident No with X-guide
Cost of implant planning software	0 to 12,000 euros	36,900 euros (complete kit)
Cost correlated with the number of implants	Yes	No
Cost per surgery (calculated as 50 implants/year over 5 years)	180 to 600 euros	190 euros
Learning curve for use of implant planning software	Yes	Yes
Learning curve during surgery	Minimal	Significant
Adaptation to unforeseeableevents during surgery	Impossible	Easy

WHAT TYPE OF GUIDE AND WHEN?

The use of static surgical guides or dynamic navigation does not eliminate the indispensable need for adequate training in freehand implant placement.

In France, courses offered by organizations such as the SAPO and post-graduate diplomas from various universities are an excellent means to acquire the necessary proficiency.

Static Surgical Guide

Long ignored or even denigrated by exclusive implant specialists, static guides have gained wide acceptance thanks to the democratization of 3D techniques, implant planning software, and laser printers.

The technique for static guides has probably reached its peak, and these guides are perfectly suitable for single tooth replacements and management of partial edentulism. For "All-on-X" type rehabilitations, however, the use of static guides should be reserved for experienced surgeons.

Static guides allow safe 3D positioning of implants: average angular accuracy is between 2° and 3° (with routine use of sleeve-type guides) versus 7° to 8° (in the best of cases) for freehand placement. They are an excellent means to guarantee that patients will benefit from an esthetic and functional rehabilitation. Cost/benefit analysis is clearly in favor of the latter. Considerable savings are made on prosthetic components because these guides usually allow prosthetic restoration directly on the implant(s). For monobloc zirconia implants, static guides permit ideal placement.

Dynamic Navigation

This technique is unquestionably geared towards experienced surgeons who place more than 100 implants a year. However, navigation systems are also fully justified in group practices where several younger dentists work with senior leader. Costs can be shared and the less experienced practitioners can profit from the senior surgeon's experience and thereby become proficient more rapidly. The absence of any lead time before surgery in an office exclusively specialized in implantology is another non-negligible advantage. Finally, dynamic navigation reduces the number of office visits because planning and guided surgery can be carried out on the same day. Productivity and quality go hand in hand.

CONCLUSION

Static Surgical Guide

The dentist with a general practice who only places a few implants annually need not hesitate as to the best type of guide. Static surgical guides are the answer. Of course, differences in quality exist between sleeve-type guides, which are very accurate, and laser-printed guides without stents that are actually more like templates than true guides. However, the latter can be very useful in the posterior sectors unless mouth-opening is limited. In the anterior zones, where 3D implant positioning conditions the long-term esthetic outcome, guides with sleeves remain the reference. Selection of an implant system with a simple, intuitive and economical guided surgery kit is recommended.

If several implant systems are used in the office, only one should be used for dynamic navigation, otherwise a specific kit will be needed for each system. If several surgeries are planned the same day, that means the number of kits will be multiplied. Along with cost considerations, kit storage requirements and the time required for sterilization must also be taken into account.

Dynamic Navigation

This is the pathway to augmented reality! Although the two leading systems - X-Guide and Navident - are already highly developed, future progress should eventually lead to partial robotization of implant placement.

For experienced dentists, navigation not only ensures the safety of their surgical procedures but also reassures their correspondents by guaranteeing easy and predictable prosthetic management.

As the correspondent will always use the same prosthetic components, his or her productivity will increase.

Complex procedures such as placement of tubero-pterygoid implants, tilted implants mesial to the anterior sinus wall, close to the mandibular nerve (V3), and zygomatic implants can be performed with increased safety. A learning curve covering at least 20 to 50 implants is required to master navigation on a screen. This is the system of the future!

Artificial Intelligence in Dentistry

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Kaan Orhan, DDS MSc MHM PhD, BA, Dr. Hc is Dean and a Professor of DentoMaxilloFacial Radiology at the Ankara University, Faculty of Dentistry,. He also received the title "Doctor Honoris Causa" from Semmelweis University in 2023. In 2004, He has over 400 international publications on peer-reviewed journals, and received over 7000 citations from his studies with an h index 47. He also served in the Research and Scientific com in IADMFR (2011-2023) and elected for the president position (2025-2027). He is editor of several journals and also reviewer more than 50 different medical journals. Prof. Dr. Kaan Orhan was included in the "World's Most Influential Scientist" list, which was published by Stanford University in 2021-2023, at the rate of 2% according to academic and scientific performance among 7 million researchers all over the world. In 2020, he received the "Innovative Dentist of the Year" award with his work titled Artificial Intelligence Application in Dentistry.

Book Review

Artificial Intelligence (AI) stands at the forefront of technology, propelling the healthcare industry into a new era. Dentistry stands out as a pioneering field that wholeheartedly embraces these innovations. Our comprehensive book on AI in Dentistry is the most valued resource available worldwide. It comprises 19 chapters and spans 365 pages, featuring extensive contributions from clinicians, specialists, engineers, and scientists with a combined experience of 500 years from around the globe.

The book delves into the multifaceted realm of artificial intelligence within the field of dentistry, serving as a valuable resource for dentists, specialists, and scientists seeking to advance their knowledge, training, and expertise in this evolving domain of AI. Readers will gain critical information on applications of AI that extend across different specialties of dentistry, encompassing Oral and Maxillofacial Radiology, Implant dentistry, Endodontics, Prosthodontics, Restorative dentistry, Periodontics, Oral and Maxillofacial surgery, and Orthodontics.

They will learn about AI-supported pathways for the diagnosis and treatment of various dental conditions, ranging from dental caries, periodontal bone loss, impacted teeth, periapical lesions, crown and root fractures, working length determination, and detecting root and canal morphology to TMJ disorders, detection of obstructive sleep apnea, oral mucosal lesions, and more. The book explores prediction tasks, including the estimation of retreatment needs and third molar eruption.

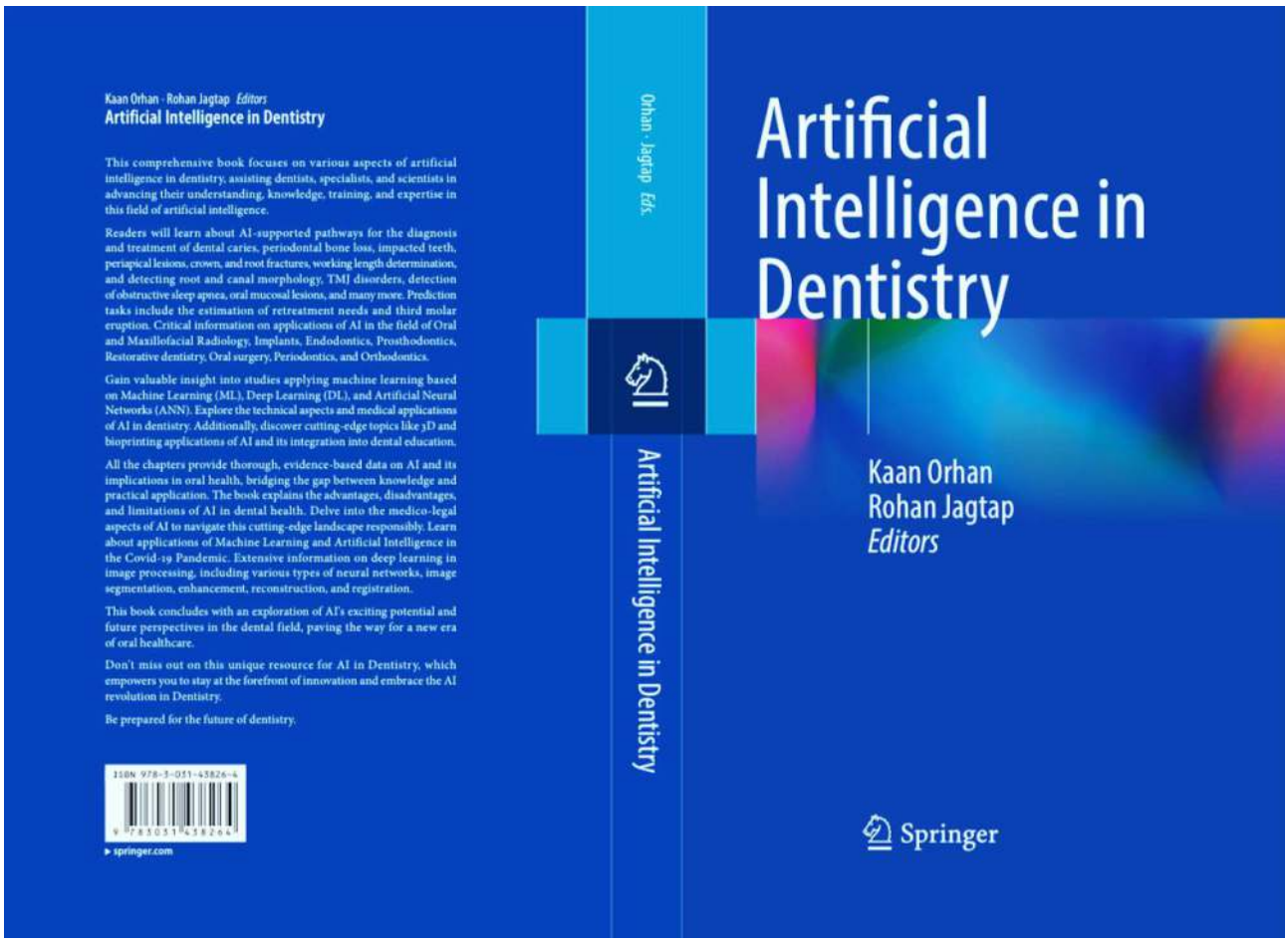
Readers will gain valuable insight into the technical intricacies of Machine Learning (ML), Deep Learning (DL), and Artificial Neural Networks (ANN) in dentistry. The book sheds light on the technical aspects and medical applications of AI in dentistry. Notably, cutting-edge topics such as 3D and bioprinting applications of AI, as well as its integration into dental education, add a futuristic dimension to the narrative.

Each chapter in the book includes thorough, evidence-based data, bridging the gap between theoretical knowledge and practical implementation.

The book critically examines the advantages, disadvantages, and limitations of AI in dental health, offering a well-rounded perspective. Furthermore, readers are guided through the medico-legal aspects of AI, ensuring responsible navigation of this groundbreaking landscape. The book also sheds light on the application of Machine Learning and Artificial Intelligence in the context of the Covid-19 Pandemic.

Extensive information is provided on deep learning in image processing, including various types of neural networks, image segmentation, enhancement, reconstruction, and registration.

As the book concludes, it offers a forward-looking exploration of AI's potential and future perspectives in the dental field, paving the way for a new era in oral healthcare. This unique resource empowers readers to stay at the forefront of innovation and embrace the AI revolution in dentistry, ensuring they are well-prepared for the future of dental practice.



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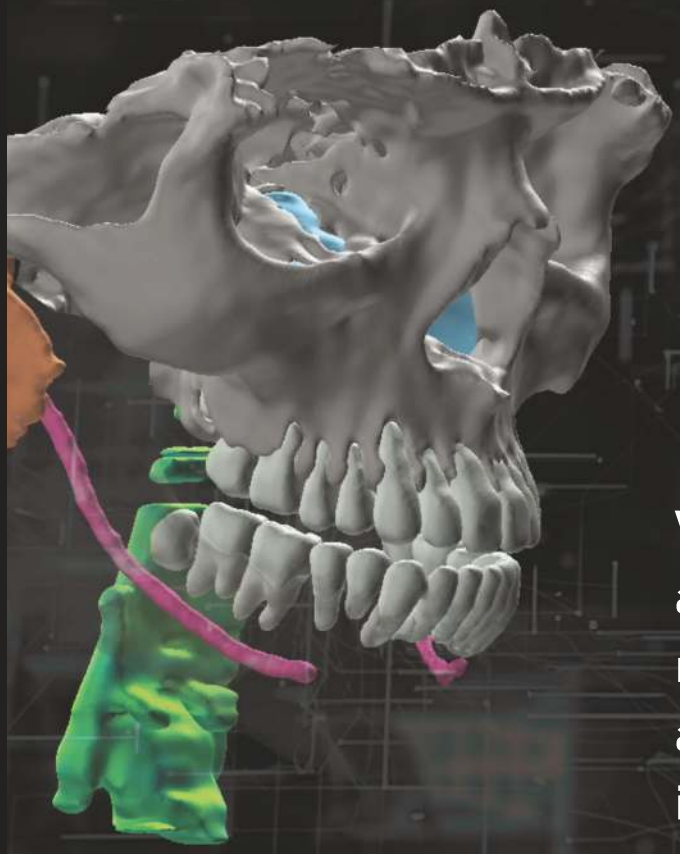

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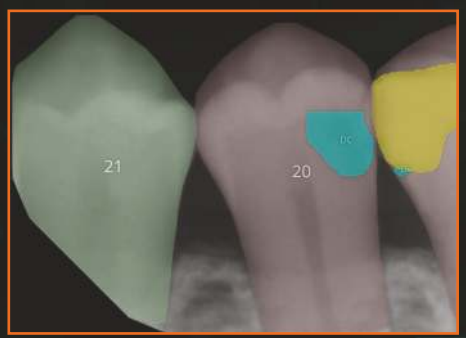

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